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Dated 25 - 6 - 1862

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No. 385. Read the following letter from W. G. McIVOR, Esq., Superintendent Government Chinchona Plantations, Neilgherries, to J. D. SIM, Esq., Secretary to Government, Revenue Department, Fort Saint George, dated Ootacamund, 9th May 1862, No. 1:—

SIR,

1. I have the honor to acknowledge the receipt of the Order of Government of the 30th April 1862, No. 931, directing me to submit any observation I may wish to offer on Dr. Anderson's Report to the Supreme Government, dated the 11th February 1862, No. 333.

2. The successful cultivations of Chinchona in India is a subject of such vast importance that the Government will, I trust, excuse the candor and detail with which I proceed to discuss the merits of the Report, as it is most important that all facts connected with this experiment be fairly and plainly represented, so that they may be understood, and duly appreciated by Government.

3. From a careful perusal of the Report, the unfair manner in which the condition and prospects of our experiment is depreciated, combined with the disparagement of the great success and exertions of Mr. Markham, and the various discrepancies which the evasion of these facts necessitate, renders the object and meaning of the Report difficult to be understood. Although the time which has elapsed since the Report was written is comparatively short, nevertheless it has been sufficient to place Dr. Anderson in the position of offering arguments and opinions against developed facts, as our plants in the open air have now passed through the whole of this unusually dry and cold season, not only without injury, but they have during the whole time preserved the finest possible state of health, many hundreds of them having made shoots in this so-called fatal season of from 9 to 12 inches.

4. It is endeavored to be shown at page 4, paragraph 8 of the Report under review, that our plants on the Neilgherries from being artificially propagated cannot bear the risks of a long journey; or in other words, that they are more delicate than the Java seedlings, which Dr. Anderson had frequently seen "die after only touching the leaves on one occasion." Our young plants are subjected to as much handling as ordinary forest trees in an English nursery; and that they are better suited to bear a journey is established by the results described by Dr. Anderson, who in the first instance states that "of those I brought, the short journey from the Neilgherries to this, I lost nearly 10 per cent., while the plants from Java, which were seedlings, can hardly be said to have suffered at all." But this is an exaggeration of the losses with our plants, as at paragraph 4, Dr. Anderson informs us that "about 13 plants out of 204, the entire number received, have been seriously damaged; the remainder, in the present genial climate of Calcutta, have quite recovered and are as healthy as they were at Ootacamund." And again at page 25, paragraph 20, Dr. Anderson states that 193 of the plants from Ootacamund were "growing most vigorously" on the 11th February 1862, it thus appears that the loss of the plants from Ootacamund was less than 5½ per cent. The number of plants which Dr. Anderson delivered at Ootacamund, compared with those which he retained in the Calcutta Botanical Garden and the number he originally received from Java, shows that the loss in transit of the Java plants was fully three times as much as the loss sustained on the plants he took from Ootacamund.

5. Another instance of extraordinary disparagement occurs at 14, paragraph 4, where Dr. Anderson states, "I maintain that the successful rearing of the Chinchonas in the green houses at 'Ootacamund is no more a proof that the climate of the Neilgherries is adapted for their cultiva- 'tion than the fact that many thousands of seedlings as well as cuttings are now existing in per- 'fect health in the Chinchona nursery at Kew would lead us to expect that the plants will grow "in the open air in England." This sentence conveys, as Dr. Anderson must be well aware, the most erroneous impression that can possibly be conceived; because in England the differenc

between summer and winter precludes the possibility of Chinchonas ever being grown there; but how different is this climate, our extreme variation between summer and winter taken from the observation of T. G. Taylor, Esq., made at Dodabetta, for 10 years, shows the extreme variation of temperature here to be 25·25° the variation in England in usual seasons is 43·7° and in severe winters frequently 80°. Dr. Anderson was here in the depth of the most severe winter we have had for 25 years, and the greatest cold that has ever been registered on the Neilgherries occurred at that time; yet notwithstanding Dr. Anderson saw hundreds of plants turned out daily into the nurseries in the open air at Neddivattum, without sustaining the slightest damage. Moreover, Dr. Anderson also saw six plants of different species which had been placed out in September last in a cleared spot in the highest and coldest part of the Neddivattum site, which at the time he saw them (December) all the species were in the finest possible state of health although they had then passed through the coldest part of the season.

6. Dr. Anderson in page 13, paragraph 3, shows that he was quite conversant with the object of our plants being placed in the glass houses,* and states this to be "the wisest plan "that could have been adopted," and it is unaccountable why this advantageous system of cultivation should have been in the very next paragraph converted into the means to impress upon the Government the very erroneous idea that the climate of the Neilgherries is as unsuited to the cultivation of Chinchonas as the climate of England. I cannot pass over without remarking the rather confusing discrepancies in the Report with reference to the sites. At page 3, paragraph 5, Dr. Anderson states that "all the sites that Mr. McIvor had selected were carefully visited, "their Geology, Meteorology and Botany examined and their characteristics noted." And again at page 14, paragraph 3, while speaking of our plants, Dr. Anderson states, "they have been "placed under these circumstances for two reasons, in the first instance from there being no "one in the Neilgherries who could point out the sites on those mountains best adapted for "receiving the plants, and thus they were considered to be safer under the protection of "a glass house." And again, at page 14, paragraph 4, "the great difference that exists "between the climates of the South American Chinchona forests and the Neilgherries ought "to have received greater attention than it has, and in the selecting of sites convenience of "access from Ootacamund should have been made subservient to the greater consideration of "climate." Also in page 19, paragraph 19, "with the exception of one, the sites that have been "chosen are certainly the most favorable localities that could be found in the Neilgherries." I submit that the information which Dr. Anderson possessed did not justify the remarks above quoted; as Dr. Anderson was aware that all the sites were either selected or approved by gentlemen who had visited the Chinchona forest of South America, and made a careful comparison of our climate with that of the Chinchona regions of the Andes. And on reflection Dr. Anderson must admit that this gave their opinions infinitely greater weight than his own; which was necessarily formed on descriptions he had read of the climate of the Andes, as Dr. Anderson never visited the Chinchona regions; and he cannot hold that reading a description of a subject can convey a more correct conviction than personal observations and experience. We all know how liable we are to misconceive and misapply a fact we have read or heard described; and that Dr. Anderson is not beyond the liability of falling into this error is illustrated at page 22, paragraph 14 of his Report, where he quotes, what Mr. Spence describes as the seriously damaging effect of wet weather on the plants, to be a condition highly favorable and necessary for their development. It is plain to the most ordinary reader that Mr. Spence, from page 2 to 4 of his Report of the 12th October 1860, speaks of the unusually damp season on the Andes as being likely to frustrate his undertakings, which in his own words was only rendered successful when "towards the end of July the weather took up, and in a few sunny days the

* Mr. McIvor to Secretary to Government 9th May 1861, No. 59, paragraph 11:—"The plants brought out by Mr. Cross have been transplanted in our glass houses, and are now favorably progressing in the process technically termed 'hardening off,' by this process they will in a few weeks be able to bear exposure without injury; and although they could then be transplanted in the Neddivattum site without the loss of a single plant, I would consider it very unadvisable to put them there because a few plants put out into an immense forest swarming with wild animals would be liable to be entirely destroyed in one night however well they may be fenced. Moreover, it is of the utmost importance that all the original plants be retained here, as this would greatly facilitate their propagation, and give us a stock of plants in fourteen or fifteen months, which otherwise could not be had for many years."

"capsules made visible advances towards maturity." Any one reading the severe losses of 1860, owing to the wet harvest, would not have fallen into a more serious error had he conceived that a wet harvest was highly beneficial, by causing the crops of grain to grow and rot in the ear.

7. At page 12, paragraph 2, Dr. Andersonhas endeavored to depreciate Mr. Markham's success and exertions to an extent which the facts of the case do not justify; with reference to the charge set forth of this gentleman's "ignorance of Botany and science generally," the result of Mr. Markham's expedition entirely rejects. The Chinchona seeds which Dr. Anderson himself brought to India were the produce of Mr. Markham's expedition, many hundreds of plants in Ceylon, and Jamaica, are the produce of the same; and we now on the Neilgherries possess upwards of 30,000 plants of nine of the most valuable species of Chinchona,* all the result of Mr. Markham's exertions. In short, the success has been such as never before to be equalled by any endeavour on record to import plants; and, are we to believe, this success to be the result of chance, directed by ignorance? Dr. Anderson might have been consistent, and instead of taking all the credit of conveying the plants from Java to himself; he should have conferred it on the Native gardener who accompanied him. Not only was Mr. Markham qualified to carry the importation of the plants with which he was entrusted to its present successful issue, but that gentleman gave much further proof of his ability by affording such information and observations as has secured the successful management of the plants after their introduction. The correctness of this is now well established; for those who have attended to Mr. Markham's observations on the management of the plants have met with great success; while those who have either neglected or despised his theory have met with comparative failure; and this indeed is the case with Dr. Anderson, who raised from Mr. Markham's seeds in the early part of last year "about 80 seedlings," and the table given at paragraph 20 of his Report shows that these had decreased on the 11th February last to 31.

8. At page 11, paragraph 12, Dr. Anderson observes that "in concluding this general "account of what I observed in Java, I may state that I was greatly impressed with the advantage "in every way of having so important an experiment directly under scientific superintendence." It is difficult to trace the facts which made this impression on Dr. Anderson's mind; none capable of doing so are described in his report, nor are they to be found in the results of the Java experiment; but the contrary, for we find that the scientific gentlemen in charge of the operations in Java (perhaps through ignorance, or perhaps because the plant was hardy and grew rapidly) cultivated to a large extent, and at great cost an entirely worthless species of Chinchona, to which they had erroneously attached the name of a valuable sort; these gentlemen were unable to discover their error, and unwilling to admit it when first pointed out; but now the fact has been indisputably established by the examination and analysis of Mr. Howard, both of specimens and bark from the Java plant, and also of the same species from its natural locality on the Andes. Again referring to paragraph 2 of Dr. Anderson's report it appears Dr. Jun-

* *List of the number and species of Chinchona plants in cultivation on the Neilgherries, on the 30th April 1862.*

Botanical Names.	Commercial names.	No of plants.	Value in the London market per lb. of dry Bark.	Remarks.
			s. d. s. d.	
1. Chinchona Succirubra ...	Red Bark	14,450	2 6 to 8 9	All in fine health.
2. Do. Calisaya	Yellow Bark	237	2 10 to 7 0	Do. do.
3. Condaminea Var, Uritusinga..	Original Loxa Bark ..	1	2 10 to 7 0	Unhealthy.
4. Condaminea Var, Chahaurguera	Rusty Crown Bark ..	8,000	2 10 to 7 0	All in fine health.
5, Condaminea Var, Crespilla ...	Fine Crown Bark	105	2 10 to 6 0	Do. do.
6. Lancifolia from Java	Crown Bark.. ...	1	1 8 to 2 10	Unhealthy, affected by fungi.
7. Nitida	Genuine Grey Bark ..	2,922	1 8 to 2 9	All in fine health
8 Species without name ...	Fine Grey Bark	1,211	1 8 to 2 10	Do. do.
9. Micrantha	Grey Bark	3,786	1 8 to 2 9	Do. do.
10. Peruviana	Finest Grey Bark .. .	357	1 8 to 2 10	Do. do.
11. Pahudiana from Java.. ..	Unknown..	425	Worthless.	
Total No. of Plants..		31 495		

ghuhn has in another instance erroneously attached the name of C. Succirubra to another worthless sort. Even in India we have examples of folly of this sort, which exceeds that of Java. An eminent medical gentleman of the Bombay service attached the name of C. Succirubra to the wild Brinjal !! or Solanum giganteum; and so successfully, that the Governor of that province was induced to visit, and to express himself highly gratified by the appearance of the young Brinjal plantation which the medical gentleman in charge had honored by the designation of C. Succirubra. But it cannot be facts of this nature in which the advantage of scientific superintendence was made plain, to Dr. Anderson. It is true that at page 11, paragraph 11, an "important" discovery of Dr. D'Vrij is detailed, namely, that "in the roots of a tree of C. Pahudiana only two years old "there was no wood with bark formed, but the herbaceous stem yielded nine hundredths of a grain "of Quinine." Or a quantity so infinitely small that it cannot be comprehended. Four hundred and eighty grains make one ounce, this gives 5,330 trees to produce an ounce of Quinine; at twenty-five feet apart, the distance the plants are placed in Java, this number will cover upwards of sixty acres. Dr. Junghuhn estimates the cost of "labor alone" for transplanting each plant from the seed bed to the forest at one Florin, this makes the cost of the Quinine 5,330 Florins per ounce or £533, and this does not include grubbing up the roots, tending the plants for two years, &c., which would increase the cost to at least double or £1,000 per ounce, and "these "important discoveries" Dr. Anderson proposes to "commence at once to prepare to test." Surely to the mind of every man, the value of this discovery is plain; except indeed it be not so to the scientific man, who views his subjects from a lofty eminence, and disdains to think for a moment of its practical value.

9. In operations of this sort a correct knowledge of the science of Horticulture is very necessary, and when combined with the knowledge of the practice also, together with the powers of correct reasoning, its advantages are enormous. It enables us to receive all theories with doubt when opposed to the laws which govern vegetable life. It points out to us our own shortcomings, and suggests the means of improvement. When matters go wrong, it enables us to trace the true cause, and apply proper remedy. But we have no record of the success of science, combined with practical ignorance, in this form alas! science has ruined hundreds of men possessed of great energy and great talent.

10. It was to be expected that the Chinchonas on their introduction to India would have to struggle against the wildest theories, in the most conflicting opinions, with reference to their cultivations; as in all ages newly imported plants of great value have suffered more or less from this cause, and from the beginning I have been anxious to mitigate this to such a degree as not serious to retard our progress, notwithstanding we have suffered to some extent, and may still suffer. I would therefore most respectfully submit for the consideration of Government the desirableness of giving us time to develope our results prior to gentlemen being deputed to report on the position of our experiment. For unless the gentlemen so commissioned, have themselves gained greater results in the cultivation of the plants than we have, together with long experience of our climate, their reports can only confuse and embarrass the Government; while they are discouraging to those entrusted with the responsible and arduous duty of bringing the experiment to a successful issue. I may mention that had a Commission been deputed to visit and report on the prospects of the Chinchona experiment in Java, so recently after their commencement, as Dr. Anderson was deputed to the Neilgherries after the beginning of our operations, only two sickly plants would have been found in that Island. That the reports are perplexing to the Government has been well established by the matter laid before them by Dr. Macpherson, who persuaded Government that Chinchona plants could not be grown or seeds raised in our glass houses at Ootacamund. It has long ago been admitted by all parties, that we have grown our Chinchonas in the glass houses with unequalled success; and in a few months I hesitate not to state that all parties will be compelled to admit that our cultivation in the open air is equally successful.

11. In experiments of this sort the preliminary operations are the most difficult to accomplish; because every day adds to our experience and knowledge of the nature of the plants.

Our success in the preliminary operations is indisputable, and it is mere trifling to argue, that we will fail in the future stages; for if we were successful when we possessed only a slight knowledge of the nature of the plants, it is only reasonable to expect that we will be more successful when our knowledge becomes perfected by long observation and practical experience.

12. The remarks on the Climatological characters of the sites on the Neilgherries, described from paragraphs 10 to 14 of Dr. Anderson's Report, are calculated to give a very erroneous impression of the climate. The only perfect Meteorological table for a whole year in my possession is that recorded at the Government Observatory Dodabetta (the highest point on the Neilgherries), and published in the Report of T. G. Taylor, Esq., H. C. Astronomer, dated Madras Observatory, 15th February 1848. The extracts at foot* are taken from this Record and entirely contradicts the impression conveyed by Dr. Anderson. The variation of our climate is, as it indeed must be from our position near the Equator, very little, the lowest temperature registered during the year being 40°, while the highest was 67°. I may observe that the mean temperature of the Dodabetta site is about 2½ degrees warmer than the summit of Dodabetta, and the Neddivattam plantation at its upper limits is about 5 degrees warmer, while its lower limits is about 15 degrees warmer. Dr. Anderson selected for his observations a land locked hollow or the coldest part that could have been found in Ootacamund, and this is evident from his own Report, as we are told in paragraph 7, that "on the night of the 24th "December, "Eencalypti, a few Accacias from Australia, Roses, Geranuim, Fuchsias, and many other "soft-wooded garden plants were destroyed; besides several indigenous shrubs, such as Berberies, "Nepalensis and Aristata and Lobelia, Excelsa, were blackened by frost." The plants which Dr. Anderson states to have been killed formed the principal growth all over the Neilgherries, so it must have been in some peculiar locality where Dr. Anderson observed the facts he describes. Dr. Anderson has been very unhappy in the selection of the facts he uses to impress us with an idea of the aridity of this climate. Referring to the dry season he states that "during this period "irrigation is absolutely necessary in the Coffee plantations, especially on the eastern aspect of the "hills, and even in the Wainád on the moist side." Yet there is not a Coffee plantation either on the Neilgherries or in the Wainád irrigated. His description of the Botany also conveys an erroneous impression, as we have no plants in these forests with perennial roots and rapidly growing succulent stems "springing up at the commencement of the rains," fruiting and dying before the dry weather. The dried up stems to which Dr. Anderson alludes being the stems of Endopogon, Barberia, and Strobilanthus, these are plants which grow from five to seven years before flowering, and immediately they have flower and produce seed, they die away, and this happened to be the case with many of the species last year, their dead stems filling the jungles at the time of Dr. Anderson's visit. With this tribe of plants Dr. Anderson is well acquainted botanically, but he would seem not to have studied their habits of growth.

13. With reference to our proposed plan of cultivating the Chinchonas in the open ground without the shade of living trees, is a plan not opposed to the opinions of the great authorities on

* Months.	Fall of rain.	Lowest temperature registered.	Highest temperature registered.
	Inches.	Min.	Max.
January	1·2	40·0	62·8
February	7·43	41·2	61·0
March	3·61	43·5	67 0
April	19·80	40·0	66·0
May	4·86	46·3	65·8
June	4 55	44·0	60·0
July	7·41	44·3	59·0
August	9·32	44·5	59·1
September	7 52	41·8	59·0
October	12·49	42·8	58·8
November	11·85	42·9	58·8
December	12·28	41·0	60 4
Total inches	102·14	42 47	61·35

Chinchona cultivation ; nor is it, as Dr. Anderson states, opposed to the opinion of Dr. Weddell.* But it is certainly opposed to the practice of the Dutch in Java ; and I have explained in detail the reasons and necessity for this mode of cultivation in my letter to Government of the 20th January last. That the Dutch in Java have grown a worthless species under dense shade, is no argument why we should cultivate the valuable species under similar conditions ; but the contrary, as they have failed in the cultivation of the only valuable species they possess, namely, C. Calisaya ; it is proverbial "that ill weeds grow apace" under the most adverse circumstances they can be placed in ; and so exists the C. Pahudiana in Java under its adverse conditions. My own experience in the cultivation of Chinchonas has been short, still it is sufficient to enable me to state that we will meet with great success in open cultivation. The observations and facts on which this opinion is formed, will be detailed at length in my Annual Report, which I trust shortly to forward to Government.

* "I have no doubt that the Indian plantations will amply compensate the trouble and expense of maintaining them. With respect to conducting them we have as yet little or no experience. The only reason I can adduce for planting the young Chinchona trees under the protection of a slight shade afforded by other trees is that these plants, in their native country, have appeared to me never to grow beyond the state of shrubs, when under other conditions. It may thence be inferred that the safest way of proceeding would be to plant the Chinchonas at convenient distances in a quincunx alternately with some more fast growing trees, which may be cut away when no longer required. It is evident that the advantage to be reaped from this disposition, must mainly depend upon the proper choice of these intervening strangers, it being kept in mind that they are placed there to protect and not to choke."

"Perhaps an equally good result might be obtained by planting the Cinchonas without any intermixture, but very close together, so as to make them run up, and then thinning them out as might be required. At all events it seems to be an essential point that, for a certain period, the *soil* and *trunks* of the young trees should be protected from the direct influence of the scorching sun, as plants so exposed have generally appeared to me to have a stunted growth."

"My reason for recommending the young plants to be placed in the open field, jointly with young trees of some other order, and rather more fast growing than them, originated from the fact of my having always seen the Calisaya tree dwarf and stunted when growing in exposed or entirely open situations, whether the same thing takes place with other species seems doubtful, as Mr. Spruce says that the Red Bark tree thrives in open ground."

"At all events I should never recommend planting any of these trees in the dense shade of the forest. In such a situation the greater part of them would evidently soon be smothered."

"If I have said that shade appeared indispensable to the trees, at an early age, I never meant that they should have too much of it. I think that the trees in India ought to be planted in open ground, and close enough (if unmingled with other trees) to oblige each other to run up, sufficient space and air being gradually provided by judicious pruning and thinning out. A most important condition of success may be found in the choice of the proper time for planting out, the best being probably the beginning of the rainy reason." 9th March 1862.

No. 386. ORDER THEREON, 25th June 1862, No. 1,400.

Ordered to lie over.

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