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Report on the Agricultural Conditions in Assam

R E P O R T

on the

AGRICULTURAL CONDITIONS, CAPABILITIES & PROSPECTS

of the

Neilgherry District.

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A

REPORT

ON THE

AGRICULTURAL CONDITIONS, CAPABILITIES, AND PROSPECTS

OF THE

NEILGHERRY DISTRICT.

BY

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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 March. 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 greater 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, as 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

population of the Presidency. The hill-tribes included in the general census, just notice under the generic name of Hindus, numbered in 1871, 23,364, and were classed as below :—

Badagas	...	19,476
Todas	...	693
Kotas	...	1,112
Kurumbars	...	613
Irulars	...	1,470
Total	...	23,364

The Badagas, as I before observed, reside chiefly in the valleys on the eastern and contra part of the Neilgherries : they form the cultivating class ; but besides tilling land of their own many of them work for hire. The Todas reside chiefly in Todanad and Peranganad : they ar a pastural race, keeping large herds of buffaloes with which they wander as change of pasturag becomes necessary : they are a useless race of people : they will not work, and the buffaloe they keep do not support them. When the time comes for energetic action in the treatmen of this district, in view to its being made more productive than at present, one of the firs steps to be taken must be either the entire removal of the Todas and their herds from th Neilgherry planteau to the lower slopes, or their restriction to fixed areas of land set apar for their special use. The Kotas reside on the south-eastern side of the Neilgherries : they are the artisans of the hill-people, but they are also, to some extent, engaged in agricultural pursuits, and many of them work for hire in the tea plantations near Kotagherry. The Irulars and Kurumbars cultivate patches of forest in the jungles in the lower slopes of the Neilgherries. Sometimes they can be induced to work for hire in clearing forest land, but generally they prefer the wild life they lead in the jungles to regular employment on plantations : they are, however, very inferior workmen, not only from want of skill, but from their inferior physique, the result partly of their habits, alternately starving and over-feeding, and from continually breathing the pestilential air of the jungles they inhabit.

4. The recent extension of the Madras Railway to Mettapoliem cannot but prove beneficial to the Neilgherries, but the centre of the district is yet more than 35 miles from the railway station ; and, for the conveyance of goods over these 35 miles of road, the charge is greater than would be the freight on similar goods between Madras and Liverpool. Though this is a serious drawback to the success of agriculture on these hills if its object is the raising of produce for export, or for use in the low country, it operates in quite a different way when the object of the agriculture practised is the raising of produce for local consumption or manufacture, as it tends to keep low-country productions out of the market. At present at the least one-half of the population of the district depend on the low country for the common necessities of life, and the price they usually pay for these productions is nearly 50 per cent. greater than the average price, ranging at the same time in the producing districts at the foot of the hills ; thus taking the returns of the average price for 1873-74 on the Neilgherries and in the Coimbatore District :—

	Coimbatore. Imperial Seers per 1 Rupee.	Neilgherries. Imperial Seers per 1 Rupee.
Rice, 1st sort ...	11·5	8·7
Do. 2nd do. ...	13·2	9·6
Cholum ...	20·6	16·3
Cumboo ...	24·5	16·2
Raggy... ...	26·6	18·2
Horse gram ...	28·7	20·3
Ulundoo ...	15·3	10·3

It is true that only one or two of the grains and pulses enumerated above can be grown on the Neilgherries, but I venture to believe that the grains, &c., that can be produced on these hills would, if cultivated with skill, soon force low-country grains and pulses out of demand,

and the heavy transit charges on such produce should operate as an additional encouragement to local production. An attempt to produce on the Neilgherries the food required by their inhabitants would not, I think, tend to reduce prices seriously by the extra supply of food thus thrown into the market. The cost of conveyance from the producer on the plains to the hill markets will always keep down undue competition from that quarter. There are several good roads through the district, but many appear to have been made with the object of reaching the more picturesque parts of the district rather than with the view of affording facilities for the development of its resources. It is certainly desirable that pleasure roads should be made, as they will render the hills more attractive to summer residents, and in this way will yield a fair return on the cost of their construction and maintenance ; but the construction of roads that will open up new tracts of country suited for culture should receive prior attention.

CLIMATE.

5. Much has been written about the climate of the Neilgherries. In many of these writings the climate is, I think, greatly over-praised. It is certainly difficult to exaggerate, in speaking of the benefits, that the over-worked European resident of the plains derives from a few months' sojourn on these hills ; but because so much good is gained by a temporary residence in the district after a lengthened sojourn in the low country, it does not follow that the climate is necessarily a very superior one ; it only proves that the climate is greatly more favorable than that of the plains for European constitutions. It is a simple exaggeration to assert that the climate of the Neilgherries is the finest in the world, an assertion frequently made in the books that profess to give information about the district for the guidance of intending visitors. In forming conclusions regarding the climate of the Neilgherries, far too much importance has been attached to the meteorological results collected near Ootacamund some years ago, it should be remembered that even if the averages thus formed are scientifically accurate, which, I have reason to doubt, they can apply only to the *immediate* locality in which the details were registered. An elevated mountainous tract of country, like that constituting this district, must necessarily have many variations in climate, and it must be within the experience of every one who has traversed the district how the climate varies with the physical features of the country, according to its aspect, degree of exposure, &c., even within the narrow limits of the Municipality of Ootacamund, there are many variations in climate, and over the district generally every valley and every piece of elevated country has each a climate of its own. Under these circumstances meteorological registrations, unless collected at many different stations under all the varying conditions met with on these hills, cannot be trusted as sufficient evidence on which to base an opinion regarding the average climate of the district. However, I do not advise that the weather records available should be altogether rejected as useless, for they are useful in indicating the nature of the climate under certain special conditions. I wish only to guard those interested in this subject from the too common error of accepting these results as conclusive evidence of the kind of climate met with throughout the Neilgherries. The fact, that in a portion of the district, not twelve miles square, a climate suited not only for many varieties of tropical productions, but for all kinds of European crops can be found, is, I think, sufficient evidence in support of the statement just made. The district is under both monsoons ; the Dodabet range of mountains forms the line of separation ; the country lying to the west and south of this range is watered by the south-west rains, and that to the north and east by the rains of the north-east monsoon ; the south-west rains begin in the early part of May and continue until the end of August ; those of the north-east monsoon begin in October and cease about the end of November ; the heaviest fall of rain is during the prevalence of the south-west monsoon, one-half of the entire rainfall of the year being precipitated in this period ; the heaviest burst is on the Koondahs, where the annual fall is not less than 150 inches ; on the western crest of the slopes the fall is nearly as heavy, and at Neddiwuttum, situated in the north-west corner of the district, the annual fall is from 100 to 120 inches : going eastward there is a gradual diminution in the amount of rain annually precipitated, the quantity registered at Ootacamund being only about 55 inches,

and at Coonoor and Kotagherry only a little over 50 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 they may continue for days, the actual fall of rain is exceedingly light as shown by the rain gauge, but in reality heavy as is 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 that 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 underwood, 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 Neilgherries, the forest situated probably 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 it 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, that 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 cultivation 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 felspar. 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 fully 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. I the central and western portions of the Neilgherries there are many valleys containing marsh and peat bogs: these occur generally only in small areas, but where these areas are sufficient great, when there are facilities for drainage and the situation is convenient, these marsh will amply repay the cost of reclamation. In some localities they contain deep beds of pe which, though rather coarse and inferior, is a useful fuel where wood is scarce; but general peat only occurs in shallow beds. Nowhere in the district did I see any attempt to impro these soils by draining, burning, and liming, the means by which, in Europe, soils of th class have been made to yield large returns. The richest soils are met with on the flo of table-land situated below the crest of the slopes, covered by forest, or a heavy growth ferns. In such situations a great depth of vegetable mould is found resting on a soil of sitty character, evidently formed of the scourings of the upper slopes washed down by th periodical rains. As a general rule, land on the higher parts of this district, with a norther aspect, has a darker-colored soil, and is more thickly covered by vegetation than land expose to the south. Large areas of country are covered by poor, temporarily exhausted soil, th result of the bad farming of the hill-people, who not only use very little manure, but b neglecting to make proper provisions for the drainage of the water that falls during th monsoon, allow a large proportion of the surface of the land they till, to be regularly carrie down into the valleys below; so far has this been allowed to go in some localities, nothin but the bare sub-soil now remains, and what was formerly a rich tract of land has been thu 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 i also extensively grown on the higher table-lands in Coimbatore and Mysore, from whence it i probable the original seed was obtained for the Neilgherry District; the quicker growth of th 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, while the grain, like that of all spelt wheats, is very difficult to separate from the chaf or husk which envelopes it: indeed, in the bazaars 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, it 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 these hills.

8. 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 crowd of plants that spring up, that but an exceedingly small proportion of them succeed in bringing to maturity even a medium-sized ear of 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; probably 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 over 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, as the crop can seldom be secured before the first showers of the north-east monsoon appear, these 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 sowings, it would be necessary to abandon spring crops on the land intended for wheat, or to crop only with some crop that will be off the land in the early part of September, leaving 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 ran which covers the grain is the result of bad culture to which the wheat has been subjected,

and that, if the cultivation is improved, the bran during the grinding process will separate flakes as does the bran of superior wheats. I certainly do not expect that, even under hi cultivation, the hill wheat will ever become suitable for producing rolong, but I see no reas why, if good floury wheat can be produced on the hills, the flour should not be manufactur and the bread made on the English method. It is well enough to make rolong when go flour cannot be obtained from the wheat only available; the low-country wheats from their har gritty condition are admirably suited for making rolong, and this is the best use to which th can be turned. Rolong is but coarsely ground flour, gritty instead of soft and flaky; it exceedingly difficult to prepare, and its preparation is costly, as from its coarse, gritty charact the bran cannot be separated effectually by the ordinary sifting machinery used in flour mill and must be separated by hand-sieves. Flour could, therefore, be manufactured at a less cos could the miller only procure suitable wheats; but, as I have previously observed, the flo made from such hill wheat, as is now produced, meets with no favor on the hills, its ordina selling price being 16 pounds for one rupee when rolong sells readily at the rate of 8 poun per rupee. Residents on the hills, therefore, for pastry and other purposes, are obliged to u Australian flour, even though its selling price is seldom cheaper than four pounds for one rupe or 400 per cent. dearer than flour made from the wheat of the district. The price paid to th producer of hill wheat is sufficiently high to remunerate him for producing a wheat of a high class. The wheat market of Southern India is influenced by the price that rules at Bang lore; but Mr. Grove informs me that it fluctuates but slightly at Coonoor, seldom lower tha Rupees 4-4-0, or higher than Rupees 5-4-0 per 100 pounds. Taking Rupees 4-12-0 as about th average price, this will represent 48 shillings per quarter, a price sufficiently high to remune rate the English farmer for raising really good wheat, even sufficiently high to pay the Colonia and Foreign producer of wheat, with all the heavy charges incurred during its transit to th English market. There is a very large tract of land in the district admirably suited for growin wheat under a superior agricultural practice. There is a large demand, at remunerative prices for really good wheat, and this demand will go on increasing.

12. *Barley.*—This crop is grown more extensively in the district than wheat. Barley can b successfully cultivated on soils of a very different character and in climates as widely different Barley is, therefore, peculiarly suited to the circumstances met with in many parts of th Neilgherries. Several varieties of barley are grown on these hills; the variety most commonly cultivated is a naked barley, known to the hill cultivators as "Akki Ganji," a six-rowed barley, i is considered by them to be a much larger producer than any of the other varieties with which they are acquainted, and probably they are correct, seeing that barleys of the higher class never receive fair treatment at their hands. Under better cultivation this naked barley might become valuable for the manufacture of barley flour; it is plump and well flavored, but, as now cultivated, it is of but little value, and is scarcely known outside the villages of the Badagas. Two other kinds of barley, also six-rowed, are met with in different parts of these hills; the one is known as "Dhore Ganji" and the other as "Badagas Ganji." The people declare that the first of these was introduced by the late Mr. John Sullivan, and the latter they claim as the indigenous barley of the district. Neither of these barleys are valuable kinds; they both appear to be identical with the Bere or Big of Scotland. The "Dhore Ganji" is a very inferior grain, much inferior to the so-called "Badagas Ganji," but both are highly valued by the hill-people who assert that both are more nutritive and more easily cultivated than Scotch two-rowed barley which has recently been brought under their notice, and which, as it is bought up by Mr. Honeywell of the Glen Arven Brewery for making malt, they call "Beer Ganji." Mr. Honeywell has acted in a very enterprising manner in his endeavours to establish a brewery on these hills; amongst other efforts made by him may be noticed the attempt he made to get the Badagas to grow a better kind of barley. He went to a considerable expense in bringing out from England good kinds of Scotch and English malting barleys which he distributed amongst the Badagas resident in the villages situated in the neighbourhood of his brewery, and promised them that he would buy all the barley they raised from the seed, at prices much higher than those they usually obtained for their ordinary barley. Mr. Honeywell is not quite satisfied with the result of his experiments in this direction. He informed me that the produce raised during the first three years after the introduction of the seed was only about five per cent. less in weight than the

imported grain, but that afterwards it deteriorated at a more rapid rate. He informed me that some of the barley raised from the fresh seed weighed as much as 50 pounds per bushel, indeed, I saw at his brewery a sample which I understood was produced from seed imported three years before, which was really good malting barley, excepting that it was rather deficient in color. I learnt from Mr. Honeywell that this barley makes excellent malt. He thinks that to keep up the quality to the malting standard, that it would be necessary to import fresh seed from Europe once in every five years; this, I think, would scarcely be necessary if the barley was grown under proper conditions and suitably manured. Nothing but deterioration in the quality of the grain can be expected as long as the present agricultural practice of the Badagas continues. Mr. Honeywell considers the climate of the part of the Neilgherries where he resides to be admirably suited for malting and brewing operations during the winter months, and the testimonials he holds are sufficiently conclusive as to the quality of the produce of his brewery. Mr. Honeywell finds that the ordinary barleys grown on the hills are altogether unsuited for malting purposes; the best of these yields a malt that weighs only about 28 pounds per bushel, and is very deficient in saccharine matters. From his experience with imported seed, he considers that properly cultivated land in selected places would readily yield 35 bushels of good barley per acre, for which he would be glad to pay Rupees 2 per bushel; indeed, he informed me that his chief difficulty in doing a large contract trade in beer and ale is his inability to secure a regular supply of good barley.

13. But not only would a good class of barley meet with a ready demand in the district for malting purposes, but such barley would be equally valuable to the miller for the manufacture of pot and pearl barley, barley flour, barley meal, &c. for the latter, there should especially be a ready demand for use in feeding cattle, pigs, &c.

14. The Badagas generally sow their barley crop when they sow wheat, and they harvest at about the same time that wheat is harvested. The remarks made in noticing their wheat crop apply with equal force to their treatment of the barley crop during its growth. They get an exceedingly poor return at harvest. I saw few crops that would yield 15 bushels per acre, and the majority I saw would not, I am sure, yield six bushels per acre. Compare this yield with that obtained in England, 50 to 60 bushels per acre under natural circumstances of a far less favorable kind than are met with in many parts of the district for barley culture, and it will be readily seen that, in the production of barley at any rate, there is much room for improvement in the agricultural practice of the Badagas.

15. *Oats.*—The oat crop is not cultivated by the hill-people; it is met with only on lands occupied by Europeans and Eurasians. The total area of land annually under oats is exceedingly small, and the crop is, in most instances, grown only for the valuable fodder it affords. The oat is specially suited for cultivation on certain parts of these hills; it thrives in a soil so deficient in lime as to be altogether unsuited for wheat or barley; it needs more moisture during its growth than either of these crops, while it seems to prefer the colder and later districts. When placed under conditions which would be highly favorable to the development of the two cereals just noticed, the grain of the oat will become less and less plump, and its weight per bushel gradually decreased. Many persons in this district have met with disappointment in their experimental cultivation of oats, straw only having been produced, the ears being quite destitute of grain; but these results may have been owing to the seed, the season, or to the soil, and in no way afford conclusive evidence against the suitability of the oat for cultivation in selected parts of the district, as oats have thriven and produced again and again most excellent grain in various parts of the Neilgherries. I believe that, under proper cultivation, there would be no difficulty in producing oats of really good quality on these hills; but it would be necessary, in the first instance, to get out from England or Scotland some really good seed of the varieties best suited for the conditions met with on the Neilgherries. From the seed now available, some really excellent fodder is raised which, when dried and cured, constitutes the oat-hay so highly valued in Australia. Merely for producing oat-hay, this cereal is well worth the attention of all who own stock on these hills. The hay, when the crop is cut before the grain begins to form, is especially suited as food for horses and sheep.

16. *Rye.*—This crop is not grown in any part of the hills, neither have I heard of it having been experimentally cultivated. Rye is largely grown in Europe, and forms the chief bread corn

of the Germans and Russians ; it is also used to a considerable extent in the north of Engla by the agricultural laborers for the same purpose. A crop of rye will yield as much food a crop of wheat, while rye will thrive in a soil too poor to yield even a moderate crop of whe In most respects its cultivation is similar to that to which wheat is subjected. While I ha said this much in favor of rye as a crop for these hills, I would not advise its general cultivati until experiments have first been made on a sufficiently extensive scale to ascertain whether t humid climate of the hills does not tend to the production of the fungus "ergot" by whi the rye plant in most countries is liable to be attacked during an unusually wet season, a fungu growth which is highly injurious to breeding stock which may chance to eat the grain so disease

17. *Buckwheat.*—I did not see any crops of this plant ; but I was informed that buckwhe grows readily, and produces heavily, even on exposed parts of the higher portions of the plate near Ootacamund. Its seed can be used for all the purposes to which the grain of the comm cereals is devoted. Its flour from decorticated seeds is white and wholesome. Buckwheat largely used in the southern and eastern parts of Europe for feeding horses, pigs, and poultry

18. *Maize.*—Maize or Indian corn grows well in the more-sheltered portions of the Neilghe ries. As this valuable plant was but recently introduced into the district, it is not yet grown as crop, its cultivation being confined to small plots of ground close to the huts of villagers. I met wit maize in many parts of the hills at elevations varying from 5,000 feet up to 7,000 feet above se level, and the plants invariably appeared strong and healthy. I was informed by several person who had grown maize experimentally, that they generally obtained most satisfactory results. It not only the yellow, hardy varieties that thrive here, but I saw a very fine plot of white Tuscaror maize which is one of the most delicate kinds growing at an elevation fully 7,000 feet above th sea. There is a large area of land in this district which would produce, under good cultivation most satisfactory crops of maize. This crop is valuable, not only for the large yield of nutritiv grain it produces, but also for its straw-producing capabilities. In America a very larg proportion of the population resident in the Western and South-western States is supporte almost entirely by the maize crop, while its grain forms the food of greater part of the liv stock of the entire Republic. The crop is well worth attention on the Neilgherries, especially o coffee estates, not only for producing suitable food (now so difficult to procure at a reasonabl price) for the cattle kept on these estates, but also as the food of the coolies employed thereon for whom, in most instances, rice, etc., must be obtained regularly, at no small trouble and inconvenience to the planter. Maize bread would be an excellent substitute for the rice and othe inferior food grains now used by plantation coolies, as the food they now consume, even i suited for use in the plains, is altogether unfitted to support work-people in health in the colde and wetter climates of these hills.

19. *Korali.*—This crop grows freely on the poorest and most exposed portions of the district ; its grain forms the chief food of the hill-people : indeed, there is, perhaps, no grain cro more extensively grown by them. Korali is generally sown along with a variety of samay. This mixed crop appears to be a popular one amongst the Badagas, but I am strongly inclined to believe that much of this popularity is due to the fact that the crop is a very hardy one, and needs little attention during growth, as the yield, except on low-lying, newly taken up land, is light, and the grain very small and inferior ; and, as the harvest cannot take place until eight or nine months after sowing, only one crop can be produced during the year. Korali will, perhaps, produce fair returns on situations too high and exposed for the profitable growth of any other crop ; but a large area of land which it now occupies might be under much more useful crops. The grain of Korali is exceedingly small ; it takes 20 ordinary sized grains to equal in weight one grain of ordinary hill-wheat. Attempts have been made to produce hay by cutting the crop down before its seed appears, and winning it in the usual way, but the result is not, I think, very encouraging. The hay so made is so tough and wiry, that it cannot but be very indigestible.

20. *Raggy, Varagoo.*—These crops grow well on the lower slopes of the Neilgherries, especially on the south and south-eastern sides, and the produce of both meets with a ready market amongst plantation coolies. However, as soils and situations suited for these crops would be equally suited for maize and other valuable crops, they do not appear to me to be worth attention.

21. *Kêre.*—Kêre is the *Amaranthus campestris*, or prince's feather, the handsome red age plant common in gardens. Kere is not grown very extensively ; it needs a rich soil in a l-sheltered situation, in such circumstances it bears heavily. The grain is small and white ; average-sized grains only equal in weight one average-sized grain of hill-wheat. It is not ike poppy seed, and is highly valued by the hill-people who consider it to be one of the st nutritious grains they have ; it is produced only for local consumption. This crop does appear to be worth much attention, as soils and situations suited for its healthy growth would admirably suited for the production of wheat, barley, &c.; and a good crop of any of these uld yield a very much larger return both in grain and in straw.

22. *Navoney or Tenney.*—This is the *Panicum Italicum ;* it is not suited for cultivation on Neilgherry plateau, and is cultivated only to a limited extent at elevations below 5,000 feet ove sea level. The grain is seldom eaten by itself, but is used by the hill-people mixed with rali and samay.

23. *Samay.*—Samay is the *Panicum Miliare* of Botanists. Four kinds of samay are known the Badagas. The difference in these are chiefly in the time of reaching maturity. The most ghly esteemed is the "nalla" samay which is an eight months' crop. One of these varieties ws and matures in three months, but it is considered to be a light producer, and is not in ch favor. The grain is like that of Navoney, small, light, and poor ; twenty grains only al in weight one average-sized grain of hill-wheat.

24. *Beans and Pease.*—I did not meet with either of these as field-crops ; as garden-crops, ey thrive in all parts of the district, and there is no reason to suppose that, as field-crops under oper cultivation, they would be less successful. The prevailing soils appear well suited for ans or pease, and the value of these pulses as food for man, or as food for the live ck of the farm, is universally admitted. As rotation crops, after cereal crops, they are great use in agriculture.

25. *Mustard.*—On the lower slopes of the Neilgherries mustard grows readily ; its culti- tion is entirely in the hands of the hill-people who grow the crop on a very limited scale, and iefly, I understand, only to supply local wants.

26. *Hemp and Flax.*—During my inspections of the Neilgherries, I did not meet with either these crops ; but, as early as 1839, the late Mr. John Sullivan directed the attention of the adras Agri-Horticultural Society to the facilities these hills afford for the production of mp and flax, and submitted to the Society some excellent samples of the fibre of both these nts that had been produced by him in the neighbourhood of Ootacamund. From the results my own observations I have arrived at a conclusion very similar to that formed by the late r. Sullivan. If care is exercised in selecting suitable land, both as regards position and ality, and the proper time of year is chosen in which to sow the seed, I have no doubt but at, under moderately good cultivation, remunerative crops of both hemp and flax will be raised. s far as I could learn, no experiments have been made during the last few years on the eilgherries in growing either of these crops for the production of fibre. Experiments have, ver, been made in various parts of the district in growing flax for the production of seed which valuable as a food for live stock, and the results obtained were, I was informed, considered satisfactory. There can be no doubt but that, if these hills should eventually be colonized an agricultural population, the production of the flax plant for its fibre will be one of the ost profitable branches of agriculture to which their attention can be devoted ; and there is nearly all parts of the hills plenty of water-power available as the motive power for working utching and spinning machinery.

27. *Cotton.*—In Wheeler's Hand-book to the cultivation of cotton in the Madras Presidency page 49 and the four pages that follow, an account is given of a very successful experiment in otton cultivation made in the neighbourhood of Ootacamund about 30 years ago. I made nany inquiries in the neighbourhood of Ootacamund amongst persons who had long resided here for information regarding this experiment, but was unsuccessful ; and the climate of the ountry immediately around Ootacamund being apparently quite unsuited for the growth of the otton plant, I concluded that there had been some mistake in compiling the Hand-book, and eferred the matter to A. Wedderburn, Esq., the Collector of Coimbatore, who was good

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

28. *Castor-oil Plant.*—On the lower slopes of these hills the castor-oil plant thrives yields good returns. Though good results are more certain on these lower elevations, the p will grow in sheltered situations even as high as 6,000 feet above sea level; indeed, I have s strong healthy plants growing at this elevation. This crop is entirely in the hands of the l people who grow it only in small patches to supply their own wants. As a shade plant 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 Kart especially in the Kaity Valley. It is cultivated merely for the opium it yields. The crop is usu sown in October, and the opium is collected in January and February. The cultivators that the capsules yield their juice more freely, and that this juice is much less watery dur cold weather than during hot weather; hence they prefer the autumn months for sowing th crop, and this practice has this additional reason to recommend it a certainty of dry weat during the opium harvest. The crop is badly cultivated, and the yield of opium per acr small. As the poppy seems to thrive in spite of the treatment it receives at the hands of Badagas, there is no doubt but that, under high cultivation, it would be a remunerative crop, there is plenty of land on the Neilgherries as well suited for the growth of the poppy as land on which it is now grown.

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

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

35. Potatoes are planted at all seasons of the year on these hills, though generally the ti
of year in which frosts occur is avoided. Three crops are sometimes obtained in 12 montl
but more generally the cultivator contents himself with two crops. As the native plou
cannot ridge the land, the preparation of the soil, except the mere stirring and loosening, is
done by manual labor, and the cost of putting in the crop is thus much higher than it need l
were a mould-board plough used; the crop is generally more liberally manured than is usual wi
native grown crops, and the land under potatoes is usually kept well weeded; but, with the
exceptions, the potato cultivation on these lands is bad; the crop is repeated again and aga
until remunerative crops cannot be obtained, until the fertility of the land has again, by a lo
fallow, become partially restored, and the produce is planted year after year without a
change. The result of this mismanagement is that it is becoming more and more diffic
to raise a remunerative crop of potatoes. This mismanagement is not confined to cro
grown on the peaty soils just noticed, but is almost to as great an extent met with wherev
the potato is grown by native cultivators on these hills. This is unfortunate, as there is n
a European population in the district requiring a large and regular supply of potatoe
and there is a large demand to be met in the low country, and I am informed that natives, wh
have settled on the Neilgherries, are fast learning to appreciate the value of the potato
human food. There is thus an increasing demand, and the price, from Rupees 30 to Rupees
per ton, is almost as high as the English farmer gets for the potato he raises by cost
appliances and dear labor, but the English farmer raises from his single crop seven to eig
tons per acre, while the two crops the hill-cultivator obtains annually will not, in the majori
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 w
introduced between 30 and 40 years ago by the late Mr. John Sullivan. The vetch appears
be well suited for cultivation. I was informed that, up to within a few years of the prese
time, strong, healthy vetch plants appeared annually in the Kaity Valley on a piece of grou
which many years ago constituted a portion of a Government Farm that existed there. T
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. Unfortunate
the plants are no longer met with, but the persistent re-appearance of the crop during so ma
years is ample proof of the suitability of the vetch to soils and conditions such as are met wi
in the Kaity Valley. I found one or two varieties of wild vetches growing in the neighbourho
of Ootacamund. From my experience in England in growing this valuable fodder crop, I fe
certain that it is admirably suited for general cultivation on most of the arable soils of this distric

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

that is admirably suited to this district, simply because it *must be cultivated*, and cannot
duce good results when left to the influence of natural agencies like the valueless indigenous
sses. It is useless to expect to meet with enterprise amongst the native stock-owners up
e, until the European residents show a better example in their management of live stock.
e fodder produced by the lucerne plant can be used in the fresh green state, or it can be
ied and made into hay. It is in either condition valuable for all kinds of farm stock. The
oduction of lucerne fodder or hay on a large scale, might be a very profitable enterprise
the neighbourhoods of Coonoor and Ootacamund, where there is during nine months in the
r a considerable demand for fodder to feed the horses and ponies that are brought up to the
ls by visitors from the plains. At prsent fodder produced by the wretched indigenous
asses only is available; and for this innutritious stuff few visitors pay less than Rupees 20
r 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
all white clover growing abundantly and with great luxuriance in a wild state in the neigh-
rhood of Ootacamund, chiefly on the sides of roads. If there is enough lime in the soil to
ble this variety of clover to grow so well, I see no reason why the larger kinds of clover
ld not thrive on the land around Ootacamund if properly cultivated. The climate met with
mirably suited for the growth of clover. Potash on which the clover plant delights to
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
few sheltered parts of the Neilgherries, and I am informed that the results obtained were
t encouraging. It would be a useful crop for planting on unoccupied land near coffee
tes for raising fodder for the estate cattle, for it will thrive wherever coffee will grow, but
quires good cultivation, and in most localities it will pay the planter better to grow maize
h will yield both grain and fodder.

39. *Grasses.*—Very few of the natural grasses met with on the Neilgherries are of any use
the agriculturist. Most of them produce a coarse, crisp, innutritious herbage fit only for
ling buffaloes; while as they either grow upright to a considerable height sending out thick
gh culms, or grow in tufts or tussacs, they never form a matted sward; hence there is noth-
in the district that can be called a pasture. On the western and south-western portions of the
lgherries, the prevailing grasses are tall and upright, without any bottom grass, lemon grass,
one or two varieties of spear grass being very abundant. In a few favored situations only, is
herbage fit for grazing throughout the year. The Todas by periodical burnings manage at
ain seasons to secure a good bite of young succulent grass for their buffaloes, but the season
ing which this is available is but of short duration, and the coarse jungle grasses soon resume
r ascendancy. On the other portions of the Neilgherries the grasses are much shorter, the
h land is generally covered by a grass which grows in tussacs, and produces tufts of hard,
p, pointed blades. Stock will never willingly eat this grass; they only take to it when
pelled by starvation, and then it can do them but little good. It is so tough and wiry, it
not but be very indigestable. In the lower valleys where the soil is not peaty and there is
d natural drainage, better kinds of grasses are sometimes found, chiefly creeping kinds,
arently closely allied to the hurrialle grass of the plains. The peaty and swamp lands are
erally covered by a heavy growth of coarse grass which seems to be much liked by the
faloes, but the grass is a worthless one, except for these animals. Arable land that has
n laid aside to undergo the long fallow, to which the Badagas subject their land periodically
er exhausting all its available fertility, seldom produces anything more than creeping weeds,
n though left for years untouched by the plough. A large proportion of the open lands,
nated on the eastern and south-eastern side of the hills, has been subjected to the exhausting
tivation practised by the Badagas, and has been abandoned; and on this land, as on the land
porarily left untilled, the only covering is a heavy growth of weeds. The greater portion of
Neilgherry plateau is, however, admirably suited for the production of pasture grasses.
ny well known and highly valued kinds of English grasses have, indeed, been introduced,
ugh only on a very limited scale; and, though mistakes have occassionally been made in
lecting the soils and situations best suited to their habits, many of these grasses have proved
emselves to be well suited for supplying the wants of the district. There is no reason, if the

proper means are employed, why really good meadows and pastures should not be produce abundance in nearly all parts of the plateau. The attempts that have been made have generally been conducted judiciously, good pastures or meadows cannot be produced, e under a very liberal expenditure on manures and on cultivations. Land intended for such should be put through a regular course of husbandry. Guinea grass and Mauritius grass also been introduced; both these grasses grow well, and yield large quantities of excellent f in the neighbourhood of Coonoor and on the lower slopes of the Neilgherries where a wa climate is met with.

ORCHARD AND GARDEN CROPS.

40. A great variety of orchard and garden crops are met with in this district; apples, peaches, mulberries, oranges, limes, citrons, pineapples, loquats, &c., thrive well in su situations in various parts of the hills; plums, figs, almonds, nectarines, apricots, filberts, wallnuts, lemons, &c., are said to produce fruit, but they are not so generally g The apples and pears produced in the neighbourhoods of Kotagherry and Coonoor are superior to those grown in other parts of the district, but they are very inferior to those in England. Raspberries, strawberries, and Brazil cherries also thrive well. None of these are remarkably good; but they are in most cases produced in great abundance, and are adm suited for making jams, jellies, &c., for which there would be a large demand in the low c at remunerative prices. All kinds of vegetables known in Europe grow with greater or less in almost all parts of the Neilgherries; potatoes, cabbages, cauliflowers, lettuce, beans, parsnips, beet, carrots, turnips, knol khol, celery, radishes, cucumbers, &c., &c.

FORESTS AND WOODLANDS.

41. In the central portion of the district natural forest occurs generally onl isolated patches, in sheltered valleys by the sides of streams; these patches are s more than 20 acres in extent, and the majority are not half this area: they consist of stu crooked, undersized indigenous trees of no value as timber, and of small value as fuel. trees in these sholas ever reach a satisfactory size; they stand so closely together, and have branches so intermingled, that they have a constant struggle for existence; and, judging from heavy growth of mosses and lichens with which they are covered, their struggle is a severe By fencing out cattle, etc., by thinning, by pruning, and clearing away brushwood, these sh might be somewhat improved; but in most instances the benefits that would result would small in comparison with the cost of effecting these improvements, as the trees from their infa have always had these unfavorable conditions to contend with, and have become more or permanently injured. Even when growing in less unfavorable circumstances the trees are scar worth attention, as their growth is so exceedingly slow in comparison with that of Austral trees which might be grown on the same ground. A few of these sholas have been thin and the spaces thus made were filled with Australian trees, though these grew well enoug the first year or two after they were planted, their growth was soon checked by the indige vegetation which in these sholas grow so luxuriantly unless kept in check, and this is exc ingly difficult to do in half-cleared natural forest. Sholas that are likely to prove of us affording shelter from high winds, those that are the favorite resorts of hill visitors, and th that are situated near the large hill stations, should be preserved; but all others should, I thi at once be offered for sale. This would set free, when cleared, a large area of valuable land growing coffee, tea, cinchona, Australian trees, etc., while the appearance of the country c not but be improved: land under natural forests unfit for these uses should, of course, remain at present. On the eastern portion of the district, above the crest of the slopes, the wh country is exceedingly bare; excepting a low jungly scrub met with in considerable patc there is nothing of the nature of forest. Descending the slopes, the appearance of country continues much the same, but it gradually assumes a more wooded aspect in t neighbourhood of Kodanade where there are some sholas of a considerable area, and t dense mass of natural forest which encircles these hills is met with a few miles beyond place. The condition of the higher parts of the northern slopes, as regards natural forest

h the same as that of the eastern parts of the district; but the growth which covers the r portions of the slopes is rather that of the jungle than of the forest. The heaviest rth of natural forest is met with on the western and southern slopes of the Neilgherries, espe- y on the south-wester corner where the belt of natural forest which surrounds these hills s almost to the crest of the slopes. In these forests the trees are much larger than those with in any other part of the Neilgherries, but they are frequently covered by creepers and nts of a parasitic habit of growth which destroys great numbers, but the trees possess no mmercial value, owing to their distance from a market and the absence of good roads, while the land on which they are growing is frequently exposed to the full burst of the south-west nsoon, it perhaps could not be more usefully employed than in growing this natural forest. ring the last 40 years a considerable area of natural forest, situated at elevations above 00 feet, has been cleared for coffee, tea, and cinchona plantations and for supplying fuel; bably not less than 25,000 acres have been cleared for these purposes, but nearly every acre been again planted, and is usefully employed, while the portions that were unfitted for ivation are now covered by a dense jungly growth. The introduction of the Australian upon these hills has already proved of much benefit; and these benefits could be vastly ased by planting these trees widely over the district, not indiscriminately as the present ations allow, but with due regard to the wants and circumstances of the land suited to vation—a work which can be performed systematically only by Government. This planting l not be directly remunerative, as it would be necessary in many instances to plant the trees es, and to place them to contend with circumstances which might tend greatly to retard growth. The return on the expenditure incurred in planting and in rearing these trees, must ught for in an increased revenue from land which their shelter renders available for higher ation, rather than from the trees themselves; it is especially necessary that this fact should lost sight of, for, if a direct return is insisted on for all capital expended in planting ions, there is every probability that only the land best suited for trees will be planted; and, h land is generally situated in low-lying sheltered places, the trees produced can have no effect in affording shelter from high winds. Favorable regulations for taking up unoccupied for planting with trees will do much to stimulate private enterprise in this direction, and tend to increase the area of land under these plantations, but very little good will be effected ards the future utilization of these hills for agricultural purposes. The men, who, under e regulations, will take up land for planting, will expect that the trees will give them a direct rn for the cost they are put to in planting and in rearing them; hence they will not plant exposed land where the trees are not likely to prosper, and where, for the benefit of the ject, it is especially desirable that trees should be planted. The Australian trees that have introduced upon the Neilgherries with the greatest amount of success are the *acacia melonoxon*, the black-wood; *acacia dealbeta*, the wattle tree; and the *eucalyptus globulus*, the gum. The *acacia melonoxylon* grows well in most parts of the district at elevations above 0 feet, even better, it is said, than in its own country. Its growth is, indeed, very rapid. Its er is highly valued in Australia, where it is used for all sorts of purposes, especially for ding carriages, and making agricultural implements, etc.; indeed, in that country it is idered to be one of the most generally useful timber trees. On the Neilgherries there is e to show what the quality of its timber produced there really is, as no trees of sufficient have been cut. Many trees, varying in age from 15 to 25 years, have been felled, and, judging the quality of the wood produced at this early age, there is every probability that the er of mature trees will be highly valuable. Unfortunately during the last few years this ety of tree has been severely attacked by a parasitic plant, one of the large family *loranea*, and one nearly allied to the mistletoe of Europe, which has spread widely and committed eat amount of injury; indeed, it is said by some, that this parasite will eventually exterminate variety of acacia; this is perhaps rather an extreme view to take: but the large increase is parasite on the trees of this species of *acacia*, growing under various conditions and umstances, is certainly a cause for alarm. I am inclined to attribute the presence of this isite to the bad conditions under which the trees so affected are frequently growing, the soil in many places being composed of a tenacious laterite clay in which the roots of no

tree can thrive in its unimproved state, and through which drainage is very imperfec
certainly found some trees growing on deep soil, under better conditions, that were near
heavily covered by the parasite, but its presence on trees apparently growing under good c
tions may be accounted for by their proximity in many instances to trees that have to co
with less favorable circumstances, which form the nursery where these parasites are develope
from whence their seeds are carried to healthy trees by birds, squirrels, etc. I observed th
the higher and exposed parts of the district that the trees growing there were as severely att
as were the trees growing in lower and sheltered localities near Coonoor. These par
plants are very abundant on indigenous as well as on introduced trees in this district : in
as far back as 1839, the late Mr. John Sullivan drew attention to this fact and sent many spec
to Madras to be named. Attempts have been made by cutting off the parasite to ric
affected tree of this plague, but the results have not proved satisfactory ; and from their nu
and the difficulty of getting at them, the cost is very great. It would be especially unfort
if the general diffusion of this parasite should prevent the planting of this valuable tr
admit that present appearances are not encouraging, but I believe that, if greater
is in future exercised in selecting soils and situations for the *monoloxylon*, this diff
may, to a certain extent, be overcome, for it must be remembered that trees gr
under really suitable conditions seldom afford the encouragement needed by parasitic p
The *acacia decalbeta* resembles in general appearance the tree just noticed. I
however, much less valuable, while from the thousands of suckers it sends up fro
long-creeping surface roots, it is exceedingly troublesome when growing on the sid
roads, or on cultivated land ; indeed, in the neighbourhood of Ootacamund, it has taken
possession of a large area of useful land, and its extermination will prove exceedingly di
and costly. This tree is not affected by the parasite which attacks the other *acacia* grown
Its wood is not highly valued, excepting for use as fuel, for which purpose it is adm
suited, and meets with a large demand. Several large fuel plantations have been for
these two *acacias* mixed equally. In most instances these have proved remunerative investm
especially when judgment has been exercised in the choice of soils and sites. Old felled
covered by jungle of recent growth is when cleared, remarkably well suited for rearing pl
tions of this description, but it is difficult, during the first two or three years, to keep
the vegetation which springs up when these soils are first planted ; and, unless vigorous mea
are taken to keep in check this vegetation, the newly planted trees make little progress
after the second or third year they are better able to take care of themselves, it being
necessary to keep down the undergrowth. Grass land, especially that heavily covered by
if resting on a good healthy sub-soil, is well suited for growing these trees, while the c
weeding is much less than on old forest land. The *eucalyptus globulus* is by far the
popular of these Australian trees on the hills. It is admirably suited for cultivation on
parts of the Neilgherries ; it certainly grows much more rapidly in sheltered positions,
will thrive even on exposed sites, at elevations as high as 7,500 feet, in such positions d
the first eight or ten years it probably does not grow more than three feet in height per an
whereas in sheltered places, such as Kaity Valley, Coonoor, etc., its annual growth on th
soils is from eight to ten feet ; much depends on the quality of the soil on which the tre
growing, for, in situations equally favorable as regards shelter, forest land will produ
annual growth twice as great as will be produced on ordinary grass land. A considerabl
of ground has been planted with these trees during the last four or five years. One of the
extensive of these recently formed plantations is that situated on the high ridge of hills
east of Coonoor. This ground was a few years ago covered by natural forest which was
to meet the requirements of the Wellington Barracks. At the time it was taken up for pla
with blue gums it was covered by a dense jungly growth which had sprung up on the re
of the forest. This block of land, which measures about 250 acres in extent, has been en
cleared and planted by Government. I had the pleasure of going over this plantation in
with Captain Murray, the then Acting Superintendent of the Neilgherry Forests. At the
of my visit only about 120 acres had been planted, but active measures were in operati
clearing and planting the other portion of the block, containing about the same number of

cost of clearing, cleaning, pitting, and planting these 120 acres was Rupees 2,000. The
ber of trees planted was 65,000 ; they were planted nine feet apart in each direction ; this
nce was adopted as it had been found that, when these gums were placed only six feet apart,
required thinning in their third or fourth year when the trees removed were of little
e ; whereas at nine feet intervals it is expected that thinning will not be necessary until
fifth or sixth year, at which age the trees to be cut out will be useful for fencing, etc.
brushwood removed in clearing, owing to the close proximity of the land to Coonoor,
ized about Rupees 900. The net cost of making this plantation would thus be something
Rupees 1,100 ; to this may be added, say, Rupees 1,400 for plants for fencing and making
tracks, bringing the total net outlay to Rupees 2,500. For weeding, filling blanks,
ing, keeping up the fences, superintendence, interest on capital, etc., the expenditure during
irst 10 years may be estimated at Rupees 1,200 annually. The total cost at the expiration
e tenth year would thus be about Rupees 14,500 ; but against this charge must be placed
mount realized by the sale of the thinnings during this period, say Rupees 6,000, that is,
es 2,000 for those removed before the sixth year and Rupees 4,000 for those removed
een the beginning of the sixth and end of the tenth year. Assuming that these estimates are
oximately correct, and I believe that they are, this plantation will, at the end of 1882,
ain about 25,000 well-grown trees, worth at a very moderate estimate as many Rupees,
uced at a net cost of Rupees 8,500, or, including a fair allowance for rent, Rupees 10,000 ;
it must be remembered that, after the tenth year, the trees will annually, up to a certain
d, increase in value, while the current expenses of the plantation will annually decrease.
e present time a blue gum of 10 years' growth will sell at from Rupees 2 to 3, and,
area of land under tea, coffee, etc., continues to increase as at present, there seems
obability that this price will be maintained, while the matured wood of the blue gum
eet with a large sale in the plains if means could be devised for transporting it to
ent at a moderate cost. The commercial prospects of this plantation and of other
as of a similar kind made by Government on these hills are very promising, but I
o think that a large return for outlay is scarcely the direction in which Government
o should tend in opening up a new country. Now that it has been proved that old
est land, too exposed for tea or coffee, can be profitably turned to account in growing
valuable kinds of Australian trees, it would be well if the planting operations under-
Government were extended to those parts of the district that are yet unutilized, and
ere is too much uncertainty to tempt private enterprise ; a few experimental planta-
ted in these portions of the Neilgherries might prove of great use. It is not necessary
plantations should be formed only of the Australian trees now so generally grown,
e are many other varieties of trees, both Australian and European, which might be
d to succeed on the different soils and under the different climatical conditions met with
e uncultivated parts of these hills.

PLANTATION CROPS.

42. *Coffee.*—A large area of land on the Neilgherries has proved to be admirably suited for the cultivation of the coffee shrub. Not less than 13,000 acres are now under coffee plantations, twenty years ago the area under this crop did not much exceed 500 acres; this great increase is entirely the result of private enterprise, and has added much to the prosperity of the Neilgerries, while the districts immediately adjoining have benefited almost to a similar extent. The revenue derived from land under these coffee plantations in the shape of rent is, it is true, but a small sum ; but this is not the stand-point from which to view this new enterprise ; it must be remembered that this 13,000 odd acres under coffee was but 30 years ago under and scrub jungle, from which no income whatever was derived ; indeed, the land in its aimed condition was injurious to the adjoining country in affording cover for wild beasts

and in producing the deadly jungle fever. In the establishment of these coffee
a property has been created, worth about five millions of Rupees, and on which the
expenditure cannot be less than two millions of Rupees, of this expenditure at least on
is for the payment of wages to coolies; nearly the whole of this is carried into the low co
either in payment for food grains consumed by plantation coolies, or as cash by the
when they return to their homes. Estimating that the sum sent into the low country i
way represents annually Rupees 6,00,000, this will support at the least 10,000 fami
laboring people, allowing each family Rupees 60 per annum, an amount certainly equal
average earnings of such a family in the districts situated near the foot of the Neilghe
but this is not all, for in carrying coffee to the coast, and in sorting, packing, &c., a
amount of other labor is employed; the advantages that thus result to the country fro
enterprise of the planters are great, far beyond what is represented by the rent they an
pay for the land which they have brought under cultivation. It is true that the planter
only to his own interest in the undertakings he launches; but fortunately for the coun
so happens that, before he can himself secure a reasonable profit, he must spend his c
freely-in employing labor. Coffee cultivation on these hills has now passed beyon
experimental stage, and can be carried on with much greater certainty than in former y
still the planter who starts a plantation must always incur far greater risks than the ord
farmer. Coffee cultivation belongs to the same category as the vine culture of Franc
the hop culture of England; and the coffee grower, like the vine and hop growe
always expect great fluctuations in his income. All experience has proved most con
that no crop can, for a lengthened period, be cultivated on the same land, even und
cultivation, without being subject to severe attacks by insects and fungoid diseases
attacks may occur but seldom, and may not be serious in their effects, or they m
short intervals, and may produce most disastrous consequences. I need only point to
produced by the coffee borer a few years ago on the estates in Southern India,
astrous results produced last year by the phylloxera in the vineyards of France,
present year to the almost entire loss of the hop crop in England caused by th
Although the owners of vineyards in France and hop grounds in England will lo
from the causes just noticed, they expect these disasters to occur, at greater or less
and are content to place the large profits they sometimes make against these lo
coffee planter must place his losses in a bad season against the extra profits secured
season, or when the markets are, as they have been, during the last 12 months
favorable. No rapidly made fortunes may be expected from engaging in coffee
though a man, who has a sufficient knowledge of coffee culture and possesses enough
can, by steady perseverance, secure a good income over a term of years; in some
crop may partly fail, and he may with difficulty meet the working expenses from the
of his plantation; but in other years the produce will leave, after paying estate charg
cient to represent a fair return on the operations of the year, and something towards
in the bad season. The disfavor with which coffee cultivation was recently viewed was
chiefly by the severe losses that followed the many wild speculations which were entered
a few years ago, when sites and soils, frequently altogether unsuited, were taken up
cultivation under coffee, by men who possessed no practical knowledge of cultivation, and wh
capital was borrowed at large interest. Under such circumstances it was not in the le
surprising that in so many instances coffee culture proved so disappointing. Many who
commenced well, and who were in a fair way to realize their hopes, grew so disheartened with
unfavorable results they obtained during the bad seasons experienced in 1867, 1868, and 18
that they forced their estates into the market and abandoned coffee planting; many of the prop
ties sold in this way were bought at a nominal price by men who had more confidence in
future, and most of these speculations have yielded splendid returns. Coffee planting
district is now chiefly in the hands of practical men who possess a good knowledge o
work. There is perhaps no cultivation that is conducted with greater care, while

uch, I must say that, in many instances, there is too great care in small matters, it would,
k, be much better to spend more in manuring the estates, and less in endeavouring to kill
st weed, or to reduce every branch on a coffee shrub to a mathematical regularity. Until
years previous to 1850 the coffee plantations in this district were found only on the eastern
, but they have now been extended to the southern, northern, and north-western slopes;
are some extensive plantations in the Ouchterlony Valley and in the neighbourhood of
oor. Virgin forest land, with a deep vegetable soil, situated in well-sheltered positions, at
tions between 3,000 and 4,500 feet, possessing a temperature ranging between 60 and 80
es, an annual rainfall from 50 to 80 inches deposited in light but frequent showers, and a
ce not too steep, are considered the conditions most favorable for the successful cultivation
ffee. This crop will grow under all kinds of circumstances; it may be grown at sea level,
altitudes of 6,000 feet. When growing below 3,000 feet it is exposed to great heat and
ent droughts; while on elevations above 5,000 feet the yield is smaller, and the crop is
h longer in coming into bearing, sometimes not yielding a maiden crop until the fifth or
year, whereas when planted under favorable conditions, at an elevation of from 4,000 to
0 feet, a maiden crop may be obtained in the third year. Land covered with the densest
t, other conditions being favorable, is generally considered the most suitable for coffee;
e can be no doubt but that it is good policy to secure soils that possess the greatest amount
tural fertility; but this advantage, important as it is, can be purchased at too great a cost,
as is frequently the case, this land is situated in remote and almost inaccessable parts of
strict, the extra cost for labor, conveying produce to market, procuring supplies, &c.,
y probably exceed in amount the sum that would be necessary to expend on manure, in
to the same standard of fertility a piece of land under ferns or jungle scrub, which
e situated conveniently as regards labor, roads, markets, &c., &c., indeed, some of the finest
plantations I saw on the Neilgherries were on land that was formerly covered by scrub
e, with good management I see no reason why such land should not be made equal in
ost respects to that under virgin forest; and, as there is a large area of land of this description
ailable, besides considerable tracts under natural forest, there is ample room for a great
tension of the area under coffee. I know that this opinion is not shared in by some planters
ho assert that all the coffee land in the district is already appropriated. It may be true that
ost of the so-called coffee land, that is, forest land, in the best known localities is taken up;
t I venture to believe that the area so appropriated is but small in relation to the area of the
nd yet available in the district. Coffee culture is a branch of agriculture, and, as sound
riculture seeks by the exercise of the means at its command, to produce fertility where no
rtility existed before, or where the fertility was not sufficient for the objects in view, the planter
ust rely on the exercise of his own skill and intelligence, to produce in a soil the conditions
e requires for the successful culture of coffee. The natural fertility that characterises soils
der virgin forest, is very evanescent and fleeting, while the proportion of organic matter,
ich exists so largly in these soils, is out of all relation to the proportion of mineral food such
ls afford, the result is, hastily run up trees with a great development of wood that bear
h great irregularity and are always subject to be seriously injured by insects, &c., as they
ssess no real stamina; it was these crops that suffered most severely during the attack of
e coffee borer a few years ago. The constituents of a soil that has by cultivation and proper
anuring been brought into a condition fit for the reception of coffee plants, are more equally
oportioned, and for this reason the plant grows more uniformly, and is better fitted to resist
sease, &c.

43. There is a wide difference of opinion amongst the planters on these hills as regards
eeding, digging, manuring, pruning, &c., one recommends that the soil should be kept clean
nd in a porous open state by being frequently dug over; another condemns this practice, on
he ground that frequent digging destroys the surface roots of the coffee plant, while soil in this
oose open state is very liable to wash down the slopes during heavy rain, and recommends
instead, that the surface of the soil should be only scraped when the removal of the weeds is

desirable, the body of the soil being left undisturbed and only broken up once in every se
or third year : one advises that manure should be applied on the surface of the ground in
space immediately around the stem of the plant, and then covered with a few inches of s
others again condemn this practice, as they say that, when manure is applied in this way,
roots of the shrub are encouraged to grow too near the surface of the soil, rendering the p
liable to injury during a drought ; others recommend that the manure should be buried in h
or trenches amongst the trees, but this also in turn is objected to by many, on the score of
waste caused by the manure passing into the sub-soil beyond the reach of the plant, while
manure is always too far from the trees for whose benefit it is intended : one recommends dep
holes amongst the trees in which silt may be washed, and in which leaves, &c., may collect, t
afterwards taken out and used in manuring the adjoining trees ; others altogether cond
these deposit holes, as they say that, during heavy rain, they become full of water, and th
flowing over, accumulates and forms ruts down the slopes, causing a great loss of good
one planter advises that the trees should be pruned before they bear their maiden crop ; and
advises that the trees should be pruned while in blossom ; while a third condems both pract
and would prune only in the brown wood. Of course, there must always be a conside
difference in the practice pursued on coffee estates situated under widely differing condit
and it is quite possible to reconcile these apparently conflicting opinions, as the conditions
with in this district are so varied ; but it is not unusual to find two planters, whose estate
similarly situated, adopting a very different practice. Systematic experiments are much n
they would cost but little, and most planters have ample leisure for watching and recordi
results of such experiments. As I have previously observed, a coffee estate as now ma
absorbs an enormous amount of capital, the bulk of which is expended on labor ; the cap
a well-conducted estate of moderate size when in full bearing is generally from £40 to £
acre. This is more than double the amount of capital needed on a farm in England on wh
very superior agricultural practice is followed, or about four times the average capital emplo
per acre in British agriculture. The capital of the coffee planter is not nearly so secure as th
of the British farmer, an attack of disease or insects may entirely destroy the coffee plantation,
leaving the planter no alternative but to abandon the place, or again expend £20 or £25 per
acre in planting it afresh, and wait four or five years until the new crop begins to bear. If he
chooses the first alternative, he may possibly by selling the estate get Rupees 5,000 for a property
which has cost him Rupees 40,000, and there are many instances of this sort. In British agri-
culture the losses are never so disastrous ; the farmer, who understands his profession, can
always realize from 50 to 70 per cent. of his capital, as it is invested in so many ways, on so
many objects, each of which always possesses a market value. The life of the coffee planter is
attended with many drawbacks, and he must, if an European, incur serious expenses in the
occasional visits of himself or family to Europe, while he cannot, like the English farmer, continue
the active management of his estate in his old age, but must look forward to a period when he
must retire to his own country, for which he must make a due provision ; though many planters
continue to enjoy health up to, and passed, middle life, they cannot, when old age begins to creep
upon them, withstand the ill-effects of the constant and great changes of temperature to which
they are so frequently exposed ; for these reasons, in addition to those previously mentioned, a
return on the operations of the year that might be satisfactory in the case of the British farmer
would be quite inadequate to meet the reasonable expectations of the coffee planter. It is exceed-
ingly difficult, in the absence of reliable statistics, without personal experience, to draw up a
statement that will exhibit the cost of establishing and working coffee estates, or show the return
that may be expected ; it would be difficult even with personal experience, in the case of farm-
ing operations in England, to prepare such a statement that would be generally accepted ; so
much depends upon local circumstances and the skill with which the operations are conducted.
The following may be accepted as being as accurate and as applicable to general conditions as
such estimates usually are :—

Cost of establishing and working a Coffee Estate of 100 *Acres.*

DETAILED EXPENDITURE.

	Rs.	Rs.
1st year.		
150 acres of scrub jungle	2,500	
Felling, clearing, &c.	1,500	
Lining, pitting, planting, &c., including cost of plants	3,500	
Road-making, draining, &c.	1,200	
Bungalow, cooly lines, cattle-sheds, &c.	3,500	
Implements, carts, tools, &c.	750	
Cattle, cattle-food, &c.	1,000	
Superintendence	2,000	
Labor (weeding, &c.)	1,200	
Contingencies	1,000	
		18,150
2nd year.		
Cattle, cattle-food, &c.	1,000	
Manures	500	
Superintendence	2,000	
Labor	1,800	
Buildings and repairs	2,000	
Contingencies	1,000	
		8,300
3rd year.		
Cattle, cattle-food, &c.	1,000	
Manure	500	
Superintendence	2,500	
Labor and charges in preparing the crop for market ...	3,000	
Buildings, store, pulper, &c.	4,000	
Contingencies	1,000	
		12,000
4th year.		
Cattle, cattle-food, &c.	1,000	
Manure	1,200	
Superintendence	2,500	
Labor and charges in preparing the crop for market ...	4,000	
Repairs to buildings, roads, &c.	500	
Contingencies	1,000	
		10,200
5th year.		
Cattle, cattle-food, &c.	1,000	
Manure	1,500	
Superintendence	3,000	
Labor and charges in preparing the crop for market ...	4,500	
Repairs to buildings, roads, &c.	500	
Contingencies	1,000	
		11,500
Total expenditure excluding interest ...		60,150

* One hundred acres only to be planted.

Total Capital expended.

		Rs.
First year expenditure...		18,150
Interest at 10 per cent. taken for half year on average, assuming that the expenditure is evenly distributed		907
Total expenditure at the end of first year ...		19,057
Add expenditure in the second year		8,300
Interest at 10 per cent. for one year on Rupees 19,057, and for half year on Rupees 8,300		2,320
Total expenditure at the end of the second year ...		29,677
Add expenditure in the third year		12,000
Interest at 10 per cent. for one year on Rupees 29,677, and for half year on Rupees 12,000		3,567
Total expenditure at the end of the third year ...		45,244
Add expenditure in the fourth year		10,200
Interest at 10 per cent. for one year on Rupees 45,244, and for half year on Rupees 10,200...		5,034
Total expenditure at the end of the fourth year... ...		60,478
Add expenditure in the fifth year		11,5
Interest at 10 per cent. for one year on Rupees 60,478, and for half year on Rupees 11,500		6,62
Total expenditure at the end of the fifth year ...		78,6

	Rs.	Rs.
Interest on capital recovered by sale of coffee in the third year, Rupees 10,100, charged at 10 per cent. for two years...	2,020	
Interest on capital recovered by sale of coffee in the fourth year, Rs. 14,000, charged at 10 per cent. for one year	1,400	
		3,42
Total expenditure including interest ...		75,180

Income.

	Rs.	Rs.
3rd year.		
12 Tons of coffee...	9,600	
Sale of cattle, &c.	500	
		10,10
4th year.		
18 Tons of coffee	14,400	
Sale of cattle	500	
		14,90
5th year.		
25 Tons of coffee	20,000	
Sale of cattle	500	
		20,500
		45,500
Expenditure	75,180	
Income	45,500	
	29,680	

these figures it would appear that, at the end of the fifth year, the capital invested in the res of coffee would be Rupees 29,680; to this must be added a sufficient amount of to meet the working expenses, making a total capital of Rupees 40,000. The estate now in full bearing, the returns may be calculated with greater certainty; estimating he expenses will amount to Rupees 15,000 per annum, including interest on capital at r cent., the income may be estimated at Rupees 24,000, that is, assuming that the average will be six hundredweight per acre of clean coffee, valued at Rupees 40 per hundred-t. This will represent a profit of 22½ per cent. on the capital; of course, these calculations be affected by markets and seasons, both of which fluctuate greatly; it is only two since the prevailing price of coffee was from 25 to 30 per cent. lower than the price d in these calculations, when the returns obtained, but just equalled the expenditure. ve that six hundred-weight per acre of clean coffee may be accepted as a fair average series of years, in some years the yield per acre may be from one to two hundred-s more, while in a bad season the yield might be 25 per cent. less than the average d. Under all circumstances I do not think that it would be safe to put the average derived from a coffee estate when in full bearing at more than 15 per cent. on the capital ed, and this is not much, seeing how insecure that capital is. A similar amount of capital ed in farming in England would cultivate from 200 to 250 acres of land, on which, after interest and cost of superintendence, a profit of from £200 to £250 per annum may be ed; it is true that this profit is less than half the profit the coffee planter may realize, before pointed out, the British farmer has many advantages that the coffee planter does not possess. I have charged the capital employed in coffee cultivation with interest at the rate of 10 per cent., per annum, this being the rate usually charged when money is borrowed for working these estates; while in the case of the British farmer I have estimated interest on capital at five per cent., as he can always obtain money at this rate. In the foregoing observations I have endeavoured, as directed, to contrast the results of coffee planting on these hills with the results of farming in England.

44. *Tea.*—The tea plant was introduced on these hills nearly 40 years ago, but it is only during the last 10 years that any real progress has been made in tea cultivation. The experiments made between 1835 and 1840 were useful in proving that the tea plant would thrive on these hills, but little else resulted from them, though the opinions expressed again and again by Mr. John Sullivan and Monsieur Perrottet, founded on these experiments, that the greater part of the district was well-suited for tea culture, have now been proved to be perfectly accurate. It is difficult to account for the little interest that was taken in tea cultivation previous to 1865, for there was ample evidence that the plant would succeed well. At the present time the area under tea cannot be much less than 2,000 acres. The oldest estates are planted with tea of the China variety; those that have recently been opened, on situations not too exposed, are generally planted with the Assam variety, or with plants produced from a cross between the China and Assam varieties. The China variety is the most hardy and best adapted for high and exposed positions, but grows slowly, and produces very little leaf; the Assam variety is suited only for sheltered situations on rich fertile soils, when so circumstanced it grows rapidly, and is a large producer of leaf; but the hybrid is the most generally useful, it combines the leaf-producing quality of the Assam with the hardihood of the China variety. The greater portion of the district is suited for tea which will grow and produce fair results on altitudes between 4,000 feet and 7,500 feet. Above 4,000 feet and below 6,000 the tea produced is said to possess strength rather than flavor, while that grown on elevations above 6,000 feet is said to possess flavor rather than strength. When the teas, which had been exhibited at the last Agricultural Show at Ootacamund, were submitted in England to professional valuation, their relative values appeared to have been but little affected by the elevations on which they had been grown, as the tea produced at 6,500 feet was not more valuable than that produced at 4,500 feet. This is, of course, not conclusive evidence regarding the value of tea grown on high and on low situations; it may be that for mixing purposes tea dealers could at that time afford to place the same value on strength that they placed on flavor and aroma. I am decidedly of the opinion that the flavor of tea is affected much more by soil, manure, and cultivation than by altitude; still it would be well if some experiments were made

with the view of obtaining information on this important question. Most of the tea es
the Neilgherries are on land which was formerly under grass ; such land especially, if
covered by ferns, gives good results, but shola land is preferred when it can be obtained
well situated, as on such land the shrub grows with much greater rapidity, and gives
and heavier flushes of leaf. Under good management and by the liberal use of suitable
good fern land can be rendered quite as productive as shola land which is always more
to bring under cultivation. The plantations are generally small, ranging between 50
acres in extent; besides these there are numerous gardens varying from plots of but
acre up to 15 or 20 acres. The bulk of the so-called plantations appear to have been st
experimental plots, and gradually increased until they have reached their present area
are generally ill arranged, and are badly provided with buildings ; indeed, many are alt
without buildings, being worked in connection with some other estate. None of the tea
tions I visited are arranged in the systematic way in which coffee estates are laid out ;
great room for improvement in this respect. The appearance of a tea plantation in this
is far less pleasing to the eye than the appearance of a coffee estate ; while the coffee shr
remarkably regular in size throughout the estate, the tea plants vary greatly ; trees of
four feet in height, with a spread nine or ten feet in circumference, often growing sid
with trees not half so high, and with a spread of branches of a circumference not
four or five feet, according to whether they are China, Hybrid, or Assam, all three ki
frequently found growing together, but this irregularity is not altogether due to
varieties having been planted together, for I have observed an irregularity almost as
plants all of one kind. It is evident that greater care must be exercised in selecting tea
It is not, I think, desirable to expend much time and money in the endeavour to produce tha
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. T
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 those higher parts of the district where the climate is well adapted for European constitu-
tions ; 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 experi-
enced 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 ;

ter
rs ago every farm on which cheese and butter were made for sale possessed its own
dai
but now large dairy factories have been instituted to which the milk produced in the
sur
iding district is sent to be manufactured into butter and cheese, and not only is the farmer's
hou
old relieved of much drudgery and labor, but the returns obtained are much larger than
here
before 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 ; indeed,
something is already done in this direction, it being customary on some estates to sell all the
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 cultiva-
tion 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, when he has
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 leaves 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 planta-
tion 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 per acre are
put down. Road-making, draining, the bungalow, cooly lines, sheds, &c., will cost about the
same on either a coffee or tea estate, but less costly machinery will be required on a tea estate
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 crops, 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 whenever 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, and this will be equal in value to the
virgin crop yielded by the coffee plantation at the same age ; in the fourth year from 130 to
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 100 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 a profit of 22½
per cent. The yield may in certain years rise to 350 lbs. per acre of made tea, while it 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 two good-sized planta-

tions belonging to private owners, but the remainder of the area is made up chiefly [illegible]all plots attached to coffee estates. As yet, cinchona cultivation has not proved attr[illegible]e to planters who generally believe that the crop is too much a speculation. There is [illegible]the least doubt but that the Neilgherries afford the soils, situations, and climates required [illegible]the healthy growth and development of the numerous varieties of cinchona, but the cultivat[illegible]n has been introduced so recently, and there is yet so much of uncertainty regarding the reproduction of the bark, while the returns under any circumstances must come in so slowly that there is little probability of cinchona cultivation becoming popular, until, with greater experience, a more certain knowledge is obtained. There is a large area of land fitted for the growth of cinchona, not, perhaps, affording all the conditions required, but yet sufficiently well adapted for ordinary plantations; but, as a general rule, land so circumstanced would answer well for cultivation under tea. Cinchona, especially the large-leaved varieties, needs shelter from high winds, and this restricts the choice of situations, as land fitted in other respects is rendered unavailable, while, as a good filtering sub-soil, must underlie the soil in which cinchona is to be grown, and as much land on the Neilgherries rests on an impervious retentive sub-soil which would require that sub-soil drainage and deep tillage should precede the planting operations, this also tends to limit cinchona cultivation. As far as can be ascertained from the experience gained on these hills, tea, under the high cultivation necessary for cinchona, would yield more speedy, more certain, and more remunerative returns, for the conditions necessary for the successful cultivation of cinchona are the conditions necessary for the successful cultivation of tea. The Government plantations, judging from their appearance, are undoubtedly a success, and it is quite evident that the high cultivation, which has been practised in them and the choice of proper situations, has brought about these good results, for where cinchona trees have been planted in the more elevated parts of the Neilgherries without a proper regard to soil, exposure, &c., and have been left to fight their way unaided by cultivation, they have turned out stunted, deformed bushes instead of the tall, healthy, upright-growing trees, such as we find in the Government plantations. While it is certain that on high elevations cinchona cannot succeed, excepting, under expensive cultivation, it yet remains to be proved whether it will not pay the planter better to grow it in the low and sheltered situations where it thrives and grows rapidly under very moderate cultivation. It is said that the bark produced on these low elevations is deficient in alkaloids, and possesses a low commercial value, but there is not, I think, yet sufficient evidence to prove this. There is no private experience in cinchona cultivation, except, on a very limited scale; the bark grown on the Neilgherries, that has been sent into the market, was almost entirely the produce of Government plantations; and, as Government are already in possession of the results of their cinchona cultivation, it seems unnecessary that I should refer here to that experience.

LIVE STOCK.

47. *Horses, Ponies, and Mules.*—As far as I could learn, no systematic attempts have been made in breeding horses on these hills. A considerable number of horses and ponies are kept in the district for saddle and harness use, but they are all brought up from the plains. The horses are generally very inferior, ponies are much preferred by hill residents who find that they are in every way more suited to supply their requirements, while they are more hardy and much surer footed. This district affords few natural advantages for horse breeding on an extensive scale; the surface of the land is very irregular, and it is exceedingly difficult to find a large area on which young horses could be turned out in safety; the indigenous grasses are exceedingly poor and quite unfitted for horses, while for six months in the year, and always during night, horses cannot be left out of doors. It is true that these drawbacks can be overcome; but to effect this a considerable outlay will be necessary. The breeding stations might be scattered over the hills, wherever suitable land can be found, and the climate is not too severe, but such land exists only in very small areas. Land, with a less regular surface, might be employed if the fields were made sufficiently small, to prevent the horses from indulging in excessive galloping, but in this case really effective fences would be necessary, and their cost

would be great. English grasses grow well, and, as I have previously observed, there are many valuable root, pulse, grain, and fodder crops admirably suited for cultivation in various parts of these hills, and these would, to a great extent, compensate for the absence of natural pasturage; and, seeing that Australian timber is cheap, and that it makes excellent boards and shingles, it would be very easy to erect, in each field or paddock, sheds for sheltering horses at night and during inclement weather. It is, of course, not necessary that land on which young horses are to be grazed should be perfectly level, a little irregularity in its surface is indeed an advantage, horses reared on such land are more generally useful than those reared in a perfectly flat country; but the undulations and swellings of these hills are generally far too abrupt and steep. When horses are turned out together, they will indulge in galloping in spite of every precaution, and this might prove very disastrous on these slopes, especially in the case of mares in foal; but small paddocks of about one acre in extent might be made for each brood mare when in foal: in these small enclosures they would seldom gallop excessively, while they would be able to indulge themselves in a gallop at half speed, or in a gentle canter, such moderate exercise being highly desirable. The fences around these paddocks should be really effective, and not such as would tempt the animals to jump over, or to force their way through, into the adjoining enclosures. But the land to be enclosed to form these paddocks would need to undergo a thorough course of cultivation, and to be properly planted with suitable grasses before it would be fit for use, as in its present unimproved state it is so excessively hard during the dry season, and frequently so bare as to be exceedingly destructive to the unshod hoofs of horses that gallop too freely over it. Each paddock should be provided with a shed properly arranged to keep out the rain and wind in which the horse might find shelter, and in this it might receive its daily allowance of fodder and grain. By judicious planting the severity of the weather experienced during the certain seasons might be moderated. Each paddock should be thoroughly sub-soil drained, and should be provided with water from a running stream. I see no hopes of it being possible to produce a pasturage sufficient to support young horses and brood mares; it will, I believe, always be necessary to provide a full supply of roots, fodder, and corn for their daily consumption. Good crops of parsnips, turnips, &c., can be raised at a moderate cost; lucerne, clover, vetches, English grasses, &c., grow almost as well as in England; while oats, maize, and hay can be produced in abundance. The brood mares might perform the work required in raising these crops; the work would be light, and the regular exercise would be beneficial. English farmers usually employ brood mares when in foal up to within a few weeks of foaling, moderately during the first three or four months of gestation, and lightly afterwards; under good management, ill consequences seldom arise from this practice, and there would always be a number of mares available for the heavier work that are not in foal. On a small breeding station of from 180 to 200 acres in extent, a score of imported brood mares might be maintained, and might, if worked in the manner I have suggested, be able to raise the food required for themselves and their offspring. The expenses of a breeding station worked in such a way would be small after once established, as the only important items of expenditure would be superintendence and manual labor; but against this, after the third year, there would annually be the value of, say, 10 or 12 three-year-olds to be placed to the credit of the establishment worth between Rupees 3,000 and 3,500, that is, valuing each three-year-old at Rupees 300—a moderate price for animals that have been reared carefully. An Overseer on a moderate salary, assisted by an efficient staff of laborers (amongst these might be two or three retired soldiers who have been accustomed to horses), would suffice to carry on each station. Ten or twelve such stations, if situated not too far apart, might be placed under the general superintendence of an agriculturist who has had experience in the management of horse breeding in England, and who has a sufficient knowledge of Veterinary Surgery to enable him to treat simple cases. A Superintendent, accustomed to horses, might be obtained in Australia more readily than in England, but, as in that country horses are reared under conditions so widely different to the artificial circumstances under which they would be reared on these hills, the Australian experience would be of little value. As the cost of superintendence would be divided over so many stations, it would be worth while to get out a really efficient man to manage the undertaking. It will be gathered from what I have already stated that the district affords few such natural advantages for horse breeding as are met with in Australia

and other countries; but, if the horses must be reared entirely under artificial conditions, and therefore at a greater expense than where natural facilities exist, it must be remembered that in their case the cost of bringing them to a market is exceedingly small, while they have not to encounter the risks which attend a long sea voyage, or a lengthened land journey, and, as the horses imported from Australia and the Cape owe what good qualities they possess, almost entirely to English blood, it would be better in every way to breed directly from English stock, especially as on these hills the climate is well suited for English horses. If these hill-breeding stations could turn out good three-year-olds at, say, Rupees 300 each, their cost to Government should not, when five years old and fit for use, exceed Rupees 550, as their cost during two years on the large grazing stations which, I think, should be started on the high table-lands of the low country in connection with these hill stations, should not be more than Rupees 200, or at the utmost Rupees 250.

48. *Ponies.*—Pegue ponies might also receive attention. If a few first-class mares and stallions could be obtained from Burmah, one or two stations might well be devoted to the breeding and rearing of these useful little animals, if only to supply the demand on the hills where this breed of ponies is very highly appreciated, and well-bred Pegues might be of use to Government in many ways; the climate seems to suit them, but even for them it would be necessary to provide suitable food, as they do not thrive well on the natural grasses of this district. Land, with a surface too irregular for horse stations, might be utilized for rearing these ponies.

49. *Mules.*—There are few districts in this Presidency in which these animals could be so usefully employed as in the Neilgherry District; they would be invaluable for transporting produce up and down the various ghauts; they would carry loads from twice as great as the loads carried by ordinary pack bullocks; they would travel much more rapidly; would be less exposed to attacks of disease from which such numbers of pack-cattle die annually, caused by the sudden and violent changes of temperature to which they are so frequently exposed, while mules can be maintained in good working order, at a cost very little greater than the cost that must be incurred in keeping working cattle in good condition, for cart traffic they would be equally serviceable, and would be useful under the saddle for passengers ascending and descending the ghauts. Mules would be of great use to planters, especially to those residing in remote situations where the roads are not generally good, for transporting manure and for conveying the plantation produce to the low country, but they would be especially useful for carrying manure by means of panniers amongst tea and coffee bushes, where from the steepness of the ground carts could not be employed, and where, even if roads existed, pack-cattle are equally unsuited from their short stature bringing their panniers into injurious contact with the bushes, the height of ordinary mules being so much greater than the height of ordinary pack-cattle, the panniers they carry would be quite above the coffee and tea shrubs; while they could be as usefully employed in carrying the ripe coffee berries to the pulping house, and the green tea leaves to the curing house. It must be remembered that mules are much more easy to manage and control than pack-cattle which sometimes commit much damage when working amongst tea or coffee shrubs.

50. For ordinary agricultural use mules are well suited, especially for ploughing and cultivating the slopes of hills where horses could not be employed. The hinney is by some preferred to the mule as in temper, &c., it takes more after the horse; it is generally less in size than a mule, but it is more compact and strongly built; it is, however, much less enduring, and needs better food, while it is not so sure footed. It perhaps would be well to explain here that the mule is the offspring of the stallion ass and the female horse, while the hinney is the offspring of the male horse and female ass; the hinney neighs while the mule brays. The mule in outward appearance resembles the ass; the hinney, on the other hand, resembles the horse, and has a long-flowing main and tail. The bad qualities somtimes found in the mule are generally the result of ill treatment; in countries where they are kindly treated they are not more difficult to manage than horses. The mule takes after the ass in being able to subsist and keep in good condition on coarse inferior food; indeed, it will even thrive under conditions where a horse would almost starve. But mules would also be of great use in the low country, which the evidence contained in the following valuable letter from the Commissary-General of Madras amply proves:—

"From the Commissary-General, Madras, to the Superintendent, Government Farms, Sydapet, dated 26th August 1873, No. 3,869.

"I have the honor to acknowledge the receipt of your letter, dated 20th August 1873, requesting the Commissary-General to furnish you with any information he can afford regarding the usefulness of the mules attached to this department, and, in reply, I beg to state that the mules at present employed by the Commissariat are composed of Spanish and Turkish or Egyptian mules, the former being of a larger size than the latter. This establishment is now maintained at five different stations, viz., Madras, Bangalore, Bellary, Secunderabad, and Kamptee.

2. "At places where trollies and mule harness have been provided, these animals have proved very useful and well adapted for draught purposes, and are superior and steadier in harness than bullocks, and much more enduring and hardy. At Bangalore authority has been given for hiring them out in pairs to officers for private use.

3. "As to their capability in carrying burdens, I append extract from a letter from the Quartermaster-General, to the Secretary to Government, Military Department, dated Fort St. George, 26th March 1872.

"The reports received regarding the mules, when employed with troops marching, show that they have done their work very well and most satisfactorily; but, for the transport of camp equipage for European troops, mules alone are insufficient. In the first place they cannot carry the poles of European tents: other carriage would have to be provided; and, secondly, the weight of the outer fly of one of these tents is beyond the load of an ordinary mule. A mule's load is calculated to be equivalent to 1½ bullock loads=181½ lbs. The fly of the tent weighs 201 lbs., sometimes more; and when wet it would be considerably increased in weight. This difficulty might be met by allowing spare mules as in the case with bullocks; but such an arrangement would necessarily enhance the cost of carriage. Any extra carriage in mules would have to be given in pairs of mules.

4. "The average cost of maintaining mules in good working order is as follows:—

	Garrison Rate							
	For one Spanish Mule per diem.				For one Turkish or Egyptian Mule per diem.			
	Rs.	A.	P.	C.	Rs.	A.	P.	C.
At Bangalore	0	2	6	0	0	2	3	0
,, Bellary	0	2	0	39	0	1	7	84
,, Secunderabad	...	...	...	...	0	3	5	38
,, Kamptee	0	4	4	40	0	3	4	40
,, Madras	0	4	1	13	0	3	2	47

"Cost of shoeing and mussals is about Annas 10 each per month. One Muleteer is employed for every two mules at a monthly pay of Rupees 7 per mensem.

5. "The daily food of mules is—

	In garrison per animal.	On the march per animal.
	lbs.	lbs.
For large mules—		
Coolty or chenna	5	6
Dry grass	20	25
Salt	½oz.	½oz.
And for small ones—		
Coolty or chenna	4	5
Dry grass	15	20
Salt	½oz.	½oz.

"If green grass is used, double the quantity of dry grass is issued at the discretion of the Commissariat Officer. When coolty is given, fuel at a cost not exceeding Pice 3 per mule per diem is allowed for boiling.

6. "At all the stations at which mules are employed they appear to keep in good health. The mortality among these animals, during the official year 1872-73, was 1¾ per cent."

51. Mule breeding might be instituted with every chance of success on the Neilgherries; land suited for the requirements of mule-breeding stations exists in abundance; it would only be necessary to import a few thorough bred stallion asses of the requisite size and possessing necessary qualities, as there would be no difficulty in obtaining a sufficient number of country bred mares to breed from.

52. *Cattle.*—In the last agricultural statistical tables for the Madras Presidency it is stated that the Neilgherry District possesses 18,000 head of cattle. Of these, probably one-fourth are buffaloes, and the remainder chiefly common low-country cattle which have been brought up from the adjoining districts, or have been bred on the hills. The buffaloes, which are supposed to be an indigenous breed, are owned almost exclusively by the Todas; the Badagas also own a few, but the buffaloes kept by them differ from those kept by the Todas, and are apparently similar to the buffalo of the plains. The Toda buffalo is taller, much more active, more compact and square; in color it is brown instead of the bluish black, the ordinary color of the low-country buffalo, while its skin is covered by long coarse hair. These differences, however, are not great; they may have been produced by change of habit and climate. The buffalo on the plains generally leads a semi-aquatic existence; it loves to be wallowing in the mud, or standing or laying in water with its head only above the surface. At night it is confined in sheds or in the back yards of native houses; it is thoroughly domesticated; its paces are very slow, even on dry firm ground it walks as if it was going through a quagmire while it carries its head horizontally, its face being almost in a line with its back. The Toda buffalo on the other hand seldom meets with facilities for indulging in a bath in liquid mud or in water, even if the temperature of the hill climate would render such baths enjoyable. To some extent they are able to exercise their semi-aquatic propensities in the marshes that are met with on the sides of some streams, and in land-locked valleys, but in these positions the marshes are generally shallow, and the animals seldom sink deeper than to their knees. They are extremely wild and difficult to herd and are confined at night in open kraals, situated in remote parts of the hills, away from human habitations excepting the few huts of their owners; they are herded in great numbers, and when there are many calves in the herd it is exceedingly dangerous for strangers to approach them; at such times they are very courageous and will not refuse combat with a tiger. The Toda buffalo passes over unequal surfaces of ground with great ease, and its pace is rapid, its head is carried more uprightly, with the face almost at right angles with the line of the back. The Todas make no use of their buffaloes, excepting the milk the cows afford, which they use, that not required by them being made into ghee for sale. But these buffaloes as managed by the Todas are exceedingly unprofitable; though there are less than seven hundred Todas, men, women, and children, all counted, the buffaloes are not nearly able to support them. During the greater part of the year these buffaloes are grazed on the western and south-western portions of the Neilgherries; in May and the following two or three months, when the weather is exceedingly rough there, they are removed to the eastern side of the district. The Toda buffaloes commit great havoc in the sholas and in young plantations; indeed, if it is under contemplation to plant in a systematic way, in view to the future utilization of the Neilgherries, it will be absolutely necessary to confine the Toda buffaloes to certain tracts of country, or to remove them entirely from the country situated above the crests of the slopes. Until the last ten or twelve years it was exceedingly difficult to induce a Toda to sell one of his buffaloes, indeed they quite refused to sell a cow under any conditions, but now there is no difficulty in procuring from them, at moderate prices, either bulls or cows. It is the custom on many plantations to buy yearling bulls which are kept merely for the manure they make. It would, I think, be well if Government would purchase a number of these yearling bulls for dispersion over the plains wherever buffaloes are kept, as they could not but be beneficial in improving the breed, and there is no domestic animal, especially in the southern parts of the Presidency, that more urgently needs attention in this way. For draught, either carting or ploughing, these buffaloes would also be very useful, but for employment in this way it would be necessary to remove them from the herd at an early age, in order to render them more tractable.

53. Little has been done in a systematic way to improve the ordinary cattle on these hills. Enterprising residents have at different times introduced animals of the Durham and Aden

breeds, but enterprise in this direction generally ended with the introduction of a single bull or a cow. Perhaps all things considered this is all that could reasonably be expected, the expense and risk attending the importation of but a single animal being so great. As before noticed the ordinary cattle that are now found on the Neilgherries are animals that have been brought up from the plains, or are the descendants of animals that have been brought up. There are some good cattle in the possession of European residents, but the majority are crosses of various degrees between Durham, Aden, Nellore, Mysore, Poonganoor, Kangayam, &c., &c., and to such an extent has this intermingling of breeds been carried, that it is frequently exceedingly difficult to trace in the animals any resemblance to any of the breeds from which they are said to be descended. The cattle owned by the Badagas and the hill-people generally are small and inferior, indeed they are not nearly as good as those met with in the districts that adjoin, from which they must at one period have been brought,—a fact which indicates that the climate of the hills and the treatment the cattle receive at the hands of the Badagas are not so favorable to them as the climate and circumstances they encounter in the plains. A considerable number of cattle are kept by Coffee Planters for making manure for use on their coffee estates; these cattle are generally grazed during the day in charge of a herdsman on the grass land belonging to the estate, and at night they are either confined in an open yard or kraal, deeply bedded with leaves and ferns and properly fenced to keep out tigers, cheetahs, &c., or they are confined in large sheds built purposely for their use. Some of these sheds are very substantial erections, and are constructed with the view of providing a sufficient amount of ventilation for the animals to which they afford shelter; but generally these sheds are not well built, and are badly ventilated. Substantial sheds are undoubtedly cheaper in the long run, than hastily run up sheds formed of any material that comes to hand most readily; but there is no necessity to go to the great expense that must be incurred in order to put the whole herd under one cover, as is the practice on some estates; it would in every way be better to erect ten small sheds, each to hold ten cattle, than to erect one large shed to contain one hundred; not only will it be less costly to erect the ten small sheds, but, whenever disease appears amongst the stock, its spread could be checked much more effectually and at much less cost than in the large shed, while the cost of keeping the cattle in the small sheds will not be greater, or the manure made more costly. Under any circumstances every estate should be provided with one or more quarantine sheds, in which to place all newly-purchased stock, until they are proved to be quite healthy, and into which all diseased animals, or those that have been in contact with diseased animals, might be put. Planters lose heavily at times by outbreaks of disease amongst their cattle, and this they must always expect so long as the present system of management, to which they subject their cattle, remains unchanged. The beef supplied by the butchers in the large stations is generally inferior, occasionally the quality is better, but, considering the facilities that exist for stall-feeding, it is never what it ought to be; it is surprising, seeing that there are so many Europeans and East Indians of the poorer class on these hills, that none of them have turned their attention to stall-feeding in view to supplying beef of a superior quality; there is at all times of the year a good demand, and during a portion of the year a very good demand. The prices that are obtained for meat of a good quality are sufficiently high to pay for stall-feeding, while, as I have elsewhere shown, there are many fodder crops that are well suited for general cultivation. It is useless to expect that cattle left to their own resources, on the wretched pasturage of these hills, can make good beef, for, even under favorable circumstances, it is as much as they can do to maintain a bare existence, while, during the dry weather, they must often be in a very impoverished condition. It has been proposed to introduce into this district Highland stock from Scotland; but it seems to me that there are several serious objections to this. Highland cattle on their own hills are kept together in large droves, they are very wild, and are very unmanageable when brought into the lowlands, and an attempt is made to put some restraint on their roving propensities; indeed they never become thoroughly domesticated, and from this cause are altogether unsuited for keeping on small holdings. They would be of use only for providing beef and would be fit for this use on these hills only after they had for a year or more received a daily allowance of fodder, &c., in addition to the food collected in grazing; they would never fatten on the natural pasture of these hills; even if kept in properly-fenced fields, and some restraint put on their movements, it

would, 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 in 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.

54. *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 Board, 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 a 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 catarrh 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 the 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. Tigers, 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

on these hills; in rough and stormy weather they generally left their sheep to their fate content as long as they themselves were protected; the sheep were thus left to wander wher ever they chose, and fell an easy prey to wild beasts. Many instances of this sort have bee mentioned to me. It is clearly necessary that good shepherds must be introduced into th district, if anything is to be attempted in sheep farming.

55. *Pigs.*—European pigs thrive well in most parts of the Neilgherries, while the foo most suited for them, maize, barley, potatoes, &c., can be raised in abundance at a very moderat cost; the climate is also well adapted for salting and curing. Seeing that the facilities are s great, while the amount of capital required is small, it is surprising that this important busi ness has not received more attention. There is no reason why the ham and bacon, raised an cured on these hills, should not be equal in every way to anything of the kind that is imported and as Europeans are obliged to pay from 1 Rupee to 1¼ Rupees per pound for ham, and fron 14 Annas to 1 Rupee per lb. for bacon imported from Europe, Neilgherry productions of thi description should command a large sale in all parts of the Presidency, for, under good manage ment, there would be no difficulty at Ootacamund in supplying well fed and properly cured ham and bacon at 6 Annas and 4 Annas per lb., respectively. Of course I allude to pigs o European breeds. I believe that no European of any respectability would willingly eat ham o bacon made from country pigs. The trade now done in Neilgherry ham and bacon is but small, as few persons have sufficient confidence in the ham and bacon supplied being made from the flesh of pigs of an European breed, as the curers can always obtain country pigs at much lower prices. The curers would best consult their own interests if they would determine never to allow the flesh of country pigs to enter into their establishments, as the fear that such precautions are not taken prevents most people from using either Neilgherry ham or bacon, and, as I have before pointed out, they can readily be supplied with well-fatted pigs of European breeds, on terms sufficiently moderate to enable them to command a good market, on most remunerative terms, for all that they can salt and cure.

56. *Poultry.*—The poultry kept on the hills are wretched in the extreme; there are some good birds of European breeds in the possession of residents, but these are but few; however the experience gained with them proves conclusively their suitability to the climate of this district. Many attempts have been made by enterprising residents to introduce from Madras acclimatized poultry descended from imported birds, but such experiments have almost invariably failed from the delicate constitution of these fowls, the result of the hot climate of Madras. The markets are supplied almost exclusively with poultry brought up from the plains; these are mostly reared in the filthy backyards of native houses; they are generally starved during the two or three days they are on transit to the hill markets, for they refuse food and pine and droop partly from overcrowding in the coops, and, from the great change in temperature; indeed it is as much as they can do to exist until the cook puts an end to their sufferings, and as may readily be supposed their flesh is not fit for the table. Sometimes these country fowls brought up from the plains are kept for a time in view to their improving in condition, but this plan seldom answers, as the fowls will not forage for themselves after a short period, and they gradually droop and die from the effects of climate. European breeds of turkeys, geese, and ducks should thrive well; indeed, I see no reason why the hill markets should not be as well supplied with poultry, &c., as are the markets in most English towns; but householders should remember that fowls of European breeds weighing, when fattened, 7 to 8 lbs. each cannot, like bazaar fowls, be sold at so many per 1 Rupee, but must be purchased at a price fixed with some regard to their weight and quality.

COLONIZATION.

57. As noticed elsewhere there has been a large increase in the population of the Neilgherries during the half century that has elapsed, since the late Mr. John Sullivan built the first house at Ootacamund; this increase is due chiefly to the large number of Europeans and Eurasians who have taken up their residence on these hills, and to the large number of natives from the low country, whom they have attracted into the district. Many of these low country people,

pecially those in domestic service and employed in other occupations in the large stations, ve become permanent residents. The Eurasians also may be considered as forming a portion the permanent population, they are chiefly employed as writers, shop-keepers, estate over- ers, &c., &c., while a few own small plantations. The European population is composed partly persons who have retired to the hills to spend their remaining years, who are not engaged any occupation; of persons who have gone to the hills in search of health and whose stay is mited, and Government employés in the Civil and Military branches of the service form nother considerable proportion; while planters, those connected more or less with the planting nterest, and a few engaged in commercial pursuits, constitute the remainder. Practically there as been no Agricultural Colonization in the district; a few European and Eurasian families ave settled and are engaged in coffee and tea planting, and a small number of natives have ettled in the neighbourhoods of Ootacamund and Coonoor, and have turned their attention to narket gardening, in view to the raising of potatoes and vegetables for sale, while a few have tarted small plantations, but little else has been effected in this direction. That there is plenty f land available and enough advantages to satisfy reasonable persons, I trust that which I have lready written will be considered sufficiently convincing; assuming that this is so, it becomes ecessary to consider what class of people will be best suited to form colonists on these hills, and rom what country they should be brought. Much has been written on this subject; some writers ave strongly advocated Military Colonization, others have as strongly recommended colonization y a civil population; of the former some would send up all the European pensioners and their families, others would send up short service men who have completed their military service; while others would station large numbers of European troops in various parts of the hills, and employ them in agricultural pursuits to such an extent as would not interfere with military discipline. Some suggest that Government might aid discharged soldiers by giving them grants of land, and advances of money towards the cost of building cottages and reclaiming the land, and an annual allowance for the first five years; the land becoming the property of the settler after his completing certain conditions, and on his agreeing to perform military service personally or by a member of his own family, or pay a fine when this is impossible, whenever the State requires such service. The force thus rendered available they would place under ordinary military discipline, drilling and other similar duty being performed at times and seasons that will the least interfere with farming operations. Old pensioners are, I fear, altogether unsuited as colonists for these hills; a long military career in the plains of India unfits them to encounter the hardships of a settler's life; while by their training they are deficient in resource and in self-reliance, and many are exceedingly unsteady. The life of a settler is not one of ease, he who would be successful must work hard, live frugally, and be willing to do any kind of work. The sons of European pensioners if collected at an early age to undergo training on these hills in a technical institution, in which agriculture, practical and theoretical, is taught, would, I believe, in time make excellent settlers. Amongst the time-expired men, especially those who were engaged on short service, it would, I believe, be quite possible to find some who would make useful settlers, who have a taste for farming, and may have had some practical experience, who might prefer to remain in the country instead of going back to England. Something could be done on a small scale with picked men, but I do not think that agricultural colonies, under military discipline, would be successful. A military force might be raised in an agricultural colony for the defence of that colony, like the volunteer or militia force in England, but I fear that it would be very difficult to get suitable men that would agree to become settlers, if one condition they must agree to, is military service in the plains, whenever such service is wanted; as long as the United States and Colonial Governments continue to offer such great attractions to settle within their territories this difficulty will exist. Military discipline, unless of a very mild description, would interfere with the freedom that settlers should enjoy, and unless the discipline was strict, there would be much difficulty in enforcing the conditions under which the men became settlers. I see no reason why large bodies of troops should not be stationed on these hills; indeed, as far as I am competent to form an opinion, there is everything in favour of the success of such an undertaking, while a considerable proportion of the soldiers' time might be usefully employed in farming and other pursuits. The Wellington Depôt draws the whole of its food-supplies, excepting potatoes and vegetables, from the low country;

hence the extra cost of the soldiers' diet when stationed on these hills under the presen arrangements. A demand for agricultural produce, such as the presence of large bodies o European troops on these hills would create, would draw many agricultural settlers into th district, and do much towards solving the colonization problem.

58. The advocates of colonization by a civil population also differ in their views. One would colonize with Scotch or English peasantry; another with poor European and Eurasian families while a third would colonize with natives from the plains. There is, I fear, little to recommend th first suggestion, the cost of bringing out such people would be very great, much greater indeed thar the expense of conveying them to the favourite colonization grounds in America and the colonies which possess far greater attractions to people who are without capital, but are willing to work hard. A few of the poorer European and Eurasian families might be brought from the low country to settle on these hills, but it would be requisite to exercise great care in making the selection; the cost of conveying them to the hills would not be great, and a small capital would suffice to support them until, by their industry, they secure a sufficient income to meet their wants, and they could doubtless obtain an advance under the Land Improvement Act to enable them to build and carry out improvements of a permanent character. The life of a settler for some time will be a constant struggle with difficulties, and even if the land was granted free for some years, no profit will be obtained until the settler has by his own industry, guided by intelligence, brought it under good cultivation; but when once this is done, a fair living will b secured for people who are ordinarily industrious and exercise prudence and common sense Persons of this class who are afraid of manual labor, and who have not sufficient capital wil never succeed as settlers on these hills; such people had better remain in the low country where, from the warmth of the climate, they can secure greater ease and personal indulgence, as from the cold of the Neilgherry climate, active work is absolutely necessary. Taking every thing into account, I am inclined to think that the youth of the European and Eurasian population of this country will, after undergoing proper training, afford the best material out of which to make settlers for this district. To give effect to this suggestion it would be necessary to establish in this district a technical institution on an extensive scale, in which the boys should be taught the elements of farming as applicable to the conditions met with on these hills, due attention being given to planting matters. They should also be taught the treatment of flax during its conversion into linen, and the same in relation to wool in the preparation of cloth, &c.; while facilities should be given for some to qualify themselves as blacksmiths, builders, mechanics, carpenters, &c., &c. The girls should be taught ordinary household matters, the management of the dairy, salting and curing hams and bacon, domestic spinning, weaving, &c. The Lawrence Asylum which, when full, gives accommodation to 400 boys and a considerable number of girls might, to some extent, be utilized; but it would require to be thoroughly reorganized. This institution was established to provide for the children of British soldiers who are serving, or have served, within the limits of the Madras Presidency, and amongst other objects to train these children to some useful employment. Children of pure European parentage, children of European fathers and Eurasian or native mothers, children who have lost one, or both parents, and children of pure European parentage who have both parents living. Upwards of eighty per cent. of the boys that annually leave the institution return to their relatives in the low country; of the total number 218 who have left the institution since its foundation up to the end of March 1872, only eight have obtained employment in plantations on the hills, and the Committee, in their annual reports, lament the increasing difficulty they experience in meeting with employment on the Neilgherries for the boys. It is unnecessary, I think, to take steps for the introduction of native settlers, excepting so far as to provide labor for coffee estates, but this can safely be left to private enterprise; if the planters will but guarantee labor throughout the year, and give due encouragement, they will in most instances secure the residence of native settlers in the neighbourhoods of their estates. I have not alluded to those enterprizing Europeans who come to this district and engage in coffee and tea planting, as they are in the district only for a time, and retire to their own country as soon as they can afford to do so; though, strictly speaking, not settlers, the large capital they expend and the labor they employ, do a immense deal of good in bringing settlers into the district, it is therefore highly desirable that every encouragement should be given to planters. It would be well if all the land fit for

planting, yet available, could be surveyed, mapped, and laid out in suitable blocks, ready at once for the use of the planter. The indefinite claims of the hill-tribes should be purchased by Government, the expense to be recovered from the person who takes up the land; at present planters are frequently put to much expense and inconvenience and suffer serious delays before they can secure land on which to begin planting operations.

CONCLUSION.

59. From the great number of subjects embraced in this report, I have had no choice but to treat many of them in a very superficial way, but I trust that I have written sufficient to justify further and more minute inquiries, in view to the utilization of the valuable tract of country which constitutes this district.

(Signed) W. R. ROBERTSON, M.R.A.C.,
Superintendent of Government Farms.

16*th December* 1874.

APPENDIX.

Proceedings of the Madras Government, Revenue Department, 22nd September 1871.

No. 304. Read the following Minute by His Excellency the President, dated Ootacamund, 7th September 1871.

The Government possess, in the Superintendent of the Experimental and Model Farms at Sydapet, an experienced and discriminating Agriculturist, whose services they are about to employ on a large scale in the improvement of husbandry throughout the country. The scheme for the institution of provincial farms, which the Government have sanctioned, has reference to cultivation in the plains, and with reason, for the plains have the first claim on our attention. The hill ranges of the Presidency do, however, also offer a legitimate subject of inquiry in this respect, and the Neilgherries, as the seat of the Government Sanitarium, of an increasing planting interest, of an independent English population of large establishments for the support and education of English and East Indian youths, and of a native population embodying a cultivating and a pastoral tribe, would justify a special investigation. With this view I would direct Mr. Robertson to proceed to Ootacamund, when he can best be spared from his employments at the Presidency for the purpose of reporting to Government on the productive capabilities of the district, and I would direct his attention to the following points in particular, but not limiting him to these:—

(1.) To the capabilities of the hills for the purposes of breeding horses, horned cattle, and sheep.

(2.) To the facilities which these hills may afford for the institution of small farms on the European system, worked in part at least by European labor.

(3.) To the improvement of the husbandry of the hill-people.

II. It may be doubted whether the Neilgherry Hills would ever be well adapted for breeding horses cheaply of a superior quality, such as are demanded for the Army. Horses would not be able to run out with safety in all parts of the plateau during the whole year; they would require protection at night, artificial fodder, and skilled superintendence. Good stock might, no doubt, be bred by private parties as a matter of taste, but it may be doubted whether Government would find such an undertaking profitable. Nevertheless, the question of horse-breeding on the hills is one which may deserve to be examined by a person more competent to decide it than I pretend to be.

III. The horned cattle of the hills are either a degenerate sort of native cattle, or a cross between the European and the Native breeds. The latter does well; but I question whether the proper European races have been selected. The European blood has generally been imported from Australia, and I suspect that the English short-horn is usually the parent of the Australian stock. No one would, however, in Great Britain turn out the short-horn stock at

a high elevation in a moist climate. It has always appeared to me that the West Highland breed might prove to be well adapted to these hills, either as a pure stock or crossed with the country cattle. They would ascend the highest steeps, stand very stormy weather, consume a rough description of herbage when there is grass on the ground, and be satisfied with a coarse sort of hay, under the simplest cover during the great heats and the heavy stress of 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 the temperature and rain-fall, be able to decide whether an improvement in the breed of cattle on these hills is to be sought in 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; far less by turning out these breeds in the pure to [illegible] 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 richer 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 [illegible] 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 Mald 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 displays a considerable variety of small cereals adapted to the climate and the soil, an increasing application of manure, and more care and neatness in the weeding of the crop than is usual in the plains. It may be doubted whether a greater weight of grain or a greater amount of human sustenance would 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, worked 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. He will forward his report to the Commissioner of the Neilgherries for transmission to Government 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-Horticultura 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 an great experience on a few tea plants which are now growing in the Government Garden a Kaity. You will observe that, in spite of neglect and ill treatment, these plants were in flourishing condition when Monsieur Perrottet left the Hills in October 1838. I have jus returned from visiting the plants, and the very luxuriant condition in which I found then induces me to call the attention of the Society to the subject. Six out of eight of the plant 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 it 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 withou delay to *Kaity*. This is the season for transplanting them, and from the freedom with whicl the plants appear to seed here, there can be no difficulty in forming a large plantation withir 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 o the advantages which would result from cultivating it on a large scale in that elevate 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 d not know from whence) several tea plants which he placed in one of the kitchen garden belonging to the establishment. He appears to have chosen a very suitable place, as th 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, wer still employed, but either they did not know the worth of these young plants, or did no 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 grante by the Superior Council of Madras during his residence in India, ordered me to th 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 a first, and induced me immediately to try and discover the cause. I found that it was owing t the plants having been immersed too deep in the soil. In fact, that part of the stalk, situate

above the colet 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 sometime longer. I cut off these decayed roots, and had a large pit dug round each plant, in which I deposited some good vegetable mould, to the depth of an inch, and afterwards watered them moderately. In a month after, at the most, all the buds of these young tea plants were seen 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 friable, and, 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 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 36¼ to about 39 degrees, whereas if the latter, it is only equal to from 35¾ to 37½ 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 a *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	——
February	0·40	——	——	——	0·60	——
March	1·10	0·10	2·04	2·08	1·55	0·05
April	3·60	1·20	4·01	2·39	5·73	1·93
May	3·00	3·80	6·20	3·09	4·71	5·00
June	3·40	10·46	6·49	7·52	5·68	6·45
July	10·40	7·35	4·36	5·06	3·33	4·89
August...	0·90	7·89	4·50	6·33	5·02	4·20
September	3·70	9·87	1·63	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.	
Bread ...	1		6 0	7 2	8 2	6 8	6 12	7 2	7 0	6½ 0	6 0	7 5	8 1	7 9	167,900 lbs.
Mutton ...	1		8 0	7 0	8 0	6 0	7 0	7 0	7 8	7 0	6 4	8 8	6 5	4 8	47,970 lbs.
Beef	1		8 0	9 0	11 2	11 3	8 0	10 9	11 8	8 9	10 8	9 4	Dept.	11 0	119,913 lbs.
Rice	1		14 0	16 4	16 8	12 4	12 12	12 8	12 4	15 0	13 4	15 8	16 8	23 0	41,975
Salt	1		24 0	20 0	21 0	25 0	19 0	18 5	18 1	20 0	20 ¾	13 0	20 1	18 0	10,494
Potatoes ...	1		30 0	45 0	50 4	46 0	40 0	38 2	27 0	30 0	30 5	39 0	31 0	43 0	83,950
Vegetables ...	1		18 0	31 0	35 0	32 0	20 0	21 5	30 0	28 12	30 5	39 0	31 0	43 0	83,950
Coffee... ...	1		4 0	4 4	...	3 3	3 8	3 12	3¾ 0	3¾ 0	4 0	4 8	4 12	4 13	7,500
Firewood ...	1		225 0	320 0	275 0	300 0	305 0	150 0	220 0	230 8	250 0	270 8	255 0	280 0	2,563,700
													As.	As.	1,000
Butter ...	1		1 0	1 0	1 0	1 0	1 0	1 4	1 0	1 0	21 ozs.	14 per lb	11 per lb.	12 per lb.	132,606 Drs.
Milk	1		6¼ Drs.	60 Drs.	40 Drs.	40 Drs.	40 Drs.	68 Drs.	192 ozs.	192 ozs.	201 ozs.	108 ozs.	135 ozs.	138 ozs.	2,607 L.
Lamp Oil ...	1		25 Drs.	28 Drs.	27 Drs.	31 Drs.	31 Drs.	25 Drs.	18½ Drs.	18½ Drs.	23 Drs.	40 Drs.	41 Drs.	40 Drs.	Gallons.
			lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	lbs. oz.	26,300 lbs.
Gram	1		57 0	26 4	21 8	32 0	34 0	23 0	21 0	11 13	19 0	30 13	41 3	47 0	16,800 lbs.
Straw, Paddy.	1		... ...	... ...	80 0	102 0	75 0	85 0	85 0	27 8	35 8	40 8	44 0	45 0	26,235 lbs.
Sugar... ...	1		6 4	6 4	6 4	6 4	6 4	6 4	5 12	5 0	5 2	4 8	4 9	4 14	

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	3·80	9	2·80	10
April	3·05	7	9·75	4
May	4·40	10	2·50	9
June	5·35	8	4·25	10
July	5·00	6	4·85	15
August	12·50	9	5·30	10
September...	4·10	5	10·65	17
October	7·90	1	3·50	11
November	2·95	7	1·10	4
December				
Total ...	49·20	89	50·20	97

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.				Temperature of Air.							Dry and Wet Bulb.		Mean deduced Dew Point.	Mean Degree of Humidity.	Rain.		Ozone.		Wind.		Cloud.	
		Mean for Month.	Highest in Month.	Lowest in Month.	Range.	Highest in Month.	Lowest in Month.	Range in Month.	Mean of all Highest.	Mean of all Lowest.	Mean Daily Range.	Approximate Mean for Month.	Mean of Dry Bulb.	Mean of Wet Bulb.			No. of Days it fell.	Amount collected.	Mean at 10 A. M.	Mean at 10 P. M.	General Directions.		At 10 A. M.	At 10 P. M.
April	Wellington.	24·360	24·389	24·212	0·177	75·9	59·0	16·9	71·9	61·9	10·0	66·9	67·9	57·0	58·1	50	6	0·84	75	70	E.		Ci-Cu.	Cu-St.
May		24·256	24·390	24·143	0·247	79·2	59·0	20·2	73·9	63·6	10·3	68·7	69·9	58·0	60·2	54	12	1·64	85	65	N. E.		Cirri.	Cu-St.
June		24·267	24·320	24·115	0·205	74·7	60·0	14·7	67·9	62·1	5·8	[illegible]	67·3	59·1	53·9	65	17	3·23	80	65	W.N.W.		Ci-Cu.	Cu-St.
July		24·207	24·285	24·129	0·156	72·0	56·4	15·6	65·[illegible]	60·1	5·7	62·9	61·2	57·3	54·4	68	16	2·45	75	70	N. W.		Haze.	Nimbi.
August		24·221	24·300	24·142	0·158	71·6	57·5	14·1	66·8	59·9	[illegible]	63·3	64·5	58·9	55·6	55	17	3·00	85	65	N.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	65	S, W.		Cirri.	Haze..
October		24·221	24·388	24·081	0·274	70·7	53·4	17·3	65·4	56·6	9·0	61·0	62·0	57·3	52·6	38	23	5·38	80	65	N. E.		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	23	12·13	75	75	E.	Not Calculated.	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	1·71	75	69	E. S. E.		Ci-Cu.	Cu-St.
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.				Temperature of Air.							Dry and Wet Bulb.		Mean deduced Dew Point.	Mean Degree of Humidity.	Rain.		Ozone.		Winds.		Cloud.		Remarks.
		Mean for Month.	Highest in Month.	Lowest in Month.	Range.	Highest in Month.	Lowest in Month.	Range in Month.	Mean of all Highest.	Mean of all Lowest.	Mean Daily Range.	Approximate Mean for Month.	Mean of Dry Bulb.	Mean of Wet Bulb.			No. of Days it fell.	Amount collected.	Mean at 10 A. M.	Mean at 4 P. M.	General Directions.	Estimated Strength.	At 10 A. M. 0-10.	At 4 P. M. 0-10.	
1871.																									
January	Wellington.	24·221	24·324	24·112	0·212	71·0	48·4	22·6	67·0	54·2	12·8	60·6	59·7	50·5	44·7	53	10	13·47	70	60	S. W.	30	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	4	2·13	75	65	S. E.	20	Ci-cu.	Cumuli.	
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	47·3	62	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	52·1	74	7	9·07	70	63	S. E.	20	Cumuli.	Haze.	
May		24·140	24·258	24·086	0·170	76·3	57·7	18·6	71·0	62·1	9·0	66·5	67·0	59·9	53·7	60	8	1·20	73	62	S. E.	10	Ci-cu.	Ci-St.	
June		24·115	24·214	23·995	0·219	74·7	57·7	17·0	69·7	61·0	8·7	65·4	66·2	59·0	52·3	66	8	3·25	65	58	W.	10	Cumuli.	Cumuli.	
July		24·143	24·214	24·050	0·164	71·6	56·7	13·9	68·0	59·4	8·6	63·7	64·2	59·0	53·3	73	10	1·90	68	60	N. W.	20	Cirri.	Ci-Cu.	
August		24·168	24·258	24·049	0·209	72·7	57·7	15·0	68·1	53·2	9·8	63·1	65·2	58·8	52·4	62	9	3·32	76	65	W.	20	Cumuli.	Cumuli.	
September		24·160	24·237	24·059	0·178	70·4	55·0	15·4	67·2	57·5	9·7	62·3	62·7	57·8	51·1	73	17	6·90	74	63	S. S. W.	40	Haze.	Hazy.	
October		24·176	24·258	24·078	0·180	69·2	52·3	16·9	66·0	55·[illegible]	10·3	60·8	60·[illegible]	[illegible]	48·7	72	18	13·90	68	62	S. S. W.	30	Hazy.	Hazy.	
November		24·173	24·311	23·940	0·371	68·0	51·2	16·8	64·3	54·0	10·3	59·1	59·6	53·[illegible]	46·5	60	14	11·72	65	58	S. S. W.	30	Hazy.	Hazy.	
December		24·219	24·316	24·152	0·194	66·3	51·8	14·5	62·[illegible]	53·1	9·4	58·1	59·0	[illegible]	45·5	62	[illegible]	[illegible]	64	57	S.	20	Cirri.	Ci-St.	
Mean ..		24·189	24·284	24·073	0·211	71·5	53·8	17·6	67·2	57·3	9·8	62·2	62·6	57·3	49·4	65	117	5·90	69	61	..	23	..	..	

WELLINGTON,
2nd February 1872.

(Signed) J. COGHLAN,
Meteorological Observer.

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

the Neilgherry mountains. Though the district is now one of the most important in the Presidency, it is only about six years since it was constituted a separate Revenue District, having previous to 1868 formed a taluq of the Coimbatore Collectorate, and it is only a little more than 50 years since the Neilgherries were first visited by Europeans. The Neilgherry mountains rise abruptly above the plains, except on the northern side of the district, where the rise from the elevated table-land of Mysore is more gradual; but on three sides they are completely isolated from the low country. The whole of the district is very hilly, especially the south-western portion, known as the Koondahs. The district is crossed in various directions by ranges of mountains; the most remarkable of these is the Dodabet range which runs through its centre and forms the line of separation between the south-west and north-east monsoons. In the south-western portion of the district there are several ranges of high mountains, which from their position, right in the line of the south-west monsoon, are of great benefit to the district in breaking the force of the storms of wind and rain that characterize this monsoon. In addition to 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 being 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 tract of 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, and 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 land under roads, &c., it will be found that less than one-fifth of the area of the district is now utilized. I have purposely omitted from this calculation the land occupied by natural forest, which in its present state can be classed only as waste land. Probably one-half of the entire district, including greater part of the Koondahs, the more elevated and rocky parts of the mountain ranges, &c., is altogether unsuited for the use of the agriculturist, or at any rate will be unsuited as long as plenty of good land is available. It is true that the 150,000 odd acres that remain is not all fit for the immediade use of the farmer, but a very considerable proportion is; and the remainder by judicious planting, clearing, draining, &c., could be made available in a few years. It is, I think, much to be regretted that 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 be highly prejudicial to the interest of the district. There is, I find, a general impression that all the good land has been taken up, but the results of my inspection of the district lead me to form a very different conclusion. It is true that all the good land within easy distance of the 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 this 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 at pleasure over 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 two 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 contain 2,487 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	1,339
Eurasians	796
Others	44
Total ...	49,501

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