

(1) Number of pages _____

(2) Date of repair 27/8(3) Initials of the Referencer L. G. R.**MADRAS RECORD OFFICE.****Government of Madras.***Revenue* **DEPARTMENT.**

G.O. No.	673	Press <u>Mis.</u>
Dated	6-6-	18 85.

Not to be folded or roughly handled

6TH JUNE 1885, No. 673, REVENUE.

GOVERNMENT OF MADRAS.

REVENUE DEPARTMENT.

READ—again the following G.O., dated 1st April 1885, Mis. No. 1716, Revenue:—

Read—the following letter from Messrs. ARBUTHNOT and Co., to the Chief Secretary to Government, dated Madras, 28th March 1885:—

We have the honor to report that Dr. E. L. Cleaver, who has been, since December last, at Calicut conducting experiments as to the practicability of making quinine in India, has arrived at the conclusion that there are no insuperable difficulties to the success of such manufacture. We enclose, for the information of Government, copy of his letter dated 13th instant, and we also send the three samples to which he refers. It is to be borne in mind that Dr. Cleaver's experiments have been conducted under somewhat adverse circumstances, it being impossible for him to obtain some of the chemicals that he deems essential to the complete success of his process. He is now about to return to England to lay before the gentlemen who have found the £1,500 required for the experiments an account of his mission, and we have every reason to believe that the next step will be the formation of a company to manufacture quinine on a commercial scale. We bespeak the favorable consideration of Government for such a company, and we will be glad to know whether we could rely on obtaining Government bark on terms somewhat similar to those indicated in Dr. Cleaver's letter of 13th March, or if, in any other way, Government can see their way to encourage an enterprise which, if as successful as it promises to be, will be a boon alike to the growers of cinchona bark and to the users of febrifuge of all kinds.

ENCLOSURE.

Letter from E. L. CLEAVER, Esq., to Messrs. ARBUTHNOT and Co., Madras, dated Calicut, 13th March 1885.

I send you by this post samples as follows:—

- No. 1. Sulphate of quinine.
- No. 2. Febrifuge.
- No. 3. Crystalline febrifuge.

2. Sample of quinine is not quite as white or as silky crystals as Howard's, but is quite equal to many commercial specimens; and, considering the very limited resources I have at my disposal, and the small scale in which it is prepared, it is, I think, a proof that it could be made commercially. It is prepared from red bark, and it is as pure as could be obtained from that kind. The febrifuge, although similar in color to Government preparation, is different in composition. The whole of the alkaloid in it is easily crystallisable, while it is a most difficult matter to crystallise much from the Government febrifuge. The crystalline febrifuge is prepared by simply crystallising No. 2. I have forwarded samples to London similar to those sent you. As regards the percentage of alkaloids obtained from working the barks, I am of course not able yet to say; but the following facts may be of some service to you in your negotiation with the Government. The bark sent by the Government weighed 2,000 lb. and should yield, according to the analyses sent by them at the same time, about 100 lb. of alkaloids; these analyses, however, I consider too high, are not similar to analyses as would be given by Dr. Paul of London. From the Government papers issued on the subject of the amount of alkaloids obtained from bark sent to England for manufacture, I see that the average loss on red bark is about 1 per cent. of the total alkaloids; therefore the 2,000 lb. would yield to Government, if sent to England, 80 lb. of mixed alkaloids, obtained of course by a far better process than I am working, but also more expensive. The cost charged to Government for working quinine barks in England comes to about 1 shilling per pound on the bark used, exclusive of the freight

2 6TH JUNE 1885, No. 673, REVENUE.

and other charges. The following is drawn up by me from the Government papers of the 18th October 1884:—

				£	s.	d.
Cost of bark to Government as per return of Plantations.						
2 annas 6 pice per pound.				25	10	8
Cost of 5,104 lb. bark				30	6	8
Freight charges, &c.				27	4	8
Return freight				272	18	0
Manufacture charges						
Total				399	0	0

from which 295 lb. of mixed crystalline alkaloids were obtained, that showing the cost of crystalline febrifuge to them at the present time, of which cost the expenses alone were about 25s. 6d. per pound. The 2,900 lb. of bark cost us as would, therefore, if sent to England, have produced to the Government about 50 lb. of alkaloids, but I think less, if the Government alkaloids, at a total cost of about £120, of which £120 would be expenses. If the Government therefore would make any arrangement by which they let us have a definite supply of certain barks we could undertake to supply a definite proportion of alkaloids, and charge them much less than the price they at present pay.

3. The percentage of alkaloids obtained by the Government is about 24 per cent. This and I expect the proportion of alkaloids in the bark used is 24 per cent. on the average. This febrifuge does not contain more than 2 per cent. of quinine, and I also contain about 16 per cent. of various impurities. Were I to distil more than 200, and I think, might undertake to give about 34 to 4 per cent. of mixed alkaloids and charge them rather as much a pound on the bark worked, as on such a pound on the alkaloids itself. In the above calculations I have left out the question of an equivalent price, which would be far less over to the Government when produced, as done by the English manufacturers. In the above I have calculated on employing a different process from that used by English, but from my experience of the climate I have no reason why the same process as used of home could not be worked here if required. At present I am working on all the bark I have obtained by the process originally intended to be used, but still will be a guide.

Order—dated 1st April 1885, No. 1716, Revenue

The letter from Messrs. Arbuthnot and Co., with the enclosures and the samples of quinine, will be forwarded to the Director of the Government Cinchona Plantations for full report. The Director should cause the samples of quinine to be carefully examined by Mr. Hooper, and submit his report upon them.

(True Extract)

H. E. STOKES
Secretary to Government

Enclosure—also the following extract from letter from M. A. LAWSON, Esq., Director of Government Cinchona Plantations, Parks, and Gardens, Ootacamund, 1st May 1885, No. 7:—

5. With respect to G.O. No. 1716, dated 1st April 1885, I have the honor to inform you that the three samples of quinine alkaloids, which were sent by Dr. Cleaver to Messrs. Arbuthnot and Co., have been carefully examined by me and I forward, herewith, a copy of the report on their analysis.

6. From this report it will be seen that sample No. 1, which was forwarded by Dr. Cleaver as being only pure quinine, contains less than 51.20 parts of sulphate of cinchonidine out of 100 parts. The large amount of sulphate value of the present day state of the market, greatly reduces the commercial value of the preparation, though, as Mr. Hooper very correctly points out, its medical value would not be interfered with.

7. Analyses of Dr. Cleaver's sample No. 2 are compared by Mr. Hooper with analyses which he has recently made of samples of febrifuge obtained from the Government laboratory in Sikkim; and from this comparison it will be seen that while Dr. Cleaver's febrifuge contains no quinine, that from the Sikkim laboratory contained 6.97 per cent. On the other hand, Dr. Cleaver's febrifuge contains 35.62 per cent. of cinchonidine, while that from the Sikkim laboratory contained only 15.78 per cent.

8. Therapeutically considered the two febrifuges are probably of equal value.

9. Of Dr. Cleaver's third sample Mr. Hooper says that, "although labelled crystalline febrifuge, it is really nothing more than an unbleached preparation of quinine and cinchonidine sulphates, almost identical in composition with sample No. 1."

10. Dr. Cleaver, in his letter to Messrs. Arbuthnot and Co., and also in a letter to myself, states that he has labored under considerable difficulties in manufacturing these febrifuges, owing to his not having received certain necessary chemicals and apparatus. It is therefore to be presumed that, under more favorable circumstances, his account of the composition of the samples which he has sent would have been more exact; and I have no doubt that, if a factory were to be established under his direction, a febrifuge of a high character might be turned out at a reasonable cost.

11. In an interview which I had with you the other day, I told you that Government had in stock a large quantity of "red bark," which, though low in the amount of sulphate of quinine, contained a large amount of "totals," and I pointed out that the prices offered for these barks were wholly unremunerative; and I urged that Government should not sell these barks, but undertake the manufacture of a febrifuge from them.

12. This manufacture might be carried on by Government themselves, or it might be entrusted (under agreement) to some such firm as that which it is proposed to establish at Calicut.

13. If Mr. Hooper goes to Madras and superintends the manufacture of 1,000 lb. of bark into liquid extract, he will be in a position to inform Government very exactly as to the cost of its production, and Government would afterwards be able to negotiate equitably as to the terms they would concede to private enterprise.

ENCLOSURE.

EXTRACT from letter from D. HOOPER, Esq., Government Quinologist, to the Director of Government Cinchona Plantations, Parks, and Gardens, Ootacamund, dated Ootacamund, 1st May 1885:—

4. The Director of the Cinchona Plantations has handed me three samples of cinchona alkaloids prepared by Dr. E. L. Cleaver at Calicut. In accordance with instructions contained in G.O. No. 1716, I have submitted them to a thorough examination, and have the honor to report upon them as follows.

5. No. 1 sample was labelled "sulphate of quinine" and was of good appearance, white and crystalline.

It had the following composition:—

Sulphate of quinine	...	...	...	...	64.17
Sulphate of cinchonidine	...	...	...	...	37.90

102.07

The quantity of cinchonidine present is comparatively large, but it should be pointed out that all commercial samples of sulphate of quinine invariably contain some amount of this other alkaloid, which has similar medical properties.

6. Sample No. 2 was "febrifuge," the dried and powdered alkaloids of red cinchona bark. The color compares favorably with that of other makers, and it is almost entirely

soluble in dilute acids. The analysis is quoted below, and, for comparison, the analysis of some Sikkim febrifuge, received last month from Calcutta, is also given—

	Calcutta	Sikkim
Quinine	None	6.97
Cinchonidine	35.62	15.78
Quinidine	Trace	1.24
Cinchonine	41.29	69.61
Amorphous alkaloids	10.82	8.12
Moisture, ash and coloring matter	9.27	7.26
	100.00	100.00

This febrifuge, Mr. Cleaver states, is made from branch bark, which is usually poor. The process, however, for its manufacture is cheap, and it contains a fair quantity of crystallisable alkaloids equally valuable in fever with quinine itself.

7. Sample No. 3, although labelled "crystalline febrifuge," is an unbleached preparation of quinine and cinchonidine sulphates, almost identical in composition with sample "No. 1."

Read—also the following letter from M. A. LAWSON, Esq., Director of Government Cinchona Plantations, Parks, and Gardens, Nilgiris, to the Secretary to Government, Revenue Department, dated Ootacamund, 22nd May 1885, No. 13.

With reference to official memorandum, No. 278, dated the 18th May 1885, I have the honor to forward a copy of the analysis of the twenty bales, or 2,000 lb., of bark supplied to Dr. Cleaver under G.O., No. 5382, dated the 2nd December 1884.

ENCLOSURE.

Report on the analysis of cinchona bark supplied to Dr. Cleaver.

	Quinine	Cinchonidine	Quinidine	Cinchonine	Amorphous alkaloids	Total	Crystallised sulphate of quinine
1. Dodaletta Renewed Crown (scrapped) 500 lb.	2.10	1.18	1.0	4.5	4.1	4.34	3.09
2. Naluvatem Branch Red 500 lb.	0.8	1.65	..	1.19	6.5	4.45	1.79
3. Pykare Natural Red 500 lb.	1.13	2.27	..	1.07	2.0	4.10	1.54
4. Do. Renewed Red 500 lb.	1.42	1.08	..	2.57	2.2	6.81	2.51

N.B.—Results expressed in percentage on the air-dried bark.

(Signed) D. HOOPER,
Government Quinologist.

ORDER—dated 6th June 1885, No. 673, Revenue.

Miscellaneous.

The report of the Government Quinologist on the samples furnished by Dr. Cleaver will be communicated to Messrs. Arbuthnot and Co., who will be requested to forward the whole of the products to the Government Medical Stores, Madras. It is observed that Dr. Cleaver's letter contains no information as to the total quantity of alkaloids produced from the quantity of bark supplied to him. Information on this point is, of course, essential to any final judgment on his results.

2. The Government note that Dr. Cleaver's calculations in regard to cost are open to criticism in several respects. The percentage assumed as the average loss in the process of manufacture in England is incorrect, as appears from the official papers quoted by Dr. Cleaver, and this percentage has been applied by him to the total quantity of raw bark instead of to the quantity of alkaloids contained therein. Further, the calculation proceeds on the assumption that the cost of extracting a febrifuge in the form of mixed alkaloids is the same as that of extracting from an

equal quantity of bark sulphate of quinine, sulphate of cinchonidine, and cinchonidine alkaloid in their separate states. The opinion expressed by Dr. Cleaver that the Darjeeling febrifuge contains about 16 per cent. of various impurities is also believed to be incorrect. The Government understand, on the contrary, from their quinologist that it is almost entirely free from impurity. The cost price of this febrifuge, according to the reports of the Bengal Government Quinologist, was in 1882-83 Rs. 8-8-10 per lb., and in 1883-84 Rs. 10-4-8 per lb. Dr. Cleaver, on the other hand, would apparently undertake to convert 2,000 lb. of bark into 80 lb. of febrifuge (mixed alkaloids) for something less than £120. At this rate his febrifuge would cost something under Rs. 18 per lb. for manufacturing alone, to say nothing of the value of bark consumed in the process.

3. With reference to the request contained in the conclusion of their letter, Messrs. Arbuthnot and Co. will be furnished with a copy of G.O., dated 20th October 1884, No. 1154, Revenue, containing the despatch of the Secretary of State on the subject of concessions to the proprietors of local factories, and they will be informed that the Government are not at present prepared to make any such arrangement as is suggested in Dr. Cleaver's letter. The object the Government have in view is the production of an efficient febrifuge at such a cost as will be within the reach of all classes, and they have recently issued orders for the conduct of experiments on a large scale in the manufacture of a liquid solution of cinchona under the superintendence of the Government Quinologist. The question of employing this or that agency on behalf of Government must depend upon many considerations, and of course, amongst others, on its ability to turn out what is wanted as or more economically than can be done by Government agency.

(True Extract.)

(Signed) W. WILSON,
Ag. Secretary to Government.

To Messrs. Arbuthnot and Co., with copy of G.O. No. 1154 of 1884.
" the Director, Government Cinchona Plantations, Parks, and Gardens.
" the Surgeon-General with the Government of Madras.
" the Board of Revenue.
" the Military Department.

Exd. E. Fernandez.

80 Copies.

56
Cobl. of 1885 Madras
REVENUE.

Issued

Encl.

G.O., 6th June 1885, No. 673.

JUNE.

Cinchona Alkaloids.

Orders passed on papers relating to samples of
prepared by Dr. Cleaver.

No. 7

Director's Office.
Colacumund 1st May 1885.

From

The Director
Govt. Cinchona Plantation
C. Nilgiris

To

Mr. Wilson Esq.
Secretary to Government
Revenue Department
Colacumund

Sir,

In continuation of my letter
No. 4 dated 15 April 1885, I have
the honor to inform you that Mr.
Hooper returned from Madras,
last Saturday; while there, he made
a careful inspection of the appliances
at the disposal of the medical
Storekeepers Department, and he
finds that there would be no difficulty
in carrying out the manufacture
of the liquid extract of the Cinchona
alkaloids to the extent of 1000 lbs of
bark - the amount mentioned in G.O.
25th March 1885 at 366 Revenue.

2.

The medical Storekeeper,
however, gave Mr. Hooper to understand
that

of 102.07 parts. This large amount of Cinchonidine would in the present dogmatic state of the matter greatly impair the commercial value of this preparation, though, as Mr Hooper very accurately points out its medicinal excellence would not be interfered with.

7 Analysis of Dr Cleaver's Sample No 2 are compared by Mr Hooper with analyses, which he has recently made, of samples of febrifuge obtained from the Government Laboratory in Sikkim; and from this comparison it will be seen that while Dr Cleaver's febrifuge contains no Quinine, that from the Sikkim laboratory contained 6.97 per cent. On the other hand Dr Cleaver's febrifuge contains 35.62 per cent of Cinchonidine while that from the Sikkim laboratory contained only 15.78 per cent.

8. Therefore, considered the two febrifuges are probably of equal value.

9. Of Dr Cleaver's third sample Mr Hooper says that "although labelled Crystalline Ipebrifuge, it is really nothing more than an unblended preparation of Quinine and Cinchonidine Sulphates, almost identical in composition with Sample No 1."

10. Dr Cleaver in his letter to Messrs Arbuthnot & Co and also in a letter to myself states that he has laboured under considerable difficulties in manufacturing these febrifuges, owing to his not having received certain necessary chemicals and apparatus. It is therefore to be presumed that under more favorable circumstances his account of the composition of the samples, which, he has sent would have been more exact; and I have no doubt that if a factory ^{were} to be established under his direction, a febrifuge of a high character might be turned out at a reasonable cost.

11. In an interview which I had with

with you the other day, I told you
that Government had in stock a
large quantity of Red bark, which,
though low in the amount of Sulphate
of Quinine, contained a large amount
of 'Totals' and I pointed out
that the prices offered for these barks
were wholly unremunerative and
I urged that Government should not
sell these barks but undertake the
manufacture of a febrifuge from
them.

A. This manufacture might be
carried on by Government themselves
or it might be entrusted (under
agreement) to some such firm as
that which it is proposed to establish
at Calcutta.

B. If Mr Hooper goes to Madras
and superintends the manufacture of
1000 lbs of bark into liquid extract
he will be in a position to inform
Government very exactly as to the
cost of its production and Government
would afterwards be able to negotiate
equitably

equitably, as to the terms they would
convert to private enterprise.

I have the honor to be

Sir

Your most ob^l. servant

M. A. Lawson.

Director

So. of the Legislature,
Paras 1 to 4 Series 6

Am: 6th Inspr.
General for ^{early} ~~the~~
of Amish.

2. The ports are ~~to be~~ glad to
have that ~~in~~ ~~15~~ ~~15~~ ~~case~~
the existing appliances at the

~~Adli~~
These paras of Mr. Loomis
about this first 3 paras
of the memo from Mr.
Hooper will be referred to
Mr. Loomis. The ~~last~~
Secy of State N:

9
K. A.
1-57-85

Medical Stores in Madras
is not difficult
can be adapted to the manufac-
ture of the liquid solution of
sodium alkaloide and that
the estimated cost of production
is only Rs. 1-12 a pound, a price
that compares most favourably
with the present cost (Rs. 16 1/2 p. pound) of

From
The Levitts
Gentlemen
Nigeria

To His Excellency the Governor
Revenue Department
Lahore

March } May 185

(1/1)

Be: 100

Silphium

Summit further apart
with reference to the
Bill dated 23 March
1881, on the issue of
Manufacture of
Sulphur.

5. The Director's attention is drawn to paragraph 5. of G.O. 25th March 1885 no 386 in regard to which an early report is requested.

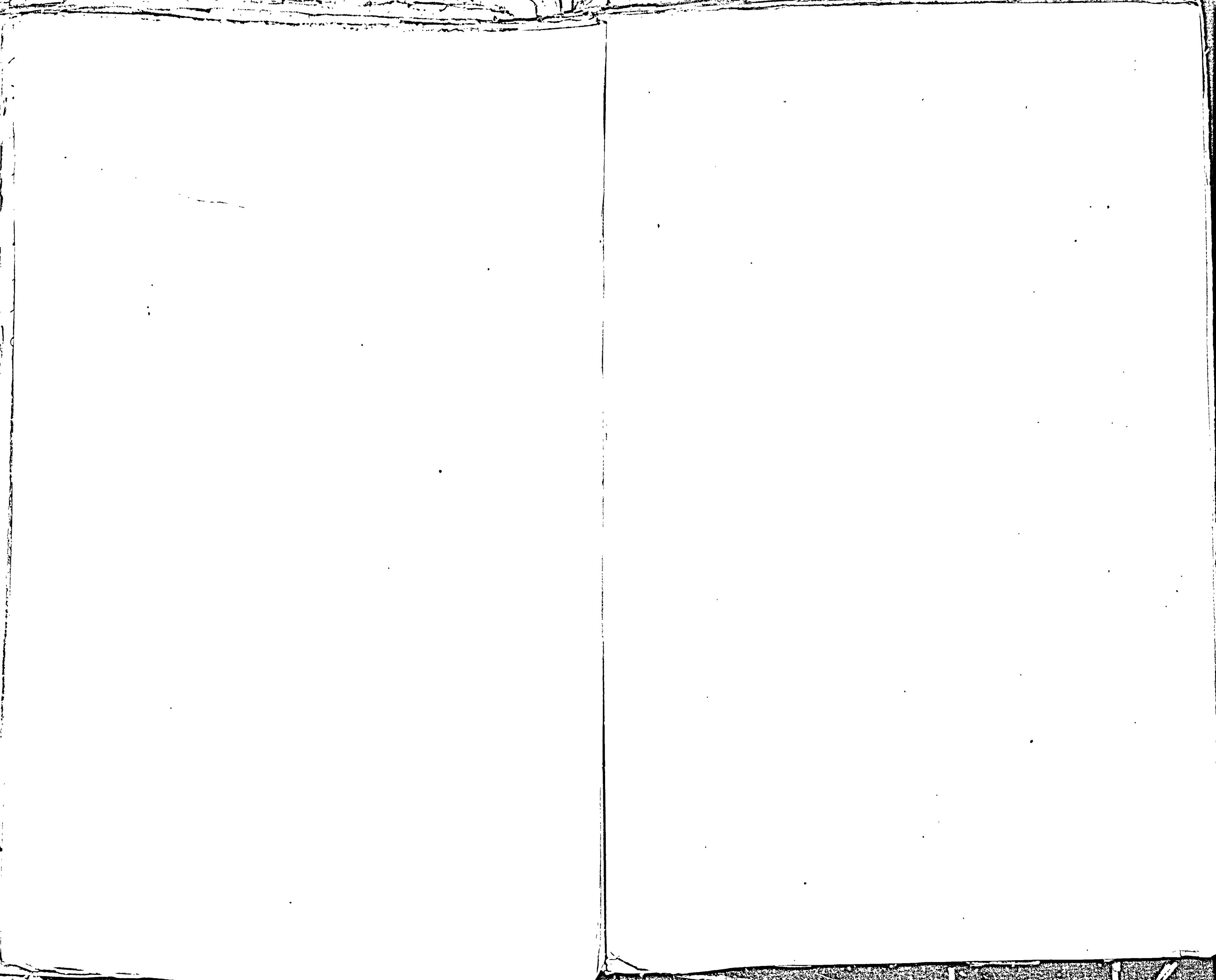
the febrile supplies by the Royal
force and ^{largely} used in the hospitals
+ dispensaries of the Prov.

3. In verification of the estimate of cost
incurred at his House will be
~~arranged~~ at our arrange for the
manufacture in Madras of 1000 lb
of the fluid extract at 40 pps 100 lb
oz. ~~his House~~ and will himself
personally superintend the operations
He should however ~~also~~ arrange
in conn. with the medical store-
keeper for the association with him
self and instruction of a competent
person for the ^{immediate} superintendence
of all future operations in Madras
unavoidable

4. The matter ~~is not~~ ^{is} in the last
 three paragraphs of Mr. Loomis'
 letter do not immediately concern
 the ~~question~~ ^{question} and will be separated
 Scott with 1/1.

W. W.
1-5-85

✓ Mrs. L. is given 1000 cc.



REVENUE (1885) DEPARTMENT.

No.

From the Director of Salt
Cm. Plant; Lathp.

Dated 16 / 5 / 85
Recd. 16 / 5 / 85

No.

Dist

SUBJECT.

Submitting herewith
report on the local
in a comparison of the
Lathp.

129

From

19 Director's Office

(Wacamaund 6th May 1885)

The Director of
Cool. Cinnamon Plant

Parks and Gardens
Nizgins

The Secretary to Government—
Revenue Department—
Wacamaund

Sir,

With reference to Memorandum
No 3121 dated the 14th instant I have the
honour to forward for reference the returns
to G. O. No 1416 dated the 1st April 1885.

I have the honour to be

Yours ⁸³¹ obedient servant

M. A. Lawrence
Director

Rev. 10. 6. 7. 3. 4. 6. 6. 8. 5.

Revenue Report

(1885-86)

No: 3266

The Director of

Public Instruction

Public Instruction

Public Instruction

The Director of

Public Instruction

(Public Instruction)

Dated 6th May 1885

Revenue Report

189

Enclosure

Subject

According to the enclosure
to G. O. No 1716 dated 1st April
1885, as called for.

Revenue 3 Zoologist's Laboratory

From

St.

Colacamund 12 May 1885.

D. Hooper Esq.

Govt. Zoologist

Colacamund

Report on the an

(1) Dorabatta. Renewed Cro

(2) Nadwatum. Renewed Cro

(3) Pykara. Natural

(4) " Renewed

N. B. Results

4.56 x 5 = 22

4.48 x 5 = 22

5.10 x 5 = 25

6.21 x 5 = 31

10

3

The cost of manufacture was discussed
with the storekeeper, and he concluded, that the
Cinchona bark taken at the rate of the recent
sales

Sales at Madras, and allowing the usual percentage
 for labour, Concentrated tincture would be sold at
 about Rs 1000.00 per 1000. I append a
 note showing the details of the calculation.

4. The Director of the Cutch and Amboyna
 has handed me two samples of Cutch, which are
 prepared by Mr. E. L. Cleaver, at Calcutta, in
 accordance with instructions contained in your
 letter of 17th. I have submitted them to a
 preliminary examination, and have the honor to state
 them as follows:-

5. Sample No 1 was labelled "Sulphate
 of Quinine" and was of good appearance, white and
 crystalline.

It had the following composition:-

Sulphate of Quinine . . . 64.17
 Sulphate of Cinchonine . . . 37.92
 102.09

The quantity of Cinchonine present is comparatively
 large, but it should be banished out, before commercial

samples of Sulphate of Quinine are sold, as it is
 some amount of the substance which has
 similar medical properties.

6. Sample No 2 was "Febrifuge", the thick
 and powdered alkaloids of Red Cinchona bark. The
 color is compares favourably with that of other makers,
 and it is almost entirely soluble in dilute acids.
 The analysis is quoted below, and for comparison the
 analysis of some Sikkim Febrifuge, received last month
 from Calcutta, is also given.

	Calcut	Sikkim
Quinine	none	6.97
Cinchonidine	35.62	15.78
Quinidine	trace	1.24
Cinchonine	44.29	60.63
Amorphous alkalis	10.82	8.12
Moisture, ash and Coloursing matter	9.27	7.26
	100.00	100.00

The Febrifuge, Mr Cleaver states, is made from Branch
 bark, which is usually poor, the process however for its
 manufacture is cheap, and it contains a fair quantity
 of crystallisable alkaloids equally valuable in fever
 and quinine itself.

7. Sample No 3 although labelled "Crystalline
 Febrifuge" is an unbleached preparation of Quinine
 and

and cerise red sulphur, almost identical
in composition with sample No. 1.

I have the honor
(Sd) W. H. Hooper
York Liverpool

(True copy)

M. A. Lawson

Director

Per M. A. Lawson

Per M. A. Lawson

13
1885

29 Director's office
Hacoma, May 1885

The Director of
York Harbor
Parks and Gardens
Hacoma

The Secretary to Government
Parks Department
Hacoma

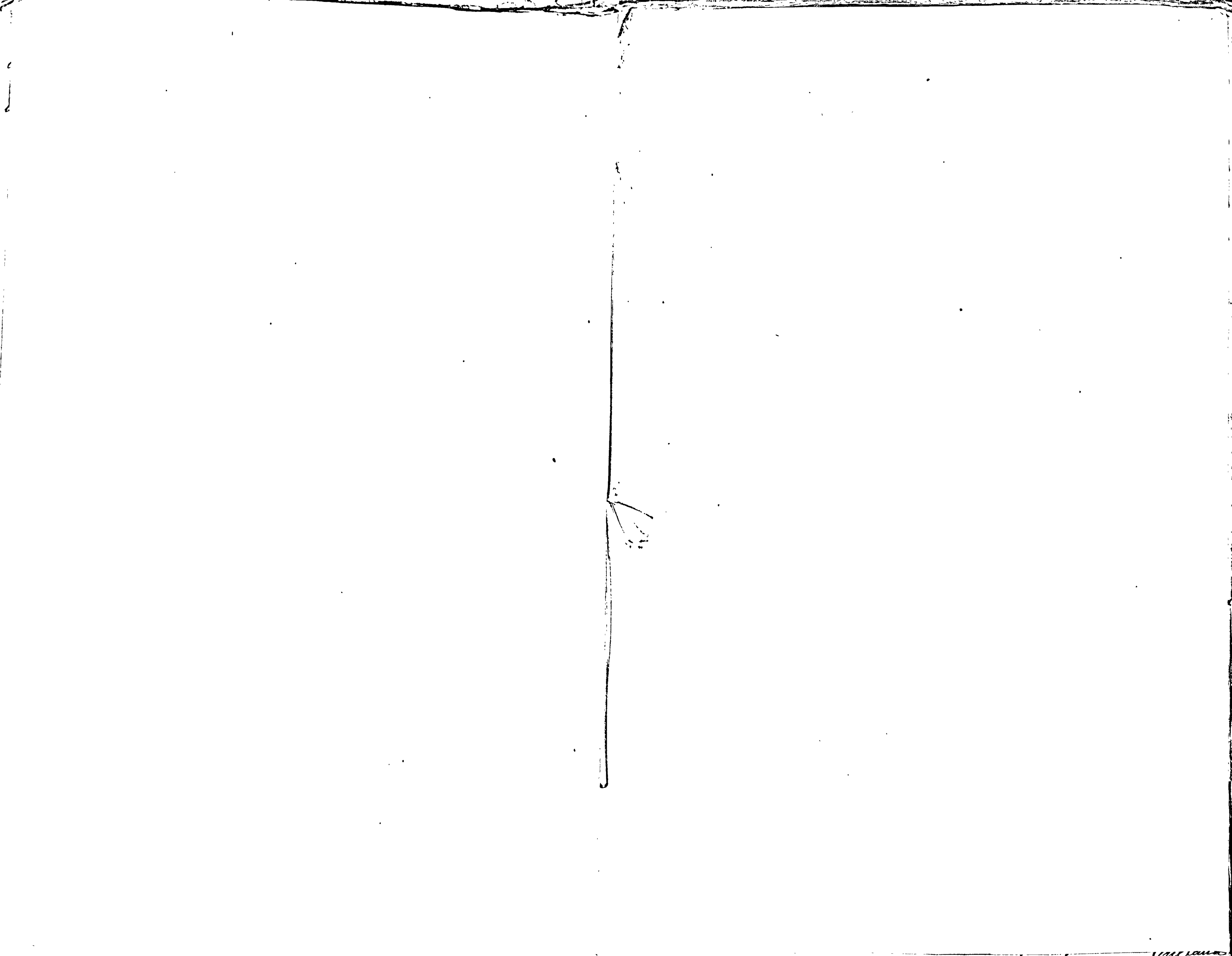
Sir,

With reference to official Memo
No. 208 dated the 18th May 1885, I have the honor
to forward a copy of analysis of the 20 Bales
of 2000 lbs of bark supplied to Dr. Cleaver,
under G. O. No. 5389 dated the 2nd December 1884.

I have the honor to be
Sir
Your obedient servant
M. A. Lawson
Director

746

Original



Recd from the
H. H. H. H.
H. H.

Yours

H. H. H. H.
S. C. C. C. C.
(C. C. C. C.)

To
H. H. H. H.
H. H. H. H.
(C. C. C. C.)

Subj. 20 } May 1885
Rev. 1 }

C. C. C.

H. H. H. H.
H. H. H. H.
H. H. H. H.

Forwarding Report
on the analyses of
Cinchona bark supplied
to Doctor C. C. C.

29-5-85
23-6-85
24-6-85
25-6-85

G. O. No. 17163 1-4-85
C. No. 3121 & 3690
REVENUE DEPARTMENT.

From The Director of Cinchona Plantations

Dated 12th May 1885.

FOR ORDERS.

In November last Messrs
A. Britton & Co. informed
the Govt. that they proposed
to experiment in the manufac-
-ture of quinine on the west
Coast and asked if Govt.
would give them bark for
the purpose on condition
that the products manufactured
were delivered to Govt. They
were told that bark up to
1000 lbs would be supplied
to them on the terms stated.
They asked for 2,000 lbs, that
being the quantity of bark
stated to be required by
Dr. C. C. C., who had been
sent out by a syndicate in
England

England to conduct the experiments.
This quantity was ordered to be
supplied to them in December
last. A further request for 9
tons of bark (20160 lb), on
the ground that all Dr. Cleaver's
arrangements had been
made for working on a large
scale, was refused. It was noted
at the time that the Secretary
of State had disapproved of
concessions of bark, inasmuch
as persons interested could
readily purchase bark at
local sales.

Messrs. A. B. & Co. have
now submitted some samples
labelled

(1) Sulphate of quinine

(2) Febrifuge

(3) Crystalline febrifuge

prepared by Dr. Cleaver and
enquired whether Govt. are
prepared to supply them with
bark on condition that they
undertake to return "a definite
proportion of alkaloids" for a
definite quantity of bark or
whether Government will

in any other way encourage
their enterprise

Dr. Cleaver's samples have
been examined by Mr. Hooper
and are reported on by him
through Mr. Lawson. He finds
that Dr. Cleaver's "quinine"
contains 64.17 parts out of
102.07 of sulphate of quinine
and 37.90 parts of sulphate
of cinchonidine. The presence
of so large a percentage of the
latter is considered by Mr.
Lawson as likely to impair
the commercial though not
the therapeutic value of the
preparation.

Dr. Cleaver's febrifuge
was compared by Mr. Hooper
with the Bengal Govt. preparation
of the same name and it was
found that while the latter
contained 6.97% of quinine,
Dr. Cleaver's contained none.
On the other hand, Dr. Cleaver's
preparation contained 35.62%

of Cinchonidine Sulphate as
against only 15.78 of in the Bengal
febrifuge. Mr. Lawson thinks
that the preparations are
probably of equal medical value.

Dr. Cleaver's Crystalline
febrifuge is found by Mr.
Hooper to be "nothing more than
an unbleached preparation
of quinine and Cinchonidine
sulphates, almost identical in
composition with" his quinine
sulphate No 1.

Messrs. Arbuthnot and Co.
say in their letter: "It is to be
borne in mind that Dr. Cleaver's
experiments have been conducted
under somewhat adverse
circumstances, it being im-
possible for him to obtain
some of the chemicals that
he deems essential to the
success of his process". Dr.
Cleaver himself speaks of the
process used in England
as being "far better" than
that

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that which he employed and
says: "I see no reason why the
same process as used at home
could not be worked here if
required". Mr. Lawson notes this
and says: "It is therefore to be
presumed that under more
favorable circumstances his
account of the composition of
the samples which he has sent
would have been more exact,
and I have no doubt that if
a factory were to be established
under his directions, a febrifuge
of a high class might be turned
out at a reasonable cost."

In his letter to Messrs. Arbuth-
not & Co. Dr. Cleaver goes into
the question of cost but admits
that the data at his command
are not complete enough to
warrant a definite conclusion.
He believes that he could supply
govt. with alkaloids in exchange
for bark at a lower rate
than was formerly paid under
the

the home manufacturing system
to English manufacturers. But
the rough calculations on which
he bases this opinion are at
fault in several respects. He
takes the alkaloidal value by
analysis of the 2,000 lb of bark
supplied to him to be about
100 lb of mixed alkaloids. This
is not far wrong, the analytical
statement sent to him at the
time, copy of which will be found
in C. N. 3690, showing it
to have been 104.6 lb. But he
then proceeds to remark that
the average loss in the process
of manufacture in England
is "about 1% of the total alkaloids",
and deduces from this that
2,000 lb. of bark would yield
80 lb of alkaloids instead
of 100 lb. Obviously he
has calculated the percentage
deduction on the bark instead
of on the "total alkaloids". $100 - 1$
 $= 99$ not 80. and 20 is 1% on
2000

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2,000 not on 100. As a matter of
fact, the official papers relied
on by Dr Cleaver and printed
in G. O. J. 3: May 1882 no 473 show
that the average loss in manufacture
was not 1% per cent but about
18% of the total alkaloids; so
that 2,000 lb of bark would have
yielded 89 lb and not 80 lb or,
taking the correct analytical
figure 104.60 instead of 100, the
net product would have
been 93.60 lb instead of Dr
Cleaver's hypothetical 80 lbs.

Then again Dr Cleaver is
wrong in concluding from
the same paper that under
the home manufacturing
system Govt got only 295 lb
of mixed alkaloids for £590.
What the Govt obtained for that
sum was

81.5 lb of gramine sulphate
143 lb of Cinchonidine do
71 lb of Cinchonidine alkaloids
— a very different thing from
295 lb of mixed alkaloids, even
that

that the extraction of mixed alkaloids is obviously less expensive than their extraction plus their separation. The same papers show that it cost 24 shillings to make a lb of quinine and 18 s and 8 s respectively to make a lb of Cinchonidine sulphate and a lb Cinchonidine alkaloid. The cost of manufacturing mixed alkaloids is possibly not more than that of manufacturing the cheapest of the alkaloids in its separate state.

D^r Cleaver is wrong therefore in concluding from these faulty premises that the cost to Govt of Crystalline febrifuge (mixed alkaloid) ^{40 shillings per} would in England be ~~40 shillings~~ found; but even if he were right, it is impossible to see how he deduces his further conclusion that the 80 lb yielded by 2000 lb of bark would in England have cost ^{about}

about £200/-

D^r Cleaver thinks that the Bengal febrifuge "contains about 16 % of various impurities. Mr. Hooper, however, is of opinion that it is very nearly absolutely pure. It is apparently true that the Bengal process only extracts about 50 % of the alkaloids contained in the bark but if D^r Cleaver's is calculated to extract ^a larger percentage, his cost of production ought to be lower than that of Bengal. Now the cost of the Bengal febrifuge, according to the reports of the Quinologist D^r Ring, was in 1882-83. Rs 8-8-14 per pound and ⁱⁿ 1883-84 Rs 10-4-8 per lb. There is nothing to show what the cost of D^r Cleaver's febrifuge would be. All he counts on being able to do is to convert 2000 lbs of bark into 80 lbs of

of alkaloids for something less than £120 or Rs 1440, about. At this rate his febrifuge would cost something, under Rs 18 a pound for manufacturing alone, to say nothing of the value of bark consumed in the process.

Looking at the matter from another point of view, Dr. Cleaver thinks he "might undertake to give $3\frac{1}{2}$ to 4 per cent of mixed alkaloids and charge either so much a pound on the bark worked or on the alkaloid delivered." This is a very low percentage indeed. Even the low percentage bark supplied to Dr. Cleaver for his experiments had an analytical value in alkaloids of over 5 per cent (104.60 on 2000) and would have yielded a net product in England (allowing a loss of 11 per cent) of 1.68 per cent. Higher qualities of bark would of course yield

Dr. Cleaver's estimate
G.O. 12-5-55-1, 5-55-1
where $6\frac{1}{4}$ % is assumed
as an average for
red bark.

I hardly think that we can say more than this that they have offered to relate to Govt. for bark supplied by them a certain proportion of alkaloids at a price less than they can make by themselves.

This is a way of saying that they are willing to work for Govt. only - it simply means that they are willing to work up for Govt. any quantity of bark that may be wanted on their own terms with planters and others. They asked it is true, for certain concessions and among others for a

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yield very much more, and Dr. Cleaver's suggestion of $3\frac{1}{2}$ or 4 per cent. as an average is thus out of the question. It will have been noticed that Dr. Cleaver proceeds throughout on the supposition that he is to be employed in manufacturing "cinchona febrifuge" (mixed alkaloids) for Government.

Neither he, however, nor Messrs. Arbuthnot & Co. have any grounds for making such an assumption, nor such an arrangement been proposed hitherto or contemplated by Govt. The proposals of Col. Henderson and of Messrs. Stanbrough, Hyde and others were to establish a factory on ordinary commercial principles, and to make their own terms with planters and others. They asked it is true, for certain concessions and among others for a

guarantee

Government
guaranteed supply of bark at
a fixed price. These concessions

This could never
be allowed by

however have been distinctly
negatived by the Secretary
of State in despatch printed
in G.O. 20 Oct 1884 no 1154, with
the remark that under the
present system of local sales
"persons interested" can procure
such a stock of bark as they
may require. In the despatch
recently sent to the Secretary
of State it was proposed to
sell all the Crown bark at the
local sales and to utilize the
red in making Cinchona
Liquida. If Dr. Cleaver and
his employers are going to
make quinine, Crown bark
is what they want and they
can get it at the local sales.
It is no use their making
"febrifuge", if they are to
proceed on their own
account

Yes - but this will not hinder
us from entering into arrangements
with them for the manufacture
of a purified solution
if we should want it and want
a profitable trade so.

But is there look out -
let them do as they
please in the matter

This is not the position
as I understand it -
- vide supra

account, as it won't pay them
trips being a work of "crown" bark.
As soon, therefore, as they clearly
understand that Govt has no
intention of employing them
as a quasi-Govt factory, they
will either abandon their
scheme or else devote themselves
to quinine, the only paying
alkaloid under present
circumstances.

Yes - vide supra

Although, however, Govt
may not wish to make use
of Dr. Cleaver in manufacturing
"febrifuge", it is perhaps worth
considering whether his factory
might eventually be used for
the manufacture of Cinchona
Liquida. If the present ex-
periment is a success, it
may become advisable to
manufacture on a scale ^{such} as
that the medical stores in
Madras may be able to attain.
It will be necessary, however,
before employing a private
factory

factory, to make sure that the cost does not greatly exceed that incurred at the medical stores, and it may be doubted whether a contract of this sort would be profitable enough to tempt the private manufacturer.

Messrs. Arbuthnot & Co. have not yet sent the bulk of the alkaloids produced by Dr. Cleaver and belonging to Govt. by agreement. They should be directed to send them to the medical stores Madras. It is not known what quantity of alkaloids Dr. Cleaver turned out. All he sends is samples and he does not say what quantity each sample represents. Information on this point is essential to any final judgment on his results.

As

Yes W
23-5-85

Yes W

at present - he may
arrange to have
the supra to
29-5-85

Would add that the
object the Govt. have in
view being ~~the~~ is to
bring out efficient factories
within the reach of all
classes and that the question
of employing the factory which
it is intended to establish
to work up the Govt. bark
must depend entirely
on the ability to turn
out what is wanted as

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As to the reply to be made to
Messrs. Arbuthnot & Co's request
for "encouragement" it is
suggested that a copy of the
G.O. containing the Secretary
of State's despatch alone
quoted should be furnished
to them together with Mr.
Hooper's report on Dr. Cleaver's
samples, and that they should
be informed that Govt. are
not prepared to make any
such arrangement as is
suggested by Dr. Cleaver.

W
23-5-85

cheaply or more so.
Nominally there can
be done in a Govt.
factory

31/5 116

Yes. Let me see the draft
on the above notes
W
Jun 3/85

Noted W
3-6-85

✓ Anna Blanche
September 15

Hon. Mr. Sedgwick
 Hon. Mr. Webster
 & Hon. Mr. Garrison

W.L.
100-100
Good-bye
Oct.
30.10.85

Dear Mr. Wilson
Mr. Hooper returned
to duty on Saturday.
He has analysed the
samples sent for Messrs
Robertson & Co. and has
reported in the terms.
You shall hear his
report tomorrow, together
with a letter from myself
on the subject.
Yrs sincerely
J. H. Lawrence

1000

1000

1000

1000

Ex 100 450

Mr. Laura S. G.

30 April 55

Received

Analysis of com-
plex a -

Udall's Linseed Serated Cream 5 Bales = 500 lbs
Syracuse Natural Red Barks 5 - = 500 lbs
Hudsonian Branch Red 5 - = 500 lbs
Syracuse Linseed Red 5 - = 500 lbs
2000 lbs

M. L. Lawton

55

Date by [illegible]

**FROM CIRCULATION
WITH
REMARKS.**

Govt Gard en 5/

007

26. V. 85.

off

My dear Leffan
The enclosed gives
you the amount of each
kind of Cinchona bark,
which was sent to
Dr. Cleaver.

Yrs sincerely

M. L. Sauer

PROCEEDINGS OF THE MADRAS GOVERNMENT.

Recd
1. Print in full -
Print pages 5 & 6 of
1 paras & 2 of
the enclosure
from Mr. Harpner -
Print in full -

Read again G.O. Min. no 1716.9
11th April 1885 -
Read also the following extract
from letter from the Director of
Govt Cinchona Plantations Dy.
18th May 1885 no 7: -
Read also the following letter
from the Dir. of Govt Cinch: Pl^{ty}
Dy. 22nd May 1885. no 13:

Order. No 693 of 6.6.85.

The report of the Govt
Quinologist on the samples
furnished by Dr. Cleaver will
be communicated to Messrs
Forbush & Co. who will be
requested to forward the
whole ~~batch~~ of the products to the
Govt Medical Stores, Madras.
It is observed that Dr.
Cleaver's letter contains no
information as to the total
quantity of alkaloids produced
from the quantity of bark
supplied to him. Information
on this point is, of course,
essential to any final judgment
on his results.

2. The Govt note that Dr.
Cleaver's calculations in regard
to cost are open to criticism
in several respects. The percent-
age assumed as the average
loss in the process of manu-
facture in England is incorrect
as appears from the official

papers quoted by Dr. Cleaver, and this percentage has been applied by him to the total quantity of raw bark instead of to the quantity of alkaloids contained therein. Further, the calculation proceeds on the assumption that the cost of extracting a febrifuge by the same

alkaloids is the same as that of extracting from an equal quantity of bark sulphate of quinine, sulphate of cinchonidine, and cinchonidine alkaloid in their separate states. The opinion expressed by Dr. Cleaver that the febrifuge contains about sixteen per cent of various impurities is also believed to be incorrect. The Govt. understood on the contrary, from their quiniologist that it is almost entirely free from impurities. The cost of this febrifuge, according to the reports of the Bengal Govt. Quiniologist, was in 1872-80 Rs 8-8-10 per lb and in 1883-84 Rs 10-4-8 per lb. Dr. Cleaver, on the other hand, would apparently undertake to convert 2000 lb of bark into 80 lb of febrifuge (mixed alkaloids) for something less than £120. At this rate his febrifuge would cost something under Rs 18 per lb for manufacturing alone, to say nothing of the value of bark consumed in the process.

3. With reference to the request contained in the conclusion of their letter, Messrs. Arbuthnot and Co. will be furnished with a copy of Govt. 20th Oct. 1884. No 1157. Revenue, containing the despatch of the Secy of State on the subject of concessions to the proprietors of local factories, and they will be informed that the Govt. are not at present prepared to make any such arrangement as is suggested in Dr. Cleaver's letter. The object the Govt. have in view is the production of an efficient febrifuge at such a cost as will be within the reach of all classes, and they have recently issued orders for the conduct of experiments on a large scale in the manufacture of a liquid solution of cinchona under the superintendence of the Govt. Quiniologist. The question of employing on behalf of Govt. the private factory which it is intended by Dr. Cleaver's employers to establish must of course depend on its ability to turn out what is wanted as cheaply or more economically than can be done in a Govt. factory. (From orders).

I rather prefer the following as commending to the Govt. employing this or that agency on behalf of Govt. must depend upon many considerations & of course amongst others on its ability to turn out what is wanted as a more economically than can be done by Govt. itself agency. 1884

W. W. 4-6-85
3/6.

80
6.
The following is the list of the names of the persons who have been employed by the Govt. Quiniologist in the manufacture of febrifuge. The names of the persons who have been employed by the Govt. Quiniologist in the manufacture of febrifuge. The names of the persons who have been employed by the Govt. Quiniologist in the manufacture of febrifuge.

