

(1) Number of pages 16(2) Date of repair 18-8-88(3) Initials of the Referencer CP**MADRAS RECORD OFFICE.****Government of Madras.***Revenue* **DEPARTMENT.**

G.O. No.

1788

Press
Mis.

Dated

29-4-1884.

Not to be folded or roughly handled*my*

India Office,
London. 27th March, 1884.

Revenue

N^o 14.



Sir,

With reference to my despatch N^o 11, dated 19th April 1883, I forward herewith, for the information of your Excellency's Government, copy of an analysis made by D^r Paul of the Cinchona barks collected by D^r Bidie, and presented by Government to the Pharmaceutical Society of Great Britain.

I have the honor to be,

Sir,

Your most obedient
humble servant

Kimberley

His Excellency
The Right Honorable
The Governor in Council,
Fort S^t George..

✓
E.V.

6
Sp. 9
Revenue
27th March 1844.

The
Letter to Lord St. George
N. 14.

Recd 18 April / 84.

Ind for P.D.
25/4

55/478
Shir.

Mr D. Pauls Compliments

[From the PHARMACEUTICAL JOURNAL, February 23, 1884.]

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		
2	5/22	" coppiceshoots . . .	2.81	—	1.12	0.32	0.43	5.90
3	6/27	" renewed . . .	5.79	0.21	0.15	0.19	0.20	6.45
4	7/28	" corky, natural . . .	4.08	0.45	trace	0.23	0.30	6.64
5	8/29	<i>C. officinalis</i> , renewed . . .	5.75	0.20	0.12	0.18	0.40	6.64
6	10/9	" " . . .	3.72	0.36	1.00	0.98	0.44	6.67
7	12/13	" " . . .	6.09	0.21	0.62	0.66	0.40	8.11
8	A/0	" (<i>Urutusinga</i>) . . .	3.94	0.19	1.06	0.33	0.34	5.91
9	B/44	" natural . . .	4.71	—	0.12	0.20	0.40	5.43
10	C/25	" " (<i>ang.</i>) . . .	3.19	—	0.95	0.17	0.30	4.61
11	D/0	" (<i>Urutusinga</i>) . . .	2.45	—	0.43	0.22	0.30	3.44
12	G/0	" renewed . . .	4.19	0.20	0.28	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. Pahudiana</i> " . . .	1.24	—	0.60	trace	0.20	2.04
15	16/23	" renewed . . .	0.69	—	1.94	0.20	0.30	3.13
16	17/50	" natural . . .	0.37	—	0.67	trace	0.20	1.24
17	18/5	" corky, renewed . . .	1.55	—	0.39	0.58	0.50	2.99
18	19/14	" natural . . .	2.27	—	0.67	0.45	0.50	3.89
19	20/32	<i>C. micrantha</i> " . . .						3.23
20	21/43	<i>C. Calisaya</i> " . . .						3.31
21	22/49	" natural . . .	3.86	0.23	0.30	0.43	0.40	5.22
22	23/47	" " (<i>Joseph.</i>) . . .						3.90
23	24/33	<i>C. anglica</i> " . . .	3.59	0.18	0.64	1.90	0.80	7.05
24	25/35	" renewed . . .	3.30	0.27	0.86	0.60	0.70	5.93
25	H/46	" mossed . . .	4.37	—	1.80	0.56	0.70	7.23
26	26/30	<i>C. pubescens</i> , natural (?) . . .	3.43	0.28	0.11	3.02	0.60	7.44
27	28/37	" " . . .	3.91	—	2.88	0.60	0.40	7.79
28	29/29	" renewed . . .	3.51	—	1.62	0.45	0.40	6.01
29	31/11	" " . . .	2.63	—	1.04	0.22	0.40	4.62
30	32/20	" mossed . . .	3.01	trace.	1.21	0.22	0.40	4.84
31	33/34	" natural . . .	6.16	trace.	1.57	0.34	0.48	8.55
32	35/31	<i>C. succirubra</i> , mossed . . .	1.35	—	2.15	2.66	1.00	7.16
33	"	" renewed . . .	2.86	—	1.72	2.50	0.70	7.78
34	36/33	" natural . . .	1.56	trace.	2.04	2.00	0.88	6.48
35	K/0	" " . . .	1.33	—	2.86	2.34	0.80	7.33
36	L/0	" mossed . . .	1.00	—	2.14	3.40	1.00	7.54
37	M/0	" " . . .	1.18	trace.	1.61	3.08	0.60	6.47
38	N/0	" renewed . . .	2.86	—	1.32	2.60	0.60	7.38
39	Indian.	<i>C. officinalis</i> . . .	1.92	—	0.43	0.30	0.36	3.02
40	Indian.	" root . . .	3.27	0.91	0.31	1.74	0.86	7.04
41	Indian.	<i>C. succirubra</i> . . .	1.55	—	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

- (1) This and two following samples are from *C. Cudaminea*, 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, the inner vascular layer being left intact.
(5) Large leaved or *C. Urutusinga*, 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 Nilghiris, to be the *C. crista* 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. crista* of Tafalla, 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 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 3½ 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. McIvor. 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. McIvor stated that it is a hybrid between *Cinchona succirubra* and *Cinchona officinalis*.
(14) Pata de gallinazo of Cross.

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	—	—	—	—
2	5/22	" coppiceshoots . .	2.81	—	0.07	0.40	0.48	5.90
3	6/27	" renewed . .	5.79	0.21	1.12	0.32	0.20	4.45
4	7/28	" corky, natural . .	4.08	0.45	0.15	0.19	0.30	6.64
5	8/29	<i>C. officinalis</i> , renewed . .	5.75	0.20	trace	0.23	0.40	5.16
6	10/9	" " . .	3.72	0.36	0.12	0.16	0.44	6.67
7	12/13	" " . .	6.09	0.21	1.00	0.96	0.40	6.44
8	A/0	" (<i>Uritusinga</i>) . .	3.84	0.19	0.62	0.66	0.53	8.11
9	B/44	" natural . .	4.71	—	1.06	0.38	0.34	5.91
10	C/25	" (<i>ang.</i>) . .	3.19	—	0.12	0.20	0.40	5.43
11	D/0	" (<i>Uritusinga</i>) . .	2.45	0.04	0.95	0.17	0.30	4.61
12	G/0	" renewed . .	4.19	0.20	0.43	0.22	0.30	3.44
13	13/0	<i>C. Pityensis</i> , natural . .	3.93	0.25	0.26	0.44	0.30	5.39
14	15/1	<i>C. Pahudiana</i> " . .	1.24	—	0.07	2.40	1.00	7.65
15	16/23	" renewed . .	0.69	—	0.60	trace	0.20	2.04
16	17/50	" natural . .	0.37	—	1.94	0.20	0.30	3.13
17	18/5	" corky, renewed . .	1.52	—	0.67	trace	0.20	1.24
18	19/14	" ? natural . .	2.27	—	0.39	0.58	0.50	2.99
19	20/32	<i>C. micrantha</i> " . .	—	—	0.67	0.45	0.50	3.89
20	21/48	<i>C. Calisaya</i> " . .	—	—	—	—	—	3.23
21	22/49	" natural . .	3.86	0.23	0.30	0.43	0.40	3.31
22	23/47	" (<i>Joseph.</i>) . .	—	—	—	—	—	5.22
23	24/38	<i>C. anglica</i> " . .	3.53	0.18	0.64	1.90	0.80	7.65
24	25/35	" renewed . .	3.30	0.27	0.86	0.80	0.70	5.93
25	H/46	" mossed . .	4.37	—	1.80	0.36	0.60	7.23
26	26/30	<i>C. pubescens</i> , natural (?) . .	3.43	0.28	0.11	3.02	0.70	7.44
27	28/37	" " . .	3.91	—	2.88	0.60	0.40	7.79
28	29/29	" renewed . .	3.51	—	1.62	0.48	0.40	6.01
29	31/11	" ? . .	2.83	—	1.04	0.45	0.50	4.62
30	32/20	" mossed . .	3.01	trace.	1.21	0.22	0.40	4.84
31	33/34	" natural . .	6.16	trace.	1.57	0.34	0.48	8.55
32	35/31	<i>C. succirubra</i> , mossed . .	1.35	—	2.15	2.66	1.00	7.16
33	36/33	" renewed . .	2.86	—	1.72	2.50	0.70	7.73
34	K/0	" natural . .	1.56	trace.	2.04	2.00	0.88	6.48
35	L/0	" mossed . .	1.33	—	2.86	2.34	0.80	7.33
36	M/0	" " . .	1.00	—	2.14	3.40	1.00	7.54
37	N/0	" renewed . .	1.18	trace.	1.61	3.08	0.60	6.47
38		" " . .	2.86	—	1.32	2.60	0.60	7.38
39	Indian.	<i>C. officinalis</i> NATURAL BARKS FROM DARJEELING.	—	—	—	—	—	—
40	Indian.	" root . .	1.93	—	0.43	0.30	0.36	3.02
41	Indian.	<i>C. succirubra</i> " . .	3.22	0.91	0.31	1.74	0.86	7.04
42	Indian.	" ? Ledger bark . .	1.54	—	0.89	1.96	0.80	5.19
43	Indian.	" " root . .	4.60	—	0.42	0.24	0.52	5.78
		" " " . .	4.27	0.13	0.04	1.10	0.40	5.94

- (1) This and two following samples are from *C. Cordaminea*, 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 is shaved or pared off, the inner vascular layer being left intact.
- (5) Large leaved or *C. Uritusinga*, 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 Nilghiris, 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 *Pahudiana*. Its bark is also very peculiar, in fact unique.
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- (11) This plant approaches the *Botiviana* form of Weddell, but the *Calisaya* are most variable.
- (12) This is not the *C. pubescens* of Vahl, but a plant which was considered to be only a variety of *C. Calisaya*.
- (13) This is 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. McIvor. 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. McIvor stated that it is a hybrid between *Cinchona succirubra* and *Cinchona officinalis*.
- (14) Pata 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 masking 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 recognized 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 McIvor and Beidome, 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 could 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) *Uritusinga* 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. Pahudiana* 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. Pahudiana*, 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 of *C. anglica*, from the Nilghiris, 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, Nos. 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 *Botiviana* variety of *Calisaya*.

The Nilghiri *Calisaya*, No. 21, appears to be identical with that of Darjeeling. The herbarium specimen of the latter is marked 2000 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 Nilghiris 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, selection based on analysis is the most promising direction for the improvement of the trees as alkaloid yielders. From 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 all that do not reach the standard 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.

Rec. 2624/84

No 10.

ON HER MAJESTY'S SERVICE.

L. 701.

Heades

Revenue

Two Copies of Analysis made by Dr Paul
Report it in Revenue Letter to Madras, No 14
dated 29th March 1804.

20.7.124/8320209

REVENUE (1884) DEPARTMENT.

No. 2624.

To
From the Secretary of State
for India.
Revenue.

Dated 27 March 1884
Recd. 22 April 1884

No. 14.

40
Communicated to the
Supt. Govt. Central Museum,
for information.

Ms. G. 6 29 April 1884

SUBJECT.

Forwarding for information
Copy of an analysis made
by Dr. Paul of the Cinchona
barks collected by Dr. Bidie
& presented to the Pharmaceu-
tical Society of Great
Britain.

To
The Supt. Govt. Central Museum
" Director of Cinchona Plantations &c.
" Board of Revenue

There have been some
contributions by Bidie?
and I am then to him

Ms. G. 6 1788
Recorded with reference
to 20.7.124/84 no 457

with an order