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Government of Madras.

Revenue DEPARTMENT.

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*Proceedings of the Madras Government, Revenue Department,
5th May 1868.*

No. 112. Read the following Proceedings of the Madras Government in the
Public Department :—

Forwarding reports of the Commissioner for }
Investigating the Ravages of the Borer in } (Here enter 27th March 1868, No. 394.)
Coffee Plantations of Mysore and Coorg.

No. 113. ORDER THEREON, 5th May 1868, No. 1,237.

Miscellaneous.

Communicated to the Board of
Revenue, Officiating Conservator of
Forests, and to the Agri-Horticultural
Society.

(True Extract.)

(Signed) F. BRANDT,
Under Secretary to Government.

To the Board of Revenue,
„ the Officiating Conservator of Forests, } With Proceedings Public Department, No. 394.)
„ the Agri-Horticultural Society, .

Exd. S. T. Augustin.

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Proceedings of the Madras Government, Public Department,
17th December 1867.

No. 142. Read the following letter from the Commissioner for Investigating the Ravages of the Borer in Coffee Plantations of Mysore and Coorg, to the Chief Secretary to Government, Fort Saint George; dated Veerajpettah, 6th December 1867, No. 8.

I have the honor to send herewith, for the information of the Government, copy of a monthly report of progress forwarded by me to the Commissioner for Mysore and Coorg.

From the Commissioner for Investigating the Ravages of the Borer in Coffee Plantations of Mysore and Coorg, to the Secretary to the Commissioner for Mysore and Coorg; dated Veerajpettah, 2nd December 1867, No. 5.

I have the honor, with reference to my letter of the 7th November, to report, for the information of the Commissioner, that I have, since the 12th November, been engaged in investigating the ravages of the Borer in Coorg.

2. The printed questions calling for information on the subject from European Planters in the District were circulated on my arrival, and replies are now coming to hand. The Canarese questions have just been received, and will be sent out immediately.

3. In the neighbourhood of Mercara my attention was directed to another insect called the "Ringer," which has done a good deal of damage on some estates. It chiefly attacks young plants, and lives in the ground at the foot of the stem, coming up during the night and feeding on the bark. When a complete circle of the bark is thus destroyed, the whole of the plant above that point dies, but the root throws up shoots which in time become productive. The "Ringer" seems identical with the "Black Grub" of Ceylon plantations, which is the larva of the Dart Moth. It, or a nearly allied species, is also well known to the English farmer, being very destructive to corn and other crops.

4. From Mercara I proceeded to this station, and have since been busily engaged in going over estates, and from the information thus collected, and observations made, find that a great deal of what has been published in the newspapers regarding the Borer is incorrect.

5. Some of the estates lying west of Veerajpettah have suffered a great deal from the Borer, while those to the south and south-east, beyond Periambody, have escaped. On the Periambody estate the insect has been very active, while on the adjoining one of Curria Mullay, on the left of the Cannanore road, I have not as yet found a single tree containing White Borer; and the owner, Mr. Rose, believes that his property is free from the pest.

6. In a Native garden in Veerajpettah I found twenty year old stems in which the Borer had been observed at work for five years at least, and various Coorgs have informed me that they have noticed the Borer occasionally during the last eight or ten years. Two gentlemen engaged in planting have also told me that they now and again found Borer in coffee trees upwards of four years ago. In many of the Native gardens near this I find that some rodent (probably the coffee rat), has begun to destroy the pupa and beetle of the Borer, by cutting down and extracting them for food. Red ants also to a small extent prey on the larva and pupa.

7. I am now trying to discover whether the White Borer did or does exist in indigenous trees as such a discovery might lead to some valuable results.

8. On some estates I have found the Red Borer prevailing. It also is capable of doing a vast amount of damage, as I have found stems, 1½ inch in diameter, completely destroyed. Fortunately it has not as yet appeared in such numbers as to cause any anxiety. It is like the larva of a moth, and I am at present watching several of the insects in order to determine how it enters the stem and discharges from this every night a little pile of pellets of wood dust. Unlike the White Borer its presence in a plant can invariably be detected, as it makes a visible hole on entering the stem and discharges from this every night a little pile of pellets of wood dust.

I have not as yet ventured to recommend any preventive for White Borer beyond the removal and destruction by fire of affected trees as soon as the presence of the Borer is detected. When the roots have been tunnelled they should also be removed, and the stem may be cut across with a saw a few inches above the ground, and the stump then throw up

*Proceedings of the Madras Government, Public Department,
17th December 1867.*

shoots that will bear coffee in two years. In this way a considerable per centage of trees may be saved to the planter. Some of them are carefully following this system, but others are allowing the pest to have its own way. I think this would form a fit subject for the consideration of the local Planters' Association, with a view to a general combination for the destruction of bored plants being organized, and I intend to bring the matter at once to their notice through the President of the Association. The question has been asked of me several times "whether the Government could not order the owners of estates to destroy plants containing Borer." It does not appear to me that such an order could be safely issued or carried out, but I submit the matter for the consideration of the Commissioner. In case, however, an estate owner may have abandoned his property on account of Borer, I think it would be highly desirable and quite practicable for the Government to adopt some measure that would effect the destruction of the plants, and trust the Commissioner will give the matter his consideration.

10. With reference to your letter, No. 435, 1867-68, dated the 6th November, to the Superintendent of Coorg, I have the honor to state that I have been furnished by him with a copy of the same, and will, in due course, when I have seen more of the forests and the clearings that have taken place, submit my opinion on the subject.

11. I have already visited fifteen estates in Southern Coorg, and I will go over the others as soon as possible. Thereafter I purpose seeing the Native estates about Nakanad, as they are the oldest in Coorg, and thereafter will proceed to the northern parts of the country.

QUESTIONS.

1. How many acres are under cultivation on your estate?
 2. Was the land when taken up covered with heavy jungle, or what is called bamboo land?
 3. Are there any springs or streams of water on the estate, and do these run throughout the year, or get dry during the hot season?
 4. Have you noticed any change in springs or streams on the land since the jungle was cut down?
 5. What is the general nature of the soil and sub-soil, and what is the exposure of the estate?
 6. What is the ordinary amount of the annual rainfall, and in what months of the year do you get rain?
 7. Can you give any information as to the mean temperature, daily range of temperature, and degree of atmospheric moisture in each month of the year?
 8. What are the prevailing winds in each month of the year, and does the coffee appear to be injured by any of them?
 9. Have you of late years observed any change in the seasons, with reference to temperature, moisture, &c.?
 10. Have you lately or in past years observed any diseases, such as bug, rot, &c., in the coffee plant; and if so, can you attribute them to any cause, or suggest any remedy?
 11. Have you noticed any signs of degeneracy in the coffee plant?
 12. Is the Red Borer common in your neighbourhood, and when did you first observe it?
 13. What parts does it attack, and what are the symptoms and effects of its ravages in the coffee plant?
- Do you know of any remedy that will keep away or kill the insect?
- Is the White Borer prevalent on your estate, and when was it first observed by you?
- Does it appear to be on the increase or decrease, and can you ascribe its appearance to any particular cause?
17. State facts which you may have observed regarding the natural history of the insect, such as the months of the year in which it is to be found in the grub, pupa, and beetle states, the period of its life in each of these conditions, and the habits, &c., of the beetle?
18. Do you know of anything likely to obviate the attacks of the borer now, or to prevent its appearance in two years?

*Proceedings of the Madras Government, Public Department,
17th December 1867.*

19. Have you tried the cultivation of coffee under shade; and if so, what is your opinion regarding that system?

20. Do any other insects besides the borer, animals, such as rats, or vegetable parasites, such as fungi, mosses or lichens, injure the coffee plant in your district?

21. Have you seen the White Borer in any other kinds of trees besides the coffee?

22. Have you observed of late other cultivated plants or jungle trees suffering from disease or attacks of insects; and if so, give all the information you can on the subject?

N. B.—Specimens of diseased plants, and animal and vegetable parasites, are much wanted, and if sent to my camp will be duly acknowledged.

No. 143. ORDER THEREON, 17th December 1867, No. 1590.

To be recorded.

(True Extract).

R. S. ELLIS,
Chief Secretary.

Exd. J. Tulloch.

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*Proceedings of the Madras Government, Public Department,
28th January 1868.*

- No. 140. Read the following letter from Assistant Surgeon G. BIDIE, M. B. Commissioner for investigating the ravages of the Borer in the Coffee Plantations of Mysore and Coorg, to the Chief Secretary to Government, Fort Saint George; dated Mercara, 7th January 1868, No. 14.

I have the honor to send herewith, for the information of the Government, copy of a monthly report of progress forwarded by me to the Commissioner for Mysore and Coorg.

From the Commissioner for investigating the ravages of the Borer in the Coffee Plantations of Mysore and Coorg, to the Secretary to the Commissioner for Mysore and Coorg; dated Mercara, 4th January 1868, No. 12.

I have the honor to acknowledge receipt of yours, No. 685-3, dated 12th December 1867, and to inform you, for the information of the Commissioner, that I have now finished my tour of inspection in Southern Coorg, having seen there 38 estates belonging to Europeans, and a large number the property of Natives. On the map of Coorg received from your Office, I have marked the position of each of the former class of estates, indicating the presence of Borer by yellow, and its absence by green color. I have also noted incidentally the eastern limit of the dense jungle and heavy rainfall; the boundaries of the tract in which Blackwood, Mutti, Honi, Ben, Teak, &c., are the characteristic trees; the western limit of the Teak District; and the boundary of the sandalwood zone—all of which will be indicated by colored lines on the map.

2. The subject of the effect of forest clearance on climate, and its bearing on the immediate matter of my inquiry, have also received due attention. I quite agree with the Commissioner that the destruction of forests in Coorg has had an influence in making the Borer so prevalent and destructive to Coffee. In other countries, such as America, as the clearing of the natural forests has gone on, insects destructive to trees and crops have vastly increased in numbers. In dense primeval wood, the conditions of light, heat, and moisture are not favorable for the production of many of the insects injurious to cultivated plants; and, besides, nature in such situations maintains enemies sufficient to keep them in check. When man comes in with his axe he disturbs this natural balance, and his fields and gardens suffer in consequence. No doubt, also, insects often attack cultivated plants when natural ones on which they used to subsist have been exterminated. Forest clearance would also seem to increase the number of many kinds of insects by producing various changes in local climate conducive to their multiplication. The Coorgs think that the Borer used to live in the Bamboo, but, owing to the death of that tree throughout the district during the past year, it was no longer able to subsist in it, and has, therefore, attacked the Coffee. This general dying out of the Bamboo they say occurs once in 60 years, that being the term of its existence, but it seems strange that all the Bamboos in Coorg should be so exactly of the same age as to perish in a single year. I am investigating these statements, however, and will soon be in a position to say positively whether or not they are founded on fact. Some think that the Borer has increased from the destruction or departure of insect eating birds, consequent on the cutting down of forest. Any one accustomed to jungle life knows that very few birds exist in dense forest, and that, if not disturbed, they rapidly increase wherever there is a clearing or cultivation. The comparative scarcity of birds in Coorg is doubtless caused by the great amount of dense forest that exists, the severity of the monsoon, and the destructive propensities of the Coorgs.

3. In various jungle trees, and in the orange, I have found larvæ which in appearance and mode of tunnelling have a strong resemblance to the Coffee Borers, but, as a larva, they differ from them in preferring dead to living wood. These and the Coffee Borers are all the larvæ of beetles or of moths. The White Coffee Borer (now so destructive) appears to be a new genus, *Clytus*, but I defer naming it until I receive the opinion of Entomologists whom I have consulted. None of the entomological works that I have are of very recent date, and as the Coorgs have been made of late years in the group to which this beetle belongs, most of the family are

*Proceedings of the Madras Government, Public Department,
28th January 1868.*

ligniperdous. Thus we have the Prionus, that preys on trees in Europe and South America; species of Cerambyx which attack the Willow, Aspen, &c.; the Saperda, that bores into the pear and plum, the Callidium, which injures the Fir; the Scolytus, so destructive to the Elm and other hard wood trees; the Hylesinus or Ash-Borer; the Tomicus, a mite of a beetle that killed in one year a million and a half of pine trees in Germany; the Hylergus, which kills the side branches of Scotch Fir; the Platypus, which inhabits the oak; and many others. The measures that have been proposed for the destruction of these pests are innumerable; but, so far as I can see, none of them would be applicable in the case of the Coffee Borer, except the cutting down and destruction of trees badly infested, and the coating of the bark of sound trees with substances offensive to the perfect insect, so as to prevent the deposition of its eggs. A species of Clytus, the *Clytus pictus*, is in America very destructive to the Locust Tree (*Robinia Pseudacacia*). Like the Coffee Borer it only exists in the living plant, but no effectual means appear to have been discovered for preventing its attacks. As already stated, the other kinds of Borers found in Coorg are the larvæ of moths. I am now watching the chrysalis of the Red Borer, which appears to belong to the genus *Zeuzera*, of which there is an English species the *Zeuzera osculi*, or Wood Leopard Moth, which does a good deal of damage in plantations to the elm, ash, beech, and birch, and in gardens to the pear, apple, walnut &c. Gardeners destroy the larva of the latter by pushing a flexible wire into its burrow, or by injecting into it a patent poisonous fluid called "Gishurst compound." The Red Borer is well known on Ceylon coffee estates, but is not very destructive, and no particular means seem to have been proposed for getting rid of it. The "Ringer", or insect that destroys the young coffee plants by gnawing off a ring of bark round the stem, is, as I stated in my last, the larva of the Agrotis or Dart Moth. It is called in Ceylon the "black grub."

4. Since my last report I have found in coffee on native estates growing under shade a small beetle belonging to the genus *Tomicus*, which bores the young primaries and secondaries, causing them to turn black and perish. The perfect insect is only about the size of a pin's head, and yet it does a great deal of damage to the young fruit-bearing wood. I have also seen on some estates a locust very destructive to the foliage of the coffee, and thus causing a considerable loss in crop.

5. I have made a pretty complete collection of the mosses and lichens that grow on the coffee in Coorg, and will enter into the subjects of their cause, effects, and prevention in my final report. I am now making microscopical preparations of the wood of coffee shrubs that have died from rot or other diseases, so as to illustrate the changes that have taken place. Specimens of soils from various estates have also been obtained, and I hope hereafter, when at leisure, to investigate their chemical composition.

6. The discovery of measures to destroy or prevent the appearance of the Borer has, of course, formed the chief object of my solicitude, and, although the peculiarities of its natural history are such as to throw serious obstacles in the way, still I hope to attain ultimately some measure of success. The fact of the insect being found in the perfect form in every month of the year nearly precludes the idea of being able to destroy it in the winged state, and the circumstance of its living as a grub and pupa in the interior of the stem renders it very difficult to attack it in either of these stages without destroying the tree. In the meantime, I would recommend the covering of the stems of the plants with clean fresh moss up to the terminal pair of primaries from the surface of the ground. The moss should be about two inches in thickness, and secured with bands of fibre, and if put on about the beginning of the monsoon will live and become matted round the stem in a short period, forming a mechanical barrier that would prevent the Borer from reaching the bark to deposit its eggs. The mossing would no doubt to some slight extent affect the health of the tree, but this would be largely compensated for by the protection that it would afford from so deadly an enemy as the Borer. I believe, too, that, although the eggs of the Borer were deposited under the moss, its presence would prevent them from hatching. The manner of applying the moss here proposed is exactly the same as that recommended by Mr. Melvor for the purpose of increasing the amount of alkaloids in their bark. Coal tar, pure or diluted with water, applied to the stems, will also have the effect of keeping away the beetles, its

*Proceedings of the Madras Government, Public Department,
28th January 1868.*

smell being most offensive to all insects. I lately saw some trees to which tar had been applied nine months ago, and, although exposed to the monsoon, the coating had not lost its odour, and the trees looked very vigorous. I mention these facts because it has been said that the tar soon loses its smell, and is also fatal to the coffee tree. Lime-wash has been used on some estates, but the great objections to its use are that it is washed away by the first shower, and scales off when the tree is shaken by the wind. I believe a mixture of cowdung and clay, like that used by the natives for leaping the walls and floors of their houses, would be more permanent, and perhaps as effectual, while it would be much cheaper.

7. Most planters seem inclined to grow on their estates trees to afford partial shade to the coffee, and protect it from high winds. As a rule, coffee will not grow in Southern Coorg on slopes with a south-west exposure, the violence of the monsoon dwarfing or killing the plants. The scorching winds that prevail during the north-east monsoon are also very injurious to the coffee. The trees most in favor for shade and shelter are the Wild Jack, the Sand Paper Tree (*Ficus Asperima*), the Atti Marah (*Ficus Glomerta*) and the Charcoal Tree (*Sponia Wightii*), all of which are indigenous and spring up spontaneously. A good deal of English manure will be imported by planters this year.

8. It appears for various reasons desirable to introduce the cultivation of other plants beside coffee into this province. Last year I sent to the Superintendent cuttings of the Chinese grass-cloth plant, which are doing pretty well in Mercara. I think the Cocoa plant is also worthy of a trial, and I have asked a small supply of seed from the Dewan of Travancore.

9. The coffee crop has turned out better than was anticipated, and this agreeable surprise has led most planters to take a much more hopeful view of the future. I am happy to report too that the Borer does not seem to be on the increase in South Coorg, but rather on the decline, as in most bored trees about five per cent. of the insects found are dead. Still, it is very difficult to arrive at a satisfactory conclusion as to the state of the pest at present, as the insect is for the most part in the winged state and not easily seen, and it is only as the dry weather begins to tell on the trees that those tunnelled will show symptoms of the injury they have sustained. The Rodent, alluded to in my last, continues to prey on the insect, cutting a hole in the wood so as to reach its tunnel. It does not appear however to frequent estates of large extent and free exposure, but to live in native gardens of limited size, in which there is some shade and abundance of cover in the shape of undergrowth. The rainfall has been deficient in the Bamboo district or eastern portion of South Coorg, and that and exhaustion of soil have kept some of the crop from ripening properly, while the trees on some estates there are now losing their leaves, and the ends of the primaries withering.

No. 141.

ORDER THEREON, 28th January 1868, No. 111.

To be recorded.

(True Extract).

R. S. ELLIS,
Chief Secretary.

Exd. J. H. Burns.

*Proceedings of the Madras Government, Public Department;
7th March 1868.*

on many estates now, instead of in the month of March as is usually the case. Should showers fall in this month the prospects as to crop will be highly favorable, but otherwise a good deal of the blossom must perish. The rain has somewhat retarded the drying and despatch of the crop now on hand.

4. In a former communication I stated that my observations regarding the larva called the red Borer, led me to think that it belonged to the wood leopard moth or zenzera, and an imago just emerged from the chrysalis confirms this opinion. Although the larva is pretty common, the moth is a very rare insect, its color and slow flight perhaps enabling its enemies to discover and catch it with ease. The moth is rather pretty, and very peculiar in its appearance, the wings looking much too small for the size of the body. The antennæ in the male are beautifully feathered for about half their length, and the wings of a dull white color, spotted with black.

5. In a previous letter I stated that the Coorgs believe that the bamboos in their country die out regularly once in sixty years, and that in consequence of that event taking place in 1866, the Borer, which used to live in the bamboo, left that plant and took up its abode in the Coffee. From inquiries made in various directions, I have come to the conclusion that the life of the bamboo is not characterized by any such periodicity, and that the general death of the plant arose simply from the unusual drought that prevailed here, as elsewhere in India, during that season. I have also secured specimens of various insects that infest the bamboo, and although one grub has a considerable resemblance to the white Borer, it is a totally different insect. I may also remark that the habits of the white Borer are such as to preclude the idea of its being able to live in the bamboo. I have found recently in the Orange tree, and also in jungle-wood, a Borer so like the white Coffee Borer in habits and appearance, that I strongly suspect they are the same. Several larvæ of the Orange Borer are now being watched, in hopes that they will duly attain the imago state, and enable me to settle this question.

No. 45. To Surgeon G. BIDIE, M. B., Commissioner for Investigating the Ravages of the Borer, Mercara; dated Fort Saint George, 7th March 1868, No. 300.

I am directed to acknowledge the receipt of your letter of the 19th ultimo, No. 23, with its enclosure, and to inform you that the Government await your report on the result of your intended inquiries in Munzerabad.

(Signed) R. S. ELLIS,
Chief Secretary.

*Proceedings of the Madras Government, Public Department,
27th March 1868.*

No. 195. Read the following letter from the Commissioner for investigating the ravages of Borer in Coffee Plantations of Mysore and Coorg, to the Chief Secretary to Government, Fort Saint George; dated Sucklaspoor, 7th March 1868, No. 29.

I have the honor to send herewith, for the information of the Government, copy of a monthly report of progress forwarded by me to the Commissioner for Mysore and Coorg.

From the Commissioner for investigating the ravages of Borer in Coffee Plantations of Mysore and Coorg, to the Secretary to the Commissioner of Mysore and Coorg; dated Sucklaspoor, 6th March 1868, No. 26.

I have the honor to send, for the information of the Commissioner, report of progress for the month of February.

2. In obedience to instructions contained in the letter marginally noted, I visited the district near Santacoope in which so many sandal-wood trees have died. I was surprised to find the tree so abundant there, its favorite place

Your's, No. 4357-593, dated 6th November 1867, to my address.

of growth being the tract immediately to the east of the teak zone, where the jungle is a low open scrub, the elevation a little over 2000 feet, and the rain-fall from 30 to 40 inches. At Santacoope the elevation is about 3000 feet, the rain-fall probably about 60 inches, and the sandal associated with trees requiring more moisture, and generally occupying a different region, such as the kino tree, ben-teak, blackwood, and terminalia coriacea. The tract in which the sandal has died sweeps round from Hallery by Santicoope, Cotacadoo and Boikerry being immediately to the east of these places, and from one to two miles in breadth. Other trees, such as the kino tree and ben-teak have also died there, and as these were in their natural locality and are very hardy, there must have been some potent general cause in operation in the quarter. The sudden appearance of the mortality, and the fact that the same species of trees as those now dying have flourished there from time immemorial, preclude the idea of the cause having any connection with the nature of the soil, while a careful examination of dead trees showed them perfectly free from any disease. Some stems have been found tunnelled by a Borer, and some roots attacked by white-ants, but I believe that in every instance these insects have committed their depredations after the death of the tree. We have no alternative, therefore, but to infer that the trees must have perished through some abnormal condition of climate. It is hardly necessary to say that here, as elsewhere in Southern India, the seasons for some years past have been unusually hot and dry, but I do not think these climatic changes would have killed so many trees of natural growth; and, besides, if they had been the sole cause of the mortality they ought to have operated over the whole province wherever the same kinds of trees grow, instead of confining their effects to a circumscribed locality. It seems necessary to conclude, therefore, that the change must have taken place in local climate, and there is nothing whatever in the district to account for this, save the extensive clearings which have been made of late years on the estates of Hallery, Santacoope, Cotacadoo and Boikerry. The heights which these now occupy were formerly clothed with dense forest, which would retain and give off gradually the rain-fall, and render the air both moister and cooler in the neighbourhood during the dry season. The tract in which the trees have died forms a fringe on that side of the shaded heights to which their drainage descends, so that the trees growing there must now, during the monsoon, receive much more moisture than they were wont to do, while, on the other hand, during the dry season they will have to bear a heat and drought excessive and unusual. The tree is a tree that, under ordinary circumstances, will thrive in situations, namely hot and dry, and readily succumbs if at one period of the year it is deluged, and at another subjected to intense heat and drought. The change, therefore, in local climate and drainage that has taken place near Santacoope seem quite sufficient to account for the mortality of so many

27th March 1868.

sandal-wood trees in that district. The trees that have perished have mostly been very young, or those that have grown too rapidly to permit of the proper development of the dense, fragrant heart-wood, and this is exactly what might have been expected, as such would of course be the most delicate.

3. With a view to the completion of my report on the effect of the destruction of forest in Coorg, I considered it necessary before leaving the province to inspect the catchment basin of the head waters of the Cauvery, and to see as much of the forests on both sides of the ghauts as possible. I accordingly proceeded, *via* Moornaad and Beppnaad, to the old palace of Nalkanaad, and thence to Bangamungalum and Tulla Cauvery. The bridle-path from Beppnaad to Nalkanaad runs nearly parallel with, and at a short distance to, the east of the mountain masses that here form the crest of the ghauts, and passes over a succession of low hills or spurs running out from these in an eastern direction, with intervening deep set narrow valleys that have with great care been converted into rice fields. The flanks of the main chain are covered to a considerable elevation with dense forest, and the low hills that run out from it are also for the most part under-wood, in the shade of which Coffee is grown to a large extent by the Coorgs. Some of the gardens contain plants upwards of 20 years old, and are evidently highly remunerative; for although the crops are small, as compared with those got from trees in the open, the expense of culture is very trifling, the gardens receiving little or no attention beyond having the weeds cut down once or twice a year. I regret to say that here also the Borer has been busy at work, destroying every plant which, from the death or destruction of the neighbouring shade trees, has become exposed to the sun. Indeed trees originally under shade appear, on losing that protection, much more liable to be attacked by the insect than those cultivated throughout in the open. On the whole, however, the Coffee in this district is looking well, and although many of the plants even in shade are bored, the conditions under which they live there appear to enable them to resist the effects of the injury better than when growing in open ground; and should the pest cease, I have no doubt many of the tunnelled trees will ultimately recover. From Nalkanaad I ascended the high hill in the rear of the palace, and went north-west along the crest of the ghauts, from which a magnificent view is obtained of both flanks of the chain. The forests on the western slopes ascend higher than on the eastern, and are for the most part occupied with Cardamom gardens. The supply of that spice has of late become so diminished by the clearing away of the forests in which it used to grow, and the price consequently so enhanced that Cardamom cultivation may, ere long, become quite as remunerative as that of Coffee. The crests of the ghauts are for the most part covered with a coarse tufted grass, which is burned annually, with the effect of bringing up soon tender young pasture, and it seems also to keep these tracts clear of jungle, as I noticed that all seedling shrubs and trees which had sprung up during the year had been killed by the fire. Returning to Nalkanaad I rode from there towards Bangamungalum, up the basin of the Cauvery, a distance of sixteen or eighteen miles. For the first eight or ten miles the country was much the same as that beyond Nalkanaad, the wooded spurs being mostly occupied with Coffee gardens, and the intersecting valleys under rice culture. Here in complete shade too the Coffee looked generally healthy, but wherever a considerable opening allowed the sun's rays to steal in, the whole of the trees had succumbed to the Borer. Within five or six miles of Bangamungalum the country becomes comparatively level, consisting of a circular undulating plain about five miles in diameter, studded here and there with clumps of trees, and clothed with a carpet of short green grass. This is the cradle of the great Cauvery, and is surrounded north, east, and south by a semi-circular chain of lofty mountain masses, completely destitute of forest. Here and there in some narrow ravine, channelled out by a mountain torrent, I was surprised to find along the centre of the plain several plants, such as the *Butea frondosa* and *Cassia fistula*, &c., to the Mysore flora. The absence of anything like dense or continuous forest throughout the whole of this basin is very remarkable, and must have the effect of sending down the rain that there falls into the river with great precipitancy. From the centre of the surrounding circle of hills a spur runs out for a short distance to the east and towards the centre of the basin, and at the end of this spur is a small hill, the summit of which is the junction of the Cauvery and the

27th March 1868.

streams, stands the village of Bangamungalum, to which thousands of pilgrims resort during the great Tulla Cauvery feast in October. At the east end of the village there is a large quadrangular temple, roofed with copper put on in small pieces like slates, and in one corner of the enclosure I found a fine specimen of the magnificent Burmese plant, the *Jonesia asoca*, all ablaze with its orange blossoms, and evidently regarded with great veneration by the guardians of the place. I spent the night at Bangamungalum, in the verandah of the little straw-roofed Cutcherry, and at day-break started for Tulla Cauvery, the spring from which the river takes its rise. The road, a mere foot-path, leads over the shoulder of the spur, at the end of which the village stands and is very steep and rough. About two miles beyond Bangamungalum I saw a Native Coffee garden of considerable extent in the open, evidently infested with Borer, and greatly scorched by the east wind. After a tiresome walk of five miles the sacred fountain was reached, and I looked with pleasure on the little rill that afterwards expands into the great river, converting barren wastes into gardens, and providing food for thousands of the population as it travels to the sea. On the slope behind the spring there is a small temple, and the water rises up first into a store basin, a few feet square, then passes into a stone-built tank in which the pilgrims bathe, and after that runs down into a shallow wooded ravine. In the month of October, when the great feast takes place, the water in the little basin is said to bubble and overflow, and the Brahmins predict the day and hour at which these phenomena are to take place. Europeans are not permitted to approach within the sacred enclosure, so I had no opportunity of examining the spring, but it seems highly probable that the commotion in the well is produced by a stream of water being poured down at the appointed time through a subterranean channel, leading from the temple to the fountain, the former being at a considerable elevation above the latter. A few yards to the west of the temple the crest of the ghauts is reached, and a fine view obtained of the Malabar country, right away to the sea. Some two miles to the south-west, on the western slope of the chain, a Brahmin has a Coffee estate of considerable size, all in the open, but the plants did not seem to be thriving, and must suffer greatly from the violence of the south-west monsoon. Returning to Bangamungalum, I proceeded to Mercara, a ride of twenty-five miles, skirting the base of the bold hills that run towards the upper end of the Sumpajee pass. On the way I saw a great many Coffee gardens, all in shade, and found the Borer busy as usual wherever there was a sunny opening. From Mercara I again proceeded down the Sumpajee ghaut and found the Coffee on some of the estates there suffering very much from the dry east winds. Large patches were completely shorn of their foliage, and if rain does not fall soon a good deal of the young wood must perish. Some of the trees that suffered much from Borer last year have borne a good crop, but many of them will doubtless die before the monsoon. In my last letter, I mentioned that the Borer had appeared in very young Coffee on an estate in South Coorg. Since then it has shown itself on another in that quarter, in which the plants were put down in July 1866. About one per cent. has been killed, and the Superintendent of the property reports that the pest is on the increase. On another estate, in West Coorg, the owner discovered a large patch in which the Coffee, not yet two years' old, had perished from Borer. I examined a number of the dead plants with him, and found that the insect had confined its operations to the lower five or six inches of the stem, and had been most destructive at the neck of the plant, there being in some cases nothing left there but a thin shell of wood and the bark. The insect was found in all stages of its existence, and as many as six were taken out of a stem not thicker at the base than the ring finger. As a rule, the Coffee in Coorg comes into blossom in March or April, but this year the rain in January caused about one-half of the buds to expand into flower in the month, and although the greater portion of this has set, there is reason to fear that the young fruit will perish, unless the parched trees are stimulated with rain during the present month. From Coorg I proceeded to Munzerabad, a distance of 60 miles, by the Haveli and Bett route, a very fair dry weather road. After crossing the Tulla Ghaut, the country changes in its aspect, consisting of a succession of rugged hills, the tops of bare rocks being but a few stunted trees, and disposed in the river valley. From the river to Seewarpet, a distance of seventeen miles, the road passes through a dense forest, interspersed with mott, heune, ben-teak, and other trees. The forest is very thick, and the

Proceedings of the Madras Government, Public Department,

27th March 1868.

sandal-wood is common; coming up the valley of the Madhapoor Hulla river, and near the ford, I saw several tamarind trees, a rare sight in Coorg. All about the village of Somwarpett I found a number of Native Coffee gardens without shade; in which the whole of the trees had been killed by Borer. About a mile beyond it there is a very large garden in the shade of lofty somewhat open jungle, where the Coffee has been cultivated with great care by the Native owner. The plants are very fine for their age and generally healthy, but wherever the shade is deficient are either dead or dying from Borer. Four miles to the north-west of Somwarpett lies the estate of Allaycuttay, the only one in North Coorg belonging to an European owner. The Coffee on it was planted in the open, but during the last two years trees springing up spontaneously have been allowed to grow, and the whole place will shortly be under very good shade. Proceeding from Somwarpett to Sanevarsuntay, the country gradually gets opener, there being long stretches of low rounded grassy hills covered with good pasture, and producing numbers of the little stemless date palm. Three miles to the south of Sanevarsuntay, and just beyond the Coorg boundary in that direction, there is an estate originally chiefly in the open, but on which shade trees are now being industriously encouraged, with the view of saving the Coffee from the ravages of Borer. Six miles to the west of this, on the northern aspect of a range of rocky hills covered with scrub jungle, are three other small estates belonging to the same owners. The Coffee on these looks very promising, and where the jungle has been cut down shade, consisting chiefly of the charcoal tree and wild plantain, is being raised. Bears are very plentiful in this neighbourhood, and seem to take a malicious pleasure in scraping holes in the bridle-paths leading from one estate to another through the jungle. Fresh traces of Bison were also observed. The flora about Sanevarsuntay is almost identical with that of Western Mysore, the characteristic trees being Sandal, Terminalia, Butea frondosa, Conocarpus latifolius (Dindul), Teak, Wild Mango, several species of Ficus, &c. Between Sanevarsuntay and Sucklaspoor, about twenty-six miles, the country is very beautiful, in fact like an English park on a gigantic scale. On both sides of the road the landscape displays a succession of rounded grassy hills studded with large solitary trees, and between the hills run winding valleys full of forest, which here and there in verdant promontories steals up the neighbouring slopes. On the way to Sucklaspoor I visited several estates, and amongst the rest one in which the coffee was planted about twenty-five years ago under the shade of the original forest. The plants in it are very high, strong, and umbrella-shaped, yield fair crops, and look as if they were able to go on bearing for another quarter of a century. On the estates that I have seen up to date in Munzerabad the Coffee has been chiefly cultivated under shade, and comparing the present state of such with that of those in their neighbourhood in the open, no one can help feeling that shade at any rate, in this part of the Coffee districts, ensures a great degree of protection from the ravages of the Borer. I trust to be able in my next report to communicate further information on this highly important and interesting subject.

No. 196.

ORDER THEREON, 27th March 1868, No. 394.

To be recorded.

(True Extract).

R. S. ELLIS,

Chief Secretary.

Public Department

with previous correspondence

Rev. 1868 Deht
Geo. of Govt for May
No. 1183. ✓

Geo. of Govt in the
Public Deht.

Dated 27th March 1868
Dec. 8th April 1868.

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