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MADRAS RECORD OFFICE.

Government of Madras.

Revenue DEPARTMENT.

G.O. No. 370 Press Mis.-

Dated 30-5- 1888.

Not to be folded or roughly handled

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30TH MAY 1888, No. 370, REVENUE.

GOVERNMENT OF MADRAS.

REVENUE DEPARTMENT.

READ—the following letter from C. CUTHBERTSON, Esq., Officiating Under Secretary to the Government of Bengal, Financial Department (Miscellaneous), to the Secretary to the Government of Madras, dated Calcutta, the 11th May 1888, No. 2131.

In compliance with the request contained in your letter, No. 2364, dated the 21st April last, I am directed to forward three spare copies of the Supplement to the *Calcutta Gazette* of 28th March 1888, containing a description of a process for manufacturing pure sulphate of quinine.

ENCLOSURES.

Resolution by the Government of Bengal in the Financial Department (Miscellaneous), dated Calcutta, the 26th March 1888.

Apprehensions of the extermination, in their native forests, of the quinine-yielding cinchona trees having reached an acute stage about thirty years ago, the Government of India decided to take effectual steps to introduce their cultivation into India. The collection of seed and seedlings in the wide tract of difficult country over which the best medicinal sorts are naturally scattered was no easy task. But it was successfully accomplished by Messrs. Markham, Pritchett, Spruce, and Cross. Contemporaneously with these efforts on the part of the English Government, the Dutch authorities were at work on behalf of their Malayan colonies, and by the year 1862 cinchona cultivation had been successfully initiated in India and Malaya. The localities selected for the experiment of cinchona growing in India were the Nilgiris and British Sikkim. And the excellence of this selection has been proved by the fact that the original nurseries in both localities have developed into large plantations which still remain in the hands of Government. From these two centres seed and seedlings have been freely distributed to planters, and large tracts of land, especially in Southern India and Ceylon, have been covered with cinchona trees by private enterprise.

2. The cinchona trees thus introduced into India are practically of two sorts—(1) *Quinine* yielders and (2) *Mixed alkaloid* yielders. Of the quinine yielders there are two kinds, viz., *Yellow* or *Calisaya* (including *Ledgeriana*) and *Crown* or *officinalis*, barks. Of the mixed alkaloid yielders there are also two kinds, viz., *red* or *succirubra* which has been in cultivation from the beginning, and a kind which has come into prominence during the past few years, and which in annual reports has been referred to as *Hybrid* bark. Red bark contains a comparatively small proportion of quinine with large proportions of cinchonidine and cinchonine. It had been chiefly used by druggists in the preparation of decoctions and tinctures, and had not been used by quinine makers as a source of quinine. This red-bark tree was, however, the kind which, in the early days of the cultivation, it was found most easy to propagate; and in all plantations, both public and private, it greatly preponderated over the other sorts.

3. The cultivation of cinchona trees having been pushed beyond the region of experiment, the next problem that presented itself was the utilization of their bark. For the private grower, the most lucrative course up to the present time has been to sell the crude bark in London. The object of Government was not, however, to secure a financial success, but to provide the people of the country, at the lowest possible rate, with an efficient remedy for the most prevalent of all the diseases of the country. The first step for Government to take was therefore to discover whether it was really a fact that quinine is the only alkaloid worth extracting separately from cinchona bark, and whether cinchonidine and cinchonine might not each be an efficient febrifuge. It was true that quinine alone had got into use as a febrifuge, and that it alone of the cinchona alkaloids had found a place in the British Pharmacopœia. On the other hand, tinctures, decoctions and various pharmaceutical preparations of red bark, into the constitution of which all three alkaloids must undoubtedly enter, had for many years borne the reputation of excellent remedies for fever. The presumption therefore appeared to be that the position claimed for quinine as the only real febrifuge yielded by cinchona bark would

prove, on careful examination, to be untenable; and that the other two alkaloids would also be found to have value as febrifuges. For the purpose of investigating this point, Commissions of Medical officers of all three Presidencies were formed during the years 1866 to 1868. These Commissions were furnished with supplies of the three alkaloids, pure and unmixed, and after very extensive trials, their unanimous verdict was that cinchonidine and cinchonine are both excellent febrifuges, the former not much less efficient than quinine itself.

4. Having thus established the value of cinchonidine and cinchonine, the next point to be settled was how best to utilize the large stocks of these alkaloids contained in the bark of the trees growing in the Government plantations. To do this, Messrs. Broughton and Wood, two professional chemists, were engaged in England and were located as Government Quinologists on the Nilgiri and Sikkim plantations respectively. Mr. Broughton (the Nilgiri Quinologist), as the result of his labors, invented a preparation of red bark which he called *Amorphous Quinine*, and which contained all the alkaloids of red bark in the form of a non-crystalline powder. Of this amorphous quinine no large amount was ever manufactured; and its preparation ceased when Mr. Broughton resigned the service of Government. Mr. Wood, who did not arrive at the Sikkim plantation until 1873, concluded, after much observation and experiment, that the best way of utilizing the red bark was to make from it the preparation now so well known as cinchona febrifuge. This, like Mr. Broughton's, is in the form of a powder, and contains the three chief alkaloids of red bark mixed in the proportions in which they naturally occur in the bark. Cinchona febrifuge was then a perfectly new product, unknown to pharmacy, and it was not clear how it might be accepted by the medical profession.

Mr. Wood therefore adopted for its manufacture on a small tentative scale a simple and inexpensive acid and alkali process, requiring only the rudest apparatus. He intended, should the product be favorably accepted by the medical profession, to replace this simple process by one more efficient, but more complicated, and involving the extensive use of spirit. During the first year of its manufacture (1874-75), only 48 pounds of this new drug were issued. At first, and chiefly owing to a misapprehension as to the proper dose in which it should be given, some prejudice existed against this drug. In 1875-76, however, 1,940 pounds of it were consumed, and its consumption so materially increased during succeeding years that, up to the present date, no less than 87,704 pounds have been issued from the factory. A preparation similar to, and avowedly an imitation of, cinchona febrifuge is now made and sold in London under the name of *Quinetum*, but until cinchona febrifuge had first been manufactured in India, no similar preparation existed. It is therefore a remedy for which the world at large is indebted to India. Cinchona febrifuge has been used in India as a substitute for quinine. It has been so used by Government in its own medical institutions, and it has been freely offered to the Indian public. Its sale has, however, been restricted to the limits of India. From the beginning, and until now, its price has uniformly been sixteen rupees eight annas per pound, and in this respect it has presented a contrast to quinine, the price of which has fluctuated considerably, rising at one time as high as 16*s.* 6*d.* per ounce. According, however, to statistics prepared by an English pharmacologist, the average price of quinine in London from 1875 to 1887 (the period during which cinchona febrifuge has been in use) has been 8*s.* 4½*d.* per ounce. The sterling value (calculated at this average rate) of 87,704 pounds of quinine would be £587,616, while this quantity of febrifuge has actually been delivered to the Indian consumer for the sum of Rs. 14,47,116. The actual saving to India has therefore been very great, and the capital account of the plantations (about eleven lakhs of rupees) has been covered several times.

5. The preponderance of red-bark trees in the Sikkim plantation, while he was attached to it, naturally induced Mr. Wood to give his attention first to the utilization of their bark. But he by no means neglected the quinine barks. Of these barks only one,—*Calisaya* and its variety *Ledgeriana*,—really thrives in Sikkim, the Crown bark, or *Cinchona officinalis*, tree having proved a comparative failure. Mr. Wood made many experiments in the manufacture of pure sulphate of quinine; but, up to the time of his retirement, for private reasons, from the service of Government in 1879, he had not succeeded in discovering an efficient process. Mr. Wood was of opinion that good quinine barks could be grown in Sikkim, and that it might be possible to extract the quinine from them on the plantation. Dr. King, the Superintendent of the plantation, was very strongly of this opinion, and in 1875 he recommended that all further planting of red-bark trees should cease. This recommendation was not acted upon for some time. Full effect has, however, been given to it of recent years, and *Succirubra* has been supplanted by *Calisaya* to the extent of about a million trees. The retirement of Mr. Wood did not put an end to the experiments on the manufacture of quinine. Mr. Gammie, the Resident Manager, took the matter up with energy, and, encouraged and assisted by Dr. King, he carried on a long series of experiments on an acid and alkali process of manufacture by which he succeeded in producing excellent quinine. He never, however, succeeded in recovering much more than half of the amount contained in the bark upon which he operated. The acid and alkali process had therefore to be abandoned as wasteful and inefficient. A process depending on the maceration of the bark in spirit was next tried; but after much experiment, it was in turn abandoned. During a visit which he paid to Holland in 1884, Dr. King acquired some hints as

to a process of extraction by means of oil. And now, benefiting by the advice of some chemical friends, Mr. Gammie has been able to perfect this process, with the result that the whole of the quinine in yellow bark can be extracted in a form undistinguishable, either chemically or physically, from the best brands of European manufacture. This can be done so cheaply that, as long as the supply of barks is kept up, quinine need never cost Government much above twenty-five rupees per pound. It is true that, at the present moment, quinine is obtainable in the open market at rates not very different from this; but that is due to entirely exceptional causes. For some time back the Ceylon planters have been uprooting their cinchona trees, both to save them from disease and to make way for tea planting which appears now to be becoming the principal industry of that colony; and cinchona bark has actually been sold in London below the cost of its production in Ceylon. Indeed, so far has the fall in price gone, that South American bark has been practically driven out of the market. This is a state of matters which cannot continue very long, and which is not likely to recur. In the ordinary course, therefore, quinine might be expected soon to rise to what may be considered its normal price. The object of making public the process now discovered is to check this rise in the price of a drug of such general utility.

6. The cordial thanks of Government are due to Dr. King and his coadjutors—and especially to Mr. Gammie—for the patience, energy and resource displayed by them in their long search for the best method of utilizing these valuable medicinal barks. The Government has no desire to make a profit by the discovery, and the details are now produced in order that private growers of cinchona may be enabled to take full advantage of the process, and that a permanent reduction in the price of quinine may ensue.

By order of the Lieutenant-Governor of Bengal,

(Signed) COLMAN MACAULAY,
Secretary to the Government of Bengal.

Method of extraction of the alkaloids from Cinchona Bark by cold oil as used at the Government Cinchona Factory in Sikkim.

In order that the oil may speedily and effectually act on the cinchona bark, the latter is reduced to a very fine powder by means of Carter's Disintegrator; and to get the powder of a uniform fineness, it is passed through a scalper, which is a machine commonly used for sifting flour. The scalper is in the form of a box enclosing a sloping, six-sided, revolving chamber, covered with silk of 120 threads to the lineal inch. It is driven at the speed of about thirty revolutions to the minute. Any particles of the powder which may be too coarse to pass through the silk meshes crop out at the lower end of the revolving chamber and are again passed through the Disintegrator.

2. A hundred parts of the finely-powdered bark are then set aside to be mixed with 8 parts of commercial caustic soda, 500 parts of water, and 600 parts of mixture composed of one part of fusel oil to four parts kerosine oil. If the caustic soda be of inferior quality, a little slaked lime (about 5 parts) may be used in addition to the eight parts of caustic soda; or caustic soda may be altogether omitted, and 15 parts of slaked lime may be used instead of it. The caustic soda is dissolved in the water and mixed with the bark. Then the oil is added, and the whole is kept thoroughly intermixed in an agitating vessel. Should lime be used, it is mixed in fine powder with the dry bark before adding the water and oil.

3. The agitating vessels in use at Mungpoo are barrels with winged stirrers revolving in them vertically, and with taps on the sides for drawing off the fluids. The first stirring is carried on for four hours, and then the whole is allowed to rest quietly in order that the oil may separate out to the top of the watery fluid. When the oil, which has now taken up the greater part of the alkaloids, has cleared out, it is drawn off by a tap placed just above the junction of the two fluids. The oil is then transferred to another agitator, and is there thoroughly intermixed with acidulated water for five or ten minutes, the mixture being again allowed to rest for the separation of the oil. It will now be found (if sufficient acid has been used and the stirring has been thorough) that the alkaloids have been removed from the oil to the acidulated liquor. The oil is again transferred to the bark mixture, and is kept intermixed with it for two or three hours; the oil is again drawn off in the same way, washed as before in the same acidulated liquor; and this process is repeated a third or a fourth time or until it is found, by testing a small quantity of the oil, that the bark has been thoroughly exhausted of its alkaloids. Each stirring subsequent to the second need not be continued for more than an hour. The quantity of acid required to take up the alkaloids from the oil will entirely depend on the quality of the bark operated on. If the bark contains 4 per cent. of alkaloids, about 2 lb. of either sulphuric or muriatic acid mixed in twenty gallons of water should be sufficient, and so on in proportion.

4. The after-treatment of the acidulated water containing the alkaloids depends on the product desired, and on the kind of acid that has been used. Should sulphate of quinine be desired and sulphuric acid have been used, the liquor is filtered (if necessary), heated and made neutral by adding a very weak solution of either caustic soda or liquor ammonia. It is then allowed to cool, and as it cools the crystals form out. These crystals are afterwards separated from the mother liquor by draining through a cloth filter. After they have been thus obtained, the crystals are dried. They are next dissolved in about fifty times their weight of boiling water. The resulting liquor is filtered hot through a little animal charcoal. On cooling after filtration the crystals again form out, and they are separated as before from the mother liquor by filtration through a cloth. The crystalline mass obtained by filtration is then placed in small lumps on sheets of white blotting paper stretched on slabs of plaster of Paris. By this means they are practically dried. They are afterwards thoroughly dried by being laid on blotting paper in a room heated to about 10 degrees above the temperature of the open air.

5. If cinchona febrifuge is wanted, the alkaloids are exhausted from the oil by muriatic acid, the solution being neutralized and filtered in the same way. On an excess of caustic soda solution being added, the alkaloids are precipitated. After standing some hours the whole bulk of liquor and precipitate is passed through cloth filters; and when the alkaline liquor has drained off, the precipitate is washed with a little plain water, dried, and powdered. The powder is cinchona febrifuge ready for use.

The 24th March 1888.

J. A. GAMMIE.

ORDER—dated 30th May 1888, No. 370, Revenue.

Miscellaneous.

Communicated to the Director of Government Cinchona Plantations and the Commissioner of Revenue Settlement and Director of the Department of Land Records and Agriculture. The latter will issue instructions to the Collectors of districts in which cinchona is grown, to publish the Resolution of the Government of Bengal in their District Gazettes.

(True Extract.)

(Signed) J. F. PRICE,
Secretary to Government.

To the Director of Government Cinchona Plantations.
„ the Commissioner of Revenue Settlement, &c.
„ the Editors' Table.

Exd. P. L. Pereira.

100 Copies.

Original

Gobt. of {1888} Madras.

REVENUE.

Issues

Read. Encl.

G.O., 30th May 1888, No. 370.

MAY.

Process for manufacturing pure Sulphate of Quinine.

Letter from the Government of Bengal forwarding spare copies of the Supplement to the *Calcutta Gazette*, containing a description of a —, communicated to the Director of Government Cinchona Plantations and the Commissioner of Revenue Settlement and Director of the Department of Land Records and Agriculture.

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Dear Price

Has the Resolution
of the Government of
Bengal of 26th March
1888 on the discovery
of a Process for manu-
facturing pure Sulphate
of Quinine been received
officially & communica-
ted to Thomson - Norgrove
Jmsmitchell
20/8/88. Quinologist

FINANCIAL DEPARTMENT.

MISCELLANEOUS.

CALCUTTA, THE 26TH MARCH 1888.

RESOLUTION.

APPREHENSIONS of the extermination, in their native forests, of the Quinine-yielding Cinchona trees having reached an acute stage about thirty years ago, the Government of India decided to take effectual steps to introduce their cultivation into India. The collection of seed and seedlings in the wide tract of difficult country over which the best medicinal sorts are naturally scattered was no easy task. But it was successfully accomplished by Messrs. Markham, Pritchett, Spruce, and Cross. Contemporaneously with these efforts on the part of the English Government, the Dutch authorities were at work on behalf of their Malayan Colonies, and by the year 1862 Cinchona cultivation had been successfully initiated in India and Malaya. The localities selected for the experiment of Cinchona growing in India were the Nilgiris and British Sikkim. And the excellence of this selection has been proved by the fact that the original nurseries in both localities have developed into large plantations which still remain in the hands of Government. From these two centres seed and seedlings have been freely distributed to planters, and large tracts of land, especially in Southern India and Ceylon, have been covered with Cinchona trees by private enterprise.

2. The Cinchona trees thus introduced into India are practically of two sorts—(1) *Quinine* yielders and (2) *Mixed alkaloid* yielders. Of the Quinine yielders there are two kinds, viz, *Yellow* or *Calisaya* (including *Ledgeriana*) and *Crown* or *officinalis*, barks. Of the mixed alkaloid yielders there are also two kinds, viz., *red* or *succirubra* which has been in cultivation from the beginning, and a kind which has come into prominence during the past few years, and which in Annual Reports has been referred to as *Hybrid* bark. Red bark contains a comparatively small proportion of Quinine with large proportions of Cinchonidine and Cichonine. It had been chiefly used by druggists in the preparation of decoctions and tinctures, and had not been used by Quinine makers as a source of Quinine. This red-bark tree was, however, the kind which, in the early days of the cultivation, it was found most easy to propagate; and in all plantations, both public and private, it greatly preponderated over the other sorts.

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in discovering an efficient process. Mr. Wood was of opinion that good Quinine barks could be grown in Sikkim, and that it might be possible to extract the Quinine from them on the plantation. Dr. King, the Superintendent of the Plantation, was very strongly of this opinion, and in 1875 he recommended that all further planting of red-bark trees should cease. This recommendation was not acted upon for some time. Full effect has, however, been given to it of recent years, and *succirubra* has been supplanted by *Calisaya* to the extent of about a million trees. The retirement of Mr. Wood did not put an end to the experiments on the manufacture of Quinine. Mr. Gammie, the Resident Manager, took the matter up with energy, and, encouraged and assisted by Dr. King, he carried on a long series of experiments on an acid and alkali process of manufacture by which he succeeded in producing excellent Quinine. He never, however, succeeded in recovering much more than half of the amount contained in the bark upon which he operated. The acid and alkali process had therefore to be abandoned as wasteful and inefficient. A process depending on the maceration of the bark in spirit was next tried; but after much experiment, it was in turn abandoned. During a visit which he paid to Holland in 1884, Dr. King acquired some hints as to a process of extraction by means of oil. And now, benefiting by the advice of some chemical friends, Mr. Gammie has been able to perfect this process, with the result that the whole of the Quinine in yellow bark can be extracted in a form undistinguishable, either chemically or physically, from the best brands of European manufacture. This can be done so cheaply that, as long as the supply of bark is kept up, Quinine need never cost Government much above twenty-five rupees per pound. It is true that, at the present moment, Quinine is obtainable in the open market at rates not very different from this; but that is due to entirely exceptional causes. For some time back the Ceylon planters have been up-rooting their Cinchona trees, both to save them from disease, and to make way for tea planting which appears now to be becoming the principal industry of that Colony; and Cinchona bark has actually been sold in London below the cost of its production in Ceylon. Indeed, so far has the fall in price gone, that South American bark has been practically driven out of the market. This is a state of matters which cannot continue very long, and which is not likely to recur. In the ordinary course, therefore, Quinine might be expected soon to rise to what may be considered its normal price. The object of making public the process now discoverd is to check this rise in the price of a drug of such general utility.

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By order of the Lieutenant-Governor of Bengal,

COLMAN MACAULAY,

Secretary to the Government of Bengal.

Method of extraction of the alkaloids from Cinchona Bark by cold oil as used at the Government Cinchona Factory in Sikkim.

In order that the oil may speedily and effectually act on the Cinchona bark, the latter is reduced to a very fine powder by means of Carter's Disintegrator; and to get the powder of a uniform fineness, it is passed through a scalper, which is a machine commonly used for sifting flour. The scalper is in the form of a box enclosing a sloping, six-sided, revolving chamber, covered with silk of 120 threads to the lineal inch. It is driven at the speed of about thirty revolutions to the minute. Any particles of the powder which may be too coarse to pass through the silk meshes drop out at the lower end of the revolving chamber and are again passed through the Disintegrator.

2. A hundred parts of the finely-powdered bark are then set aside to be mixed with 8 parts of commercial caustic soda, 500 parts of water, and 600 parts of mixture composed of one part of fusel oil to four parts kerosine oil. If the caustic soda be of inferior quality, a little slaked lime (about 5 parts) may be used in addition to the eight parts of caustic soda; or caustic soda may be altogether omitted, and 15 parts of slaked lime may be used instead of it. The caustic soda is dissolved in the water and mixed with the bark. Then the oil is added, and the whole is kept thoroughly intermixed in an agitating vessel. Should lime be used, it is mixed in fine powder with the dry bark before adding the water and oil.

3. The agitating vessels in use at Mungpoo are barrels with winged stirrers revolving in them vertically, and with taps on the sides for drawing off the fluids. The first stirring is carried on for four hours, and then the whole is allowed to rest quietly in order that the oil may separate out to the top of the watery fluid. When the oil, which has now taken up the greater part of the alkaloids, has cleared out, it is drawn off by a tap placed just above the junction of the two fluids. The oil is then transferred to another agitator, and is there thoroughly intermixed with acidulated water for five or ten minutes, the mixture being again allowed to rest for the separation of the oil. It will now be found (if sufficient acid has been used and the stirring has been thorough) that the alkaloids have been removed from the oil to the acidulated liquor. The oil is again transferred to the bark mixture, and is kept intermixed with it for two or three hours; the oil is again drawn off in the same way, washed as before in the same acidulated liquor; and this process is repeated a third or a fourth time or until it is found, by testing a small quantity of the oil, that the bark has been thoroughly exhausted of its alkaloids. Each stirring subsequent to the second need not be continued for more than an hour. The quantity of acid required to take up the alkaloids from the oil will entirely depend on the quality of the bark operated on. If the bark contains 4 per cent. of alkaloids, about 2lbs. of either sulphuric or muriatic acid mixed in twenty gallons of water should be sufficient, and so on in proportion.

4. The after-treatment of the acidulated water containing the alkaloids depends on the product desired, and on the kind of acid that has been used. Should sulphate of quinine be desired and sulphuric acid have been used, the liquor is filtered (if necessary), heated and made neutral by adding a very weak solution of either caustic soda or liquor ammonia. It is then allowed to cool, and as it cools the crystals form out. These crystals are afterwards separated from the mother liquor by draining through a cloth filter. After they have been thus obtained, the crystals are dried. They are next dissolved in about fifty times their weight of boiling water. The resulting liquor is filtered hot through a little animal charcoal. On cooling after filtration the crystals again form out, and they are separated as before from the mother liquor by filtration through a cloth. The crystalline mass obtained by filtration is then placed in small lumps on sheets of white blotting paper stretched on slabs of plaster of Paris. By this means they are practically dried. They are afterwards thoroughly dried by being laid on blotting paper in a room heated to about 10 degrees above the temperature of the open air.

5. If Cinchona Febrifuge is wanted, the alkaloids are exhausted from the oil by muriatic acid, the solution being neutralized and filtered in the same way. On an excess of caustic soda solution being added, the alkaloids are precipitated. After standing some hours the whole bulk of liquor and precipitate is passed through cloth filters; and when the alkaline liquor has drained off, the precipitate is washed with a little plain water, dried, and powdered. The powder is Cinchona Febrifuge ready for use.

The 24th March 1888.

J. A. GAMMIE.

C. E. G.—Reg. No. 1541C—75—30-4-88.

15E

GOVERNMENT OF MADRAS
18 MAY 88
REVENUE DEPARTMENT

Financial DEPARTMENT.

Miscellaneous.

No. 2131.

From C. Cuthbertson, Esquire,

Offg Under Secretary to the Government of Bengal,

To

The Secretary to the Government of Madras.

Calcutta, the 11th May 1888.

Sir,

In compliance with the request contained in your letter No. 2364 dated the 21st April last, I am directed to forward 3 spare copies of the supplement to the Calcutta Gazette of 28th March 1888, containing a description of a process for manufacturing pure Sulphate of Quinine.

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

C Cuthbertson

Offg. Under Secy. to the Govt.
of Bengal.

H. L. G.—Reg. No 190971—2,000—29-3-88.
Fincl. Dept.—Draft Form (half sheet), 11.

GOVERNMENT OF MADRAS
17 MAY 88
CHIEF SECRETARY

Ind. 915

Misc.

28 May

Communicated to the Director of Govt. Cinchona Plantations & the Commissioner of Rev. Settlement & Director of the Deptt of Land Records & Agriculture. The latter will issue instructions to the Collectors of ~~Cinchona~~ ~~Darjeeling~~ districts (w. which cinchona is grown) to publish the Resolution of the Govt of India in their D.t Gazettes.

24/May. 23 May

The inclosed papers do not seem to require any expression of their information. Might not the G.O. be placed on Rec. E.D. with a copy of the Supplt to the Calcutta Gazette. The inspr. genl will be of interest

24/May

To
The Director of Govt Cinchona Plantations
25th Comr of Rev: settlement
23rd Editor Gazette

C. 28-5-88
T. 23-5-88

100/H

Rec: 16/6 - 19-6

(1888.)

REVENUE DEPARTMENT.

No. 3401

From The Govt. of Bengal, Financial Deptt.

Dated 11th May
Received 18th May
Enclosures 2

No. 2131 Misc.

SUBJECT.

Forwarding 3 spare copies of the Supplement to the Calcutta Gazette of 28-3-88 containing a description of a process for manufacturing pure Sulphate of Quinine.

P.T.O.