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MADRAS RECORD OFFICE.

Government of Madras.

Revenue DEPARTMENT.

G.O. No.	457	Press Mis.
Dated	1-4-	1884.

Not to be folded or roughly handled

GOVERNMENT OF MADRAS.

REVENUE DEPARTMENT.

READ—the following letter from Brigade-Surgeon G. BIDIE, M.B., C.I.E., Superintendent, Government Central Museum, to the Secretary to Government, Revenue Department, dated Madras, 24th March 1884, No. 304 :—

I have the honor to report to the Right Honorable the Governor in Council that the specimens of Cinchona bark, which together with the botanical specimens collected by me in 1882* were presented to the Pharmaceutical Society, have lately been analysed by Dr. B. H. Paul, and the results published with remarks in the Journal of the Pharmaceutical Society.

2. As the bark specimens were all collected from typical trees, the analyses are of much interest, and as it is not probable that Dr. Paul's paper may otherwise reach Government, I take the liberty of forwarding a manuscript copy of it for their information.

ENCLOSURE.

Report on Analyses of Specimens of Cinchona Bark.

Forwarded from Madras, through Her Majesty's Secretary of State for India, to the Pharmaceutical Society.

By BENJAMIN H. PAUL, Ph.D.

No.	Mark.	Description of Bark.	Quinine.	Quinidine.	Cinchonidine.	Cinchonine.	Amorphous.	Total.
1	3/12	<i>C. officinalis</i> , renewed	4.86	0.09	0.07	0.40	0.48	5.90
2	5/22	Do. coppice shoots	2.81	..	1.12	0.32	0.20	4.45
3	6/27	Do. renewed	5.79	0.21	0.15	0.19	0.30	6.64
4	7/28	? corky, natural	4.08	0.45	trace	0.23	0.40	5.16
5	8/29	<i>C. officinalis</i> , renewed	5.75	0.20	0.12	0.16	0.44	6.67
6	10/9	Do. do.	3.72	0.36	1.00	0.96	0.40	6.44
7	12/13	Do. do.	6.09	0.21	0.62	0.66	0.53	8.11
8	A/0	Do. (<i>Urutusinga</i>)	3.94	0.19	1.56	0.38	0.34	5.91
9	B/44	Do. natural	4.71	..	0.12	0.20	0.40	5.43
10	C/25	Do. do. (<i>ang.</i>)	3.19	..	0.95	0.17	0.30	4.61
11	D/0	Do. (<i>Urutusinga</i>)	2.45	0.04	0.43	0.22	0.30	3.44
12	G/0	Do. renewed	4.19	0.20	0.26	0.44	0.30	5.39
13	13/0	<i>C. Pitayensis</i> , natural	3.93	0.25	0.07	2.40	1.00	7.65
14	15/1	<i>C. Pahudina</i> do.	1.24	..	0.60	trace	0.20	2.04
15	16/23	Do. renewed	0.69	..	1.94	0.20	0.30	3.13
16	17/50	Do. natural	0.37	..	0.67	trace	0.20	1.24
17	18/5	? corky, renewed	1.52	..	0.39	0.58	0.50	2.99
18	19/14	? do. natural	2.27	..	0.67	0.45	0.50	3.89
19	20/32	<i>C. micrantha</i> do.	..	..	..	..	..	3.31
20	21/48	<i>C. calisaya</i> do.	..	..	..	..	..	3.23
21	22/49	Do. natural	..	..	..	..	..	3.31
22	23/17	Do. do. (<i>Joseph</i>)	3.86	0.23	0.30	0.43	0.40	5.22
23	24/38	<i>C. anglica</i> ..	..	..	..	..	..	3.90
24	25/35	Do. renewed	3.63	0.18	0.65	1.90	0.80	7.05
25	11/46	Do. mossed	3.30	0.27	0.86	0.80	0.70	5.93
26	26/30	<i>C. pubescens</i> natural (?)	4.37	..	1.80	0.36	0.70	7.23
27	28/37	Do. do.	3.43	0.28	0.11	3.02	0.60	7.44
28	29/29	Do. renewed	3.91	..	2.88	0.60	0.40	7.79
29	31/11	? do.	3.51	..	1.62	0.48	0.40	6.01
30	32/20	? mossed	2.63	..	1.04	0.45	0.50	4.62
31	33/34	? natural	3.01	trace	1.21	0.22	0.40	4.84
32	35/31	<i>C. succirubra</i> , mossed	6.16	trace	1.57	0.34	0.48	8.55
33	..	Do. renewed	1.35	..	2.15	2.66	1.00	7.16
34	36/33	Do. natural	2.86	..	1.72	2.50	0.70	7.78
35	K/0	Do. do.	1.56	trace	2.04	2.00	0.88	6.48
36	L/0	Do. mossed	1.33	..	2.86	2.34	0.80	7.33
37	M/0	Do. do.	1.00	..	2.14	3.40	1.00	7.54
38	N/0	Do. renewed	1.18	trace	1.61	3.08	0.60	6.47
			2.86	..	1.32	2.60	0.60	7.38
Natural Barks from Darjeeling.								
39	Indian	<i>C. officinalis</i> ..	1.93	..	0.43	0.30	0.36	3.02
40	Indian	Do. root	3.22	0.91	0.31	1.74	0.86	7.04
41	Indian	<i>C. succirubra</i> ..	1.54	..	0.89	1.96	0.80	5.19
42	Indian	? Ledger bark	4.60	..	0.42	0.24	0.52	5.78
43	Indian	? do. root	4.27	0.13	0.04	1.10	0.40	5.94

Footnotes to Table of Report on Analyses.

- (1.) This and two following samples are from *C. Condaminea*, How. variety.
- (2.) These botanical specimens and also the bark were taken from coppice shoots.
- (3.) The bark belonging to this specimen is renewed, after the tree had been subjected to the Java shaving process.
- (4.) Bark covered externally with a thick corky layer, very peculiar, of *officinalis* type but undetermined species.
- (5.) Large leaved or *C. Uritusanga*, Pavon type.
- (6.) This is the No. 2 variety, in the estate nomenclature, of the variety *C. angustifolia*, How.
- (7.) This species was discovered by Hasskarl, cultivated on a large scale in Java and found to be worthless.
- (8.) From Java it was introduced into India, where its culture never went beyond the stage of an experiment.
- (9.) This plant was said by Cross, on his recent visit to the Nilgiris, to be the *C. crispata* of which he sent seeds from the Loxa Mountains. That it came from Loxa there is no doubt, as the few specimens of it on the estate of Dodabetta are growing amongst the "crown" barks introduced from that region. It differs, however, very much from the *C. crispata* of Tafalla, which belongs to the *C. officinalis* group of Weddell. In general appearance it is more nearly allied to Weddell's section *Pahutiana*. Its bark is also very peculiar, in fact unique.
- (10.) This form of the *C. Calisaya* grows to a considerable size and has bright green shining leaves, some of which measure from 6 to 7 inches in length by $3\frac{1}{2}$ to 4 inches in width. Flowers pink, very sweetly scented.
- (11.) This plant approaches the *Boliviana* form of Weddell, but the *calisayas* are most variable.
- (12.) This plant, according to Howard, is a hybrid between *C. calisaya* and *C. succirubra*. On the other hand, it is said to come perfectly true from seed. Mr. Surgeon-Major Bidie thinks it to be only a variety of *C. calisaya*.
- (13.) This is not the *C. pubescens* of Vahl, but a plant which was considered to be a hybrid by the Superintendent of the Cinchona estates, the late Mr. McIver. Mr. Cross regards it as the pubescent form of "Cuchicara," referred to by Dr. Spruce in the Parliamentary Blue Book of 1863, p. 116. Mr. McIver stated that it is a hybrid between *Cinchona succirubra* and *Cinchona officinalis*.
- (14.) *Pat's de Gallinazo* of Cross.

When the valuable series of specimens of Madras Cinchona bark was presented to the Museum of the Pharmaceutical Society by the Indian Government through Dr. Bidie, it appeared to be important that analyses should be made, in order that the specimens might be rendered thereby more useful for reference and that the analyses might be available for comparison with others, which might be made subsequently on the plantations. Therefore having learnt from Mr. Holmes, the Curator of the Society's Museum, that portions could be spared from the Museum specimens without destroying their value for reference, I undertook to carry out the examination. Unfortunately, the smallness of some of the samples precluded the possibility of dividing them. Only eleven specimens, however, out of the forty-nine received, were too small to be divided. The preceding table gives the results obtained. The footnotes are taken from remarks written on the herbarium specimens by Dr. Bidie. The Specimens, No. 39 to 43, marked "India," are barks which were forwarded last year from Darjeeling by Dr. King.

These specimens of bark illustrate very well the influence of hybridization in making the characteristic features of the bark of particular species of *cinchona*, and the difficulty of forming an opinion as to the source of samples as well as their value in regard to amount of alkaloid.

I learn from Mr. Holmes that a comparison of the samples of *C. officinalis* bark indicates that the only one which could be easily recognised is No. 4. In this sample the bark presents an extraordinary development of the suberous or corky layer, which is divided into angular pieces about half an inch square, each piece exhibiting a stratified appearance. It is totally different from Nos. 17 and 18 in which the suberous layer, although very much developed, presents a rough granular appearance more like toasted bread-crumbs and is very friable. The corky *C. officinalis* also possesses more quinine (0.45) than the other varieties, and a good percentage (4.08) of quinine. No. 4 is evidently the bark referred to by Dr. Trimen in his report "On the Nilgiri Plantations" as being the "Crispa" of McIver and Beddome, of which a vigorous propagation was going on by seed. If it can be shown, therefore, by further analyses on the plantations, that these percentages are tolerably constant, this variety would appear in every way to be specially suited for pharmacy.

On examination of the several specimens of renewed bark of *C. officinalis*, Mr. Holmes is of opinion that it would not be possible to recognize by physical characters bark rich in alkaloids from a poor one, and that, however valuable such bark may be to the quinine manufacturer, it would not be expedient for pharmaceutical use, unless a guarantee as to alkaloidal strength were supplied to the retail pharmacist. It is also of interest to note that in Nos. 2, 6, and 8 the smaller amount of quinine found by analysis is associated with an increased amount of cinchonidine. The fact that No. 2 was obtained from coppice shoots adds weight to the supposition that the age of the tree may have something to do with the yield of cinchonidine; while the fact that the renewed (No. 6) and the natural (No. 8) *Uritusanga* varieties yield less quinine than the *angustifolia* and *condaminea* points to the latter as being the better varieties, i.e., so far at least as can be gathered from a limited number of analyses.

The bark of *C. Pahutiana* might easily be mistaken by an unpractised eye for that of *C. officinalis*, and it seems desirable that such an inferior bark should be eliminated from the plantations as speedily as possible, lest by cross-fertilization it should deteriorate the seed of more valuable species. The same remark applies to the corky barks, Nos. 17 and 18, which, although very different in appearance from *C. Pahutiana*, are produced by a tree which has on its young shoots and capsules the peculiar coarse hairiness of that species, although in a less degree, forming a feature by which it is easily distinguished. The specimens of the bark *C. anglica*, from the Nilgiris, are not easily recognizable by physical characters, and Mr. Holmes considers that they bear evidence of the hybridization of the plants with *C. succirubra*, particularly No. 23, which gives 1.90 of cinchonine. This, he thinks, is further confirmed by the large leaves, resembling in size, shape and venation those of *C. succirubra*. The capsules also more nearly approach in size those of that species, being much larger than those of *C. calisaya*.

With respect to the barks from Darjeeling, No. 39 to 43, Mr. Holmes is of opinion that the samples, judging from their physical appearance, were evidently collected from several different varieties of each species, and therefore the analyses cannot reveal anything special concerning them.

Judging from its physical characters, the Ledger bark, No. 42, is good typical *calisaya* bark, and does not at all resemble the thick bark with scattered warts which was recognized by Mr. Howard as Ledger bark, and of which samples presented by him exist in the Museum of the Society. Taken in conjunction with the analysis, the characters of the No. 42 bark indicate that it approaches most nearly to the *Boliviana* variety of *Calisaya*.

The Nilgiri *calisaya*, No. 21, appears to be identical with that of Darjeeling. The herbarium specimen of the latter is marked 2,000 feet, an elevation that is hardly high enough to develop the alkaloidal richness of the *calisaya* to its utmost degree.

In Dr. Trimen's recent report on the cinchonas of the Nilgiris, he lays great stress on the importance of analysis as a guide in the selection of plants for cultivation, and he expresses his conviction that, in the present state of our knowledge, this point of view, he recommends the isolation of trees with high analysis, together with other precautions to prevent cross-fertilization, care in collecting seed, analysis of a selection of the resulting plants, and destruction of all that do not reach the standard of their parent. It is by the continuation of this mode of procedure in the cinchona districts of the Madras Presidency that Dr. Trimen considers the interests of the great industry of cinchona-growing in India can alone be efficiently promoted.

The attempt to draw deductions from the figures of the analyses now published of a limited number of specimens must, of course, be regarded as subject to correction by results of further examinations of a larger series of similar botanical specimens and barks that may come under future notice; but it may be hoped that the facts brought out by analyses of these specimens may prove of some value to the pharmaceutical public and to the energetic directors of the plantations in India and elsewhere.

ORDER—dated 1st April 1884, No. 457, Revenue.

Miscellaneous.

Communicated to the Director of Government Cinchona Plantations, Parks and Gardens, Nilgiris.

(True Extract.)

(Signed) H. E. STOKES,
Secretary to Government.To the Director of Government Cinchona Plantations,
Parks and Gardens, Nilgiris.
„ the Superintendent, Government Central Museum.

rd. W. H. French.

D Copies.

Govt. of (1884) Madras
REVENUE.

Issued

Recd.

Encl.

G.O., 1st April 1884, No. 457.

APRIL.

Cinchona Bark.

Letter from Dr. Bidie forwarding a copy of report on analyses of specimens of —, forwarded to the Pharmaceutical Society of Great Britain, communicated to the Director of Government Cinchona Plantations, &c.

- Notes to table of Report on analyses
- (1) This and two following samples are from
C. Condamined, How. variety
 - (2) Three botanical specimens and also the bark were taken from coffeee shoots
 - (3) The bark belonging to this specimen is renewed after the tea had been subjected to the Java shanning process.
In this the outer cellular portion is shaved or pared off, the inner vascular layer being left intact.
 - (4) Bark covered externally with a thick corky layer, very peculiar, of officinalis type but undetermined species.
 - (6) Large leaved or C. Uritusinga, Paron type
 - (7) This is the No. 2 variety, in the estate nomenclature of the variety C. angustifolia, How.
 - (14) This species was discovered by Boiss Karl, cultivated on a large scale in Java and found to be worthless. From Java it was introduced into India, where its culture never went beyond the stage of an experiment.
 - (17) This plant was said by Boiss, on his recent visit to the Nilghiris, to be the C. crispa of which he sent seeds from the Loxa Mountains. That it came from Loxa there is no doubt, as the few specimens of it on the estate of Doodabetta are growing amongst the "crown" barks introduced from that region. It differs, however, very much from the C. crispa of Safalla, which belongs to the C. officinalis group of Weddell. In general appearance it is more nearly allied to Weddell's section Pahudiana. Its bark is also very peculiar, in

in fact unique.

(20) This form of the *C. Calisaya* grows to a considerable size and has bright green shining leaves, some of which measure from 6 to 7 inches in length by $3\frac{1}{2}$ to 4 inches in width. Flowers pink, very sweetly scented.

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is divided into angular pieces about half an inch square, each piece exhibiting a stratified appearance. It is totally different from Nos 17 and 18 in which the suberous layer, although very much developed, presents a rough granular appearance more like toasted bread-crumbs and is very friable. The corky C. officinalis also possesses more quinidine (0.45) than the other varieties, and a good percentage (4.08) of quinine. No 4 is evidently the bark referred to by Dr. Trimen in his report "On the Kilgiri Plantations", as being the "crippa" of the Suar and Beddome, of which a vigorous propagation was going on by seeds. If it can be shown, therefore, by further analyses on the plantations that these percentages are tolerably constant, this variety would appear in every way to be specially suited for pharmacy.

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True Copy.
D. D. D.
Supt. Gov. Central
Museum

* See G. O. Revenue
Department No 1381
1381.A of 8th
December 1882.

Rev. Mr. Paul 2007/82

No. 304

Government Central Museum

Egmore

Madras 24th March 1884

From

Brigade Surgeon George Bidie M.B., B.S.,
Superintendent Government Central

To



Museum

The Secretary to Government
Revenue Department
Fort Saint George

Sir,

I have the honour to report to the Right Honorable the Governor in Council that the specimens of Cinchona bark, which together with the botanical specimens collected by me in 1882, were presented to the Pharmaceutical Society have lately been analysed by Dr. B. H. Paul, and the results published with remarks in the Journal of the Pharmaceutical Society.

2/ As the bark specimens were all collected from typical trees, the analysis are of much interest, and as it is not probable that Dr. Paul's paper may otherwise reach Government, I take the liberty of forwarding a M.S.D. copy of it for their information.

I

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The attempt to draw deductions from the figures of the analyses now published of a limited number of specimens must, of course, be regarded as subject to correction

by

I have the honor to be,
 Sir,
 Your most Obedient Servant,

James
 Brigade Surgeon
 Superintendent Government
 Central Museum.

Report on Analyses of Cinchona Bark

Forwarded from Madras, through Her Majesty's Secretary of State for India, to the Pharmaceutical Society.

By Benjamin S. Paul, F.R.S.

No	Mark	Description of Bark	Quinine	Quinidine	Cinchonic	Cinchonine	Amorphous	Total
1	3/12	<i>C. officinalis</i> , renewed	4.86	0.09	0.07	0.40	0.48	5.90
2	5/22	" " coffee shoots	2.81	—	1.12	0.32	0.20	4.45
3	6/27	" " renewed	5.79	0.21	0.15	0.19	0.30	6.64
33	—	" " " "	1.30	—	2.75	2.00	1.00	7.18
34	3/23	" " " " renewed	2.86	—	1.72	2.50	0.70	7.78
35	R/10	" " " " natural	1.56	trace	2.04	2.00	0.88	6.48
36	L/10	" " " " "	1.33	—	2.86	2.34	0.80	7.33
37	M/10	" " " " mixed	1.00	—	2.14	3.40	1.00	7.54
38	A/10	" " " " renewed	1.18	trace	1.61	3.08	0.60	6.47
		" " " " "	2.86	—	1.32	2.60	0.60	7.38
<i>Natural Barks from Darjeeling</i>								
39	Indian	<i>C. officinalis</i>	1.93	—	0.43	0.30	0.36	3.02
40	Indian	" " " " root	3.22	0.91	0.31	1.74	0.86	7.04
41	Indian	<i>C. succirubra</i>	1.54	—	0.89	1.96	0.80	5.19
42	Indian	" " " " Ledger bark	4.60	—	0.42	0.24	0.52	5.78
43	Indian	" " " " " " root	4.27	0.13	0.04	1.10	0.40	5.94

Your most Obedient Servant,

Leeds Brigade Surgeon
 Superintendent Government
 Central Museum.

Report on Analyses of Specimens of Liriodendron Bark

Forwarded from Madras, through Hon^{ble} Magistrate's Secretary of State for India, to the Pharmaceutical Society.
By Benjamin F. Paul. F.R.S.

By Benjamin F. Paul, P. F. D.

No	Mark	Description of bark	Lumiere	Lumiere	Lumiere	Lumiere	Lumiere	Spinel
1	3/2	C. officinalis, renewed	4.86	0.09	0.07	0.40	0.45	5.90
2	6/22	" coffee shute	2.81	—	1.12	0.32	0.20	4.45
3	4/27	" renewed	5.79	0.21	0.15	0.19	0.30	6.64
4	7/25	" corky, natural	4.03	0.45	trace	0.23	0.40	5.16
5	9/29	C. officinalis, renewed	5.75	0.20	0.12	0.16	0.44	6.67
6	11/9	" "	3.72	0.36	1.10	0.96	0.40	6.44
7	12/13	" "	6.09	0.21	0.62	0.66	0.53	8.11
8	14/10	" (Whitings)	3.94	0.19	1.06	0.98	0.34	5.91
9	15/14	" natural	4.71	—	0.12	0.20	0.40	5.43
10	16/25	" " (large)	3.19	—	0.95	0.17	0.30	4.61
11	17/10	" (Whitings)	2.45	0.04	0.43	0.22	0.30	3.44
12	18/10	" renewed	4.19	0.20	0.26	0.44	0.30	5.39
13	19/10	C. Pitagoris, natural	3.93	0.25	0.07	2.40	1.00	7.65
14	20/11	C. Pitagoris "	1.24	—	0.60	trace	0.20	2.04
15	21/23	" renewed	0.69	—	1.94	0.20	0.30	3.13
16	22/15	" natural	0.37	—	0.67	trace	0.20	1.24
17	23/15	" corky, renewed	1.52	—	0.39	0.53	0.50	2.99
18	24/14	" " natural	2.27	—	0.67	0.43	0.50	3.84
19	25/12	C. micrantha "	—	—	—	—	—	—
20	26/18	C. Calceolaria "	3.06	0.23	0.30	0.43	0.40	5.22
21	27/19	" natural	—	—	—	—	—	—
22	28/17	" " (large)	3.33	0.18	0.64	1.90	0.80	3.90
23	29/18	C. anglica	3.30	0.27	0.86	0.80	0.70	5.93
24	30/15	" renewed	4.37	—	1.80	0.36	0.70	7.23
25	31/16	" " "	3.43	0.28	0.11	3.02	0.60	7.44
26	32/19	C. pubescens natural (C?)	3.91	—	2.33	0.60	0.40	7.79
27	33/11	" renewed	3.51	—	1.62	0.48	0.40	6.01
28	34/11	" " "	2.63	—	1.04	0.45	0.50	4.62
29	35/10	" " "	3.01	—	1.21	0.22	0.40	4.84
30	36/14	" natural	6.16	trace	1.57	0.34	0.45	8.55
31	37/11	C. succedanea, renewed	1.56	—	2.15	2.66	1.00	7.16
32	38/11	" renewed	2.88	—	1.72	2.50	0.70	7.78
33	39/13	" natural	1.56	—	2.04	2.00	0.88	6.43
34	40/10	" " "	1.33	—	2.86	2.34	0.80	7.33
35	41/10	" renewed	1.00	—	2.14	3.40	1.00	7.34
36	42/10	" " "	1.13	—	1.61	2.03	0.60	6.47
37	43/10	" renewed	2.86	—	1.32	2.60	0.60	7.33
38	44/10	" " "	1.93	—	0.43	0.30	0.36	3.02
39	45/10	C. officinalis	3.22	0.91	0.81	1.74	0.86	7.04
40	46/10	" " "	1.54	—	0.89	1.96	0.80	5.19
41	47/10	C. succedanea	4.60	—	0.42	0.24	0.52	5.78
42	48/10	" " "	4.27	0.13	0.04	1.10	0.40	5.94
43	49/10	" " "	—	—	—	—	—	—

Order No 457

Comd. to the Director
of Govt Cinchona Plantations,
Parks & Gardens, Nilgiris.

WY
1-4-84.

Revenue (1884) Department
From No 2007
The Superintendent
Government
Central Museum

No 304
Encl. 2

Dated 24th March 1884
Recd do
Recd

To the Director of Govt Cinchona Plantations
Parks & Gardens, Nilgiris.
S. " Supt, Govt Central Museum

Print
1/4

No

Subject
Forwarding for information M.D.S.
Copy of Report on Analyses of
Specimens of Cinchona bark, for-
warded from Madras, through the
Magist's Secretary of State for India,
to the Pharmaceutical Society
by Benjamin H. Paul. M.D.S.

With an order