M.R.O. 14—10,000—21-4-22

MADRAS RECORD OFFICE.

Government of Madras.

Revenue **DEPARTMENT.**

G.O. No. 855

Press Mis.

265-271

Dated 16—9— 1861.

Not to be folded or roughly handled

Proceedings of the Madras Government, Revenue Department,
16th April 1861.

Read the following letters:—

No. 265. From Captain H. R. MORGAN, Officiating Conservator of Forests to J. D. BOURDILLON, Esq., Secretary to Government, Revenue Department, Fort Saint George, dated Ootacamund, 28th March 1861, No. 418.

SIR,

1. With reference to G. O., No. 552 of 9th March 1861, ordering all further propagation of seed to be put a stop to in the glass house at Ootacamund, &c., I have the honor to request you will bring to the notice of Government the following discrepancies which exist in Dr. Macpherson's first and second reports on the Cinchona plants, and which, I would respectfully point out, invalidate the whole of his remarks and render his information of no value.

2. In letter No. 1, Dr. Macpherson ascribes the failure and death of the plants to a "want of elevation," only 3 to 4,000 feet, and in letter No. 8, Dr. Macpherson recommends a site in Coorg as admirable though the elevation is only from 3 to 4,000 feet. Again in paragraph 13 of No. 1 letter, Dr. Macpherson admits that "those planted under 5,000 feet "yield but little quinine," and in the face of this admission recommends Coorg, and condemns the Dodabetta site.

3. In paragraph 12 of letter No. 1, Dr. Macpherson says, "the southern decline of hills "is that most suitable for its growth," and in letter No. 2, paragraph 7, contradicts himself and says, "the northern is the best."

4. In paragraph 9, letter No. 1, it is stated that "five per cent. was obtained." This was under peculiar circumstances, from stunted plants which had died through being planted on a substratum of volcanic tuff (lava) on an exposed situation. There is no evidence to show that the general yield of the Java cinchona is five per cent. of quinine.

5. In notes on the culture of cinchona, page 13, Dr. Jungbuhn "considers that the elevation for the culture of the cinchona is to be found at 5 or 6,000 feet above the sea." At page 15, Howard, the greatest authority, says "the higher and colder the place of growth was, the more value was attached to the bark." Again, page 15, "those cinchonas which are rich in "alkaloids inhabit the peculiar cloudy region of the Andes, in which, during the rainy season, "which continues for nine months in the year, a steady rain is only interrupted during the day "by short gleams of sunshine, interchanging with clouds and mist; whilst in that part of the "year which answers to our winter, cold nights, in which the temperature of the air descends to "freezing point, are followed by days in which the rays of the sun, piercing here and there "through the thick clouds, raise the temperature to 77° Fahr., whilst the leaves are kept almost "constantly bedewed by the continual mists. The mean temperature of this region is about "55° Fahr," Dodabetta itself is 52° Fahr. The mean temperature of the Dodabetta site is about 55° Fahr., that of Coorg may be reckoned about 75° Fahr. Again, page 17, "the bark of those "trees which grew in this ravine, far above the normal limits of the forest-growing cinchona, "gave 3½ per cent. of sulphate of quinine, whilst the bark obtained from the cinchona of the "lower-lying forest scarcely afforded 1 per cent."

6. From the above it is clear that Dodabetta is the best site, and Coorg the worst for producing quinine. The lowest height in Java (see page 6 Cinchona cultivation) for plantations is 4,700 feet, not 3,000 as stated by Dr. Macpherson in paragraph 4, letter No. 2; the highest, about 7,500, just the height of the Dodabetta site, mean temperature 57°. In paragraph 7 of Mr. Markham's letter to Government of 22nd October 1860, he approves of the Dodabetta site. C. nitida, plants of which are now growing in the glass house of the gardens, "grow on high "mountains in cold situations"—*vide* page 21. It is true that C. succirubra is said to grow at an elevation of only 3,000 feet (Mr. Spruce's report), but this elevation is not to be relied upon, as neither aneroid nor mountain barometer was in the possession of Mr. Spruce, and the probability is (supposing it to be a good quinine-yielding plant) that the elevation was not under 6,000 feet as the locality ranges over 12,000 feet of elevation.

7. Dr. Macpherson states that the Dodabetta site consists of granite and trap rock. I can see none. The rock is gneiss, the substratrum is decomposed felspar and hornblend, the former yielding 11 per cent. of potash, a most valuable ingredient for forming alkali; the latter supplies 13 per cent. of lime. Had we only trap and granite the situation would be very indifferent. The surface mould is in many places 2 feet deep. The trees in a clump which I measured, consisting of 7, averaged 2 feet in diameter at 3 feet from the ground—quite large enough for our purpose. Again, the Neddiwattum site is spoken of in paragraph 9, letter No. 2, as "a stratum of yellow or reddish marl"—Now marl is a compound of clay and lime, of which we have none on these Hills. Mr. Spruce is probably mistaken also about marl; what is more probable, is a compound of mica and felspar, the greasy feeling being due to the mica. Nothing could be better than this for a substratum, as mica gives for the formation of alkali 9 to 14 per cent. of potash, and felspar 13 per cent. There can be found a hundred suitable sites on these Hills with a substratum of the above.

8. In paragraph 11 letter No. 1, Dr. Macpherson speaks of raising seed under "narrow ridge-roofed nurseries" (thatched?) "open on both sides." The only seed I know of that is grown in this manner is mushroom-spawn. I am confident that if this plan is to be carried out not a seed will germinate at Neddiwattum. In my former letter, No. 343, dated 28th January 1861, I recommended that the seed should be made over to Mr. McIvor to be raised under glass, and I now again would most respectfully urge upon Government the absolute necessity of raising the seed under glass at present. A small quantity of seed has been distributed to different parties in various situations for trial, and if they are successful more can be sent.

9. With glass we can command any temperature between 60° and 90°, quite sufficient for raising seed. If the seeds expected by Mr. Cross are now planted in the nurseries at Neddiwattum recommended by Dr. Macpherson, the monsoon will commence before they can germinate (those in the glass house at Ootacamund having taken more than 60 days), and they must mildew and rot. The same will happen to the plants if planted out before they have made strong roots.

10. In paragraph 13 letter No. 2, Dr. Macpherson speaks of "chemical research" as having achieved success for the Dutch. I would remark that a good practical gardener would have done more for them, and further that as far as quinine-yielding plants go, they have yet to attain success.

11. In paragraph 14 letter No. 2, an intelligent botanist possessing a knowledge of "analytical chemistry" is recommended. Mr. Howard, the great manufacturer, will soon settle the value of the bark—a better chemist we could not have.

12. In conclusion, I would observe that the Dutch have by no means accomplished success. They have grown some 90,000 plants—(in the large glass house at Ootacamund we can store away 80,000 plants until fit for planting out),—but they have yet to prove that those contain quinine. Had Dr. Macpherson given the market quotation of the bark or an analysis by an English chemist, instead of the results of a partial experiment of an enthusiastic Dutchman, we might have had some proofs of success. It is notorious that neither the Java tea or coffee is considered good, whereas our Kangra tea surpasses the Chinese, and our Neilgherry coffee equals Mocha. With the exception of the expedient for raising seed which every practical man versed in Arboriculture must condemn, Dr. Macpherson has told us nothing but what we knew before—*Vide* Notes on the vulture of the cinchona, *passim*, by Mr. Markham, 1859;—and the result of Dr. Macpherson's visit to Java has been to recommend here what he condemned in Java, and paralyse our efforts by introducing an impracticable plan for raising plants from seed. Fresh seeds according to Mr. Spruce take from 4 to 25 days to germinate, old seeds according to Mr. McIvor from 60 to 90 days under glass. What time they will take in Dr. Macpherson's nurseries, supposing they ever germinate, it is impossible to say. The sandal-wood tree, if grown in a moist and shady situation, does not yield the same scent as that grown on partially exposed situations. Tea if grown in a low latitude and elevation commands no price in the market, and the like reasoning holds good with the cinchona,—the higher the situation, the greater the production of alkaloid.

No. 266. From Captain H. R. MORGAN, Officiating Conservator of Forests, to J. D. BOURDILLON, Esq., Secretary to Government, Revenue Department, Fort Saint George, dated Ootacamund, 1st April 1861, No. 424.

SIR,

1. In forwarding a letter* and tabulated statement from Mr. McIvor, Superintendent Government Gardens at Ootacamund, I have the honor to request you will submit it to Government for their decision.

* *Dated 30th March* 1861, *No. 37.*

2. As Dr. Macpherson has requested in his letter, No. 7, dated 5th February 1861, paragraph 15, that his report may be laid on the Editor's table for the information of those who have obtained a supply of seeds, perhaps Government would have no objection to lay my report No. 418, dated 28th March 1861 and the accompanying report of Mr. McIvor's also on the Editor's table for the information likewise of those who have obtained seeds.

From Mr. W. G. McIVOR, Superintendent Government Gardens Ootacamund, to J. D. BOURDILLON, Esq., Secretary to Government, Madras, dated Ootacamund, 30th March 1861, No. 37.

SIR,

1. I have the honor to solicit the favor of your having the goodness to submit for the consideration of the Right Honorable the Governor in Council, the following remarks on the subject of Dr. Macpherson's report, dated the 5th February 1861, No. 7.

2. I am induced to bring the circumstances under which this report was written to the notice of Government, being convinced by practical experience and personal knowledge that the Order of Government under date 9th March 1861, No. 552, if carried out, will render almost certain the entire failure of the important experiment now in progress for the introduction of the quinine-yielding cinchonas into India.

3. In my first interview with Dr. Macpherson, and while about to enter into botanical and horticultural subjects, he informed me that he was "entirely ignorant of Botany and gardening;" that he had been selected by Government to inspect and report on the sites, simply because he had seen the cinchona plantations in Java, and the practice of the Dutch in "successful operation." He informed me that as he had been sent here he wished to give a good report to Government on the "whole subject," requesting my assistance with information. This I most readily gave, placing in his hands notes of all that has been published in English on the subject, also the valuable work of Dr. Weddel in French, together with the manuscript notes of Mr. Markham, at the same time pointing out and explaining the parts bearing on the subject in connection with my experience of this climate.

4. Dr. Macpherson in his report lays much of this information before Government as the result of his own investigation and personal knowledge, and I would have been glad to have passed over in silence Dr. Macpherson's adoption of this rather unusual course had it produced no bad results; but when his report has produced an order endangering the experiment, I feel myself called upon by duty to your Honorable Government, to myself, and to the country, to detail with plainness and candour the facts which have lead Government to place (as I will presently show) unmerited confidence in the opinions of Dr. Macpherson.

5. In paragraph 3 of his report Doctor Macpherson gives altogether an incorrect description of the "Dodabetta site." Istly it is not "a scantily wooded Shola," but on the contrary is composed of trees of the ordinary size and height prevailing in the best forest or "Sholas," on these hills, as the Conservator of Forests can testify, having at my request taken the measure of a clump of trees near the centre of the site. 2ndly, it has not an "eastern aspect," but nearly a contrary one, the aspect being north-west. 3rdly, the soil is not "generally a

superficial superstratum" as proved by specimens * (from 1 to 10) taken from various parts of the forest. 4thly, the soil does not rest on disintegrated granite—*vide* specimens from 11, to 15 both included. 5thly, no "masses of trap" (or whinstone) are found in any part of the site. 6thly, it is not deficient in moisture, as can be proved by the Register of the last 20 years kept in the Government Observatory at Dodabetta and established by the specimens of the branches and bark Nos. 16 to 18. Doctor Macpherson has omitted to give in his report the observations he made with the thermometer on this site, which I supply.†

6. In paragraph 4 of the report under review, Doctor Macpherson states: "Now with these facts" before us, it must, I think, be admitted that we are risking our seeds and plants by attempting to propagate them in the Government gardens at Ootacamund, "the elevation" being 7,478 "and 7,596 feet above the level of the sea." Such assertions as the above are very objectionable, because they convey the impression that Doctor Macpherson had given facts to prove that plants could not be propagated, or seeds raised, at such elevations; whereas, Doctor Macpherson did not quote, nor can he quote, a single fact to prove his position; but simply his own opinion, founded as it is on a total want of knowledge of the subject. But I on the contrary have much pleasure in being able to state for the information of Government, the very gratifying fact that many fine seedlings of three varieties of the cinchona are at the present now growing, and have been reared, in the very places Dr. Macpherson *condemns*, and I state without fear of contradiction that no such a favorable place can be found in India for rearing the cinchonas as in the gardens under my charge.

7. In paragraph 5 of Dr. Macpherson's report he urges your Government "without loss of time" to adopt the system now so successfully working in Java. In paragraph 8th of his report of the 19th December 1860, we are informed of the extent of this success in Java; and that with the Dutch, "only one seed out of one thousand germinated." We have already raised over 3 per cent. of our imported seeds; and more are daily coming up, so that at the lowest estimate I have in this respect obtained thirty times the results of the Dutch, and I trust this important fact will induce the Government to reconsider paragraph 5 of their order of the 9th instant, No. 552, and more especially as the operation of this part of the order deprives the experiment of the advantage of the efficient appliances possessed by the garden for rearing seeds, and propagating plants, and thus places Mr. Markham in a wrong position, with reference to his unwearied exertions for its success. On this part of the subject I would most respectfully remark that Dr. Macpherson, apparently alarmed at the effects likely to be produced on the experiment, so far counterorders this order of Government that in paragraph 6 of the notes drawn up for my guidance he directs that I will use my discretion in retaining a portion of the seeds and plants at the garden. The Conservator of Forests in his letter, No. 409 of the 21st, directs that I will put a "stop to any *further attempt* to propagate seeds or rear plants in the garden:" the order of Government being plainly to this effect, I am at a loss how to proceed.

8. In paragraph 8th of Dr. Macpherson's report he approves of the northern exposure of the sites I have selected, but, he does not explain to Government the fact that on his first inspection he entirely condemned the sites because of this exposure, distinctly informing me that

* Specimens of soils from Dodabetta site.
No. 1. from first ridge, six inches below the surface.
,, 2. from second ridge, do. do.
,, 3. from first valley, do. do.
,, 4. from third ridge, do. do.
,, 5. from second valley, do. do.
Specimens of sub-soil.
No. 6. from first ridge six feet below the surface.
,, 7. from second ridge do. do.
,, 8. from first valley, do. do.
,, 9. from third ridge nine feet below do.
,, 10. from second valley, do. do.
Forwarded by Banghy.

Specimens of rocks.
No. 11. from first ridge.
,, 12. from second do.
,, 13. from first valley.
,, 14. from third ridge.
,, 15. from second valley.
Specimens of branches and bark.
No. 16. from centre of site.
,, 17. Upper limit.
,, 18. Lower do.

† Temperature of Air from 12th December to 11th January, the coldest season in the year, mean... 59½°
Lowest... 54°
Highest... 67°
Of earth 63° at 18 inches below the surface.
Temperature of water in the Stream under dense shade at 6 A. M. 52½°, at 6 P. M. 54°, in the water there was no variation throughout the month.

"nothing but a southern exposure would suit the cinchonas, and this they had proved by long experience in Java." All my arguments were used in vain to persuade Dr. Macpherson of the altered condition of the climate which required altered circumstances. I named coffee estates which had failed and been parched up on south exposures; mentioned the greater capability of the coffee plant to endure drought and extremes of climates, and as it had failed, how could we expect to be successful with the cinchonas. Although these questions were unanswerable, they would have proved quite unavailing and had it not been for the fortunate circumstance that while inspecting the Avalanche site we came on a narrow ridge where I was enabled to show Dr. Macpherson at a glance the wonderful difference in the vegetation caused by exposure only between the two forests which lay at our feet, one facing the north, and the other the south. This accident brought conviction to his mind, otherwise Dr. Macpherson would have recommended your Government to have changed every site to the south, and thus brought the most certain destruction on the undertaking.

9. I pass over paragraphs 7, 8 and 9, not because they are free from error of description, but because they do not contain anything seriously calculated to mislead the Government.

10. While describing the soil of Neddiwattum site in paragraph 10, Dr. Macpherson states that "the character of the soil generally on the surface is a rich, black vegetable mould, "18 inches in depth, beneath which is a fine, red, coffee-colored, friable, porous marl." Marl in any shape whatever, has not been found on the Neilgherries; and certainly none on the Neddiwattum site.

11. In Dr. Macpherson's letter to Government, dated Mercara, 20th February 1861, No. 8, a site on the Mangalore Ghát is strongly recommended for a cinchona plantation, the average of the "ridges" being given as "3,400 feet above the level of the sea." Prior to leaving the Neilgherries Dr. Macpherson asked for, and received my opinion on this site; he mentioned that he had seen Mr. Markham at Mysore and recommended that gentleman to visit it. I pointed out to Dr. Macpherson that it is given as a rule by every authority on the subject that cinchona trees growing below 5,000 feet are deficient in quinine, although it is true that the largest chinchona trees are found at much lower elevations, even down to 1,000 feet, but in the words of Dr. Lindley many of these species "yield as little quinine as a willow." The object of this experiment is to produce quinine, and I submit the Government should call for further information before expending a large sum of money on the plantations on the Mangalore Ghát. Without any disrespect to Dr. Macpherson I will quote himself as an authority against the measure he now recommends Government to adopt. In his letter to Government, dated Madras, 19th December 1860,* No. 50, and at paragraph 8, Dr. Macpherson states that he (Hasskarl) "selected for his plantation the slope of the Geday mountain about 100 miles from Batavia varying in elevation from 3,500 to 4,500 feet above the level of the sea," remarking that "ignorant of the habitudes of the plant three mistakes were committed." 1st, the elevation was insufficient; namely the elevation of 3,500 and 4,500 feet, he states to be insufficient, although 100 and 1,600 feet higher than the highest ridges of the site recommended in Coorg. When on the subject of elevation, I give at the foot the opinions of the best authorities, by which it will be seen that we have much to learn on this

* Doctor Macpherson to Government, Madras, 19th December 1860, No. 50.
Paragraph 8th.—Nurseries succeed best at or under 4,000 feet, the Cinchona Calisaya grows only between 5,000 and 5,800 feet, the other species will flourish at a greater elevation. Those planted under 5,000 feet yield little Quinine.
Doctor Jungbuhn in his report, dated July 1st 1858, gives the elevation of the lowest plantation in Java at 4,704 English feet, the highest at 7,875 feet, and the plantation on the Gedong-Badah, as from 6,852 to 7,000 English feet above the level of the sea.

Humboldt gives the elevation.
For Quilled bark at... 9,000 feet.
,, Grey do. ,,... 6,500 ,,
,, Yellow or Calisaya bark at... 6,200 ,,
,, Red bark... 4,500 ,,
Howard, Karsten, and Pöéppy give nearly the same elevation for all the varieties of bark except the red bark.
Markham gives the best elevation for grey and crown barks at from 6,300 to 7,000 feet.
For Calisaya bark... 5,000 feet.
Spruce for red bark... 3,000 ,,
Weddell for the C. Ovata (which Howard says is the red bark) gives an elevation of 5,900 to 7,500 feet.
Note.—The probable cause of these discrepancies may be found in the fact, that in the neighborhood of high mountains, the temperature of the valleys is much reduced at night because the cold air generated on the mountain tops being of greater specific gravity descends rapidly displacing the warm air of the valleys. Consequently the region of the different species of Cinchona will be lowest where the mountains are high, and their tops covered with snow, and highest where the mountains are comparatively low.
W. G. McIvor.

point; and the safest way to attain this knowledge is by careful though inexpensive experiments, which the Neilgherries offer greater facilities for conducting than any other part of India. In conducting these experiments it should always be borne in mind that the highest point at which the plant will flourish and the greatest exposure it will bear without injury is the most favorable for the production of quinine, because vegetable alkaloids such as quinine *are not drawn from the earth*, but are formed by the action of the leaves when exposed to light and air, and the power of this action is increased by elevation and a rarified atmosphere.

12. I shall now proceed to notice the practice of the Dutch in Java, not from a wish to criticise their mode of operations, but because I am directed "carefully to carry out their practice." Long experience, in many instances dearly bought, has taught me the difficulty of carrying out a practice however perfect and successful in other localities or countries, because of the great difficulty of faithfully applying the details of the practice to the varied local circumstances. But when a practice opposed to every principle of horticulture and vegetable physiology is attempted to be carried out, certain failure must of necessity follow.

13. The description given by Dr. Macpherson of what he saw in Java must convey to the mind of every man acquainted with horticulture a painful picture of the want of knowledge of the Dutch in these matters. But in justice to the gentlemen in charge of the plantations in Java, I mention that many important discrepancies occur between their published accounts and that given by Dr. Macpherson, the instance given in the foot,* being selected, as Dr. Macpherson grounds on it, the whole change of the culture in Java; but as my object is simply to deal with this matter in so far as the accounts have mislead Government, I shall only notice the operation as described by Dr. Macpherson.

14. In paragraph 14 of Dr. Macpherson's letter of the 19th December 1860, No. 50, it is stated, "chemical researches have shown a considerably larger amount of quinine in the plants grown in the Island of Java than in any yet imported from South America"** "3 per cent. appears the largest average in the latter, whereas 5 per cent. was discovered in the former." That this result is most encouraging is a fact beyond all dispute; it is probable also, because in cultivation plants can be placed in more favorable conditions for the production of certain secretions than usually happens in nature. Dr. Macpherson does not state it, but it is certain that this gratifying result must have been obtained from the plants exposed to light and air, *i. e.*, grown on the site effectually cleared of forest, as it is as impossible for a cinchona plant to produce quinine when grown in dense shade as for an animal to be fed without food. Dr. Macpherson details the system now followed in Java, namely that of planting the trees under dense shade without even clearing away the underwood as a complete success; experience will prove the reverse, and will one day establish the fact that having gone from one extreme to the other, the Dutch are retrograding instead of progressing in the culture of the cinchona *for the production of quinine*, and that they are now figuratively and literally working in the dark. I append the opinion of Dr. Lindley† on this subject, and this can be supported by hundreds of authorities, and the fact of every-day experience with all plants, as no plant can thoroughly elaborate its juices or perfect its secretions in dense shade.

* Dr. Macpherson, to Government Madras, 19th December 1860, No. 50, paragraph 8 * * * "2nd. The ground should not have been cleared, for the fungi generated by the decaying roots of the forest trees proved pestilential to the growth of the Cinchona tree as is shown in the specimen of the root herewith sent of one that struggled on for 6 years."

In Mr. Clement Markham's translation of Dr. Jungbuhn's report at paragraph 3 and 4, a very different account of the cause of fungi is given. "The attacks of the Rhizanthes, which are also met with at Tjinircan; but the plants here, have been rendered more liable to them, by the great wooden stakes; that Hasskarl had driven in, to protect the young plants from the stormy winds, so close as to injure their roots; and as the ends of the stakes decayed in the earth, they were attacked by fungi.

The strong south-west winds, which prevail during the rainy season, they blow with such force, that several Cinchona trees have been half cut through by the strong cords by which Hasskarl, without the protection of soft moss, had caused them to be tied to the stakes.

† Lindley's Theory and Practice of Horticulture, page 70.—"It is to the action of leaves, to the decomposition of their "Carbonic acid, and of their water; to the separation of the aqueous particles of the sap from the solid parts that were "dissolved in it; to the deposition thus effected of various earthy and other substances, either introduced into plants, as Silex "and Metallic salts, or formed there as the Vegetable alkaloids; to the extrication of nitrogen, and probably, to other causes as "yet unknown—that the formation of the peculiar secretions of plants, of whatever kind, is owing; and this is brought about "principally, if not exclusively by the agency of light. Their green colour becomes intense, in proportion to their exposure "to light within certain limits, and feeble in proportion to their removal from it, till, in total and continued darkness, they are "entirely destitute of green secretion and become blanched or etiolated. The same result attends all their other secretions; "timber, gum, sugar, acids, starch, oil, rasins, odours, flavours, and all the numberless narcotic, acrid, aromatic, pungent, "astringent, and other principles derived from the Vegetable kingdom, are equally, influenced as to quantity and quality, "by the amount of light to which the plants producing them have been exposed."

15. I would further remark that our experiment so far as it has gone will bear favorable comparison with that of the Dutch. Dr. Hasskarl's expedition to South America cost the Government, I am informed, £10,000 and occupied upwards of two years, and was productive of less results than the expedition of Mr. Markham has already been, if nothing more comes from it than the plants now growing in the gardens. On this subject I would remark that I learn from Mr. Anderson that he brought plants of the Cinchona calisaya to Ceylon. I also received from that gentleman seeds of the species noted at the foot;* more of these and other species may shortly be expected from Kew, and more are daily coming up here, so that at the lowest estimate I may safely say that one-tenth of the results to be fairly expected from Mr. Markham's expedition have not yet developed themselves. The two cuttings, one of Cinchona calisaya and one of Ovata, are still alive, but show no signs of growth.

16. Appended is a detailed report of the seeds reared here, the time they have taken to germinate, and the various modes of treatment adopted.

17. With reference to planting seeds on the plan adopted in Java, namely that of sowing them in beds, "one seed in a pot or bamboo" under thatched sheds and watering them "twice daily from the squeeze of a sponge," is so absurd that I am confident on reconsideration your Honorable Government will not require such a mode to be put into practice; few persons have any idea of the care and attention required to rear these small and delicate seeds, especially, after a long journey and exposure to many vicissitudes of climate.

18. With reference to selecting the "Dodabetta site" now condemned by Dr. Macpherson and the work stopped for the present by Government, I have the honor to state that in the first instance the Secretary of State* for India requested information from Dr. Cleghorn and myself on the subject of the sites best suited for the cultivation of the Cinchonas. Ill health prevented Dr. Cleghorn from visiting the localities and selecting the sites. Prior to that gentleman leaving for home he left this duty entirely to myself, stating "it could not be left in better hands." At the time I felt myself insufficiently informed to accept so great a responsibility, and although I named the sites which appear suited I recommended that they should not be finally adopted until we had the benefit of Mr. Markham's personal knowledge of the natural localities of the plants. That gentleman on his arrival here inspected this site, and on a careful comparison of what he observed on the Andes highly approved of it. Mr. Markham being here for a short time only had not an opportunity of observing the moisture of the climate. The observations made by Mr. Markham were forwarded to Mr. Howard, the best judge in Europe of such matters, and that gentleman's opinion is given in the foot note.† Subsequent observations and inquiries confirm in my mind that this site is eminently suited for the experiment, and it is most unfortunate that the work should have been stopped, at the very time the plants requiring a high elevation, are growing in the gardens.

19. I most respectfully beg to solicit that your Honorable Government may be pleased to place this experiment on the Neilgherries entirely under my management, or release me from any connection with it.

20. I make this request having been taught in the early stages of the garden‡ the utter impossibility of conducting operations, either to the satisfaction of Government or myself, when

* Dated India Office, London, 9th June 1859, No. 21, also dated India Office, London, 17th August 1860, No. 42.

* Mr. Anderson to Mr. McIvor, Calcutta, 8th March 1861.—"I also brought out 3 plants of the Cinchona Calisaya which I sent up to Peradenia in charge of Mr. Thwaites, Head Gardener, one was a large plant 3 feet high. It arrived in excellent order."

Cinchona Mecrophylla provenciana.
C. Mecrophylla Pata digellinago.
C. Succirubra.
C. Nitida.
C. Without name.

† From Mr. Markham, February 10th 1861.—"I have heard from Mr. Howard who thinks the site for a Cinchona plantation "in the Shola behind the garden, well chosen if it be not too dry, that is if it is moistened with sufficient showers."

"The conditions favorable for the production of quinine are evidently those of a continuous vegetation with a mean temperature of from 60° to 70°, varying a little according to the species."

No. 126. *Public Department.*

‡ "Extract from the Minutes of Consultation, dated 9th February 1853," paragraph 8.—"In originally appointing a Committee (Extract Minutes of Consultation 20th June 1848), the Government distinctly declared that interference with the Gardener in professional matters should be avoided. It was difficult to state how far the control of the Committee should

constantly interfered with by parties possessing no practical knowledge of the matters in which they would direct. I therefore trust that the success I have attained in these gardens may be taken into consideration, and that Government may repose the same confidence in me they have hitherto done. My long experience (13 years) on these Hills, and consequently my possession of local knowledge in horticultural matters, which must prove of great advantage in conducting this experiment, is a subject worthy of the consideration of Government. I possess testimony to my attainments in botany, vegetable physiology, and horticulture from the most eminent men in Britain ;* and not only do I possess this knowledge, but that I am qualified to apply it with judgment and develope it with success, is established by numerous minutes by the Government of Madras, also the Secretary of State for India, and the late Court of Directors have honored me with frequent and creditable mention of my "zeal, skill, and activity.†—From the Secretary of State to the Government of Madras, dated 12th January 1859, No. 3. From the Honorable Court of Directors to Madras Government, dated 5th August 1857, No. 51, and others.

21. Should your Honorable Government think fit to place the Cinchona plantations on the Neilgherries entirely in my hands, I will accept the responsibility of their success or failure. I do not promise to conduct the experiment throughout without mistakes, but I fear not to guarantee to Government greater results and at far less cost than they will obtain in Coorg or elsewhere.

N. B.—The following telegram just received from Doctor Birdwood is furnished for the information of Government.

From Doctor Birdwood to Mr. W. G. McIvor, Ootacamund.

From Bombay, to Mr. W. G. McIvor, Ootacamund.

Cross left for Calicut to-day, March 30th, by Steam Ship "Dalhousie" with 15 cases of Cinchonas, all healthy."

Received at 6 A. M. Sunday 31st March.

extend, but it was intended that it should be of a general character; that in fact, they should merely see that the Superintendent was carrying out the objects for which the garden was established, and not that he should be placed entirely under their orders and deprived of all power of acting without their instructions."

Paragraph 9.—"The progress which the gardens have since made renders it desirable that this control should be still more relaxed, and the Government think the most expedient plan now is to place the gardens and their establishment entirely under the management of Mr. McIvor, who has shown himself equal to the task, and who will have an additional stimulus to exertion by being made wholly responsible for its success or failure."

* Sir W. J. HOOKER, in London Journal of Botany, June 1847.—"A separate work was still much needed upon the Hepatics, and we have now the pleasure to announce an excellent little Volume on these, the labor of Mr. W. Graham McIvor, at this time attached to the Royal gardens Kew. While resident in Scotland, and since his sojourn in England, this Botanist has been indefatigable in his researches after these beautiful plants, and has consequently been eminently successful, and no less so in the accurate determination of the species."

Professor Lindley bears similar testimony to my Botanical attainments.—"Gardeners' Chronicle and Agricultural Gazette" for 1848, page 20.

From Mr. WESTWOOD, Botanic Gardens, Dollar, November 1st 1845.—"I may with confidence recommend him to your notice as one who is likely to employ the energies of an active mind to advantage in any department of this profession."

From Mr. J. MCNAB, Royal Botanic Gardens, Edinburgh, 8th December 1847.—"I would consider you eminently qualified for any situation either Horticultural, Botanical, or combined that may occur at home or abroad."

From Mr. CUTHBERTSON, Repora, Yorkshire, December 8th 1847.—"He has a thorough knowledge of Gardening in all its branches, in short he is a most enterprising young man and it is very rare to find a young man to equal him."

From Mr. J. SMITH, Curator, Royal Botanic Gardens, Kew, 11th December 1847.—"Therefore viewing his general good conduct, his practical knowledge of Gardening and his Botanical knowledge, I have no hesitation in considering him a most efficient person to fill the gardener's situation now vacant in India."

"Minute by the Honorable the President."

† "I have visited the gardens, and entirely agree with Dr. Cleghorn that Mr. McIvor deserves great credit for the manner in which he has laid it out. The garden is both a beautiful pleasure ground and a valuable public institution for the improvement of indigenous and the naturalization of foreign plants; and it has been formed from the commencement by Mr. McIvor with great industry and artistic skill out of a rude ravine."

"The advantage of Mr. McIvor's science and experience will be in a great degree lost if means are not taken to train up under him persons who can profit by his teaching, and if he is not relieved from mere clerical work."

Ootacamund, 24th February 1861.

(Signed) C. E. TREVELYAN.

"Extract from the Minutes of Consultation under date the 15th March 1859, No. 323."

"The Governor in Council has much pleasure in giving effect to this Order of the Home Authorities, being of opinion that Mr. McIvor has fully earned this augmentation of salary by his zealous and intelligent discharge of his duties; and he desires to express his sense of the great improvement which Mr. McIvor's care and skill, and judgment, have effected in the garden."

Revenue Department.

Proceedings of Madras Government, 15th May 1860, No. 781.

Paragraph 5.—"They concur with Dr. Cleghorn that the Superintendent deserves great credit for his important application of moss, whereby, at once, young plants intended for transplanting are better prepared than formerly for removal and can be transported at less than one-tenth of the usual cost while the garden space is also economized."

(Signed) J. D. BOURDILLON,
Secretary to Government.

Report showing the number of Cinchona seeds reared at the Government Gardens, Ootacamund, with a detailed account of the various modes of treatment.

Names of species.	Nature of the soil in which sown.	Amount of shade.	Amount of water.	Preparation of seeds before sowing.	Number of days before germination took place.	Number which germinated strongly.	Number which germinated weakly.	Total number of seedlings.	Remarks.
No. 1.									All the seeds were sown in flower pots well drained, and the soil boiled in order to destroy the grubs and larva of insects, which would otherwise devour the seeds or young plants as they began to grow. After the soil is boiled it is allowed to dry, then mixed in a dry state, and put into the pots. It is important it should be mixed dry, otherwise it hardens.
Cinchona Micrantha. Variation Provinciana.	A mixture of 3 equal parts, one of burned earth, one of sand and one of very old cow dung.	Shaded in bright sunshine only.	Watered sparingly at first, and only when the soil was dry on the surface. Watered morning and evening.	Steeped for 4 hours in Oxalic acid.	62	61	16	77	
			Do.	none.	.....	none.	none.	none.	
No. 2.	Do.	Do.	Watered as No. 1.	none.	65	none.	8	8	
Do.			Do.	Steeped as No. 1.	63	18	6	24	
No. 3.	In brown loam selected by Dr. Macpherson.	Shaded throughout, except in the mornings and evenings.	Do.	none.	.....	none.	none.	.....	
Do.			Do.	Steeped 4 hours in Oxalic acid.	66	46	14	60	
				none.	.....	none.	none.	.....	
No. 4.	In black loam selected by Dr. Macpherson.	Shaded in bright sunshine only.	Watered as No. 1.	none.	68	none.	2	2	
Do.			Do.	Steeped 4 hours in Oxalic acid.	65	125	47	172	
No. 5.	A mixture of equal parts of loam, burned earth and leaf mould.		Watered as No. 1.	none.	Total number of seedlings...				
Do.	Soil prepared as at No. 1.	Do.	Do.	Steeped as No. 1.	63	18	6	24	
Cinchona Micrantha Var: Pata de Gallinago.									
Do.	Soil as No. 1.	Do.	Do.	none.	.....	none.	none.	.....	
Cinchona Nitida.	Soil prepared as at No. 1.	Do.	Do.	Steeped 4 hours in Oxalic acid.	60	24	8	32	
				none.	.....	none.	none.	.....	
Do.	Prepared as at No. 4.	Do.	Do.	none.	68	none.	2	2	
					Total number of seedlings...				

In the treatment of these seeds they appeared to be impatient of too much shade and moisture, soon becoming mouldy and rotting off. The seeds were sown on the surface and covered with a thin coating of finely sifted moss. The black and brown loams as used in Java, seemed to retain too much water, and are certainly unsuited for rearing old seeds. Fresh gathered seeds possessing great vital power may grow in loam, but not so freely as they would in soil, prepared as at No. 1. The seeds are easily distinguished when they begin to germinate as the radicle being established in the ground the plumule is raised up with the seed on the top of it, where it remains of the process of germination as I find it is not described in any of the Works I possess.

OOTACAMUND,
20th March 1861.

(Signed) W. G. McIVOR,
Superintendent, Government Gardens.

No. 267. From Captain H. R. MORGAN, Officiating Conservator of Forests, to J. D. BOURDILLON, Esq., Secretary to Government, Revenue Department, Fort Saint George, dated Ootacamund, 3rd April 1861, No. 430:—

SIR,

1. I have the honor to report for the information of Government that fifteen Wardian cases of Cinchonas, stated to be in fair order, in charge of Mr. Cross, are expected per Steamer "Dalhousie" this day at Calicut.

2. The Collector of Malabar will make arrangements for their speedy transmission to Sisipara, from which place Mr. McIvor will bring them on with fresh coolies.

3. As the plants will be weak, I propose keeping them in the glass house at Ootacamund until they are in a fit condition to plant out.

4. I have the honor to request the Orders of Government on the subject of entertaining Mr. Cross for the proposed Neddiwattum plantation.

No. 268. From Mr. C. R. MARKHAM, to the Under Secretary of State for India, dated Bombay, 26th February 1861, No. 8.

SIR,

1. In this letter, I propose to submit, for the information of the Secretary of State for India in Council, a report of the present prospects of the experiment now in progress for the introduction of Cinchona plants into India; of my proceedings during my stay in India; and of the conclusions I have been led to form, respecting the measures which it would be advisable to adopt, in order to ensure the success of this important attempt. It is my intention to return to England by the Steamer which leaves Bombay on 12th March.

2. It is with deep regret that, in the first place, I have to report that the sanguine hopes of the final recovery of the collection of plants which arrived in the Neilgherry Hills last October, prematurely expressed in my letter, dated October 20th 1860, No. 7, have been disappointed. I will recapitulate the prospects as they now appear, of successfully introducing the various species of Cinchona into India: and, though as regards the plants and some of the seeds which have already arrived, they are sufficiently unpromising, it will be seen that there is no reason to apprehend the eventual failure of the experiment.

3. The species which, it is intended to introduce into India, are:—

I. The Cinchona Calisaya.
II. Those yielding grey bark.
III. Those yielding red bark and the C. Condaminea, and.
IV. Those which yield the barks imported from New Granada. I will notice each of these, in their order.

4. (I.)—*The "Cinchona Calisaya."*—In my letter dated October 20th 1860, No. 7, I reported that, out of the collection of plants which I conveyed to the Neilgherry Hills, Mr. McIvor had obtained 207 green cuttings and 125 wood cuttings, from which all visible appearances of decay were first carefully removed. I added that, during the first week, upwards of 50 of the green cuttings, and 10 of the wood cuttings were showing signs of growth, and that success was certain. My conclusion, partly dictated by the intense anxiety I felt on the subject, was premature. On the four days following the despatch of my letter there was incessant rain, accompanied by heavy mist; the atmosphere of the gardens resembled that of the interior of a Wardian case, and the green cuttings all began to droop and look sickly. Every endeavour was made to save them, two Waltonian cases were constructed, in order to subject some of them to a bottom heat of 75° and force them to take root; but warmth though it tends to draw out the roots of cuttings, also increases the rapid spread of decay, if any exists, and this experiment was, therefore, only tried on a portion of the cuttings. In spite of all our efforts the green cuttings went off one after the other, the last one lingering until late in November. The wood cuttings continued to look promising for a considerable time longer; but decay made its appearance in them also, a fatal

taint seemed to pervade them all, and when I finally left the Neilgherry Hills, on the 10th of January 1861, only eight retained life, of which one C. Calisaya had a green healthy looking bud, and was very promising. It was healing over the portion of the bark which had been cut, a thing which none of the others had ever attempted to do. In a letter, dated February 10th, Mr. McIvor tells me that these surviving cuttings remain nearly in the same state, but that a little decay is making its appearance here and there in some of them, so that I am unable to entertain hopes of the ultimate recovery of more than one.

5. On my arrival at Alexandria 175 of the plants were covered with leaves and green sprouts and were looking fresh and healthy: so that the mischief must have been caused by the intense heat of the Red Sea, and of Bombay during the six days I was delayed there. It is much to be regretted that a Steamer was not furnished, to convey the collection direct from the West Coast of South America to India. I feel certain that in that case, a great number of plants would have been saved: though it is right to add that, out of the 400 Cinchona plants procured by M. Hasskarl for the Netherlands Government, which had the advantage of being conveyed by the direct route to Java, only two have survived.

6. The loss of the Cinchona plants, which I have collected with so much labour and difficulty in the Peruvian forests, is most disastrous, but not, I trust, irreparable. Before leaving England, I sent 17 small Calisaya seedlings to Kew, respecting which Sir William Hooker says, in a letter dated 8th January 1861, that two continued to show signs of *real life*, though he did not expect to keep them through the winter. In a letter, dated August 18th 1860, he informed me that he had obtained five plants of C. Calisaya which had been in gardens in England for some years, from which he was striking cuttings. There is reason to hope therefore, that a case of C. Calisaya plants may be sent to India, at the same time with the seedlings raised at Kew from the seeds of the grey and red barks. I also think that I shall be able to procure a supply of seeds of the C. Calisaya from South America by means of the £50 which has already been sanctioned for that purpose; and there is a prospect of the Netherlands Government in Java being induced to exchange some of their plants of C. Calisaya for those of species which we possess and they do not, a subject on which I shall submit some further observations presently.

7. (II.)—*The Cinchona yielding grey bark.*—The collection of plants and seeds of Cinchona yielding grey bark, made by Mr. Pritchett in the forests of Huanuco, arrived in England in October; and a gardener from Kew reported on the 20th of that month, that "46 were good strong plants, apparently well rooted." Two of the plants, and a portion of the seeds were left at Kew gardens, the remaining plants and seeds being despatched to India on the 10th of November. They arrived at Bombay on the 13th of December, when Dr. Birdwood, who was directed to examine them by Sir George Clerk, found the seams of some of the cases gaping, the soil utterly parched and dried up, "just like powder in a druggist's shop," and the plants in a hopeless condition. All, except six, were quite dead, several being mere cuttings without the sign of a root, and one a small branch torn roughly from a tree, and stuck in the soil of the case. The six survivors had the pith discolored, and the bark soft. They are all now dead, and Dr. Birdwood reports that the dead plants in the cases appeared to have lost all life for at least three or four weeks.

8. At the same time a packet of seeds of the *Cinchona Nitida, Micrantha*, and of the variety of *Micrantha* known to the bark collectors as *pata de gallianzo* arrived at Bombay, but did not reach Ootacamund until the 13th of January, when they had lost their vitality, and Mr. McIvor entertains no hope that any will come up.*

* Mr. McIvor sent a portion of these seeds to Ceylon.

9. Nevertheless there is every prospect that the grey bark species will be eventually introduced into India, as the seeds left at Kew are coming up in great quantities, and the seedlings will probably be ready for transmission to India in the course of next autumn.

10. (III.)—*The Cinchona yielding red bark, and the C. Condaminea.*—I have received copies of Mr. Spruce's report, and have felt much pleasure at the great ability, perseverance and zeal with which he has conducted the service entrusted to him. I have also heard from Sir W. Hooker in a letter, dated January 8th 1861, that the supply of seeds sent to Kew by Mr. Spruce are doing well, many having already germinated; and that three tin cases of seeds, since transmitted

by Mr. Spruce, reached England early in January, and will be forwarded, some to India and some to Ceylon, without delay. These seeds have arrived at Bombay in good condition, and have been despatched by post to Ootacamund. I trust that Mr. Spruce will not forward the cases of plants until the severity of the winter in England is passed.

11. Mr. Spruce reports that he was unable during the season of 1860 to take any steps for the collection of seeds and plants of the C. Condaminea, but the Secretary of State in Council will probably authorize him to do so during that of 1861.

12. (IV.)—*Cinchona which yields the barks imported from New Granada.*—It will perhaps be remembered that respecting the region of New Granada, one of the four from which I considered it advisable that the different species of Cinchona should be procured, a letter was addressed to the Colonial Office, but that no steps were taken by that Department to procure the species of New Granada. I now find that the eminent Botanist Dr. Karsten presented some seeds of the "Cinchona Condaminea" (Vur 8* Lancifolia) to the Dutch Government and, that there are now 14 healthy young trees of that species in Java, some of which might be exchanged for a few plants of species which we possess and which the Dutch have not. I now propose to submit a few remarks on the letter of Dr. Macpherson, Inspector General of Madras Hospitals, to the Secretary to the Principal Medical Inspector General, dated 19th December 1860 (No. 50), reporting his visit to the Cinchona plantations, Java, especially with respect to procuring this New Granada species, and perhaps some plants of the *C. Calisaya*, by a system of exchange.

* One of the New Granada species.

Proceedings of Madras Government, 11th January 1861, Nos. 166, 167.

13. Doctor Macpherson supplies a few particulars respecting the cultivation of Cinchona in Java in addition to those already given from Dr. Jungbuhn's report, translated in my pamphlet (*"notes on the culture of Cinchonas"*;" but Mr. McIvor assures me that the system of culture adopted by the Dutch is most erroneous (as described to him by Dr. Macpherson), and as the sites selected by them in Java were not chosen by any one who had visited the Cinchona forests in South America, little dependence can be placed on their suitability, while the Java experiment is as yet too recent to admit their superior knowledge on the ground of experience. Dr. Macpherson, however, quotes a letter from the British Consul at Batavia to himself stating "that if the Governor of Madras addresses the "Governor-General of Netherlands India personally, requesting a supply (of Cinchona plants) "for an experiment in India, and offering in return any of the products of India that he may "desire, the supply will be granted." How far this liberality on the part of the Dutch authorities can be advantageously accepted by the Madras Government, is worthy of consideration. There can be no doubt that the Dutch have plants of the *C. Calisaya* (15,819) raised partly from the two surviving plants brought by M. Hasskarl, and partly from seeds sent to Paris several years ago by Dr. Weddell, but I have reason to doubt whether they have any plants of the *C. Succirubra*.† (Dr. Macpherson names that species among those in Java, and gives the number at 35.) Mr. Spruce is probably in a position to bear out my opinion that the Dutch are mistaken in supposing that they possess that species. We, however, now have a large supply of the seeds in India, and as it is of equal value with the *C. Calisaya*, the Dutch authorities, when they ascertain that they have not got it, will probably be quite ready to exchange plants of *C. Calisaya* for those of so valuable a species. It will of course, be unnecessary to make any application, unless our own endeavours to introduce the *C. Calisaya* end in failure.

Paragraph 16.

† Red bark species. It is not mentioned in Doctor Jungbuhn's report.

14. The Dutch also have a New Granada species, the *C. Lancifolia* (14 plants) and they would probably be quite ready to exchange some of these plants for those of equal value which we possess in Mr. Pritchett's collection, namely the *C. Nitida* or *C. Micrantha*.

15. The other species given in Dr. Macpherson's list are quite worthless. The *C. Lucumaefolia* (9,20,068 plants) originally called *C. Ovata* by M. Hasskarl,‡ is of very doubtful character, and the *C. Lanceolata* (45 plants) is probably not a Cinchona at all, the name not appearing in Dr. Weddell's list, nor in those of any of the established modern authorities.

‡ See my pamphlet para. 9 and note.

16. If any proposal for exchanges should eventually be made, it will be very important that a person well acquainted with the appearance of the different species should be sent to receive the plants in Java, so as to prevent mistakes. This might be done by one of the gardeners who have been in South America, who will accompany the plants which will hereafter be sent from Kew to India, and whose services will be required at the Cinchona plantation in the Neilgherries.

17. I now proceed to submit the observations I have made, and the conclusions I have formed as to the suitability of the various hill districts in the Madras and Bombay Presidencies for Cinchona cultivation. These Districts are the Neilgherry Hills, Wainád, Coorg, the Pulney Hills, the Anamallays and Shervaroys, the Hills near Courtallum in Tinnevelly and the Mahabaleshwur Hills in Bombay. I have examined all except the Anamallays, Shervaroys, and Courtallum, it being impracticable to form any Cinchona plantation in the Anamallays for many years to come as there are no European residents and the Shervaroys and Courtallum not possessing sufficient elevation and being ineligible from other causes.

18. *The Neilgherries and Wainád.*—In my letter, dated October 20th 1860, (No. 7), I described the site already selected by Mr. McIvor near the Government gardens at Ootacamund, and stated my reasons for believing that it will prove suitable for the cultivation of those species of Cinchona which flourish at the highest altitudes, namely the *C. Nitida, C. Condaminea* and a variety of the *C. Calisaya*.

19. Early in November, I went with Mr. McIvor in the direction of Wainád, to select another site for a Cinchona plantation, at a somewhat lower elevation, and where the available land would be more extensive than in the ravine already chosen near the gardens. The conditions most favorable for the production of quinine in the bark of Cinchona plants are those of continuous vegetation, with a mean temperature of from 60° to 70° Fahr. varying according to the species; an almost constant supply of moisture; and an elevation from 5,000 to 8,000 feet. In every part of the Western Ghâts the vegetation is subjected during at least three months in the year to an amount of dryness which is never known in forests of South America, but I have seen no locality in India which more nearly meets the requirements of a Cinchona plantation than that which we selected on this occasion. It is or was within the Wainâd District, and the land belongs to the Rajah of Nelemboor in Malabar, who will be quite willing to let it to the Government; but it is, in fact, a portion of the northern slope of the Neilgherry Hills. The site is close to the travellers' bungalow at Neddivattum, near the crest of the Ghât on the road leading from Ootacamund to Manantoddy. The forest covers a declivitous slope, at an elevation of about 5,000 feet, and extends to the verge of the steep descent into the table land of Wainâd. There is a good supply of water in the forest, and the soil is rich, its base being a mixture of syenite and laterite, curiously combined. In this forest amongst other plants, I found the *Hymenodictyon excelsum* (called by Roxburgh *Cinchona excelsa*, but excluded from the list of *Cinchona* by Weddell) an *Andromeda, wildyam, cinnamon, pepper, coffee,* wild *ginger*, an *Osbeckia*, with purple flowers and numerous ferns and orchids. Moss in great quantities was hanging from the branches and trunks of the trees, a sure sign of much moisture. This jungle is within the narrow limits of the region which receives both monsoons. Though protected to some extent from the south-west, it receives a full share of the monsoon during the summer, and is also refreshed by the north-east monsoon coming across Mysore from October to December. During the remaining months, it is not without mists and heavy dews in the nights until the south-west monsoon again commences in May. Eventually the plantation might be extended for a considerable distance to the east and south at the same elevation to the falls of the Moyaar, a tributary of the Cauvery, and even further still in the direction of Kalhutty. The travellers' bungalow, which is never used, would be available as a residence for the gardener in charge of the plantation.

20. The road which passes by Neddivattum leads to the coffee estates in Wainâd, of which there are now upwards of forty belonging to European settlers; thus the planters will often pass the Cinchona plantation, and when its success is secured, it is to be hoped that some of them will undertake the cultivation in the forest lands immediately above the line of their own

coffee estates. Unfortunately the coffee plantations in the Neilgherries are all on the southern side near Coonoor and Kotagherry, which is too dry for the Cinchona, being outside the region of the south-west monsoon. The *C. Succirubra* yielding red bark, *C. Calisaya*, and *C. Micrantha*, may all be cultivated in the forest which has been selected at Neddivattum.

21. *Coorg.*—Next to the sites selected in the Neilgherries the mountainous District of Coorg appears better adapted for the growth of the Cinchona plant than any other part of the Western Ghâts. Tadiandamol, the highest peak of Coorg, is 5,780 feet, and its capital Mercara 4,500 feet above the sea. During January, February and March, scarcely any rain falls, but the valleys are seldom without moisture, and during my visit in January, heavy dews were frequent in the morning and evening, and at sunrise there were always long streaks of low-lying clouds resting on the sides of the ravines. At this season the belts of jungle, both on the Mysore and Malabar sides of Coorg, are scorched up with excessive dryness (a condition never known in the South American forests with which I am acquainted), but this was not so much the case in the loftier parts of the Coorg District. In April and May there are frequent showers, from June to August the rain comes in torrents, in September and October there are showers, in November Coorg receives rain from the north-east monsoon in small quantities, and December is foggy. The fall of rain on the western side of Coorg, the only part suitable for Cinchona, averages 150 inches. The mean of the thermometer at Mercara in 1836 during the hottest month was 78°, and during the coldest 63°, the average temperature being about 65°.

22. I examined the country in the neighborhood of Mercara, and found a locality to which I had been directed by Dr. Macpherson, which is well suited for a Cinchona plantation. It is four miles from Mercara by the side of the road to Mangalore. Its elevation must be a little over 4,000 feet, and the forest, about a mile long, extends in breadth from the road down the steep sides of a ravine, to the valley at the bottom, which is bare of trees. It contains many tall trees though not growing close, and the underwood is very dense, consisting of five kinds of ferns, a solanum, a lobelia, &c. There were also cinnamon, hymenodictyons, tree ferns and melastomacea, and the general character of the flora appeared suitable for the growth of Cinchona. In this the dryest season I found two small streams trickling through the underwood. Further down the Mangalore Ghât there are several flourishing coffee plantations, and when a Government Cinchona nursery is successfully established in their neighborhood, the planters may also undertake the cultivation. There are probably many other sites equally suitable for the growth of Cinchona in Coorg, but none so conveniently situated as regards Mercara. Labor, as is also the case on the Neilgherries, is chiefly procured from Mysore, the coolies coming up after their own work is done.

23. *Pulney Hills.*—In the Madura District the Pulney or Kerraghery hills, like the Neilgherri Hills further north, branch out in an easterly direction, from the main line of the Western Ghâts, united to a portion of the Anamallay range at their western end, they stretch out into the Madura plains for a distance of 50 miles, and average a breadth of 15 to 20. They are divided into two parts, a lower series of hill and dale to the eastward averaging a height of 4,000 feet, where there is a great deal of forest, some cultivation and several villages inhabited by people of the Vellaler caste; and a loftier region to the westward averaging 6,000 feet with mountain peaks, the highest of which, Permanallie, attains an elevation of 7,500 feet. The formation consists of gneiss traversed by veins of felspar, and the soil in the eastern part is a light reddish loam, yielding crops of garlic, mustard, two kinds of millet, besides groves of plantations and lately the villagers have formed several small coffee gardens. In the western and loftier part, the soil is very poor, being a heavy black peat, several feet thick with a yellow stiff clay as a sub-soil. The rains on the Neilgherry Hills have the effect of mixing the decaying grass with the decomposed rock and a rich soil is thus formed, but on the Pulneys this does not appear to be the case, the one becoming a black peat, the other a stiff clayey sub-soil. These remarks apply to the interior valleys, but on the outer slopes looking over the plains of Madura, there is good soil in places and magnificent forests at the foot of a perpendicular wall of gneiss, which forms the southern ridge of the Pulneys. There are also fine forests in the sheltered ravines, in which I observed trees of the following genera, *michelia, myrsine, symplocos, bignonia, crotalaria, passiflora, osbeckia*

jasminum, besides a variety of Cinchonaceous plants such as *hedyotis, lasianthus, canthuim* and *hymenodictyon*. Tree ferns abound near streams, and like the Neilgherries the grassy plains are dotted with rhododendrons, gaultherias lobelias hypericums, and ferns. I was told that during the season of the south-west monsoon, the Pulneys only receive passing showers, and in corroboration of this, I missed the *berberis mahonia* a plant which, on the Neilgherries is never found beyond the range of the south-west monsoon. The Pulneys, however, receive the full benefit of the monsoon from the north-east.

24. There are several damp well wooded ravines near the Settlement of Kodakarnal where the species of Cinchona which prefer great altitudes, might be established. When these plants are thoroughly rooted in the Neilgherries, a few might advantageously be sent to the Pulney hills under the care of the gardener employed by the Collector of Madura, Mr. McIvor having previously selected a suitable site. As the villagers have lately introduced the coffee plant, it is not improbable that they might also be induced to undertake the cultivation of the plant yielding quinine, of the value of which they are well acquainted.

25. *The Anamallay Hills* probably possess several localities suitable for the growth of Cinchona, but being very feverish and no European being yet established on them, it will probably be many years before they could be made available.

26. *The Shervaroy Hills*, in the Salem District, only attain a height of 3,000 feet, and being quite out of range of the south-west monsoon they are both too low and too dry for the growth of the Cinchona plant.

27. *The hills near Courtallum* in Tinnevelly enjoy the full benefit of both monsoons, but the highest waterfall near Courtalium is only 2,000 feet above the sea. Localities however may hereafter be found between Tinnevelly and Travancore with an elevation of 3,000 to 4,000 feet, where the *C. Micrantha* and even the *C. Succirubra* might thrive.

28. *The Mahableshwur Hills.*—The only part of the Western Ghâts within the Bombay Presidency which attains an elevation sufficient for the growth of Cinchona, are the Mahableshwur hills, the highest part of which is 4,700 feet above the sea, in latitude 18° N. These hills are composed almost entirely of laterite overlying the basalt of the Deccan, and the soil is exceedingly poor and shallow. The average temperature of the hottest month is 73°, of the coldest 62°, but the climate in every other respect is most unfavorable. From October to the end of April scarcely a drop of rain falls and every thing is dried up, the Mahableshwur hills receiving no portion whatever of the north-east monsoon, too wide an extent of land intervening between them and the Bay of Bengal. In May there are showers and from June to September there is an unceasing deluge of rain, the fall being estimated at from 250 to 300 inches. The most essential requirement for the growth of Cinchona is a continuous supply of moisture and in a climate where for upwards of six months in the year, they would be exposed to excessive dryness, they certainly would not live. In addition to these climatic obstacles, there is a great want of forest trees in the jungles, which would supply a sufficient amount of shade, the vegetation of the scanty thickets consisting chiefly of such shrubs and small trees as *memecylons, jasmines, randias, indigoferas willows* near streams, a small *crotalaria engenias* with an undergrowth of solanums, gentians ferns and curcumas. I visited both Coorg and Mahableshwur in the driest and most unfavorable period of the year, but the advantage, both as regards vegetation and moisture, was incomparably in favor of Coorg, indeed I should say that there was no part of the Western Ghâts of similar elevation so entirely unsuited for the growth of Cinchona as the Mahableshwur Hills.

29. Ten miles to the eastward of the station at Mahableshwur, and immediately overlooking the valley of the Kistna there is a place called Paunchgunny. It is under 4,000 feet above the sea, entirely exposed to the cold east winds during the dry months, the surrounding hills are destitute of jungle affording suitable shade, and altogether it is the last place where Cinchona plants would be likely to thrive, I regret this because at Paunchgunny there is a small experimental farm belonging to a retired Apothecary of Sir Jamsetjee Jeejeebhoy's hospital, application has been made for some plants, and no doubt all possible care and attention would have been bestowed upon them.

30. The Cinchona plant, in its Native forests is entirely confined to the tropics, and it seems likely that the greater variation of temperature in extra tropical regions would render any part of the Himalaya range unsuitable for its culture. Nevertheless under cultivation it may be found possible to extend the area of the Cinchona region, and the Khasia hills in the Bengal Presidency, where the necessary elevations can be obtained, may hereafter supply another site for a plantation, though, in the first instance, it would be imprudent to attempt the experiment in any other region than that which most nearly resembles the Cinchona forests of South America. In the Island of Penang and in the Tenasserim Province, the necessary climate and elevation may also be found.

31. On the whole, it will probably be found that the hill country of Newera Ellia, in Ceylon, which possesses the necessary elevation and is within the region of both monsoons, will be found as good a locality as any which I have described in the Peninsula of India, and I am glad to hear from Mr. Thwaites, that many of the coffee planters are extremely desirous of trying the cultivation of Cinchonas on their estates. Mr. Thwaites has received some seeds of *C. Micrantha* from Kew, which have not germinated, and there is little hope that those sent him by Mr. McIvor will be more successful. A good supply of Mr. Spruce's seeds will, however, have reached Ceylon by this time.

32. In conclusion, I have to submit some observations respecting the measures it will be advisable to adopt in conducting the future operations connected with this most important experiment, the success of which will establish as a native of India, the plant yielding the most valuable drug as regards tropical countries, that is known in medicine, the supply of which now costs the Government upwards of £50,000 a year.

33. I would recommend that the experiment should, in the first place, and, until the propagation of plants by cuttings has rendered success certain, be confined to the two sites already selected near the gardens at Ootacamund, and at Neddivattum, and that its management should be entrusted to Mr. McIvor, whose zeal, intelligence, experience as a gardener, and knowledge on this special subject, probably exceeds that of any other person to be found in India.

34. There is every reason to hope that, before the close of this year, Mr. McIvor will have in the green house at Ootacamund, a goodly supply of healthy young plants, raised from plants and seedlings sent from Kew, and from Mr. Spruce's seeds of the species *C. Calisaya*, *C. Succirubra*, *C. Micrantha*, *C. Condaminea*, and *C. Nitida*, and it should be remembered that, as regards the *C. Calisaya* especially if only one or two good healthy plants could once be established at Ootacamund, it would be easy to propagate them in two or three years to almost any extent. The Madras Government has already made the necessary grant for expenses connected with clearing and planting the site near the gardens, and a similar grant will be necessary for the plantation at Neddivattum. As soon as the plants are sufficiently strong for planting out, it will be requisite that Mr. McIvor should be assisted by a European gardener to be resident at Neddivattum, and he is now anxious that Weir, the gardener who went with me to South America, should be employed on that duty.

35. When I left Bombay in October, Weir was accidentally left behind, and as on my arrival at Ootacamund, Mr. McIvor said that his services would not be required, I telegraphed to Bombay to have him dismissed and sent back to England. Unfortunately he had already been despatched to Calicut in a native boat and having been three weeks at sea, eventually reached Ootacamund. Regretting exceedingly the additional expense which this mistake has caused, I sent him back to Bombay and he sailed for England on the 12th of January. Mr. McIvor having fully instructed Weir in the best methods of packing plants for long voyages, having demonstrated to him the errors usually committed by the nurserymen in England and considering him a steady and honest man who would be very useful to him when the plantations are fairly begun, is now very anxious that he should be sent out in charge of the cases which will, hereafter be transmitted from Kew, and that he should be appointed as his Assistant

1. Letter to the Under Secy. of State for India from Bombay, General Department, No. 2 185 of 1860.
2. Letter from C. R Markham, to Secy. to Government Bombay, October 15th 1860.

in the Cinchona plantations. When the operations are extended it will be of great importance to secure the services of Cross, the other gardener who has been in South America, to take charge of the plantation in Coorg, under Mr. McIvor's superintendence.

36. As soon as the plantations on the Neilgherries are thoroughly established, I would recommend that a third plantation should be formed in the forest already in Coorg, on the Mangalore road, and in the vicinity of the coffee estates, and also that some plants should be established on the Pulney hills, in charge of an intelligent native. Mr. McIvor having previously selected a site, and given the necessary instructions. Mr. Levinge, the Collector of Madura, has expressed his willingness to do all he can to ensure the success of the experiment. He tells that to the westward of Kodakarnal he can find forests more nearly resembling those of Neddivattum, and which receive more of the south-west monsoon, and thus, under his auspicies, the experiment in the Pulneys would have every prospect of success. Eventually the staff required for the conduct of the Cinchona experiment would thus consist of Mr. McIvor to superintend the whole, and especially the plantation near the gardens, two European gardeners, one at Neddivattum and the other at Coorg, a native with some education on the Pulneys, and the necessary number of Native Overseers and laborers.

37. The large forest trees would at first be left standing in the plantations, to protect the plants from the sun, the gales of wind, and heavy rains; and further reflection has confirmed me in the opinion that it will be most advantageous to cultivate the Cinchonas as shrubs, in the same way as coffee and cinnamon, and not to allow them to run up as trees for reasons which I have already stated in my letter, dated October 20th 1860 (No. 7). Mr. Howard, the Quinine manufacturer, informs me that though the large bark from trees is preferred and yields rather the most quinine, the bark from small branches also commands a good price. Shrubs would undoubtedly suffer little from the bark being removed from their smaller branches while large trees would never recover from the loss of the bark from their trunks, indeed such a system would resemble that which has proved so destructive to the Cinchona trees in South America.

38. As Cinnamon is the only other plant which is cultivated for its bark, I have procured a few particulars respecting its culture in Ceylon from Mr. Thwaites. In the cinnamon gardens the young shoots are peeled twice during the year at a particular period of growth when the bark comes off readily. This particular time is known at once by the peelers from the appearance of the young shoots and the process of peeling is then a very expeditious one, with practised hands. Young plants are raised from seeds in nurseries, and planted six feet apart, when they are a foot or 18 inches long. They will commonly bear peeling in three or four years after being transplanted, if in a favorable locality, and properly attended to. The roots are earthed up frequently to keep the soil loose and free from weeds.

39. From the Government plantations it may be expected that a considerable quantity of quinine-yielding bark will eventually be collected, and though the process of extracting quinine may be too difficult and require too much skill as well as expensive materials difficult of transit to give any prospect of its being carried on *in situ*, there can be no reason why a manufactory should not be established in the Presidency town, so as to avoid the costly necessity of sending the bark to England. I have had conversations with many coffee planters on the subject, and I think it likely that as soon as they know that the Government experiment has been successful, they will be willing to undertake the cultivation of Cinchona plants on their own account. For this reason it is an advantage that the Government Cinchona nurseries should be in the vicinity of the coffee estates. Should this be the case, the Cinchona would soon be as important an addition to the products of the hills in a commercial point of view as coffee has already become. The impression that the Natives can with difficulty be induced to undertake the cultivation of any new plant is certainly erroneous, as regards Southern India. In Wainád upwards of 2,000 acres is taken up for coffee cultivation by Natives: in Coorg, where coffee was only introduced about six years ago, I scarcely saw a single hut to which a small coffee garden was not attached, and the villagers in the Pulney hills have also commenced its cultivation. Thaine is grown to some extent in Mysore, and the extent to which the Cassava (*Jatophra Mainhot*) only lately introduced, is cultivated in Travancore, is quite remarkable. There is every reason to suppose that the Natives will be equally ready to cultivate a plant yielding quinine, the value of which is so well known to them

Mr. Dalzell states that Chirimoya has already been introduced, but the fruit and flower described by him, is quite different from the Peruvian Chirimoya.—*Bombay Flora Supp.*

The seeds of the Chirimoya, generally considered the most delicious fruit in the world, of the Aji or Peruvian pepper and of the schemes Molle, which I brought from Peru, are coming up very well. The Chirimoya will probably succeed well at Bangalore, the Aji Capsicum in all the warm parts of India.

I have supplied Mr. McIvor with Dr. Weddell's "*Quinologie*" and with memoranda on the species of Cinchona yielding red, grey and crown barks, collected from the works of Karsten Humboldt, Coldas, Pöeppy and others. It is important that he should also have Mr. Howard's work ("Quinologia de Pavon") now in process of publication by Lovell Reine (Henrietta street, Covent garden), and I request that the numbers of that work, which have already appeared, may be supplied to him.

Copies of this report have been transmitted to the Governments of Madras and Bombay.

(True Copy.)
(Signed) G. BIRDWOOD,
Secy. and Curator, Govt. Museum, Bombay.

No. 269. From D. MACPHERSON, Esq., M.D., Inspector General of Hospitals, to J. D. BOURDILLON, Esq., Secretary to Government, Revenue Department, Fort Saint George, dated Rangoon, 22nd March 1861, No. 21:—

SIR,

1. The Proceedings of Government, No. 552, dated 9th March, having reached me on the eve of embarkation for this place, I was unable until now to reply to the 6th paragraph, wherein I am requested to suggest the means for preparing the ground selected for a Quinquina nursery and plantation in Coorg, in order that the plants and seeds expected may be divided between that locality and the two others on the Neilgherry Hills.

2. The site is on the left hand side of the road as it descends to the port of Mangalore 70 miles distant. Towards its upper third is an elevated green knoll, overlooking the entire space, having gentle sloping banks descending to a winding stream, with a corresponding gentle ascent on its opposite side, and so onwards, the ground covered with forest undulates until it approaches the open space near the village of Mudenaad.

3. The Overseer's house (a temporary building which could be erected in a couple of weeks) should occupy this knoll; and all the underwood down to the ravine facing north-east from the knoll should be removed without delay, which would give space sufficient for seed nurseries and for the protection of the plants imported, until they had acquired sufficient strength to bear planting out during the months of June, July and August, extreme care being taken (*vide* my report on the Java system) that all dead roots, &c., are removed from the holes prepared for them.

4. The dimensions of the Java nurseries are about 80 to 100 feet long, six feet deep and seven feet high in the centre of the roof, the frame work being rough branches bound together with fibres, and the leaf roof descended on both sides to within four or five feet from the ground, the space beneath and both gables being open, one side of the roof was capable of being raised so as to admit the rays of the morning sun and to secure free ventilation above. Seed beds raised about a foot, the mould being retained in space by split bamboos, and platforms, two feet high for pots and cut ends of bamboos, are ranged on one side of these nurseries, the space in front being free, for the purpose of watering and examining these. And on a card board at the entrance into each range, are recorded the number of seeds or plants, the date on which they were put down, and other particulars. I think this system should be introduced into our plantations.

5. Permit me to suggest that the Coorg plantation be placed in charge of a skilled European gardener. This is very necessary here, as he will probably be left very much to his own judgment. If such an individual be not procurable at present, Mr. McIvor may probably be able to depute an East Indian from his gardens to commence operations without delay.

Lieutenant Gunning, an Officer of the 25th Regiment now stationed at Mercara, who takes an interest in horticulture, might have charge of the expenditure, and perhaps Government may sanction the usual deputation allowance to him on such occasions as he visited the locality.

No. 270. From Captain H. R. MORGAN, Officiating Conservator of Forests, to J. D. BOURDILLON, Esq., Secretary to Government, Revenue Department, Fort Saint George, dated Ootacamund, 9th April 1861, No. 437:—

SIR,

1. I have the honor to report for the information of Government, that Mr. Cross has arrived at the Ootacamund Gardens with 463 plants of the C. Succirubra and 6 Calisaya plants all in good order.

2. Mr. Cross is not prepared to proceed to Neddiwattum as he wishes to return to South America.

3. Mr. Cross, I think, would accept an engagement from Government, say for two years, to send supplies of seeds and plants to this place. I have requested him to draw up a paper stating what he purposes doing and his terms, which I trust to be able to submit to Government shortly.

No. 271. ORDER THEREON, 16th April 1861, No. 855.

1. The papers above recorded relate to the prosecution of the attempts to introduce the Cinchona tree into South India. It is unnecessary to review them at length; and the Government will merely notice those points on which orders are required.

2. It was directed in the Order of the 9th March, No. 552, that the site at the back of the Government Garden at Ootacamund should be abandoned, and also that a stop should be put to attempts to raise Cinchona plants and seeds at the Garden. In deference to the opinion expressed by Mr. Markham as well as by Mr. McIvor, the Government now modify that order, and give permission to continue the operations at the Garden ravine site, as well as to retain at the garden for the present the plants brought by Mr. Cross, and sow the seeds, as the Neddiwattum site is not ready and does not contain the necessary appliances.

3. The Governor in Council however desires that this last mentioned site, which Mr. Markham considers (paragraph 19) to be eminently well suited to the purpose, shall be prepared as soon as possible, and a portion of the plants transferred to it. The Government had hoped to engage the services of Mr. Cross to have immediate charge of this plantation; but from Captain Morgan's letter of the 9th April they learn that he is unwilling to remain in India. The Government have applied to the Secretary of State to send out Mr. Weir, and they will repeat the request now it is found that Mr. Cross does not desire to remain.

4. For the present the Government plantations will be confined to these two sites; but seeds should be distributed to those Coffee planters in Wainád and Coorg who may wish to try and rear them. After the result of the experiment on the Neilgherries shall be known, the Government will be prepared to commence operations at the site selected in Coorg, which Mr. Markham (paragraph 21) agrees with Dr. Macpherson in regarding as well suited to a Cinchona plantation.

5. In accordance with Mr. Markham's recommendation (paragraph 33) the operations at both the sites now fixed on, viz., the Garden ravine and Neddiwattum, will be entrusted to Mr. McIvor. Captain Morgan will report after consulting with him, as to the arrangements to be made for the immediate superintendence of the operations at Neddiwattum, until the arrival of Mr. Weir or some other qualified Gardener from England.

6. The papers will be laid on the Editor's table.

(Signed) J. D. BOURDILLON,
Secretary to Government.

ever germinate, it is impossible to say.
The sandal-wood tree if grown in a moist and shady situation does not yield the same scent as that grown on partially exposed situations. Tea if grown in a low latitude and elevation, commands no price in the market, and the like reasoning holds good with the Cinchona, the higher the situation the greater the production of Alkaloid.

I have the honor to be,
Sir,
Your Most Obedt. Servant.

W. Mayne Capt.
Offg. Conservator of Forests

It seems to me that cause is shown for trying a portion of the seed at the place I in the suggested in the letter

Mr. Wilcocks
Mr. Edgeworth
Mr. Wallich

We appear to have been rather hasty in Commendatory Dr. Graphic have had read a proper price in the letter. Mr. Wood not have happened - I don't think would have Mr. Morgan - the smaller had letter be left in the hands of Mr. Forest & Co.

WD

Received 12th Dec. 1863
From Govt. of India
No. 806.

R— 11 Jany/64 Rs 166-14.
— 12 Bundy/64 — 3-4
— 9 Bundy/64 — 170-12-
Copy sent to Collector of Customs
Dy 24th to Madras for Rs 13.

Dated 1st Dec. 1863
Rec'd 23rd Dec.
No. 1110.
Calcutta Mint
Transmitting Certificate of Assay of Bullion received from the Bombay Mint.

No 265.

C. & E. Copies

Simmonds for work to guarantee to Government as good results and at far less cost, than they will obtain in Europe or elsewhere.

I have the honor to be
Sir
Your most Obedient Servant

J. B. Nelson
Superintendent
Govt Gardens

The following Telegram just received from Dr Birdwood is furnished for the information of Government.

From Dr Birdwood to Dr W. G. Mc Lean
Cotacammund
" Bombay "
Cross left for Calicut to day March 30th by Steam Ship Dalhousie with 15 Cases of Cinchonas - all healthy.
Received at 6 A.M. Sunday 31st March.

Note- In case the Govt. should consider it expedient to purchase Iron of the above Species, according to the process in Para 18, I may mention that

the telegram from Hanley herewith
but ask announces the destruction of
our Crops with plants from Hanley
for the Millstreams. I believe our
Crops is a good one & Trees; but I
am not quite sure. If but in
charge of the Plantations, he will be
under some disadvantages from
his removal to the country. And Capt
Morgan the only Conservator of
[illegible] could be relied on to
give him all necessary assistance.

D. J.
Feb. 5

Except our Crops I know
no one competent to relieve me.
Mac Iver. He latter would take
pains with the experiment I have
no doubt; but it cannot be in his
own way.

There was no telegram
to indicate [illegible] Mr McC— is

The Messages most of the
Seeds Use — Made out
to Trees — The most Depth
Wants Just the
Values Will —

N° 430.

Ootacamund 3rd April 18

From,

Captain H. R. Morgan
Offg: Conservator of Forests

To,

J. D. Bourdillon Esqr
Secretary to Government
Revenue Department
Fort St. George

Sir,

I have the honor to report for the information of Government that fifty Wardian cases of Cinchona, stated to be in fair order, in charge of Mr. Gross, are expected per Steamer "Dalhousie" this day at Calicut.

2. The Collector of Malabar will make arrangements for their speedy transmission to Sisipara, from which place Mr. McIvor will bring them on with fresh coolies.

3. As the plants will be weak, I propose keeping them in the glass house at Ootacamund until they are in a fit condition to plant out.

4. I have the honor to request the orders of Government on the subject of

---

From Capt. H. R. Morgan
Offg. Conservator of Forests
Nilgiris.
To J. D. Bourdillon Esqr
Secretary to Government
Revenue Department
Fort St. George

Received 7th April 1863
No 430

Transmitting Letter from Mr. Gross
Cinchona Seeds
Plants &c.

Referred to Collector of Malabar
Mr. McIvor
Mr. Gross
Dr. Wallich
Dr. Thomson
Dr. Bidie
Dr. Cleghorn
Mr. Cathcart
Mr. Sedgwick

entertaining Mr. Crole for the proposed
Neddymottum plantation.

I have the honor to be,
Sir,
Your most Obedt. Servant.

W. Morgan Capt.
Asst. Conr. of Forests

I am not acquainted with the exact particulars of terms - if they are favorable & such a one as you intend to Capt. Morgan & Mr. Mc Ivor, in which point the letter is not clear, he should be engaged 3 years at 3 months at a time

W. Ch.

Looking to the terms of Mr. Mc Ivor's last letter I think it would be desirable to secure the services for ten years, at all events if practicable

WH

R. D.

No 853

Proceedings of the Madras Government

Under date the 16th April 1861

Read the following letters

From the Offg: Const of Forests
Brings to the notice of Govt certain discrepancies ~~which exist between~~ Dr Mac Iver's first & second Reports on the Cinchona Plants ~~recorded in Proc of Govt No 533 dated 24th March 1861~~

} Here enter 28th March /61 No 418

From the Offg: Const of Forests
Forwards letter and tabulated statement from Mr Mc Ivor, Supt Govt Gardens at Kotagherry on the culture of the Cinchona ~~and requests that~~ this report as well as its enclosures be laid on the Editor's table for the information of those who have obtained seeds

} Here enter 14th April 1861 No 424

From the Offg: Const of Forests
States that 16 Wardian cases of Cinchona plants in charge of Mr Cross are expected ~~to arrive~~ ~~at Calicut this day~~ and requests that ~~Mr Cross may be directed to proceed with them to Ootacamund~~ & that instructions ~~may be issued~~ for the disposal of the plants ~~on their arrival~~

} Here enter 8th April 1861 No 430

~~From Secy and Curator Bombay~~

~~From~~ Copy of Mr R. Markham's report to the Under Secretary of State for India on the prospects of the experiment in progress for the introduction of Cinchona ~~plants~~

} Here enter 26th July /61 No 878

From the Insp Genl of Hospitals
Rangoon.

In obedience to orders proposes measures for preparing the ground selected for a Quinquina Nursery and plantation in Coorg.

} Here enter 22nd March /61 No 221

Copy with Letter to Govt
Dated 24th March 1861 No 63

Proceedings of Govt
No 853
Dated 16th April 1861

From
The Offg: Const of Forests
To the Secy to Government
Revenue Department

Dated 3rd April 1861
Rec'd 6th

No 430

Ootacamund Nilgiris
The 3rd April 1861

Sir

I have the honor to transmit
Letter of Circulars in charge
of Mr Cross and explain the
object of the steps and request
that I may be informed
how many of the plants
are to be retained - Collects orders
on the subject of entertaining
Mr Cross for the production
of Quinine plantations -

I have &c
(Signature illegible)
Offg Const of Forests

No 263

From the Offg: Coms.y of Stores to
Reports the arrival of Mr. Crofs
at the Botacamund Gardens with 263
plants, of the Cinchona kind, sent by Mr. Crofs
[~~plants, of the Cinchona kind and~~
~~Coleus & plants all in good order~~
~~but he~~ writing is not prepared to proceed to
Neddivattum, for reasons stated within
That he would accept of some cuttings
seeds and plants of other kinds from S. America

Here enter 9th April 1861 No. 437]

1. The papers above recorded relate to the prosecution of the attempts to introduce the Cinchona tree into South India. It is unnecessary to review them at length; and the Govt will merely notice those points on which orders are required.

2 It was directed in the order of the 9th March, No. 562, that the site at the back of the Govt Gardens at Botacamund should be abandoned, and also that a stop should be put to attempts to raise Cinchona plants and seeds at the garden. ~~in Botacamund.~~ In reference to the opinions ~~of~~ expressed by Mr. Markham as well as by Mr. McIvor, the Govt now modify that order, and give permission to continue the operations at the garden ravine site; as well as to retain at the garden for the present the plants brought by Mr Crofs, and sow the seeds, as the Neddivattum site is not ready & does not contain the necessary

necessary appliances-

3 The Governor in Council however desires that this last mentioned site, which Mr Markham considers (Para 19) to be eminently well suited to the purpose, shall be prepared as soon as possible, and a portion of the plants transferred to it. The Govt had hoped to engage the services of Mr Cross to have immediate charge of this plantation, but from Capn Morgan's letter of the 9th April they learn that he is unwilling to remain in India. The Govt have applied to the Secretary of State to send out Mr Weir and they will repeat the request, now it is found that Mr Cross does not desire to remain.

4 For the present the Govt plantations will be confined to these two sites, but seeds should be distributed to those Coffee planters in Wynaad and Coorg who may wish to try and rear them. After the result of the experiment on the Neilgherries shall be known, the Govt will be prepared to commence operations at the site selected in Coorg which Mr Markham (Para 21) agrees with Dr Macpherson in regarding

regarding as well
suited to a Cinchona
plantation.

5 In accordance
with Mr Markham's
recommendation, (Para 33),
the operations at Cotta tree
hills now fixed on, viz
the garden raising and Ne-
-ddiwattum will be en-
-trusted to Mr Mr Ivor.
Capt Cleasby will report
after consulting with
~~Mr the Supt~~ him, as to the
arrangements to be made
for the immediate su-
-perintendence of the opera-
-tions at Neddiwattum,
until the arrival
of Mr Weir or some other
qualified gardener from
England.

The

6 The whole of the
papers will be laid on the
Editor's table.

5 Copies to the Conservator of Forests
13 — Do of Revr Dist.s 17
5 — Dispr Genl of Hospitals
1 Supr Gdn Gardens, Otacamund.
Returned 7 Dist.s

Attempts to introduce the
Cinchona trees in S. India

Linn. Zoology.
Botanical Commerce.
Lectures
a Prof.
Ah. 15.

Copy in a Letter to England
of 24th April 61 N. 63-

Revenue 1861 Departt.
Pro: of Govt. for April.

No 855.

Pro: of the Madras Govt.
of 16th April 1861.

From Comm. of Funds. 1 June 61 C. No 1321.
(Increase of Pay for Mr. Mc Ivor).

From Supt. of Chinchona
Plants to Govt. recommending
27 July 61 C. No. 1792 in

Reviewing papers
relating to the prosecution
of the attempts to introduce
the Cinchona tree into South
India.

166. 167

11-1-61

3-4

1-3-61

170. 171

9-3-61

R. C. No 806/61

No 265 at 271.

C.F. 73.

DEPARTMENT.

Paper taken out of the Records from the charge of the Referencer.

Press / Miscellaneous / Routine **No._____, dated_____ 193 .**

Date taken out.	FOR WHAT PURPOSE.			Initials of clerk taking the paper or of attender.	Date returned.	Initials of attender.
	Department.	C. No.	Year.			
17/5/88	MHO	53/27	88	RSP	88/6/10	
10/3/53	MHO BW	892/54		M	Lodged 2 Files MD	