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MADRAS RECORD OFFICE

GOVERNMENT OF MADRAS

Revenue DEPARTMENT

G.O. No. 885 Press

~~B.P. No.~~ ~~Mis.~~

Dated 7-6-1875 ~~196~~

Not to be folded or roughly handled

No. 57. Read the following Proceedings of the Board of Revenue, dated 23rd April 1875, No. 1,0.

Read report of the Superintendent, Government Farms, on the agricultural conditions, capabilities, and prospects of the Nilgiri District, dated 30th December 1874.

Read also letter from J. R. COCKERELL, Esq., Commissioner of the Nilgiris, to H. E. STOKES, Esq., Acting Secretary to the Board of Revenue, dated Ootacamund, 16th April 1875, No. 34:—

WITH reference to G. O., No. 1,658, of 22nd September 1871, I have the honor to submit herewith copy of report from the Superintendent, Government Farms, on the agricultural conditions, capabilities, and prospects of the Nilgiri District.

2. I regret the delay in the transmission of the report. It is owing to my absence on leave.

THE Board were on the point of submitting Mr. Robertson's report direct to Government when the Commissioner's letter was received. Mr. Cockerell should have recorded his views on the several questions adverted to therein; to obviate further delay the Board resolve to submit the report at once with their remarks.

2. The report contains much interesting information, and Mr. Robertson's remarks on the prevailing soils, and his description of the different field crops will, no doubt, prove of value to cultivators of all classes, as Mr. Robertson is thoroughly conversant with the subject. The Board question whether European farming, even if introduced in one or two localities, would exercise much influence generally, as the lime needed for the soil cannot be procured on the hills, and the improved method of cultivation suggested would be costly and might not be adapted to the requirements of the native cultivators. The Board have no means of testing the accuracy of that portion of the report which is devoted to plantation crops; but, when the report is made public, it will, no doubt, be fairly criticised by those possessing a special knowledge of the subject.

3. In his remarks on climate and forests, Mr. Robertson urges that planting is greatly needed as a protection against high winds, and recommends its being undertaken by Government on the more exposed parts of the hills rather than in the sheltered valleys where trees flourish best. He also advocates the entire abolition of the restrictions on the clearing of forest land except such as are necessary to preserve forest in exposed situations. The Board cannot concur in this proposal. It is possible that conservancy may at present be stricter than is necessary, but to do away with it altogether would be risking irreparable injury to many and great interests. It may be true that trees have little or no effect in increasing rain-fall and that coffee and cinchona plantations would answer equally well, but the effect of trees in the distribution of rain in checking floods and in holding up the soil on steep slopes is undoubted, and it would be rash to permit the general clearance of the natural forests when the result of such a course is open to question.

4. The breeding of live stock does not appear to have hitherto been attended with much success, and there appear to be great difficulties in the way owing to the climate and to the bad quality of natural pasturage. The light thrown on

the subject by Mr. Robertson may lead some of the planters to turn their attention to the subject, but it does not appear that the interference of Government would be productive of much good.

5. As regards colonization there is probably room for a limited number of settlers on the hills from the Eurasian community, but it does not appear that any measures are called for in the way of State assistance. The Government have performed their part in providing an admirable approach and constructing roads, and there is no hindrance, should settlers feel disposed, to try the experiment of farming. The only point of administration which seems to call for improvement is that relating to the transfer of waste lands. The delay which sometime occurs is a serious drawback, and demands the earnest attention of the Commissioner.

(A true Copy and Extract.)

(Signed) C. A. GALTON,
Acting Sub-Secretary.

No. 58. ORDER THEREON, 7th June 1875, No. 885.

Miscellaneous.

THE thanks of Government are due to Mr. Robertson for his excellent and practical report on the agricultural conditions, capabilities, and prospects of the Nilgiri District.

2. The Board will take steps to circulate it widely and to render it readily accessible, and with this view it should be reprinted in 8vo.

3. The Government agree with the Board that the report does not indicate much which it is advisable for Government to undertake.

4. They are, however, prepared to entertain favorably any proposals which the Board may decide to make for the importation of some Kerry cattle and approved sheep purely for experiment to test the suitableness of the breeds at the Asylum Farm.

5. All that appears necessary to facilitate settlements on the Nilgiris has been done, but the discussion which the publication of the report is likely to elicit among those practically engaged in agricultural enterprise on the hills will be of value should the question of modification of the existing system arise.

(True Extract.)

(Signed) A. MACGREGOR,
Acting Secretary to Government.

To the Board of Revenue.
" the Commissioner of the Nilgiris.

Exd. B. C. Shunker.

Govt. of 1875 Madras.

REVENUE.

To

THE BOARD OF REVENUE,

&c. &c., &c.

Dated June, 7th.

Read Encl.

G. O., 7th June 1875, No. 835.

JUNE

Nos. 57-58

Nilgiri District.—Thanking Mr. Robertson for his excellent and practical report on the agricultural conditions, capabilities, and prospects of the —; and directing the Board to take steps to circulate it widely and to render it readily accessible, and with this view ordering it to be reprinted.

☆

No. 1,015.

PROCEEDINGS OF THE BOARD OF REVENUE, dated 23rd April 1875.

Read report of the Superintendent, Government Farms, on the agricultural conditions, capabilities, and prospects of the Neilgherry District, dated 16th December 1874.

Read also letter from J. R. COCKERELL, Esq., Commissioner of the Neilgherries, to H. E. STOKES, Esq., Acting Secretary to the Board of Revenue, dated Ootacamund 16th April 1875, No. 34 :—

WITH reference to G. O., No. 1,658, of 22nd September 1874, I have the honor to submit herewith copy of report from the Superintendent, Government Farms, on the agricultural conditions, capabilities, and prospects of the Neilgherry District.

2. I regret the delay in the transmission of the report. It is owing to my absence on leave.

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3. In his remarks on climate and forests, Mr. Robertson urges that planting is greatly needed as a protection against high winds, and recommends its being undertaken by Government on the more exposed parts of the hills rather than in the sheltered valleys where trees flourish best. He also advocates the entire abolition of all restrictions on the clearing of forest land except such as are necessary to preserve forest in exposed situations. The Board cannot concur in this proposal. It is possible that conservancy may at present be stricter than is necessary, but to do away with it altogether would be risking irreparable injury to many and great interests. It may be true that trees have little or no effect in increasing rain-fall and that coffee and cinchona plantations would answer equally well, but the effect of trees in the distribution of rain in checking floods and in holding up the soil on steep slopes is undoubted, and it would be rash to permit the general clearance of the natural forests when the result of such a course is open to question.

4. The breeding of live stock does not appear to have hitherto been attended with much success, and there appear to be great difficulties in the way owing to the climate and to the bad quality of natural pasturage. The light thrown on the subject by Mr. Robertson may lead some of the planters to turn their attention to the subject, but it does not appear that the interference of Government would be productive of much good.

5. As regards colonization there is probably room for a limited number of settlers on the hills from the Eurasian community, but it does not appear that any measures are called for in the way of State assistance. The Government have performed their part in providing an admirable approach and constructing roads, and there is no hindrance, should settlers feel disposed, to try the experiment of farming. The only point of administration which seems to call for improvement is that relating to the transfer of waste lands. The delay which sometime occurs is a serious drawback, and demands the earnest attention of the Commissioner.

(A true Copy and Extract.)

Acting Sub-Secretary.

To the Secretary to Government, Revenue Department, with printed report.
,, the Superintendent, Government Farms.
,, the Commissioner of the Neilgherries.

Exd. E. C. Shunker.

No. 1623 Revenue 1875. Sept.

Board of Revenue,

MADRAS.

PROCEEDINGS, 23RD APRIL 1875, No. 1,015.

Encl.

Received 3d May.

APRIL.

1,015.

Neilgherry District.—Report of Superintendent of Government Farms on the agricultural conditions, capabilities and prospects of —, submitted to Government with remarks.

REVENUE DEPARTMENT

885

No. 1623

From Bd. of Rev.

Dated 23rd April 1875.

FOR ORDERS.

The report is interesting & valuable. But I think the best use Govt. can make of it is to circulate it widely & make it readily accessible. I concur with the Bd. in thinking that it indicates little th. it is advisable for Govt. to undertake. In some respects W. R. is not sufficiently acquainted with the facts to warrant his conclusions. Such a suggestion as that of removing the Todas bodily from the plateau of the Hills & raising the assessment on the Badagas [illegible]

extra that ch'd. expect in a landlord's rent (for
this experience is what you've the means by a
factor that would fairly represent market value)
cannot surmise be entertained for a moment
by Govt. The whole report to my mind points
to the conclusion that Govt. can do little to
develope the occupation of the Hills except
by removing all difficulties in the way of the
land. if such there be -
It is quite evident that W.R. contemplates
high farming as essential for success - but
? w'd it pay - I incline to think that he
overestimates plantation expenses - & that
that is the kind of occupation of the land
wh. is most likely to succeed -
The only suggestion that wh. I'd be disposed
to advocate Govt. attending to experimentally
is that of breeding Mules - those for this
purpose I doubt whether more suitable

localities w^d. not be found elsewhere. 8685

I believe there is nothing to prevent the holding [illegible] land being maintained in subjection at [illegible] localities – Dairy [illegible] but available. J.D.

1.8.5.75

Some Kerry cattle – & ~~Scotch~~ *approved* sheep might be imported perhaps by Gov^t. purch^s. for experiment & test the suitableness of the breeds at the Asylum farm. [illegible]

I agree with the Board that the Gov^t. have done all that is necessary to facilitate settlements on the Hills. I would circulate M^r. Robertson's report as widely as possible.

I see no objection to M^r. Huddleston's proposal in connection with the Asylum farm. N.S.C.

FOR ORDERS.

A

REPORT

ON THE

AGRICULTURAL CONDITIONS, CAPABILITIES, AND PROSPECTS

OF THE

NEILGHERRY DISTRICT.

BY

W. R. ROBERTSON, M.R.A.C.,

SUPERINTENDENT OF GOVERNMENT FARMS, MADRAS PRESIDENCY.

MADRAS:
PRINTED BY E. KEYS, AT THE GOVERNMENT GAZETTE PRESS.

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AGRICULTURAL CONDITIONS, CAPABILITIES AND PROSPECTS

OF

THE NEILGHERRY DISTRICT.

INTRODUCTION.

In a Government Order, dated the 22nd of September 1871, I was directed to proceed to the Neilgherry District, when my duties elsewhere would permit, in view to making such inquiries as would enable me to report to Government on the agricultural conditions, capabilities, and prospects of the district, especially with regard to the breeding of horses, cattle, and sheep; to the facilities for establishing small farms on the European system; and to the improvement of the husbandry of the hill-people. I was also directed to give some attention to the planting operations that had already been undertaken, in view to the production of coffee, tea, and cinchona bark, and was requested to contrast the prospects of these enterprises with the probable results that might be secured by farming on the system followed in Great Britain. In compliance with these instructions, I proceeded to the Neilgherries in the latter part of January 1872, and remained in the district pursuing these inquiries until nearly the end of April. I again returned to the Neilgherries in October of the same year, and devoted that month and the next to similar investigations, and, in the present year, while on privilege leave during a portion of July, the whole of August and September, and a portion of October, I was again able, on the spot, to give much attention to this important work. I have thus been engaged in these inquiries altogether about 7½ months, of which only 4½ months was when on duty. A shorter time would have sufficed for collecting the information I now submit, had it been possible for me, while on duty in the district, to devote my whole time to the work; but I had, at the same time, to conduct my ordinary duties in Madras, and these demanded much attention, and unfortunately the state of the weather during a great part of my second visit, was very unfavorable for out-of-door work. I had originally intended to draw up the report in a way that, while it would furnish the special information needed by Government, it might, at the same time, be useful to persons newly settled in the district, and with this object I collected a large amount of general information which appeared likely to be of use in this way: however, as the report is now urgently required, I have been obliged most reluctantly to abandon my original intention, and will now confine myself to making such observations as seem to bear specially on the questions suggested in the Government Order under which I acted. Though I was not able to make such a thorough investigation as I had desired, my observations having been made at different seasons of the year, over a period extending to nearly three years, will, I trust, be more reliable than if, with greater opportunities for making them, my knowledge of the district was confined to the experiences of but one season only. Unfortunately, though I have resided in the district during eight months of the year, I have not witnessed the full burst of the south-west monsoon; I regret this, as its influence extends over the greater part of the Neilgherries; I am, therefore, so far as regards the effects of this monsoon, obliged to base my opinions on the meteorological registrations of the district, and on information obligingly supplied by several gentlemen who, from a long residence in the district, were well qualified to furnish such information.

PHYSICAL FEATURES, AREA, POPULATION, &c.

1. The Neilgherry District is situated on the western side of the Madras Presidency about 50 miles from the Malabar coast, and between latitude 11 degrees and 11 degrees 20 minutes north, and longitude 76 degrees 30 minutes and 77 degrees east. It includes the whole of

the Neilgherry mo[illegible] Presidency, it is on[illegible] the district is now one of the most important [illegible] the [illegible] since it was constituted a separate Revenue District, more than 50 years [illegible] taluq of the Coimbatore Collectorate, and it is only a little [illegible] mountains rise abr[illegible] were [illegible] visited by Europeans. The Neilgherry [illegible] rise from the [illegible] across the plains, except [illegible] the northern side of the district, where the [illegible] completely iso[illegible] table-land of [illegible] the low country [illegible] is more gradual; but on three sides they are [illegible] south-western [illegible] known as the K[illegible] The west of the district is very hilly, especially the [illegible] ranges of mountains [illegible] the most remarkable [illegible]dahs. The district is crossed in various directions by [illegible] and forms the line of separation [illegible] of these is the Dodabet range which runs through the [illegible] western portion of the di[illegible] between the south-west and north-east monsoons. In [illegible] from their [illegible] the district there are several ranges of high mountains which [illegible] district [illegible] line of the south-west monsoon, are of great benefit to the [illegible] the force of the storms of wind and rain that characterize this monsoon. In addition [illegible] these higher ranges of mountains, chains of hills cross the country in every direction, and so close do these run together, that the valleys formed between are frequently little more than extensive troughs, through the bottoms of which streams flow, the drainage of the neighbouring hills. Though the surface of the country throughout the whole district is exceedingly irregular, the undulations are less abrupt, and the hills more rounded on the eastern and central portions. On the Koondahs these gentle undulations and rounded hills are replaced by high ranges of mountains with steep-rugged slopes, while deep valleys and ravines, with perpendicular precipitous sides, cut up the country in various directions. The so-called Neilgherry plateau runs through the whole district from east to west, its boundaries [illegible] formed by the crests of the slopes on either side; but it is table-land only in the sense that its surface is less irregular than the surface of other parts of the Neilgherries. The elevation of this [illegible] country varies between 6,000 and 7,500 feet above sea level, and it is here that the European Settlements are situated. Except on the western and exposed side, level land is exceedingly scarce: some of the larger valleys, especially those in the slopes through which the larger streams find their way to the plains, do occasionally contain tracts of land sufficiently level for any purpose; but these tracts seldom occur in large blocks. On the higher part of the district, valleys are met with in the form of natural basins without outlets for drainage, in which small plots of level land are found; but the soil in such situations is always peaty, and its reclamation would be costly in the absence of facilities for drainage. Thus the surface of the cultivated land is almost invariably irregular and undulating and ill-adapted for the use of field implements or machines. Excepting on the eastern portion of the Neilgherries, a stream flows through nearly every valley that is not land locked; as these flow towards the slopes in each direction and join together on their way, they form considerable rivers before they reach the plains. There is thus plenty of water-power available in most parts of the Neilgherries, but as yet it is almost unused. As might be expected from the heavier rainfall and more scanty population, there is most natural forest on the western side of the Neilgherries; but even here the forests are not extensive; they are met with generally in valleys and in ravines running down the slopes, and seldom, except in very low situations, contain any useful timber. In other parts of the Neilgherries natural forest is met with only in patches in hollows on the sides of streams.

2. The area of the district is about 510,000 acres. Of this area only about 55,000 acres are under cultivation under the following cropping:— 33,000 acres under food grains, &c.; 2,000 acres under potatoes and garden crops; and 20,000 acres under coffee, tea, cinchona, or Australian trees. Of the 33,000 acres under food grains, korali and samay occupy 22,000 acres. In addition to these 55,000 acres under crops, there is annually about 20,000 acres of arable land under bare fallow, or, perhaps, I should say, temporarily abandoned, for no cultivations are performed on the so-called fallow; to recognize land that is thus left for 5, 8, or even 10 years untouched by a plough as "fallow land" is a great error; it would be much better in every way that such land should be classed as "temporary waste." To this may be added, say, 33,000 acres of the so-called grass land for grazing and feeding, with the help afforded by the straw produced on the arable land, the 18,000 head of cattle and 2,000 sheep belonging to the district. If we add to this the area taken up by the Municipalities and other hill settlements, the [illegible] roads, &c., it will be found that less than [illegible] a of the district is now utilized. I have purposely omitted from [illegible] occupied [illegible] forest, which in its present state can [illegible] classed only [illegible] of the entire district, including greater [illegible] the Koondahs [illegible] ed the rocky parts of [illegible] mountain ranges, &c., is altogether [illegible] for the use of the agriculturist, [illegible] at any rate will be unsuited as long as plenty [illegible] is available. It is t[illegible] 150,000 odd acres that remain is not all fit [illegible] made use of [illegible] the farmer [illegible] considerable proportion is; and [illegible] remained [illegible] judicious planting, clearing, [illegible] &c., could be made available in [illegible] view [illegible] is, I think, much to be regretted [illegible] nothing is known with any degree of certainty as to the area of each description of unoccupied land on the Neilgherries. The absence of reliable information of this nature cannot but [illegible] highly prejudicial to the interest of the district. There is, I find, a general impression [illegible] the good land has been taken up, but the results of my inspection of the district lead [illegible] a very different conclusion. It is true that all the good land within easy distance of [illegible] different Stations is taken up, but the total area of the land thus appropriated is but small in relation to the area of good land yet available. I wish to avoid being misunderstood in stating [illegible] opinion. I readily admit that a large proportion of the most useful land conveniently situated has been appropriated; but I believe that, if the restrictions relating to the preservation of Sholas and other natural forests were withdrawn, the grazing of the Todas' buffaloes was confined to certain fixed localities, and the rent of the land held by the Badagas raised to an amount that would fairly represent its market value, that a very large amount of useful land conveniently situated would at once become available. At present natural forest (Sholas) covers a considerable area of valueable soil, the herds of buffaloes kept by the Todas are allowed to roam [illegible] a wide expanse of country, while the rents paid by the Badagas are so low, that they can afford to keep one-half of their land lying in an uncultivated state.

3. When the last census was taken in 1871, the population of the Neilgherries was found to number 49,501 persons, or about 66 persons per square mile—a very scanty population when contrasted with that of the two adjoining Collectorates, Coimbatore and Malabar, which respectively contain 237 and 376 persons per square mile; but thinly populated as the country would be if its inhabitants were evenly distributed over its whole surface, it is, owing to the fact that so many of these inhabitants are congregated together in small areas of country, much more scanty than these figures show; thus, the [illegible] Municipalities, containing together not more than 30 square miles of country, have a population of 13,040 persons, while the Badagas, which number together 19,476 souls, nearly all reside in the villages situated in the centre of the district. Wellington, Kotagherry, and Lovedale together [illegible] persons, leaving the remainder of the district to be divided amongst less than 15,000 persons, of whom 3,880 only are hill-people, the remainder probably being plantation coolies and their families, and immigrants from the low country who gain a livelihood, partly by occasional labor for hire, and partly by cultivating small plots of land; but these latter are not distributed over the district: they are met with chiefly near the villages of the Badagas and near the large European Settlements. A large proportion of the district is altogether without inhabitants, and another considerable proportion only inhabited during certain seasons of the year. The population of the district in 1871 was 49,501, as follows:—

Hindus	42,451
Mahomedans	1,936
Native Christians	2,935
Europeans	1,33[illegible]
Eurasians	796
Others	44
Total ...	49,5[illegible]

Europeans and Eurasians together form nearly five per cent. of the population of the Neilgherries, a proportion four times as great as the average percentage they form of the entire

and at Coonoor and Kotagherry only a little over 60 inches. The south-west rains are accompanied by high cold winds which are alike prejudicial to the health of live stock and crops exposed to their fury. Though the district is divided under periodical rains, no portions suffer from an inadequate rainfall, for in nearly every locality the monthly rainfall is generally sufficient for agricultural crops. It is true that in the first three months of the year the rainfall in all parts of the hills is light, and the atmosphere is very dry; but this is not generally the cropping season: the highest range of temperature is during the months of April and May, and the coldest weather is experienced during December and January, when the mercury frequently falls as low as the freezing point; the temperature, like the rainfall, varies with change of locality: at Ootacamund, at about 7,500 feet above sea level, in moderately exposed situations the mean temperature ranges between 40 and 65 degrees, while at Coonoor and Kotagherry, at 6,000 feet above sea level, in similarly situated positions the mean range is between 50 and 70 degrees. Though the rainfall, excepting in the extreme western and south-western portions of the district, is generally suited for crops, it is owing to the manner of its precipitation frequently highly injurious to the health of farm stock, especially if recently brought up from the low country, as during a considerable portion of the year it falls only in drifting fogs which gradually condense as they meet with resistance; and, though this may continue for days, the actual fall of rain is exceedingly light as shown by the rain gauge, but in reality heavy [illegible] well known to all who have experienced the effects of these gradually condensing fogs. Trees are much needed in this district, especially on exposed land for giving shelter to crops and farm stock. By judicious planting the climate could be greatly improved. It is true that in situations where the trees would be useful as shelter they would not grow so well as in low-lying land, but it is absolutely necessary that planting operations should be begun on a very extensive scale, with the view of affording the requisite shelter from the high winds which prevail for several months annually in this district. Until sufficient shelter can be obtained, a very large proportion of the Neilgherries must remain unutilized, as the high wind is the greatest drawback the hill farmer has to contend with. A great cry has been raised against the clearing of forest land for plantation purposes, under the impression that by the removal of so many trees the climate would be injured. My own opinion is, that there is no grounds for alarm, and that the matter has excited a great deal of unnecessary attention. Instead of laying down strict rules for the indiscriminate preservation of natural forests at the sides of streams, &c., I would venture strongly to recommend the entire abolition of all restrictions on the clearing of forest land, excepting such as would be calculated to preserve forest on all exposed situations. It must be remembered that the heaviest forest is invariably met with in low-lying sheltered situations, and forests in such positions can seldom be of use in breaking the force of the wind. Natural forests in exposed situations are exceedingly rare. But the alarmists, who have raised such an outcry against the clearing of forest land, assert that such clearing tends greatly to the diminution of the annual rainfall: they contend that because the deforesting of large districts in France and in several other countries has been attended with such disastrous consequences, that bad results will follow the clearing of land on these hills, but such shallow reasoners forget this important difference in the instances they would compare that, whereas in France, Spain, &c., the deforested land was left perfectly bare, the almost universal custom on the Neilgherries is to plant every acre of cleared land with coffee and other crops, and I have no hesitation in stating that the vegetable growth on the coffee estate is as effective as the forest growth it supplanted on the natural agencies which effect variations in climate. Trees situated in valleys can have but little effect in arresting passing rain clouds; they can but cool the atmosphere, and in this way condense the moisture it contains, but this much the coffee plantation will do, it has been asserted that the accumulations formed by leaves, &c., that collect in these forests, is beneficial in retaining moisture from too rapidly passing down into the low country; but an acre of forest land covered by these accumulations is not so effective for absorbing water as an acre of land under coffee, cultivated in the usual way. After a shower of rain there is always a much larger flow of water off an area of land under natural forest than from a similar area of well-tilled, deeply pulverized soil under coffee, tea, &c. A low growth of vegetation, such as is found on coffee estates, is of much greater value in cooling the earth, and thus preventing undue evaporation,

than forest without undergrowth such as is common in this district. Fogs which accumulate around the tops of mountains are condensed without the aid of trees, it is a well-known fact, that the Cheviots and other ranges of hills in Great Britain are perfectly destitute of trees, and yet several large rivers rise on, and draw their supplies from, these hills. The peaks of high mountains are also beneficial in arresting the passage of rain clouds, and by their coldness causing these clouds to condense and precipitate their contents. It is evident that where these peaks abound as on the western side of the Nedgherries, the forest situated [illegible] many hundred feet below can have no effect at all on rain clouds; and even when the trees are growing in less mountainous tracts of country, their effect is very slight in increasing atmospheric humidity: indeed, trees tend rather to rob the soil of moisture than to afford additional moisture; they act like as many water-lifts, raising the water by means of their roots, stems, and leaves into the air, a tree will invariably evaporate during a year a far larger amount of water than is precipitated by rainfall on the ground it covers. One result of clearing forest land is an immediate and increased flow of water from its surface. Planters invariably find a larger volume of water in streams passing through recently felled forest, but this excess continues only until the land is covered by coffee shrubs. It seems to be a mistake to preserve narrow strips of natural forests at the sides of streams with the view of rendering the flow perennial. The existence of these streams is in no way connected with the presence of trees on their banks, but quite the reverse, for the existence of trees in such positions is entirely due to the presence of the stream, for it is generally found that, after a constant flow of water has passed along a channel for some time, the banks of which were previously quite bare, shrubs and trees rapidly make their appearance, while it has been found that land from which trees have been removed rapidly becomes swampy, and only dries up again on being planted. Trees have undoubtedly a very beneficial effect on the climate of the district in which they are found; they render the air more uniform, reduce the violence of storms, and afford shelter; but, as I have before stated, they have little effect in increasing the rainfall, unless growing on situations considerably above the level of the surrounding country; but, as the majority of the forests in this district growing on land suitable for coffee are found in sheltered situations, they can have no more beneficial influence on the climate of the district than would coffee or cinchona plantations if substituted for them.

SOILS.

6. It is generally believed that the prevailing soils of the Neilgherries possess great natural fertility. It is true that in this district, in common with all districts possessing a very irregular surface, good soils are found; but the soils most common are not naturally fertile: they only become fertile under the influences put in operation by good husbandry. Most of the country above the crests of the slopes is covered by a soil that has been formed by the decomposition of granite; in many places it rests on immense beds of rotten [illegible]. This soil varies greatly in color, according to the proportion and state of the iron it contains: in some places it is red, in other places chocolate, pink, yellow, and even black; but its physical state is generally similar, hard, compact, and difficult to work when first brought into cultivation, though under good treatment forming in time a free, friable, easily worked soil. A glance at the inferior herbage on such soils when in their natural state affords sufficient evidence of their low natural fertility. When deeply ploughed, regularly worked, and adequately manured, they will yield well, especially when in the manure applied there is a fair proportion of lime. It is not that these soils are deficient in the elements of plant food, for, on the contrary, they are rich in all that constitutes this food, lime excepted; but their physical condition is such that this food remains latent and useless, until by deep cultivation the soils are brought gradually under the influence of atmospheric agencies. In many parts of the district a peaty surface soil is found resting on a red-colored tenacious sub-soil. Soils of this character are especially abundant on the higher ranges of hills; they are not so productive under good treatment as the soils just noticed; but, when of sufficient depth, they can be more easily brought into cultivation. Such soils might be greatly improved by sub-soil draining and by having a portion of the under-soil, removed in cutting the drains, spread over and mixed intimately

through them. On these soils also a heavy dressing of lime would yield good results. In the central and western portions of the Neilgherries there are many valleys containing marshes and peat bogs. These occur generally only in small areas, but where these areas are sufficiently great, where there are facilities for drainage, and the situation is convenient, these marshes would amply repay the cost of reclamation. In some localities they contain deep beds of peat which, though rather coarse and inferior, is a useful fuel where wood is scarce; but generally peat only occurs in shallow beds. Nowhere in the district did I see any attempt to improve these soils by draining, burning, and liming, the means by which, in Europe, soils of this class have been made to yield large returns. The richest soils are met with on the plots of table-land situated below the crest of the slopes, covered by forest, or a heavy growth of ferns. In such situations a great depth of vegetable mould is found resting upon soil of a strong character, evidently formed of the scourings of the upper slopes washed down by the periodical rains. As a general rule, land on the higher parts of this district, with a northern aspect, has a darker-colored soil, and is more thickly covered by vegetation than land exposed to the south. Large areas of country are covered by poor, temporarily exhausted soil, the result of the bad farming of the hill-people, who not only use very little manure, but by neglecting to make proper provisions for the drainage of the water that falls during the monsoon, allow a large proportion of the surface of the land they till, to be regularly carried down into the valleys below; so far has this been allowed to go in some localities, nothing but the bare sub-soil now remains, and what was formerly a rich tract of land has been thus transformed into a sterile waste.

FIELD CROPS.

7. *Wheat.*—A considerable area of the land occupied by native cultivators is annually under wheat. The variety most generally cultivated appears to be *Triticum Spelta* which is also extensively grown on the high table-lands in Coimbatore and Mysore, from whence it is supposed the original seed was obtained for the Neilgherry District; the quicker growth of the Neilgherry wheat, and its ability to mature its seed without the aid of irrigation water may be the result of change in climate and cultivation. In general appearance when ready for harvesting this wheat resembles the bearded wheats of England; its ears are, however, much shorter and broader, like those of all spelt wheats, is very difficult to separate from the chaff or husk which encloses it. Indeed, in the Badagas it is always met with in the husk, like oats or barley; its husk does not adhere so firmly as does the husks of these two cereals, still it cannot be removed by any threshing process, and a considerable expense must be incurred for husking the grain before it can be used by the miller. The Badagas consider it a great merit of this wheat that it parts so reluctantly with its chaff, as the chaff protects it to a considerable extent from the attacks of weevils which on these hills are very destructive. Another kind of wheat is known to the Badagas who call it "naked" wheat, to distinguish it from the other variety just noticed, because it separates so easily from its chaff. The hill-people declare that it is European wheat, and that it was introduced by the late Mr. John Sullivan when Collector of Coimbatore. The Rev. Mr. Metz, who is very intimately acquainted with the history of the Neilgherry District, informed me that he thought that the people were correct in their statement. It seems to me that the wheat did probably originally come from Europe; but, if so, has deteriorated greatly, though probably not more than could reasonably be expected, seeing how inferior the cultivation is to which it has been subjected at the hands of the cultivators on the hills.

The hill-people generally take advantage of the first rains in April to begin ploughing their land, and usually sow their wheat crop before the middle of May. The cultivation is very imperfect; the soil is worked usually only by the native plough, which is common to all parts of the Presidency, and little or no manure is used, the small quantity of manure collected by the cultivator being chiefly required for the potato land. No attention appears to be given to the crop during its growth, weeding and hoeing evidently being considered by the cultivators as unremunerative refinements. In seeding the land, far too much seed is usually sown; there is such

a struggle for existence amongst the weeds of plants that spring up, that not an exceedingly small proportion of them succeed in ripening to maturity even a medium-sized cereal grain; and as the seed is generally sown broadcast, hand-weeding only is possible, hoeing which is so advantageous to the wheat crop being quite impracticable except when the crop has been sown in lines. The crop sown in April generally arrives at maturity in August. If, as it generally occurs, there are heavy rains about the beginning of July when the wheat is in flower, the yield of grain is exceedingly light. The wheat plant during the first half of its existence needs showery weather, but during the latter half it is essentially a drought-loving plant. Over the greater part of the district, April sowings of wheat do not meet with these conditions; the plant gets plenty of rain during its early growth, but seldom a dry blooming season. Wheat is sometimes sown about the beginning of November on land which has just carried a crop of wheat or barley, but the cultivators put a very low value on these crops, they say that they are so uncertain, seldom doing more than returning the seed and affording a little straw for the use of their live stock during the dry season.

9. On the side of the district watered by the south-west rains, it would, I think, be more to the interest of the cultivator if, instead of the wheat he now grows, he would cultivate a variety that is longer in reaching maturity, a variety that would begin to flower just about the time when the heaviest burst of the periodical rains is over; perhaps one of the red-chaffed varities of bearded wheats would suit for this purpose: after having been grown on the hills for two or three seasons by exposure to the higher temperature it would there meet with, it might be induced to mature in a little less time than it requires in England.

10. On the northern and eastern sides watered by the north-east monsoon, there would be no difficulty in raising a good crop of wheat of the ordinary kind now grown on the hills if sowing could be done in the latter part of September or early in October; but on this side of the district as well as on the portions lying to the south and west, the almost universal practice is to sow the wheat in the spring months, trusting the crop to the few showers which come from the south-west monsoon; thus the conditions needed for the successful culture of wheat are reversed: the result is an uncertain yield, and an exceedingly troublesome harvest. The crop can seldom be secured before the first showers of the north-east monsoon appear, which not only retard the harvesting operations, but they render it exceedingly difficult to secure the wheat in good condition. To obtain good results in this tract of country from autumn sowing it would be necessary to abandon spring crops on the land intended for wheat, or only with some crop that will be off the land in the early part of September, allowing sufficient time for the preparation of the land to be sown with wheat. However, by irrigating the crop which in many parts of the hills the cultivator can readily do, these precautions will be rendered unnecessary.

11. Though wheat grows so readily on the greater part of the Neilgherry plateau a very small proportion of the bread made on these hills is made from hill wheat, low-country wheat being brought up in large quantities for this purpose, even though it is more costly. I was informed by Mr. G. N. Grove, the enterprising owner of the Flour Mill and Bakery at Coonoor, that he never buys hill wheat if he can get low-country wheat, even though he can generally get delivered at his mill 9½ pounds of the former at the price he must pay for 8 pounds of the latter. His chief objection to the Neilgherry wheat appears to be that, while the grain is hard on its outer surface, its inner parts are very soft; so that in grinding the bran breaks up into hard angular pieces which mix with the powdery mass from the inner part of the grain, and are exceedingly difficult to remove, a dark grey-colored flour being produced which is almost unsaleable, and can only be used for making brown bread. Mr. Grove has made many experiments, and he is of opinion that it is impossible by any kind of sifting to get a good-colored flour from ordinary hill wheat. One great fault urged by Mr. Grove against the hill wheat is that it makes too much flour, flour which I have already stated is of little value; and, as the great object of the miller in this part of India is to get from the wheat he grinds as much rolong as possible, the bread used by Europeans being almost exclusively made of rolong, he is quite correct, looking at the matter from his stand-point; but I look upon the large flour-yielding capabilities of hill wheat as one point in its favor. I believe that the hard flinty bran which covers the grain is the result of bad culture to which the wheat has been subjected,

enough to have the records of his office searched. The result of that search was the discovery that the experiment in question was not made on the Neilgherries, but in the Coimbatore District, near the village of Ootacamund, near the Palghaut Pass. I have noticed this matter, because Ootacamund is mentioned several times in the Hand-book in connection with this cotton experiment which was one of the most successful ever made in the Madras Presidency. Though, on the high plateau on which Ootacamund is situated, there is no probability of the cotton plant doing well, there is, nevertheless, plenty of land in this district remarkably well suited for the production of cotton. I met with several persons who had made experiments with the cotton plant in the more sheltered valleys, at elevations below 6,500 feet. The results they had obtained were generally good, that is, the plants grew well and bore heavily, but they agreed also in thinking that the expense of collecting the cotton on the hills is so great that but little is left from the sale proceeds of the crop to pay the other expenses of cultivation. It is true that with their present labor-supply, these hills cannot produce the ordinary indigenous cotton, at a cost to enable it to compete with that produced in the plains; but in the production of the superior varieties of cotton, I have not the least doubt but that there are many localities in the district which could successfully compete with the low country, especially if the crop was cultivated by peasant farmers who would employ their own families in picking, &c.

28. *Castor-oil Plant.*—On the lower slopes of these hills the castor-oil plant thrives and yields good returns. Though good results are more certain on these lower elevations, the plant will grow in sheltered situations even as high as 6,000 feet above sea level; indeed, I have seen strong healthy plants growing at this elevation. This crop is entirely in the hands of the hill-people who grow it only in small patches to supply their own wants. As a shade plant for young coffee when first planted out, it is worth attention by planters.

29. *Poppy.*—The poppy thrives in the sheltered valleys in the district around Kartary, especially in the Unity Valley. It is cultivated merely for the opium it yields. The crop is usually sown in October, and the opium is collected in January and February. The cultivators find that the capsules yield their juice more freely, and that this juice is much less watery during cold weather than during hot weather; hence they prefer the autumn months for sowing their crop, and this practice has this additional reason to recommend it a certainty of dry weather during the opium harvest. The crop is badly cultivated, and the yield of opium per acre is small. As the poppy seems to thrive in spite of the treatment it receives at the hands of the Badagas, there is no doubt but that, under high cultivation, it would be a remunerative crop, and there is plenty of land on the Neilgherries as well suited for the growth of the poppy as the land on which it is now grown.

30. *Tobacco.*—This crop was at one time a very popular one with those Badagas who had land suitable for it, but it now receives little attention from them. There are several reasons for this: they cannot now produce a tobacco that they can afford to sell at a price that will enable it to compete in the native market with the tobacco raised in the low Country; they find that the potato yields more speedy returns, and meets with a readier market; and they cannot collect enough manure to enable them to grow crops of both potatoes and tobacco on a scale sufficiently extensive to secure a reasonable profit. While hill-grown tobacco cannot compete with the low-priced tobacco of the low country, there is no reason why, if properly cured and prepared for the European market, it should not meet with a large demand at most remunerative prices. I have had many opportunities of consulting old residents on these hills, more especially the Rev. Mr. Metz, late of Kaity, regarding the quality of the tobacco formerly produced by the Badagas; and all who have been good enough to favor me with their views concur in the opinion that the tobacco, though badly cured and prepared, was really most excellent in quality. From my own knowledge of what constitutes a good district for tobacco, I believe that there are on the Neilgherries many localities admirably suited, not only for producing a really good tobacco, but what is of far greater importance for providing the climatical conditions required for curing and preparing the leaf for the market; and, if Government ever determine to engage directly in the production and manufacture of tobacco for the European market, they will, I believe, in this Presidency, find no more favorable locality for this purpose than are met with on these hills.

31. *Turnips, Mangold-Wurzel, Parsnips.*—All these crops grow well on the more elevated parts of the Neilgherry plateau. On the Tudor Hall Farm, near Ootacamund, I saw some good crops of turnips of different varieties; these were growing between the lines of young tea shrubs, and afforded support to a large flock of sheep which, at the time of my visit, were eating the roots on the land—a most excellent practice when circumstances admit of it being followed. These turnips were large and well grown; their flesh was remarkably fine-grained, sound, and well-flavored, qualities, but seldom met with in turnips grown in this country, which go far to prove their high-feeding value. Now that it has been proved that the turnip thrives so well on a considerable proportion of the Neilgherries, it becomes an easy matter to provide in these portions of the district for the wants of live stock during the dry weather experienced in the first three months of the year which was previously the great difficulty in connection with stock-farming. The owner of live stock in these localities who, at the approach of the dry season, is unprovided with a crop of turnips for the use of his animals, only has himself to blame if, from the scarcity of grass during that season, his animals get seriously out of condition, and in that state become liable to attacks of disease when, after the beginning of the rains of the south-west monsoon, they are able to indulge freely in the consumption of the hastily grown immature grass then so very abundant. The extended cultivation of the turnip on the arable soils of these hills, suitable for their growth, would do much towards enabling these soils to produce more valuable kinds of crops than they now yield, as the turnip never can produce good results, unless the land on which it is growing has been well manured, and is, during the growth of the crop, kept free from weeds and in a loose friable state. Land that has just carried a good crop of turnips is generally in a most suitable state for growing a crop of wheat or barley. The benefits that arise from the cultivation of the turnip crop are thus, not only a supply of excellent food at the season of the year when grass is scarce, but a direct benefit to the soil by enabling it to produce more largely and to carry crops of a more valuable description. It is not too much to say that a very considerable proportion of the impulse given to agricultural improvement, during the last 50 years in Great Britain, was due to the introduction of the turnip and to its general cultivation throughout the country.

32. I did not see any field crops of mangold-wurzel or parsnips, but I was informed by those who had grown these crops that they produce heavily in many parts of the hills under very ordinary cultivation, and I see nothing to prevent them from being quite as successful as the turnip has been in this district if properly cultivated.

33. *Beetroot.*—This is at present only grown as a garden crop, but I believe that it will be found well worth growing as a field-crop for the production of sugar, &c., under the practice so largely followed in France and Germany, and lately introduced into the south of England. The climate met with in the neighbourhoods of Coonoor and Kotagherry seems to be admirably suited for the growth of sugar-beet, and the prevailing soils appear to be equally well adapted. It is yet to be determined whether beet-sugar could be manufactured in this country to compete with cane-sugar; but seeing how usefully the beet-pulp can be employed in feeding dairy and fattening stock, there seems to me enough to justify an experiment in this direction.

34. *Potato.*—The hill-people now give much attention to the raising of potatoes for sale. There is on these hills a wide range of country suited for the production of the potato; indeed, all the cultivated land situated at a higher elevation than 5,000 feet above sea level, and this includes nearly the whole of the arable land of the district. Its cultivation is, however, confined to the low-lying land in the valleys, chiefly in the neighbourhood of Ootacamund. The potato crop is said to thrive on land in the district situated as low as 4,000 feet above sea level, but the quality of the potatoes grown in such situations is very inferior. The potatoes raised in the Kaity and Kalhutty Valleys are, perhaps, the finest produced on these hills; and in these valleys the prevailing soil is one particularly well adapted for producing good potatoes: it is a light, free, well-mixed loam, of a good depth, and is naturally well drained. The cultivated land in these valleys is about 6,500 feet above the sea level. A considerable area of marshy peaty land, situated within the limits of the Ootacamund Municipality, has been taken up for potato cultivation by speculative natives who pay a high rent for it. Though, on such soil, heavier crops can be obtained with less trouble and at a little less expense than would

necessary on the better kinds of land, the quality of the potato produced is generally very inferior, its flesh after cooking is wet, hard, and waxy, while that of the potato raised on the soils known as [illegible] is dry and mealy; however, as these bog lands are so conveniently situated as regards the market for the produce they bear, they are in great demand. On some of these peaty soils attempts have been made by means of surface drains to carry off the surplus water, but, as far as I could ascertain, nothing whatever has been attempted in sub-soil draining. Sub-soil drainage and a liberal dressing of lime would work wonders on these soils, not only in increased yield, but also in improved quality—results that would represent a large return on the cost of effecting these improvements. Land so improved might have some other crop alternated with the potato crop, instead of as at present being devoted exclusively to the raising of potatoes, in this way keeping the soil in a healthy condition, while the frost, which during the winter months is frequently so hurtful to the potato crop on these ill-drained soils, would be much less injurious.

Potatoes are planted at all seasons of the year on these hills, though generally the time of year in which frosts occur is avoided. Three crops are sometimes obtained in 12 months, but more generally the cultivator contents himself with two crops. As the native plough cannot ridge the land, the preparation of the soil, except the mere stirring and loosening, is all done by manual labour, and the cost of putting in the crop is thus much higher than it need be, were a mould-board plough used; the crop is generally more liberally manured than is usual with native grown crops, and the land under potatoes is usually kept well weeded; but, with these exceptions, the potato cultivation on these lands is bad; the crop is repeated again and again until remunerative crops cannot be obtained, until the fertility of the land has again, by a long fallow, become partially restored, and the produce is planted year after year without any change. The result of this mismanagement is that it is becoming more and more difficult to raise a remunerative crop of potatoes. This mismanagement is not confined to crops grown on [illegible] seasons just mentioned, but is almost to as great an extent met with wherever the potato is grown by native cultivators on these hills. This is unfortunate, as there is now a European population in the district requiring a large and regular supply of potatoes, and there is a large demand to be met in the low country, and I am informed that natives, who have settled on the Neilgherries, are fast learning to appreciate the value of the potato as human food. There is thus an increasing demand, and the price, from Rupees 30 to Rupees 40 per ton, is almost as high as the English farmer gets for the potato he raises by costly appliances and dear labour, but the English farmer raises from his single crop seven to eight tons per acre, while the two crops the hill-cultivator obtains annually will not, in the majority of instances, yield two tons of marketable potatoes per acre.

36. *Vetches or Tares.*—This crop is not now grown on the Neilgherries, though it was introduced between 30 and 40 years ago by the late Mr. John Sullivan. The vetch appears to be well suited for cultivation. I was informed that, up to within a few years of the present time, strong, healthy vetch plants appeared annually in the Kaity Valley on a piece of ground which many years ago constituted a portion of a Government Farm that existed there. The Rev. Mr. Metz, my informant, describes the plants as remarkably large, strong, and healthy; and he attributed their annual appearance to the shedding of each year's seed. Unfortunately the plants are no longer met with, but the persistent re-appearance of the crop during so many years is ample proof of the suitability of the vetch to soils and conditions such as are met with in the Kaity Valley. I found one or two varieties of wild vetches growing in the neighbourhood of Ootacamund. From my experience in England in growing this valuable fodder crop, I feel certain that it is admirably suited for general cultivation on most of the arable soils of this district.

37. *Lucerne.*—This valuable fodder plant was introduced into the district more than 40 years ago; but, though under good cultivation it grows well and yields most satisfactory results, it has never been cultivated on an extensive scale, and the crop does not, I suppose, now occupy a larger area of land than it did 10 or 12 years after it was first introduced. It is to be regretted that European residents on the Neilgherries, who own live stock, give so little attention to the lucerne plant. All complain of the difficulties they experience, not only during the dry season, but throughout the year, in keeping their stock in good condition on the grass usually met with, and yet they neglect one of the most valuable fodder crops known, and

one that is admirably suited to this district, simply because it [illegible] cannot produce good results when left to the influence of natural agencies like the useless indigenous grasses. It is useless to expect [illegible] enterprise amongst the native stock owners here, until the European residents show a better example in their management of live stock. The fodder produced by the lucerne plant can be used in the fresh green state, or it can be dried and made into hay. It is in either condition valuable for all kinds of farm stock. The production of lucerne fodder or hay on a large scale, might be a very profitable enterprise in the neighbourhoods of Coonoor and Ootacamund, where there is during nine months in the year a considerable demand for fodder to feed the horses and ponies that are brought up to the hills by visitors from the plains. At present fodder produced by the coarse indigenous grasses only is available; and for this innutritious stuff few visitors pay less than Rupees 2 per ton when supplied by their grass-cutters.

37. *Clover.*—I did not see any crops of clover on the Neilgherries, but I found plants of the small white clover growing abundantly and with great luxuriance in a wild state in the neighbourhood of Ootacamund, chiefly on the sides of roads. If there is enough lime in the soil to enable this variety of clover to grow so well, I see no reason why the larger kinds of clover should not thrive on the land around Ootacamund if properly cultivated. The climate met with is admirably suited for the growth of clover. Potash on which the clover plant delights to feed is abundant, and lime could be added to those soils that do not contain a sufficiency.

38. *Sorghum Saccharatum.*—This plant has been grown as a fodder crop experimentally on a few sheltered parts of the Neilgherries, and I am informed that the results obtained were most encouraging. It would be a useful crop for planting on unoccupied land near coffee estates for raising fodder for the estate cattle, for it will thrive wherever coffee will grow, but it requires good cultivation, and in most localities it will pay the planter to grow maize which will yield both grain and fodder.

39. *Grasses.*—Very few of the natural grasses met with on the Neilgherries are of any use to the agriculturist. Most of them produce a coarse, crisp, innutritious herbage only fit for feeding buffaloes; while as they either grow upright to a considerable height sending out thick tough culms, or grow in tufts or tussacs, they never form a matted sward; hence there is nothing in the district that can be called a pasture. On the western and south-western portions of the Neilgherries, the prevailing grasses are tall and upright, without any bottom grass, lemon grass and one or two varieties of spear grass being very abundant. In a few favored situations only, is the herbage fit for grazing throughout the year. The Todas by periodical burnings manage at certain seasons to secure a good bite of young succulent grass for their buffaloes, but the season during which this is available is but of short duration, and the coarse jungle grasses soon [illegible] their ascendancy. On the other portions of the Neilgherries the grasses are much shorter, the open land is generally covered by a grass which grows in tussacs, and produces tufts of hard, crisp, pointed blades. Stock will never willingly eat this grass; they only take to it when compelled by starvation, and then it can do them but little good. It is so tough and wiry, it cannot but be very indigestable. In the lower valleys where the soil is not peaty and there is good natural drainage, better kinds of grasses are sometimes found, chiefly creeping kinds, apparently closely allied to the hurrialle grass of the plains. The peaty and swamp lands are generally covered by a heavy growth of coarse grass which seems to be much liked by the buffaloes, but the grass is a worthless one, except for these animals. Arable land that has been laid aside to undergo the long fallow, to which the Badagas subject their land periodically after exhausting all its available fertility, seldom produces anything more than creeping weeds, even though left for years untouched by the plough. A large proportion of the open land, situated on the eastern and south-eastern side of the hills, has been subjected to the exhausting cultivation practised by the Badagas, and has been abandoned; and on this land, as on the land temporarily left untilled, the only covering is a heavy growth of weeds. The greater portion of the Neilgherry plateau is, however, admirably suited for the production of pasture grasses. Many well known and highly valued kinds of English grasses have, indeed, been introduced, though only on a very limited scale; and, though mistakes have occassionally been made in selecting the soils and situations best suited to their habits, many of these grasses have proved themselves to be well suited for supplying the wants of the district. There is no reason, if the

with the view of obtaining information on this important question. Most of the tea estates on the Neilgherries are on land which was formerly under grass; such land, usually somewhat heavily covered by ferns, gives good results, but shola land is preferred when it can be obtained equally well situated, as on such land the shrub grows with much greater rapidity, and gives earlier and heavier flushes of leaf. Under good management and by the liberal use of suitable manure, good fern land can be rendered quite as productive as shola land which is always more costly to bring under cultivation. The plantations are generally small, ranging between 50 and 80 acres in extent; besides these there are numerous gardens varying from plots of but a single acre up to 15 or 20 acres. The bulk of the so-called plantations appear to have been started as experimental plots, and gradually increased until they have reached their present area; they are generally ill arranged, and are badly provided with buildings; indeed, many are altogether without buildings, being worked in connection with some other estate. None of the tea plantations I visited are arranged in the systematic way in which coffee estates are laid out; there is great room for improvement in this respect. The appearance of a tea plantation in this district is far less pleasing to the eye than the appearance of a coffee estate; while the coffee shrubs are wonderfully regular in size throughout the estate, the tea plants vary greatly; trees of three or four feet in height, with a spread nine or ten feet in circumference, often growing side by side with trees not half so high and with a spread of branches of a circumference not exceeding three or five feet, according to whether they are China, Hybrid, or Assam, all three kinds being frequently found growing together, but this irregularity is not altogether due to different varieties having been planted together, for I have observed an irregularity almost as great in plants all of one kind. It is evident that greater care must be exercised in selecting tea seed. It is not, I think, desirable to expend much time and money in the endeavour to produce that almost perfect uniformity which characterises the shrubs on a coffee estate, but it must have occurred to the most casual observer that it is scarcely wise for a tea planter to allow small diminutive plants to encumber his land, when he can as easily grow much larger ones. In many gardens the plants are stunted, evidently over-picked and insufficiently manured. Tea cultivation is gradually becoming very attractive on these hills; there is a wide tract of country admirably suited for this crop, while what is of far greater importance, tea is peculiarly suited for these higher parts of the district where the climate is well adapted for European constitutions; tea has so far proved to be less liable to attacks of disease and insects than coffee; less expensive buildings and machinery are required than on a coffee estate, and the labor is more regular throughout the year, and under high cultivation the returns, if not so large as those occasionally obtained from coffee, are much more regular and certain, and over a term of years quite as satisfactory. Many estates but just pay their working expenses; the cultivation generally adopted is far too low. It is only when high cultivation is practised that tea culture becomes really remunerative. Nothing is more simple than the production of leaf; there is such a wide choice of suitable manures, and tea under ordinary care is a crop that requires little skill on the part of the cultivator, while the harvesting of the leaf is equally simple. The manipulation and curing of the leaf is the most difficult part of the tea planter's work, and the value of the manufactured tea altogether depends upon the skill and care with which this is performed. It matters not that the leaf may have been produced under the most favorable conditions of climate, soil, and manure if the curing is defective. The great drawback to the general consumption of Neilgherry teas is their varying character, each plantation and garden producing different samples and qualities; they are thus to a great extent kept out of the wholesale market. If the tea planters, instead of each attempting to cure the leaf he produces, would raise the capital amongst themselves for establishing in each centre of tea cultivation, large well-equipped factories in which the leaf of the district could be properly cured under skilled direction, they would be able to produce a tea of an uniform sample and quality, which could be sent in quantity into the wholesale market where it would take a definite position. One such factory could be worked at far less expense than the ten or a dozen small tea-curing houses which it would displace; and under good management there would seldom be any more difficulty in conveying the fresh leaf to the factory than is now experienced in carrying it to the present curing houses. Co-operation of this kind has during the last five years worked an entire revolution in the manufacture of cheese and butter in Great Britain;

ten years ago every farm on which cheese and butter were made for sale possessed its own dairy, but now large dairy factories have been established to which the milk produced on the surrounding district is sent to be manufactured into butter and cheese, and not only the farmer's household relieved of much anxiety and labor, but the returns obtained are much larger than heretofore from the uniform and established character of the produce turned out by the factory, these factories are worked entirely by capital provided by the farmer. Co-operation of this kind having proved so successful in dealing with milk which is easily tampered with, varies greatly in quality, is difficult to transport long distances, and is easily spoiled, there is, I think, no reason why co-operation should not be equally successful in dealing with tea leaf. Indeed, something is already done in this direction, it being customary on some estates to sell any fresh leaf produced to some neighbouring planter who pays for the leaf at the rate of Annas 2 per pound, and manufactures it along with that produced on his own plantation. It would not be difficult amongst the planters themselves to find men qualified to direct such factories. I believe that, before tea planting can be placed on a safe and really satisfactory footing, it must be combined with the practice of ordinary agriculture; it is fortunate that tea cultivation is especially suited to those parts of the districts in which agriculture can be practised most successfully. The tea plant requires to be liberally manured, and the manure best suited is that made by stall-fed cattle; and to feed these cattle, grain, fodder, and root crops must be raised; this would afford useful and profitable occupation for the tea planter who, with no one only tea to cultivate, must often have a great deal of unemployed time, while by combining farming with tea planting he will be able to give constant employment to his laborers throughout the year, and thus have them always at hand whenever there is a flush of leaf to gather. Many of the observations made, when speaking of coffee, apply with equal force to tea culture. The tea planter, who would be successful, must employ a capital almost equal to that employed by the coffee planter. If he takes up grass land, he will incur less expense in starting his plantation than the coffee planter who takes up land covered by forest or scrub jungle; but in that case he must spend a greater sum on manure. Lining, pitting, planting, &c., will be more costly on a tea estate than on a coffee estate, because a larger number of plants are put down. Road-making, draining, the bungalow, coolly lines, sheds, &c., will cost about the same on either a coffee or tea estate, but less costly machinery will be required on the latter than will be needed on a coffee estate. The amount of labor absorbed under high cultivation will be greater on a tea estate than on a coffee estate, this is not due to any difference in the cost of cultivation, but is the result of the extra expense in harvesting the crop, as, while the coffee planter collects his crop at one stated season, the tea planter must collect his crop throughout the year at uncertain intervals when ever a flush is ready: and superintendence will be cheaper on a tea estate on account of the more healthy climate. A tea plantation of Assam or Hybrid plants in a favorable situation will, under high culture, give a virgin crop at the third year of 75 to 100 lbs. of made tea per acre, this will be equal in value to the virgin crop yielded by the coffee plantation at the same age; in the fourth year from 150 lbs.; in the fifth year from 220 lbs. to 250 lbs. In the sixth year the tea plantation will be in full bearing when the annual yield may be estimated at 250 lbs. of made tea per acre worth 1 rupee per pound on the estate. This, on an estate of 400 acres, will represent an income of Rupees 25,000, against an expenditure, say, of Rupees 16,000, leaving a net profit of Rupees 9,000 per annum, on the gross capital employed, say, Rupees 40,000, or 22½ per cent. The yield may in certain years rise to 350 lbs. per acre of made tea, and may in a bad season fall as low as 200 lbs., but the returns do not fluctuate so greatly as in the case of coffee, for this reason that, if a coffee crop is partly destroyed, a whole year must pass over before another crop can be gathered; while as the tea tree gives from 15 to 20 flushes in the year, the loss of a single crop is of comparatively little moment. I believe that a return of 250 lbs. of made tea per acre per annum from a well-managed tea estate in full bearing may fairly be taken as equivalent to a return of six hundred weight of clean coffee per acre from a coffee estate of the same age equally well managed, while there is more likelihood of tea continuing to commend 1 rupee per pound than coffee Rupees 40 per hundred-weight.

46. *Cinchona.*—The area of land under cinchona is probably not more than 3,000 acres, of this, the greater portion consists of Government plantations, there are also good-sized planta-

wood, until good pastures are provided, always be necessary to grow roots, fodder, &c., for their use. Even when Highland cattle are reared on their own hills, it is always necessary to pasture and feed them on turnips, &c., for a year or more on the lowlands, before they are ready for the butcher and their own pastures are in most instances greatly superior to the pasturage they would find on these hills. Under present circumstances it would be necessary in this district to keep Highland cattle in large droves, and to move them about as the state of the weather or pasturage demanded, and this would greatly retard the utilization of these hills. It is undoubtedly highly desirable that a good breed of cattle should be introduced into the Neilgherry District, but the breed to be selected must not only be suited to its climate, but must be equally adapted to supply the wants of the inhabitants under the agricultural practice that is likely to be most generally pursued. The cattle found in the south-west of Ireland appear to me to be well suited to the country around Ootacamund. I allude to the improved Kerrys; this breed is found in a very hilly district, where very high winds at times prevail, and where the rainfall varies from 50 to 70 inches per annum, and falls in frequent drifting showers, similar to those showers that characterize the Ootacamund rainfall. These cattle are kept only in small numbers by peasant farmers, who look to them to pay the rent by the sale of the butter their rich milk affords. From being brought up near the dwellings of their owners, the Kerrys are exceedingly good-tempered and tractable, indeed it is not at all unusual for a few cows of this breed to share one roof with their owner and his family; they are specially valuable as dairy cattle, indeed the butter for which Cork is so celebrated is made chiefly from the milk of the Kerry cow. Bullocks of this breed when fattened make very good beef. For Coonoor, Kotagherry, and the more sheltered and dry situations, I believe that animals of the Devon breed would be suitable, especially the variety that inhabits North Devon; this is one of the most generally useful breeds that England possesses; the North Devon is a good draught animal for either plough or cart, where activity and moderate strength is required; for the butcher it is equally well suited, when put up to feed it gives a large percentage of increased weight for the food consumed, while for the dairy, under proper care, it is unsurpassed. It is amongst these more domesticated breeds of cattle, especially those recognised as good dairy breeds, that we must look for the animals required for introduction into the Neilgherry District, for I believe that if the practice of agriculture is ever widely extended in this district, it will be under the influences of peasant farming, the only kind of farming that I believe practicable, as the very uneven surface of the country and the variations in its climate depending on these inequalities of its surface, will render it exceedingly difficult to conduct farming operations successfully excepting on a very limited scale.

34. *Sheep.*—Many attempts have been made to introduce sheep into the Neilgherry District, but with one or two exceptions these attempts have ended in failure. From what I could learn, the unfortunate results which have attended most of the experiments made, is not so much due to the climate, as to mismanagement, to the choice of sheep altogether unfitted for these hills, and to the absence of proper food. Many experiments were made with animals brought up direct from the plains, animals which had never previously experienced the effects of a temperature lower than 70 degrees, and this only for a few nights in the year, and these were at once exposed to a temperature which at night during two or three months frequently falls below 35 degrees, and as, in the majority of these cases, no sufficient precautions were taken to screen the animals from the effects of such a sudden and great change in temperature, it was not surprising that they fell victims to the climate. While these experiments were directed by persons interested in the matter the results were comparatively successful, but when from any cause their management was turned over to others, who did not feel the same interest, failure was generally the result. While mismanagement was undoubtedly the chief cause of failure, much of the want of success must be attributed to the sheep having been injudiciously selected. Of one experiment made by Government, the Collector of Coimbatore, writing to the Board in 1851, says: "Of the 50 half-bred Merino rams sent from Mysore 32 have died, the remainder 18 are placed under the charge of a European pensioner at Coonoor." And, in reply to a further enquiry of the Collector, he says, "the 18 rams referred to in my letter of August 1851 have all died." Such was the result of one experiment, and it may be taken as a sample of many others. I was unable to collect any reliable information regarding this experiment, but I can easily understand

that sheep bred in Mysore would suffer severely on these hills when first introduced, unless gradually accustomed to the change by residence in the more sheltered portions of the district before passing into the more exposed tracts of country. If, without undergoing this gradual acclimatization, the sheep were at once left to their own resources on the Neilgherry plateau, which seems to have been the case, they were sure to be attacked severely by rot, foot and similar diseases. Sheep are capable of thriving in a great variety of climates, and they will bear a great amount of privation and hardship in a climate to which they have long been accustomed; but it is unreasonable to expect them to bear sudden changes better than horses, cattle and pigs, which are generally gradually acclimatized, care being taken to guard them from the ill-effects of a sudden exposure to conditions different from those to which they were previously accustomed. I cannot but consider that it was a serious mistake to attempt at once to start a flock on the higher portion of these hills with stock reared in Mysore, even though that stock possessed a considerable amount of Merino blood. The Merinos from which on one side these sheep were descended were imported from Australia, where they are much more delicate and less hardy than in their own country, and the stock they got could not be expected to possess more hardy constitutions than the ordinary sheep found on the high table-land of Mysore. If it is desirable to introduce Merinos, it would be in every way better to import these animals direct from Europe instead of from Australia, but I do not think that the Merino is suited for the conditions generally met with on the Neilgherries. Though sheep of this valuable breed have proved capable of adapting themselves to a wide variety of circumstances, they are not suited for keeping in a wet climate. They would probably thrive, in the drier portions of the hills, in the neighbourhoods of Kotagherry and Coonoor, but they should be introduced direct from Europe, and the Saxon variety should be selected in preference to the Spanish, the latter though a better wool-producing animal fattens much less rapidly, and the ewes are not so prolific or such good mothers as those of the Saxon variety. For the Neilgherries generally, I would recommend the improved Cheviots or the Herdwicks; these inhabit the hilly country in Northumberland and Cumberland where they are frequently exposed to an annual rainfall varying from 50 to 100 inches, and to great cold intensified by piercing winds. The Scotch black faced breed have been recommended for these hills, and if there was any natural pasturage fit for sheep, they would perhaps be the best breed that could be introduced for extensive sheep-farming; but as the sheep must be fed on cultivated crops, on enclosed land, the black-faces would prove far too wild and unmanageable. On the Tudor Hall farm I saw a flock of good sheep which had been reared there for some time; they were a cross between the Chinese breed and Leicester breed, were large and compact and well covered with wool, and were apparently doing well at that high elevation nearly 7,500 feet above the sea. For keeping in small numbers on arable farms, where the chief food would be turnips, lucerne, &c., &c., raised specially for them, and where the feeding land is properly protected by plantations from high winds, they are perhaps as useful animals as could be obtained; but these conditions can be secured only to a very limited extent, until the district has been brought generally into cultivation. There are few natural facilities for sheep-farming in this district; there is an almost entire absence of grass suited for sheep; but, as before observed, crops suited for these animals can readily be produced. The general introduction of sheep into the Neilgherry District will entirely depend on the spread of cultivation, for the sheep must follow the plough; pastoral pursuits can never be successfully followed until cultivation has first prepared the way. No attempts have been made, except on a small scale, to utilize the wool produced; there is an erroneous impression prevalent that clipping is highly injurious to the sheep; if proper precautions are not taken, newly-clipped sheep, especially if the clipping has been performed at the wrong season, are very liable to injury, but ill-consequences are not more likely to result from clipping sheep up here, than in most countries where sheep are kept. The last agricultural statistical tables state, that the Neilgherry District possesses 2,000 head of sheep, but few as this number is, it probably includes the goats kept by the hill-people, which will number quite as many as the sheep. Leopards, cheetahs, jackals and other wild beasts will, until their numbers are greatly lessened, prove very destructive amongst flocks of sheep, but with good shepherding the loss from these causes need not be so great as has been experienced. Native shepherds have been found almost useless

a high elevation in a moist climate. It has always appeared to me that the best Highland breed might prove to be well adapted to these hills, either as a pure stock or crossed with the country cattle. They would resist the highest storms, rain and very stormy weather, consume every description of herbage solving there is grass of some ground, and be satisfied with a coarse sort of hay under the monsoon. Mr. Robertson would, however, on a careful inspection of the grasses of the country and of the existing sorts of cattle, native or crossed, and on due consideration of a temperature range each fall, be able to decide whether an improvement in the breed of cattle on these hills is to be sought by selection or importation. The depôt at Wellington and the markets of Coonoor and Ootacamund offer a steady demand for beef, which is at present supplied, in a great measure, from the plains, though the pastures of the plateau would appear to be capable of supporting more numerous herds than are driven over them at the present moment.

IV. A far greater boon to these hills than a good breed of cattle would be an appropriate breed of sheep, for, in addition to the meat-supply, there would be wool for which a ready sale would be obtained in the country. The Native sheep of the adjacent plains in the Coimbatore District would be too delicate to run out on these mountains all the year round, and the crosses which have been, up to the present time, effected with European breeds have not, in my opinion, been judicious. There is little use in attempting to raise a mountain-breed of sheep by crossing the native stock with the Leicester, the Southdown, or the Merino races; nor is by turning out these breeds in the pure state under an uncongenial sky and on pastures altogether repugnant to their habits. What is wanted here is a breed of sheep inured to high elevations, steep ground, rough weather, a heavy rain-fall, wet soil, and coarse grasses. The habits and qualities appropriate to the Neilgherries would be found in the Cheviot and black-faced breeds used on the borders of England and Scotland, which are hardy, and which yield good mutton and a heavy clip of useful wool. That sheep should be profitable here. It is indispensable that they should be able to run out the whole year in all weathers; that they should never require artificial shelter or artificial food, though it would be necessary to fold them at night for protection against the attacks of wild beasts. If any sheep would stand such hardships it would be the black-faced Scotch sheep. I do not affirm that they could do so, but it might possibly be worth trying, and no one would be more capable of giving an opinion on the expediency of making the experiment than Mr. Robertson, after local inspection and consultation with the Commissioner and with experienced residents on the Hills.

V. Some discussion has occurred, from time to time, respecting the possibility of appropriating portions of the Neilgherry Hills for the purpose of establishing European agricultural settlers, for the purpose, in fact, of creating a self-supporting English rural population. On a first view of the plateau such an undertaking might seem promising to an inexperienced eye. The climate is fine for a large portion of the year; the temperature is congenial to the European constitution; the soil is rich; there are apparently large tracts of unappropriated ground; there is a market; these are conditions favorable to the production of cereal crops, garden crops, fruits, and valuable commodities for exportation, such as tea and coffee; there is a friendly and fostering authority. A close inspection and analysis, however, tend materially to qualify such favorable expectations. Much of the good land on the warm side of the hills is subject to the rights of native cultivators; the cost of building is excessive; the price of labor is high; clothing is dear; medical attendance and education would be costly and difficult of access; the sale of grain crops, fruits, and vegetables would offer little money-remuneration compared to the wants even of a humble European family; the returns of tea and coffee culture are slow and liable to great fluctuations. A poor man would find it difficult to establish and maintain himself; a rich man would prefer to go elsewhere. My own impressions are decidedly unfavorable to the hills as a scene of agricultural settlement for Englishmen; but, I think that it would tend to the correction of erroneous impressions and to the formation of sound opinions that this question should be illustrated by the report of a person of unquestionable judgment and practical knowledge in such matters. The formation even of a limited working and self-supporting English community on these hills, if it could be effected under favorable conditions, would not be without importance either in a commercial or political point of view; and the basis for such a community might be found, in part, in the Male and Female Military Orphan Asylums which are about to be permanently established on the Neilgherries. There is the land, and there are the people; the question is whether they could be made to suit each other.

VI. The cultivation now practised by the Badagas shows a considerable variety of small cereals adapted to the climate and the soil, an intelligent application of labor, and more care and neatness in the weeding of the crop than is seen on the plains. It may be doubted, however, whether a greater weight of grain or a greater amount of human sustenance could be raised by the substitution of European seeds or crops on a given area than that which is now obtained. The poverty of the cattle betrays, however, the want of root crops, artificial grasses, and green crops. The same defect is apparent from the deficiency of hay in the market of Ootacamund. The system of grain cultivation is associated with long fallows. The principle of rotation or substitution of crops is imperfectly practised. Without entertaining any very enthusiastic hopes of a rapid improvement of native cultivation under European impulse on the hills, it can scarcely be doubted that, under the existing Revenue agencies, useful innovations might be gradually promoted, and the suggestions of Mr. Robertson would not be without value to the Commissioner.

Should the Government see fit to adopt the step here proposed, and sanction an investigation of the agricultural condition and prospects of the Neilgherries by the Superintendent of Government Farms, we should then be able to judge whether a Government undertaking, either for breeding stock or for the improvement of cultivation by example, would be justifiable. Any attempts in these directions which we might make would never be of broad utility to the general population of the country who are placed in circumstances radically different; but we have a duty to our own countrymen who have been cast by necessity or choice on this portion of English territory, and we possess in the Lawrence Asylum, in its labor, power, and in the land attached to it, the elements and means of experimental culture.

(Signed) NAPIER.

No. 305. ORDER THEREON, 22nd September 1871, No. 1,658.

Miscellaneous.

The Government have recently resolved on the establishment of three Experimental Farms under Mr. Robertson's superintendence in the low country for the improvement of agriculture, and, in furtherance of the same object, they deem it expedient that Mr. Robertson should proceed to the Neilgherries, when his duties elsewhere will best permit, and place himself in communication with the Commissioner, in view to instituting such extended inquiries as will enable him to report to Government fully on the agricultural condition, capabilities, and prospects of the hill district, especially in regard to the breeding of horses, cattle and sheep, to the facilities for establishing small farms on the European system, favored in part, at least, by European labor; and to the improvement of the husbandry of the hill-people.

2. His attention should also be directed to the planting operations already undertaken there by private individuals in connection with tea, coffee, and cinchona, and to the comparative profitableness of such enterprises in the special locality and circumstances of market, labor-supply, and capital employed or available for employment, as contrasted with the prospects of farming on the system followed in Great Britain.

3. The Commissioner will afford Mr. Robertson all the assistance in his power in prosecuting his inquiries, and will put him in the way of obtaining all available information on former experiments in hill-farming.

4. The Government believe that Mr. Rohde went to considerable expense in rearing cattle on the hills, and that Colonel Morgan has done the same in regard to sheep, while Mr. Phillips at Kotagerry devoted much attention to the same subject. The Missionaries at Kaity have also, it is believed, tried agriculture in a systematic way, and on a comparatively extended scale. Mr. Robertson may doubtless derive valuable information from these quarters, and it is possible that the records of the Kartairy experiment may furnish something useful, as also those of the tea experiment under Mr. Rae.

5. The Minute of His Excellency the President indicates, in considerable detail, the points on which the Government desire to receive Mr. Robertson's opinion and advice. They leave it to him to bring forward any other matters connected with the subject on which he may wish to submit his views towards solving forward his report for the Commissioner of the Neilgherries for transmission to Government along with his remarks through the Board of Revenue.

(True Extract.)

(Signed) S. F. OAKES, Captain, R.E.,
Officiating Joint Secretary, P.W.D.,
for *Secretary to Government.*

The following is an extract from the Proceedings of the Madras Agri-Horticultural Society :—

From the Hon. J. SULLIVAN, Ootacamund, to Dr. WIGHT, M.D., Secretary to the Agri-Horticultural Society, Madras, dated Ootacamund, 28th May 1839.

I send you, for the information of the Madras Agricultural and Horticultural Society, translation of a memorandum from Monsieur Perrottet, a French Naturalist of reputation and great experience on a few tea plants which are now growing in the Government Garden at Kaity. You will observe that, in spite of neglect and ill treatment, these plants were in a flourishing condition when Monsieur Perrottet left the Hills in October 1838. I have just returned from visiting the plants, and the very luxuriant condition in which I found them induces me to call the attention of the Society to the subject. Six out of eight of the plants are at this moment laden with buds, full flower, and fruit ; some seeds have already been gathered, and abundance more will be ripe in a few weeks. There can be no doubt whatever, therefore, that the tea plant at certain altitudes will thrive on these mountains so well as to make its cultivation an object of primary importance.

2. I am under the impression that a quantity of the plant was entrusted to your care some months ago. If this should be the case, I would earnestly recommend you to send them without delay to Kaity. This is the season for transplanting them, and from the freedom with which the plants appear to seed here, there can be no difficulty in forming a large plantation within a short time. For the growth and manufacture of tea, these hills present one great advantage over the Assam country, viz., the cheapness and abundance of labor.

Memorandum on the growth of the tea plant (Thea Viridis) upon the Neilgherries and on the advantages which would result from cultivating it on a large scale in that elevated part of India (by M. Perrottet, Botanist to the French Government.

At the period when Kaity (which was intended to serve as the model of a farm on the Neilgherries) was built, Colonel Crewe, who then had the management of it, received (I do not know from whence) several tea plants which he placed in one of the kitchen gardens belonging to the establishment. He appears to have chosen a very suitable place, as the young tea plants are sheltered by a very bushy, quickset hedge, from the north and north-east winds, generally so fatal to vegetation in that elevated region. A short time afterwards, Colonel Crewe died, and the place was almost deserted. Some native gardeners, however, were still employed, but either they did not know the worth of these young plants, or did not attend to them, and they were almost entirely neglected. In August 1836 General de St. Simon, Governor of the French Settlements in India, to whom Kaity had just been granted by the Superior Council of Madras during his residence in India, ordered me to the Neilgherries. I arrived at Kaity on the 4th of the same month. I found these tea plants, nine in number, very much stunted in growth, and hardly a few inches high, but, however, still living. The little progress they had made and their wretched condition surprised me at first, and induced me immediately to try and discover the cause. I found that it was owing to the plants having been immersed too deep in the soil. In fact, that part of the stalk, situated

above the collet or first vital joint which is designed to live above ground, was buried at least one foot deep. I cut down to the roots several of which were already rotten : all would infallibly have been so, had they remained in this state some time longer. I cut off these decayed roots, and had a large pit dug, and each plant one and deposited some good vegetable mould, to the depth of an inch, and afterwards watered them moderately. In a month at the most, all the buds of these young tea plants had been gradually to spread and unfold themselves, so that when I left the Neilgherries in April 1837, eight months after, almost all these valuable plants had attained the height of 2 or 2½ feet, and were loaded with branches and leaves of the finest growth. In January 1838 I returned to the hills, and found my tea plants in good condition, but they had made little progress in height. The gardeners had either filled up the pits, or allowed them to close up, so that the plants were as much buried as before. I again pared them down to the roots and restored them to their former condition. They were only watered when the weather was extremely dry, and then moderately. Their progress was so rapid that during the nine months I again spent on the Neilgherries, they attained the height of 3½ feet at the least, and had thrown out branches from the lower part of the stalk to the summit, which almost gave them the shape of a pyramid. People came from Ootacamund to see them out of curiosity.

This shrub prospers most from July till October when the rains are more regular and abundant : care must then be taken to pull up all weeds that shoot out with great force and in a prodigious quantity. When I finally left the Neilgherries, October 18th, 1838, my young teas were loaded with flowers, fruits, and leaves. The latter were most beautiful, large, and of a remarkably bright green color. The flowers were also very large and emitted a delightful odor. All the plants, except two, were then about 4 feet high and in a most flourishing state. Their numerous branches were remarkable for the vigor and strength of their vegetation. The fruit with which they were adorned was perfectly spherical, and had attained the size of a large pea.

From the facts I have just stated, there is every reason to suppose that the culture of tea established on a large scale will succeed very well on the Neilgherries, and might produce the most important results, especially if care is taken to choose the localities and expositions that suit it best. The soil, in general, is very fertile ; it is neither compact nor [illegible], therefore, very easy to cultivate. The rains are very frequent, and generally very abundant : they do not fall, however, in torrents capable of doing mischief which often happens on other mountains. In some localities the thermometer descends below congelation—at Ootacamund, for instance, it freezes from one to two degrees, that is to say, that solid ice is seen there. At Kaity white frosts are experienced, and at night the thermometer ranges at, but does not descend below, two or three degrees above zero.* This cold does not appear to injure the tea plants ; it only retards their vegetation. But I say again, they must certainly be sheltered from the north and north-east winds which are pernicious to them, being dry and cold.

Labor on the Neilgherries is plentiful and cheap. Laborers are procurable at all seasons in any numbers. The climate is healthy and very pleasant, the air is fresh and exceedingly wholesome. What more can be requisite to render it a delightful place—what am I saying ! an earthly paradise. In fact, I do not know any country so pleasant to inhabit, where the European is less troubled by cold or heat. Woollen clothing is worn there without inconvenience all the year round.

Herds of cattle and flocks of sheep, &c., &c., are very numerous and in fine condition. Pasture is plentiful and of a good quality. Meats of every description are succulent and very moderately priced. Almost all the year round there are excellent vegetables and a great variety of them ; peaches, plums, and apples, which are not, it is true, as good as in Europe, but are, nevertheless, quite eatable. Delicious strawberries, raspberries of two or three kinds, and a great many similar fruits, are found there in abundance growing wild, for instance, those

* The thermometer used is not mentioned, but it is either Reaumer's or the Centigrade, both of which commence from the freezing point of water at the level of the sea, or 32 degrees of Fahrenheit's scale. As however, the former between the freezing and boiling points of water is divided into only 80 degrees, while the latter has 100 ; it follows that, if the former is the one used 2 or 3 degrees above, zero is equal to from 36½ to about 39 degrees, whereas if the latter, it is only equal to from 35¾ to 37¼ of Fahrenheit's scale.

of the *Myrtus tomentosa* which are perfect, those of the *Berberis tinctoria*, those of an *Eleagnus* allied to the *E. argentea*, those of the *Moncera tuberculata*, those of the *Physalis*, those of the *Toddalia aculeata*, &c., &c.

Wheat, barley, and oats, flourish also there, beyond all expectation, and almost without care. Their produce is generally of a good quality and much esteemed. Barley especially possesses the necessary qualities for brewing beer. Mr. Davis, settled at *Kulhutty*, was making some when I passed that way; it appeared very good for a first trial.

Hemp and flax succeed equally well on the Neilgherries: they vegetate so rapidly, that at the end of three months they may be harvested: incalculable advantages might be derived from the culture of these plants. The potato also bears at the end of three months, and even less; it possesses qualities which are not to be found elsewhere; a flour is extracted from it which is much esteemed.

What cogent reasons there are then to settle on these delightful hills, and form regular plantations of all the precious vegetables of which I have just been speaking. What a mine of wealth for that man who has the good sense to devote himself first to the study of the different branches of agriculture! Let no one be mistaken, what I have just said is not nonsense as might at first be supposed, but the result of a deep conviction founded on a thorough knowledge of the localities. I have not visited the Neilgherries as an amateur, but as a naturalist and agriculturist. Besides being a foreigner, I can have no object in imposing upon any one. Let people only judge for themselves, and they will soon be convinced of the truth of my statement.

Ootacamund Rainfall from 1867 *to* 1872.

Months.	1867.	1868.	1869.	1870.	1871.	1872.
January	——	4·50	——	0·51	1·95	——
Febru...	0·40	——	——	——	0·60	——
March	1·10	0·10	2·0[illegible]	2·08	1·55	0·05
April	3·60	1·20	4·0[illegible]	2·39	5·73	1·93
May	3·00	3·80	6·20	3·09	4·72	5·00
June	3·40	10·46	7·49	7·52	5·63	6·45
July	10·40	7·35	4·36	5·06	3·33	4·89
August	0·90	7·80	4·50	6·33	5·02	4·20
September	3·70	9·8[illegible]	7·63	2·04	4·23	10·08
October	7·30	18·38	3·97	10·10	10·45	3·99
November	0·30	2·80	4·28	1·69	13·92	6·93
December	——	——	2·17	1·11	0·06	1·90
Total ..	34·10	66·35	38·65	41·92	57·23	45·42

Memorandum showing the Contract Rates of the Commissariat Department at Wellington from the years 1860 *to* 1871.

Articles.	1860. Per Rupee.	1860. Quantity.	1861.	1862.	1863.	1864.	1865.	1866.	1867.	1868.	1869.	1870.	1871.	Average Quantity of each Article consumed in one year.
	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	
Bread	1	6 0	7 2	8 2	6 8	6 12	7 2	7 0	6½ 0	6 6	7 5	8 1	7 9	167,920 lbs.
Mutton ...	1	8 0	7 0	8 0	8½ 0	7 0	7 0	7 8	7 [illegible]	6 [illegible]	5 8	6 [illegible]	4 8	37,970 lbs.
Beef	1	0 0	9 0	11 2	11 3	8 0	10 9	11 8	8 9	10 [illegible]	8 [illegible]	Dept.	[illegible]	115,913 lbs.
Rice	1	0 0	16 4	16 8	17 4	12 12	12 8	12 4	15 0	13 [illegible]	15 8	16 8	0	41,975
Salt	1	0 0	20 6	21 6	25 0	19 0	18 5	18 1	20 0	20 [illegible]	13 0	20 [illegible]	18 0	19,494
Potatoes ...	1	0 0	45 0	50 4	46 0	40 0	38 2	27 0	30 0	33 [illegible]	34 8	36 [illegible]	57 0	83,950
Vegetables ...	1	18 0	31 0	35 0	32 0	20 0	21 5	30 0	28 12	30 5	30 0	31 0	43 6	83,959
Coffee... ...	1	0 0	4 4	...	3 3	3 8	3 12	3½ 0	3½ 0	4 0	4 8	4 12	4 13	7,500
Firewood ...	1	220 0	320 0	275 0	300 0	305 0	150 0	230 0	230 8	250 0	[illegible] 8	257 0	280 0	2,503,700
												As.	As.	As.
Butter ...	1	1 0	1 0	1 0	1 0	1 0	1 4	1 0	1 [illegible]	1 [illegible]	14 per lb.	11 per lb.	12 per lb.	1,000
Milk	1	64 Drs.	60 Drs.	40 Drs.	40 Drs.	40 Drs.	68 Drs.	192 ozs.	192 ozs.	201 ozs.	108 ozs.	135 ozs.	138 ozs.	132,600 Drs.
Lamp Oil ...	1	28 Drs.	28 Drs.	27 Drs.	31 Drs.	31 Drs.	25 Drs.	18½ Drs.	18½ Drs.	23 Drs.	40 Drs.	41 Drs.	40 Drs.	2,607 I.
	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	Gallons.
Gram	1	57 0	26 4	21 8	32 0	34 0	23 0	21 0	11 13	19 0	30 12	41 3	47 0	26,350 lbs.
Straw, Paddy.	1	... ...	... ...	80 6	102 0	75 0	85 0	85 0	97 8	85 8	40 [illegible]	44 [illegible]	45 0	16,500 lbs.
Sugar	1	6 4	6 4	6 4	6 4	6 4	6 4	5 12	5 0	5 2	4 [illegible]	4 [illegible]	4 14	20,250 lbs.

COMMISSARIAT OFFICE,
Wellington 29th February 1872.

(Signed) T. C. GUNNING, Captain,
Sub.-Assistant C. General.

Rainfall registered in the Kaity Valley.

Months.	1872. Inches.	1872. Wet Days.	1873. Inches.	1873. Wet Days.
January	——	——	——	——
February	0·15	1	5·40	7
March	——	——	——	——
April	3·80	9	2·80	10
May	3·05	7	9·75	4
June	4·40	10	2·[illegible]0	9
July	5·[illegible]5	8	4·25	10
August	5·00	6	4·85	15
September...	12·50	19	5·30	10
October	4·10	5	10·65	7
November	7·90	17	3·50	1[illegible]
December	2·95	7	1·10	[illegible]
Total ...	49·20	89	50·20	[illegible]7

Meteorological Observations as taken at Wellington from 1st April to 31st December 1870.

Year and month.	Where Observations were made.	Barometer No. 626 N. & Z. Mean for Month.	Highest in Month.	Lowest in Month.	Range.	Temperature of Air. Highest in Month.	Lowest in Month.	Range in Month.	Mean of all Highest.	Mean of all Lowest.	Mean Daily Range.	Approximate Mean for Month.	Dry and Wet Bulb. Mean of Dry Bulb.	Mean of Wet Bulb.	Mean deduced Dew Point.	Mean Degree of Humidity.	Rain. No. of Days it fell.	Amount collected.	Ozone. Mean at 10 A.M.	Mean at 10 P.M.	Wind. General Direction.	Strength.	Cloud. At 10 A.M.	At 10 P.M.
April	Wellington.	24·300	24·389	24·[illegible]12	0·177	[illegible]5·9	59·0	16·9	71·9	61·9	10·0	66·9	67·9	[illegible]	[illegible]	50	6	0·84	75	70	E.	Not Calculated.	Ci-Cu.	Cu-St.
May		24·256	24·390	24·14[illegible]	[illegible]·247	79·2	59·0	20·2	73·9	63·6	10·3	68·7	69·9	58·0	60·2	[illegible]	12	1·64	85	65	N. E.		[illegible]	[illegible]
June		24·267	24·320	24·115	0·205	74·7	60·0	14·7	67·9	62·1	5·8	65·0	67·3	59·1	53·9	65	[illegible]7	3·23	80	65	W. N. [illegible]		Ci-Cu.	[illegible]
July		24·207	24·285	24·129	[illegible]·156	72·0	56·4	15·6	65·8	60·1	5·7	62·9	64·2	57·3	54·4	68	6	2·45	75	70	N[illegible]		[illegible]	Nimbi.
August		24·221	24·300	24·142	0·[illegible]58	71·6	57·5	14·1	66·8	59·9	6·9	63·3	64·5	58·0	55·6	55	17	3·00	85	55	[illegible] N. W.		Cumuli.	Nimbi.
September		24·231	24·318	24·144	0·174	69·1	56·8	12·2	65·4	59·9	5·5	62·6	63·0	57·1	53·4	71	9	2·09	80	[illegible]5	S. W.		Cirri.	Haze.
October		24·221	24·388	24·084	0·274	70·7	53·4	17·3	65·4	56·6	9·[illegible]	61·0	62·0	57·3	52·6	38	23	5·38	80	[illegible]	[illegible]		Ci-Cu.	Nimbi.
November		24·286	24·424	24·140	0·274	66·6	48·0	15·6	62·1	54·0	8·1	58·1	57·3	54·6	46·5	79	28	12·13	75	6[illegible]	E.		Nimbi.	Nimbi.
December		24·280	24·402	24·159	0·245	68·8	41·0	27·8	62·8	49·2	13·6	56·0	54·9	51·2	41·3	84	11	1·74	75	60	E. S. [illegible]		Ci-Cu.	[illegible]
Means ..		24·235	24·354	24·142	0·212	72·3	54·5	19·4	66·9	58·5	8·3	62·7	63·4	56·6	54·2	63	139	32·50	80	65	..	..	..	..

Wellington,
5th February 1872.

(Signed) J. COGHLAN,
Meteorological Observer.

(Signed) R. W. CARTER,
Staff Surgeon and Local Meteorological Superintendent.

Meteorological Observations noticing the Pressure of the Atmosphere, the Temperature and Humidity of the Air, the Fall of Rain, the Amount of Ozone and Cloud, the Prevailing Winds, and the Variations in the Weather taken at Wellington during the year ending 31st of December 1871.

Year and month.	Station.	Reading of Barometer No. 626 N. and Z. Mean for Month.	Highest in Month.	Lowest in Month.	Range.	Temperature of Air. Highest in Month.	Lowest in Month.	Range in Month.	Mean of all Highest.	Mean of all Lowest.	Mean Daily Range.	Approximate Mean for Month.	Dry and Wet Bulb. Mean of Dry Bulb.	Mean of Wet Bulb.	Mean deduced Dew Point.	Mean Degree of Humidity.	Rain. No. of Days it fell.	Amount collected.	Ozone. Mean at 10 H. A. M.	Mean at 4 H. P. M.	Winds. General Directions.	Estimated Strength.	Cloud. A. M. 0-10.	P. M. 0-10.	Remarks.
1871.																									
January	Wellington.	24·221	24·324	24·112	0·21[illegible]	71·0	48·4	22·6	67·0	54·2	12·8	60·6	59·7	50·5	44·7	53	10	[illegible]·47	70	60	S. W.	[illegible]	Haze.	Nimbi.	
February		24·240	24·318	24·143	0·175	69·9	48·0	21·9	64·3	55·6	8·7	59·9	58·9	53·8	46·0	68	[illegible]	2·13	75	65	S. E.	20	Ci[illegible]	[illegible]	
March		24·245	24·324	24·149	0·175	73·0	52·0	21·0	68·5	56·9	11·6	62·7	62·5	54·1	[illegible]7·8	6[illegible]	7	2·54	70	65	E. S. E.	30	Ci-cu.	Ci-St.	
April		24·239	24·357	24·071	0·286	74·8	57·1	17·7	69·4	59·9	9·5	64·6	65·9	58·8	5[illegible]	[illegible]4	7	[illegible]·07	70	63	S. E.	20	Cumuli.	Haze.	
May		24·140	24·256	24·08[illegible]	0·170	76·3	57·7	18·6	71·0	62·1	9·0	66·5	67·0	59·9	[illegible]3·7	60	8	1·20	73	[illegible]	S. E.	10	Ci-cu.	Ci-[illegible]	
June		24·115	24·214	23·[illegible]	0·219	74·[illegible]	57·7	17·0	69·7	61·0	8·7	65·4	66·2	[illegible]	52·3	66	8	3·25	65	58	W.	10	Cumuli.	Cumuli.	
July		24·143	24·214	[illegible]	0·164	71·[illegible]	56·7	13·9	68·0	59·4	8·6	63·7	64·2	[illegible]·0	53·3	73	10	1·90	68	60	[illegible] W.	20	Cirri.	Ci-C[illegible]	
August		24·168	24·[illegible]	24·0[illegible]	0·205	72·[illegible]	57·7	15·0	68·1	58·2	9·8	63·1	65·[illegible]	[illegible]·8	52·4	62	9	3·32	76	65	[illegible]	20	Cumuli.	[illegible]muli.	
September		24·160	2[illegible]·237	24·[illegible]	0·178	70·4	55·0	15·4	67·2	57·5	9·7	62·3	6[illegible]·7	57·8	51·1	73	17	6·90	74	63	S. S. W.	40	Haze.	Hazy.	
October		24·176	[illegible]	[illegible]·078	0·180	69·2	52·3	16·9	66·[illegible]	[illegible]·8	10·2	60·8	60·[illegible]	55·8	48·7	72	18	13·90	68	[illegible]2	S. S. W.	30	Hazy.	Hazy.	
November		24·1[illegible]	2[illegible]·311	23·940	0·371	68·0	51·2	10·[illegible]	[illegible]	54·0	10·2	59·1	59·6	53·2	46·5	60	14	[illegible]1·7[illegible]	65	58	S. S. W.	30	Hazy.	Hazy.	
December		[illegible]·249	24·340	24·152	0·194	66·3	51·8	14·[illegible]	62·8	[illegible]	9·1	58·1	59·[illegible]	53·7	45·5	62	[illegible]	[illegible]·4[illegible]	64	57	S.	20	Cirri.	Ci-St.	
Mean ..		24·189	24·[illegible]	[illegible]·07[illegible]	0·[illegible]1	71·5	53·8	17·3	67·2	57·3	9·8	62·2	62·6	57·3	49·4	65	17	5·90	69	61	..	23	..	..	

Wellington,
2nd February 1872.

(Signed) J. COGHLAN,
Meteorological Observer.

(Signed) R. W. CARTER,
Staff Surgeon and Local Meteorological Superintendent.

-12-12-90

7 June 1875
67-68

RDL 1623 of 75

Progs — 6-75 — 885

Pros: Bd of Revenue
Subrng with remarks report of Sub Coll.
Finances agricultural conditions &c of the Nilgiri Dt.

No. 885

H. E.

7 June 1875
April 1875 No. 5

The thanks of Govt are due to Mr. Robertson for his ~~admirable~~ excellent & practical report on the agricultural conditions, capabilities & prospects of the Neilgherry District.

The Board will take steps & [illegible] it widely & render it readily accessible & with this view it should be reprinted in 8vo.

~~x 523 [illegible] already printed~~

The Govt agree with the Board that the report does not indicate [illegible] which it is advisable

for Govt. to undertake

They are however prepared & entertain favourably any proposals which the Board may decide to make for the importation of some Kerry cattle & approve their purchase for experiments to test the suitability of the breed at the Asylum Farm.

All that appears necessary to facilitate [illegible] on the Neilgherries has been done but the discussion which the publication of the report is likely

to elicit among those practically engaged in agricultural enterprize on the Hills will be of value should the question of modifying of the existing system arise.

A.H.

14 To the Board of Rev Dec 19 June
to the Commissioner of the Nelgerries

Fig. 1

Fig. 2