

Revenue (1897) Department.

PRESS SERIES.

G.O., No. 351-352.

DATED 18th May 1897.

[Despatch Abstract.]

Lady Birds.

Coming to the Honourable Mr. H. P. Hodgson a communication from the Commissioner of Agriculture and Forestry, Honolulu, furnishing information regarding certain points connected with the experiments made with— for the destruction of scale bugs.

Letter. Conveying the thanks of the Madras Govt for the great courtesy and readiness with which the Commissioner of Agriculture and Forest, Honolulu, furnished the information asked for regarding the destruction of scale bugs by lady birds.

BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

Revenue (1897) Department.

CURRENT No. 3584

From

The Commissioner of
Agriculture + Forestry
Honolulu

No.

Order

Dated 3rd March 1897

Received 30th April 1897

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Enclosures 7

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SUBJECT.

Furnishing information
on the Entomological work
carried on by Professor
Keeble

LADY BIRDS AND COFFEE BUG.

Mr. CHAIRMAN & GENTLEMEN.

The prime interest of coffee planting naturally centres in the results, *i.e.*, the crop, and consequently of little less interest are the factors which contribute on the one hand to its increase and on the other hand to its decrease. I hope we shall take up manuring at some future time; I propose now to take up the latter subject and only part of it, namely blight—which is in my opinion likely to do us the greatest amount of harm and which has proved the most difficult to deal with. I cannot go into the subject as fully as it deserves, since I cannot lay my hands on all the entomological works I should like.

Of this family of scale, commonly known as bug and scientifically known as *coccidæ*, there are, I understand, some thirty species. Sabonadière, in his edition of the "Coffee Planter of Ceylon" of 1870, says there are only two species that the planter has to contend with; since then however a great many more have become known and even in my own personal experience I have come across four—the black, the red, the green, and the white or mealy, bug. The red bug I have met with only in very limited quantities on the Travancore Hills; the effect of these does not seem great, nor does the rate of increase bear comparison with that of the other species. Black, and white, generally known, I believe, as green, bug is too well known to need description; on the Lower Pulneys here I have not come across this white bug. Though we are, in this district, wonderfully free from this class of pest, in some parts of the Hills, especially on native estates, both the green and the black are to be found. By green,

in this instance, I mean a purely green scale that I have not been able to entomologically identify yet; it is evidently a distinct species from the white or mealy bug known on the Nilgiris, in that it appears to propagate itself in the same manner as black bug, showing no cottony white fluff round the base of the scale as in white bug. It is an extraordinary fact that the scale known as green on the Nilgiris is universally called *white* by the writers Sabonadière, Laborie and Hull: and I think this latter name the better since there is evidently a distinct species of green. Of these scales the mode of propagation is common to all, with the exception of the slight difference of one or two who lay their eggs in the fluff with which the females encircle the base of the scale. The number of eggs hatched at one time is generally about seven hundred.

The black soot-like appearance of the tree which is the sign manual of all bug-attacked coffee is according to some described as a fungus which spreads over the plant in a dense felt-like covering, and Laborie says, this fungus or *Honey-dew* is termed *Triposporium Gardneri* by Berkeley, and *Syncladeum Neitneri* by Rohenhorst. The general idea however seems to be that it is the excrement of the bug which makes itself apparent, not at once on the arrival of the bug, but after the scale has been on the trees for some months.

Of the order of *Hemiptera*, to the variety of *coccidæ* belongs the *coccus cacti* which yields cochineal, the *coccus ficus* which yields shellac, and other well-known scales.

The black *coccus* scale seems to be called both *Coccus coffeæ* and *Lecanium coffeæ*.

The insects belonging to this family live upon trees and plants of various kinds. In coffee it appears that the females in the full grown state are generally to be found on the young shoots or succulent branches, and the males chiefly confine themselves to the backs of the leaves. The females glue themselves on to the bark of the young shoots

and hatch their eggs within their own shell, at certain seasons when about to undergo transformation. They are closely attached to the bark of the trees they inhabit, and exhibit no external organs. The larvæ apparently feed for some time at any rate on the body of the female who dies as soon as the eggs are hatched. And these larvæ eat their way through the hardened shell and turn into the pupa state independently on the under sides of the leaves, when they can be seen as small specks, and with no distinction of sex. In some varieties of the *coccidæ*, however, they pupate within the scale, and only emerge as young scales looking not unlike diminutive wood-lice. The male appears to be winged, at any rate at some stage of its existence, and is never as large as the female, unlike whom, it derives no nourishment from the juices of the tree, the mouth, it is said, being obsolete in the perfect state. The female punctures the cuticle of the plant to which it is attached with a proboscis, springing, as it were, from the breast—a short three-jointed proboscis capable of being greatly protracted and inserted into the cuticle of the plant, through which she abstracts her nutriment. As she increases in size, the skin distends and becomes smooth and dry, the small rings or corrugations on the scale become effaced, and entirely losing the form of an insect assumes a roundish conical form, and in this stage is better described as a scale.

I will not enlarge on the effect of bug on coffee, as that is only too well known. The effects have been disastrous in Ceylon, and bug, of course, is still bad enough in some districts in Southern India. Generally speaking the pest is not so common in the hot and dry districts, and to this fact I should put down our comparative immunity as a district from this class of blight. Many methods have been tried for the extermination of the pest by artificial means, and a large number of recipes for solutions to be sprayed or brushed on, have been promulgated by planters, and have even been tried with some amount of comparative success.

Hull says, "this scourge cannot well be overcome and destroyed unless taken in the very early stage—that is, when found only on a few isolated trees. Each tree on which it first makes its appearance may be well dusted with a mixture of pounded saltpetre and quicklime in equal parts. Some planters recommend brushing or sponging the parts affected with a mixture of soft soap, tar, tobacco, and spirits of turpentine, in about equal quantities. A cooly, with a bucket and a piece of rag, can perform the office effectually. If the first application is insufficient it may be repeated."

Laborie says, "no effectual remedy has been discovered for it, and Dr. Gardner thought that the ravages of the insect were entirely beyond human control. Mr. Neitner says, hand rubbing will destroy an immense quantity of the bug, but is afraid that the permanent good effect is but trifling. High culture has the effect of throwing off the pests and tar applied to the roots of the tree seems to be a valuable remedy."

Sabonadière, in the "Coffee Planter of Ceylon," says, "the best mode of driving away the black bug is to thatch the ground thickly with mânâr-grass. Coal tar applied to the roots is also a very good remedy, but to render it more efficacious it should be followed by the thatching process. The best mode of applying coal tar is to scrape the earth gently from the surface roots, and sprinkle half a cocoanut-shell full over them, afterwards carefully replacing the earth round the stem. Manuring is also good, for anything that will invigorate and give the tree strength to throw off this pest is of service. It is very curious that the mânâr-grass cure was not long ago discovered, but I can now vouch for its efficacy in this district."

Many solutions of kerosine oil, soap, lime, various poisons, etc., etc., have been suggested, but it was found almost impossible to spray these solutions on to the tree sufficiently thoroughly to reach the scales which had got into the axils of the leaves and among the stalks of the

crop clusters. Latterly solutions of hard drying substances, as starch, lac or even ordinary cungy water have been suggested as a spray to be applied to the trees early in the day before the sun is up, so that they may harden and peel off, taking the scales with them, as soon as the day begins to get hot.

I have not heard of its having been tried, but I am inclined to think that the same difficulty of reaching the odd corners that the scales get into, in spraying these solutions, would be met with. Even Professor Koebele in his report (referred to below) suggests that until the natural enemies of the scale are established, the trees be sprayed with a resin compound, which is easily prepared by any one. Three pounds of washing soda (carbonate of soda), and four pounds of resin are boiled in two pints of water until well dissolved, then hot water should be added slowly while boiling, to make five gallons of the compound. This should be diluted with cold water before cooling, to make about forty gallons of wash for the mealy bugs, or about sixty gallons for plant lice. I have always found this, says Professor Koebele, the simplest and most effective wash to prepare—very effective and not injurious to plants.

All artificial means have proved abortive (at least as a final exterminator), and as far as I know no natural means have as yet been tried in India.

Comparatively lately, that is within the last few years or so, the great scale pests which had increased in, and devastated the islands round Hawaii to an alarming extent, have been almost annihilated by the introduction of a natural enemy—*viz.*, certain varieties of the Lady bird, and these have proved wonderfully successful where artificial means have utterly failed.

This Lady bird was apparently first introduced from Australia, where it had been noted by entomologists that certain scales formed the food for the larvæ of certain varieties of the Lady bird.

Professor Kœbele, the Government entomologist who is engaged in this work, gives some interesting information of the work that has been done by these insects on the scale in the Hawaiian islands.

The Lady bird is a small almost round and generally brightly coloured beetle.

Professor Kœbele says, that he arrived in Sidney from Honolulu in April 1894, "and at once commenced to make shipments of beneficial insects, principally Lady birds (coccinellidæ). These were sent on ice and were invariably received in good order, and much credit is due to the Oceanic Steamship Company for the care taken in carrying these valuable consignments,.....and no charge has been made for freight."

Here follows a long list of the Lady birds imported into Honolulu. Then Professor Kœbele goes on "these insects were all liberated (as soon as possible after arrival) in places where food was most abundant. That all these insects are now well colonized is beyond a doubt, as all the forms have been seen for months after they were liberated, conclusively proving that those seen are the progeny of the first liberated, as very few of the different species of Lady birds live beyond a few weeks' time."

"That good work has been done by most of the species is shown by a marked decrease in the various forms of blight. The work of one Lady bird (*Cryptolæmus Monrozeri*), has been truly marvellous. A year ago and for the last three years, all the citrus trees (such as tamarind, orange, lime and lemon) were affected by a blight that was terribly destructive, so much so that it seemed that if relief was not soon obtained, the citrus trees would all be destroyed. Many trees in fact did succumb to the effects of the blight which Mr. Maskell has named *Dactylopius Albizzia*. The *Cryptolæmus* soon got to work on this blight and increased to such a wonderful extent that the ground, walls, and fences were soon covered with the full-grown,

crawling white larva, seeking suitable places to pupate and transform into the imago or perfect stage."

"Tens of thousands of the larva were collected and shipped to all parts of the islands wherever any Dactylopiids were known to exist. A great number were shipped to Kona to attack the coffee blight (*Pulvinaria Psidi, mask*), which also belongs to the genus Dactylopedæ. For a time the most encouraging reports came of the work this Lady bird was doing on the coffee blight, but latterly letters have been received stating that the bugs do not increase; this is but natural. The Lady birds have certain times for breeding, usually during the summer months, and during the winter they hibernate. This seems to be the case with the *Cryptolæmus*, for now hardly one can be found in Honolulu where three months since hundreds of thousands were to be seen. The work of this bug has been so effective that many orange and tamarind trees that for the last three years have borne no fruit, and looked as if they would eventually succumb, have this year come out in full foliage and fruit."

Professor Kœbele gives other instances of this same Lady bird exterminating other varieties of scale from other fruit bearing trees, and goes on to say "The *Pulvinaria Psidi, mask* made its appearance some three or four years ago upon the Pride of India trees in North Kona, Hawaii, destroying many of these and spread to such an extent that at the present time, it is one of the most numerous and injurious insects upon the coffee trees, and as Mr. Miller, of Kona, remarked, "it would be impossible to raise coffee trees with this scale always present." This insect was found to have already spread from the seacoast upwards to about two thousand feet altitude, from North of Kailua to South of Hookena, a distance of about twenty-five miles. For miles away the black appearance of the Guava forest show the presence of this coccid."

"An effective enemy to this is already established in Honolulu, which also will successfully destroy all the numerous other lecanidæ found on the islands."

"Other species of the same genus were met with upon plants introduced from Japan. *Dactylopus* is represented in numerous species, one of this, *D. Citri, boisd.*, is the so-called white louse of the coffee trees. At the present time it was found chiefly in its earlier stages and not numerous. Its most effective enemy is undoubtedly the larvæ of a species of lacewing-fly, *hemerobius, sp.*, this unfortunately as well as the closely related species *chrysopa* are preyed upon by numerous parasites, which, at times, reduce their number considerably; and owing to this the mealy bugs again appear in numbers. A true parasite "Chalcid" bred from this scale, has been observed upon these scales will be many, and they will remain free of parasites for very many years to come, so as to be able always to keep this pest in check."

The Professor gives a list of insects sent over from California with notes of their feeding habits from which it appears there are many varieties that feed on the *Lecanium*. The most valuable scale-feeding coccinellæ in America is, he says, undoubtedly *Chilocorus cacti, Linn*: "It will prey upon most of the coccids, and especially various *Aspidiotus* and *Lecanium*. Large numbers were sent here and without doubt will increase and become as valuable as in their native home."

All of which goes to prove that Lady birds can be transported with safety, and will acclimatize themselves in a foreign country: and if they do so in the Hawaiian islands, there is no reason why they should not do so in India.

These Lady birds, it appears, sting the mealy bugs (*Dactylopius*) and the black bugs (*Lecanium coffæ*) and lay from a few to forty eggs within each according to size. And the little maggots live on the contents of the scale, which then dries up and falls off. When full grown, they pupate in some cases inside the eaten-out bug, and in some cases upon adjoining stones, trunks of big trees or walls.

It is prior to pupation, i.e., in the larva state that the Lady birds feed on the contents of the scale, whether those contents be the eggs or larvæ or only the body of the scale. Although they do most work in this way, as larvæ, still the full grown Lady bird, it appears, does some good work in piercing the scale and sucking the contents.

The Lady birds were taken over from Australia to Honolulu in small wooden cases, packed on ice, and during transshipment were placed within the ice-house of the steamer carrying them. They were thus kept in the dormant state until they were liberated and taken from their box at their destination, and put direct on to the trees, when they revived in the warmth of the sun and at once proceeded to business.

The Editor of Planting Opinion, in a little article in his issue of the 21st December 1895, says, he has written to Mr. Marsden and to Mr. Wait of Honolulu, to send him some of the species referred to, and that on their arrival, he intends to distribute them "in suitable localities," presumably on the Nilgiris.

The Editor, P.O. does not seem to know whether there are Lady birds to be found that will feed upon the black bug, but I am informed that there are many that will not only feed on this coccus, but will feed on almost every variety of coccid that we are likely to come across as a coffee pest. Even Red Spider (*Tetranychus Telarius*) which hitherto (if it is the same species) has in India kept entirely to tea, has been troubling the coffee growers of Olat recently. And even for this pest a natural enemy has been found from among the Lady birds, which is making short work of it.

The Haputah Planting Association of Ceylon are taking up this matter of Lady birds, and possibly will be assisted by the Head Association of Kandy.

I also am having two varieties sent out to me from Australia, *Cryptolæmus Montrozeri*, and *Rhizobius Ventralis*,

for green and black bug respectively. I had hoped that these Lady birds would be out before this meeting, and that I should have been able to give a fuller description of these little beetles.

I have not heard why they have been so long in sending them off but the reason probably is that the Lady birds are still hibernating. This being the winter in Australia and thereabouts.

I hope to have these small consignments out during March or early in April, and intend to experiment with them as soon as they arrive, hoping at no very distant date to be able to lay the notes on the results of my experiments before the Association.

If these Lady birds after experiment are proved to be all that is hoped of them, and can be acclimatized, and will work upon the coccidæ, we have here in South India, I hope that the planters will be assisted by the Steamship Companies by having brought over for them, free of charge, the small packages of dormant Lady birds,—which certainly cannot take up much room in their refrigerators—as they have done to the coffee growers in the Hawaiian islands.

It remains to be seen whether here in India we shall find we have other insects or ichneumon that will prey upon the Lady birds, but even should this be the case, it is improbable that their Nemesis will overtake and annihilate the Lady birds for many years to come.

HOWARD O. NEWPORT,

Honorary Secretary,

Lower Pulneys Planters' Association.

LOWER PULNEYS,
29th February 1896. }

*Extract from the Hawaiian Planters' Monthly,
April 1895.*

Action of the Kona Planters' Association regarding the Coffee Blight.

KAILUA, HAWAII, April 5, 1895.

TO THE EDITOR OF THE PLANTERS' MONTHLY.

DEAR SIR,—Enclosed please find copy of resolutions on blight passed by the "Kona Planters' Association" of Kailua on April 4th. Trusting that it may receive space in the next issue of your valuable monthly.

I remain very truly,

E. B. BARTHROP,

Secretary.

Whereas, The cultivation of coffee has become an established industry in the districts of Kona, representing the investment not only of considerable capital, but likewise the labor of a great many persons in small holdings, and

Whereas, The blight which is now infesting the coffee is doing great damage and will seriously affect the coming crop, and may (as did the "White Aphis" once before), entirely ruin the prospects of the industry, and

Whereas, Professor Kœbele, before his departure on his present tour, thoroughly examined this blight and assured individual Planters that he was familiar with its enemies and guaranteed that they would be provided, and

Whereas, The Lady bird *Cryptolemus* supplied by the Commissioner of Agriculture has been given a fair trial, and has in no way prevented the blight from increasing to an alarming extent, and

Whereas, On individual plantations the spread of the blight would have been checked had not spraying operations been suspended, on the assurance that the Lady bird would do the work, and

Whereas, The members of this Association have every confidence in Professor Kœbele, and believe that he is in ignorance of the present state of affairs, therefore;

Be it resolved, That a special committee of five members be appointed to investigate the present condition of this blight (*Pulvinaria*), and what has been the effect, if any, of the remedy supplied by the Commissioner of Agriculture. It shall collect all information available on the subject, and shall report in two months after this date, and further;

Be it resolved, That the members of this Association are quite willing to co-operate in conducting any measure to suppress pests affecting the agricultural interests of the islands. And further;

Be it resolved, That in the opinion of the members of this Association, Prof. Kœbele, the Entomologist engaged jointly by the Government and Planters' Labor and Supply Company should be immediately informed as to the present serious condition of affairs in Kona, so that he may have an opportunity to give the matter proper attention before his return, and further;

Be it resolved, That the Secretary be and is hereby instructed to respectfully communicate these resolutions to the Board of Agriculture. The Planters' Labor and Supply Company and to the Editor of the Planters' Monthly.

REPLY FROM THE
COMMISSIONER OF AGRICULTURE,
Department of Interior,
Bureau of Agriculture and Forestry.

HONOLULU, 11th April 1895.

E. B. BARTHROP, Esq.,
Secretary, Kona Planters' Association,
Kailua, Kona, Hawaii.

DEAR SIR,—Your esteemed favour of the 5th instant, together with copy of the resolutions passed by the Kona Planters' Association of Kailua, came duly to hand.

It is with great regret that I learn from the resolutions that the coming coffee crop of Kona is seriously affected by the blight known as *Pulvinaria*, and that the *Cryptolæmus Montrouzerie* has so far proved ineffectual in destroying it.

In regard to that part of your resolutions which says that "The members of this Association have every confidence in Professor Kœbele and believe that he is in ignorance of the present state of affairs," I must say that I am of the opinion that you would not have embodied such a statement in your resolutions had you taken the trouble to enquire from this Bureau as to how far Professor Kœbele had been kept informed as to the results obtained from the various beneficial insects that he has collected and sent to this country during his sojourn abroad.

This Bureau has been in constant correspondence with Professor Kœbele, and the work of the different Lady birds that he has sent us, as observed in Honolulu and from reports received from the other islands, has been duly communicated to him. The selection of the *Cryptolæmus Montrouzerie* Lady bird for *Pulvinaria* coffee blight is entirely due to the instructions received from Professor Kœbele, who sent this valuable insect from Australia, and in parts

of the islands where the Lady bird was sent (with the exception of Kona) the results obtained have been in keeping with his excellent judgment.

Under date of September 3, 1894, Professor Kœbele writes as follows: "I have written you previously in regard to the feeding habits of the *Cryptolæmus* and *Rhizobius*. You will do best always to select the *Cryptolæmus* for the insects or scales upon the coffee plant, as this is the beetle to destroy the Dactylopids, as well as Pulvinaria and Lecanium while *Rhizobius Ventralis* will not feed upon the mealy bugs." That the *Cryptolæmus* has done good work on all the Dactylopids and on the Pulvinaria is an established fact, to support which there is abundant evidence.

After the first few broods of these insects had been liberated in Honolulu, several months elapsed before they became numerous enough to enable us to gather colonies and send them to the other islands. Kona was the first district to receive the Lady bird, and the first reports received from there were quite encouraging. Mr. C. D. Miller, Manager of the Hawaiian Tea and Coffee Company, writes under date of October 16, 1894, and speaking of the *Cryptolæmus* says: "The larvæ of the latter are doing good work on the infected coffee trees, and I believe in course of time the scale will be very scarce." Soon after this, letters were received from Mr. W. Muller and Mr. M. F. Scott, stating that from some cause or other, the Lady birds did not increase; and in another letter Mr. Muller stated that an insect attacked the larva of the Lady bird and destroyed it. From Mr. Muller's description, I recognised this insect to be the larva of the lace winged fly a *Chrysopa*, species unnamed. This insect is quite common all over the islands, and is classed as among the beneficial insects. I have bred numbers of them together in the same jar with the *Cryptolæmus*, and with careful observation I have never seen them attack the larva of the latter.

I therefore suggested to Mr. Muller that he was mistaken in his conclusions, and that the true cause of the *Cryptolæ-*

mus not increasing was that the non-breeding season of the Lady bird was approaching, during which no increase was possible. All this was duly communicated to Professor Kœbele, and his opinion asked as to the cause of the Lady bird not increasing.

His reply is as follows: "The *Cryptolæmus* beetle has its rest during the winter in Australia, when it does not breed, and the same will be the case in the islands; but you will see good work during the summer." This fact has been fully demonstrated in Honolulu. During the summer months the beetle increased to a marvellous extent, and its work on the Dactylopids and Pulvinaria was truly wonderful; but as the winter months approached, its numbers began to grow less, until during November, December, January and February hardly one was to be seen; and the several blights on which it fed began to increase again. At the present time the *Cryptolæmus* is again increasing, and wherever any of the blight is seen, the larva of the *Cryptolæmus* is seen feeding upon it. I have spoken to Mr. Muller and Mr. Scott when they were in Honolulu and stated to them the above facts, and asked them to have a little patience until the summer set in when there would be good work done by the *Cryptolæmus*. I believe with Professor Kœbele that this will be the case.

Your resolutions seem to imply (though I trust such was not your meaning) that I, as Commissioner of Agriculture, had selected and sent to your district the *Cryptolæmus* Lady bird independently and without the sanction and advice of Professor Kœbele. If such is your way of thinking, I must assure you that you are mistaken. In all matters pertaining to the entomological work of Professor Kœbele with which I have had any connection, I have relied upon and implicitly followed his instructions in every particular.

You have done well to express confidence in Professor Kœbele, but you are decidedly wrong in believing, that he is in ignorance of the state of affairs in Kona. Just

so far as I have been informed by the people of Kona, so has he been informed, and a copy of your resolutions will be sent to him by the next mail. He is now in Japan, a country which he reports as being much infected with scales and blights, and it is quite possible that he might find an insect to supplement the work of the *Cryptolæmus* beetle.

Had my duties permitted me, I would have visited Kona and consulted with your coffee planters concerning blights and other matters but I have been quite unable to leave Honolulu.

Constant vigilance is necessary in order to prevent the introduction of pests and blights, some of which, if introduced, would destroy the coffee industry in a short order. I can assure you that as soon as possible after the arrival of Professor Kœbele he will visit your district and do what is possible to relieve you of the blight on your coffee.

Trusting that you will soon be able to see the *Cryptolæmus* at work on the *Pulvinaria* and assuring you that anything that is in the power of the writer to help your industry will be done.

I have the honor to remain,

Yours very truly,

J. MARSDEN,

Commissioner of Agriculture.

Extract from the Hawaiian Planters' Monthly
for August 1895.

The Australian Lady Birds receive kind Notice.

KAILUA, NORTH KONA, HAWAII, August 8, 1895.

3^d EDITOR, PLANTERS' MONTHLY:—

Some eight months ago, I wrote to you concerning the Lady bird which had been introduced to prey upon our coffee blight, expressing doubts as to its utility, and, until May of the present year, my remarks seemed to hold good, as, up to that time, very few specimens in any stage could be found, and the increase of *Pulvinaria* was simply terrible.

In his reply to the resolutions adopted by the Local Association on April 5, Mr. Marsden informed us of the habit of the *Cryptolæmus* (?) taking a winter rest, and some weeks afterwards an increase of the Lady bird was apparent on guavas growing in the vicinity of coffee, on which the original colonies had been liberated, but principally at a point about three miles on the Thurston Road, at an elevation of about 1,000 feet. Spreading from this place they have travelled in all directions and are now to be found from the beach up to 2,000 feet on the mountain side, their distribution having been materially aided by large quantities of pupæ having been collected and carried to various parts of the district. So far they seem to breed more rapidly at low elevations and show a preference for blight upon any tree but the coffee. It is, however, gratifying to note that, having cleared out the blight on other vegetation, they take to the coffee, as a last resort, and keep on until that too is clean.

The work of *Vedalia Cardanalis* on the cottony cushion scale in California has hitherto been regarded as an exceptional instance of the complete extermination of an insect pest by a predacious enemy; and, in a recent letter from the Washington Department, a doubt is expressed as to the wisdom of relying too much in that direction. The work of *Cryptolæmus Montrouzers* in the *Pulvinaria psidi* will, however, so far as the present indications show be just as remarkable as that of the *Vedalia* in California, if it remains as industrious as it is at present.

Now, that the dreaded white aphis has been completely exterminated by *Rileyii*, the hopes that *Cryptolæmus* will inflict a similar fate upon *Pulvinaria* is making our Kona Coffee planters jubilant, and Prof. Kœbele, as well as Mr. Marsden, will occupy a warm corner in their hearts.

Yours faithfully,

WILLIAM G. WAIT.

*Extract from the Hawaiian Planters' Monthly
for October 1895.*

HOW TO COLONIZE LADY BIRDS.

[The following experiences of a fruit grower in California may be of service to coffee planters, who may have had difficulty in colonizing the Lady birds in their groves.—*Ed.*]

Since the discussion regarding the beneficial results obtained by the *rhizobius ventralis* first began the most contrary opinions have been ventilated. The facts as stated by the various gentlemen who had given time and attention to the subject, have appeared to be in conflict with one another, the results obtained in one orchard being different from those obtained in another orchard similarly situated, conditioned and lying, perhaps, closely adjacent. In such cases the advantage of the parasite is to some extent, at all events, an open question.

Rowland Machin, Ex-President of the Santa Barbara Horticultural Commission, has furnished some interesting data on the matter and, perhaps needless to say, he heartily endorses the utility of the parasite.

"Early in June of this year we erected in various orange orchard tents varying in size from 8 by 8 feet over the trees, giving ample elbow room inside, made of 2 x 3 scantling, and 1 x 3 strips, covered tight with 2½ cent. cheese cloth; of course we selected the very blackest scale covered tree in the block, having due regard to the course of the prevailing winds, draughts, environments, etc. The little beetles were then liberated in varying numbers; under one tent fifty, under another 100, up to 200 in a single tent, taking care to put olive branches—emblems of peace—covered with black scale under the tents, because my supply of parasites was taken from an olive grower in Ventura county, stocked two years ago with only twelve of the *rhizobius ventralis*," writes McMahon.

BACK PAPER

G.O.	No	Department.

20

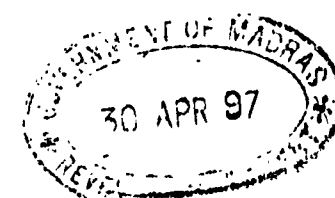
"Now for the results, and in estimating this, I would say, make haste slowly. Don't do as a certain Commissioner in Southern California did with *novius Kæbeli* parasite or the pernicious San José scale. Having liberated a colony on an infested tree, finding no visible results in three weeks, he sprayed the tree. This week I took my sheet to make an examination of many colonies. In the first tent (whose owner had met me and repeatedly told me he could see nothing of the bugs) I found a nice colony, with specimen beetles just pupated. The second tent (the owner of which declared that there could be nothing left, because he had looked and looked and found nothing) I found gravid beetles and larvæ.

"The third and fourth tent (in spite of the same expressed fears of owners and foremen) the colonies were in a thriving and prosperous condition, and ready to be liberated on the rest of the orchard.

"Now, all these tents had been left intact, and I left them open two feet from the ground, preferring to have them radiate from the lower part of the tent for practical results.

"The rest of the tents had been taken down, where I had put beautiful colonies at the time I put out the others, and do as I would, I failed to find a solitary beetle on any tree near. My conclusions are that the greatest and most economic success with the parasite will follow colonizing in tents until fairly established in the groves.

"In my judgment these colonies now permanently located will, in a year's time, be so plentiful, if undisturbed, as to rid the groves of most of the scale. Unless this is followed to a successful issue, in my opinion wide-spread disaster will follow in the wake of every citrus grove now affected with black scale."—*Riverside Enterprise*.



210
Department of Interior

Bureau of Agriculture and Forestry

Honolulu March 3rd 1897

To Gabriel Stokes Esquire, I.C.S.

Ag. Secretary to the Government of Madras

Sir:-

Your Communication dated November 14th 1896 in which you make certain inquiries concerning the Entomological work of Professor Koebele, was duly received.

I have delayed answering your letter until I could communicate with Professor Koebele who had departed from these Islands on a mission to Mexico and Central America, in search of Beneficial insects to send to this Country.

I can offer you no encouragement that Professor Koebele's services will be available for the Madras Government, at least for two or three years to come, as He is under an engagement to this Government and to the Hawaiian Sugar Planters

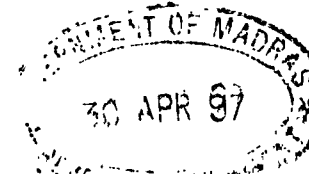
Association, each paying one half of the Salary and expenses.

The Salary paid to ^{the} Professor is \$3,000, or six hundred pounds sterling per annum and all travelling expenses.

Your first question, as to the results obtained from the experiments which have been conducted, I beg to answer as follows.

Before the engagement of Professor Koebele, the vegetation of the Hawaiian Islands was sorely infested by numerous Coccids or scale insects, which were so destructive that any industry, except Sugar growing, seemed impossible.

Particularly was the coffee trees infested with a terribly destructive scale insect (Pulvinaria psidii) The tree could not ripen its fruit, the berries turned black and dropped off long before they became ripe.



Tetranychus Telarius (Red Spider) was also present as well as several other destructive scales infesting coffee trees. The outlook for the coffee Planter was gloomy indeed, and no one had the courage to start a new plantation and it seemed but a question of a short time when the industry would cease to exist in this country.

Now, all is changed, the coffee trees are free of scale pests and blights, and new Plantations are being started all over the Islands.

This wonderful change has been accomplished by the introduction in this country of the natural enemies of the scale pests that were present. The work of finding these natural enemies and sending them to this country, was entrusted to Professor Koebele, and well has the work been done.

The Professor has sent us Beneficial insects from California, Australia, Ceylon, China and Japan, and these keep our vegetation practically clear of scale pests. The Professor is now on a mission to find and send to us parasites and beneficial insects for cut-worms and caterpillars that are injurious to Sugar cane, Pastures, and garden produce.

Question (2) as to the cost of obtaining a consignment of Lady-birds for experimental purposes in Madras and the source from which to procure such consignment.

The cost of such a consignment should be but trifling, an experienced collector can collect many hundreds of ladybirds in a day. The method of packing them for shipment, is to place the lady-birds in small, practically air

30 APR 97

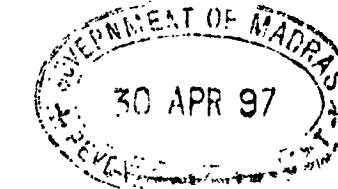
tight, wooden boxes, in which some slightly moistened moss has been placed, the boxes should then be wrapped in oil cloth so that no outside moisture can penetrate to the boxes. In order to safely carry the ladybirds on journeys of over one week's duration, they must be carried in a temperature of between 30 and 40 F, this temperature can be found in the cold storage or ice room of all passenger steamships.

If transshipment from one steamship to another is required on the journey, a trustworthy agent should be on hand to make the transshipment without delay, for if the ladybirds are once thawed out, it is fatal to make them cold again.

In this manner they can be safely carried on journeys occupying from one month to six weeks.

As to the source from where to procure the ladybirds, I am afraid that my advice will be of little service to you as I am not familiar with the coccids or scale insects affecting the vegetation of Madras, if there are any of the Dactylopidids present the Cryptolaemus Montreuzeri will surely feed on them. Australia is the nearest country that can furnish that valuable ladybird as well as many other useful Coccinellidae. China and Japan also have many indigenous species some of which have proved of great value to these islands.

I would strongly advise against the wisdom of relying on the importation of one or two shipments of ladybirds and judging from the effects of these importations as to what can be accomplished in this branch of applied entomology.



There are over 1700 different kinds of Coccinelladae or Lady-birds catalogued and probably many hundreds yet undiscovered, and all are, with very few exceptions, Coccid or scale feeders, some such as the Vedalia Cardinalis will feed only on one scale, while others, as the Cryptolaemus will feed on several. 570

In order to obtain the best results, all countries within reach of a month or six weeks journey, should be explored for the Beneficial insects they can furnish, and the work should be entrusted only to a skilled Entomologist, one who has made the life habits of Beneficial and injurious insects a special study.

While all countries have their Beneficial insects, they also have those that are injurious, and if the work of collecting is done by a person not thoroughly competent, injury instead of benefit might result.

(3) as to whether Professor Koebele could arrange to visit Madras for a short period for the purpose of investigating the insect pests which cause damage to coffee in the Madras Presidency.

In reply to this question I beg to say that I have communicated a copy of your letter to Professor Koebele and in reply He writes, that He feels Himself bound to the service of this Country as long as we may require Him.

Re: the Entomological work
D 1,000-20-2-96. in the Hawaiian Islands.

REVENUE DEPARTMENT.

35-1
18-5-97.

c No. 3584

From the Commissioner of Agriculture
Honolulu

Dated 3rd March 1897.

The Hon: Mr. Grose C. E.

The Hon: Mr. Bliss C. E.

FOR ORDERS.

Re: the Governor

In Nov: last, at
the instance of the Hon Mr
Dodgson, the Commr. of Agri:
Honolulu, was requested to
favour this Govt with infor-
mation as to

(1) what it would cost
the effect on the scale bugs of
the introduction into Hawaii
of certain species of lady birds

(2) the cost of obtaining
a consignment of the lady birds
and the source from which they
could be obtained

(3) the feasibility of obtain-
ing the services of Professor Hol-
beke for a brief period for in-
vestigating the insect pests which
attacked coffee in Southern India
and the conditions under
which the Professor would be
willing

willing to come over to Madras
(C.O. 4584-5 of 14th Nov: 1896
flagged A).

2. The Commissioner's
reply to the above reference is
now submitted for information
and orders. Briefly his an-
swers to the several questions
raised are

(1) that the introduction
of the ladybirds into Hawaii
had the effect of ~~removing~~ removing
has ~~rooted out~~ the several in-
sect pests therein and more
especially those that attacked
Coffee and Sugar cane.

(2) that the cost of collecting
the ladybirds is not likely to be much
but the source from which they
should be obtained would de-
pend upon the particular sort
of insects required to destroy the
~~pests~~ pests in Southern India.

(3) that Professor Korbula's
services will not be available for
employment in Madras for
another two or three years but
that he, the Commr. is waiting
the United States shortly and if
this point deserves will be proposed

FOR ORDERS. 0

to ascertain and report whether
the services of any other com-
petent entomologist can be
procured there for service in
this Port.

3. The Commissioner
gives some valuable information
as to the packing and dis-
patch of ladybirds. In re-
gard to their collection, he
remarks that in order to ob-
tain the best results all coun-
tries within reach of a month
or six weeks' journey should be
explored by a skilled entomo-
logist and that if the work
were to be entrusted to unskilful
hands injury instead of benefit
would probably be the result.

4. A letter acknowledg-
ing with thanks the informa-
tion furnished by the Commr.
may it be submitted be sent
to him. The question whether
he should at the same time
be requested to make enquiries
concerning the feasibility of
obtaining the services of a
competent entomologist for
employment

+ because different species
of ladybirds feed on different
species of insects
11/11/97

Yes certainly
JG 11/11/97

employment in this Post is, however, submitted for orders Professor Korbale is reported to draw Rs 600 per annum or about Rs 800 per mensem besides travelling allowance, and half of the cost incurred on his account is paid by the Hawaiian Govt and the other half by the Sugar Planters' Association there. A Scientist from the United States is not likely to come to India for less than what Professor Korbale gets in Hawaii and as the investigation is only a temporary one, the sanction of the Govt of India will be required for his entertainment even if the planters here undertake to bear half the cost (vide art 93 of the C.S.R.) It may be mentioned here that in 1894 some correspondence passed between the Govt of India and this Govt on the subject of entomological researches in this Pres^d and the Supreme Govt then expressed

It depends on what the Planters Assocⁿ says on the matter:

at Rs 16 per 2

13-2-1896

1896

vide papers
flagged B & C.

vide papers
flagged B & C
+ In July 1896 the Govt of India arranged a loan for Mr. Cole an entomologist attached to the Indian Museum. And this Govt agreed to pay his expenses during his term in this Presidency which was to come off in 96-97. Vide papers flagged together F. The last that was heard of Mr. Cole, appearing in the papers was that he was to stop in Assam for the next 4 months of 95-96. Vide Flag G. At this rate of progress, if the order of provinces is being adhered to, it will be some time before he reaches Madras. India might admit, he asked when he was expected.

* But at all. ^{Instead of a Botanist India proposed that this Govt should get a cryptogamist} This Govt did not want a cryptogamist who, I believe, is an expert in fungus growths; but it never denied the importance of having the noxious insects investigated by an entomologist.

flagged E
11/5-97

No!
Jg

a qualified approval of this Govt's employing any special Agency on the work if it thought that the employment of other than the Indian Museum Agency was urgently called for (vide G.O. 1396 of 7th April 1896 and 1920 of 16th May 1894). This approval, however, should apparently be considered to have been withdrawn when, as already pointed out in the note stitched with the G.O. flagged A, when this Govt in Dec 1895, after due deliberation, declined to accept the proposal of the Govt of India to employ a cryptogamist in this Pres^d on much the same work. Attention in this connexion is also solicited to the fourth of the Resolutions of the Govt of India (pages 1 & 2) in connexion with Dr. Volckers' report and it will be seen therefrom that "Entomology" is treated as "Imperial" and that according to India work connected with it should be undertaken under

5. Orders are in the above circumstances solicited as to whether in case the port desires to or bear the whole or a portion of the cost of employing an expert entomologist it will not be better to first ascertain the views of the Govt of India on the point and whether before these views are known it is advisable to ^{request} ~~address~~ the Commt. of Agri, Honolulu, to ^{on behalf of this port,} make any enquiries in the United States.

We made the inquiries at the
distance of the Plaster Bros.
I think the paper will be

As pointed out in the
previous page an
Entomologist attached
to the Indian Museum
is going the round of
India and apparently
has yet to visit
Madras. The Govt
of India may be
asked when Mr
Coles, or his successor
may be expected.
I am told that western
flies about which
can be found in the
region of this office.
But his name
does not appear
in the classified list
of GAZETTED OFFICERS in the
Indian Museum as it
stood on 1st Jan. 1887.

in minimum as it
is on 1st Jan 1957.
Ull
5.5.57
As the PCC suggests
these papers and be communicated to
Wm Hodgson who refers to his
note @ 22.9.56
8.5.57
3.44
14.5.57

but as to them & they that
he heard before anything more
is done except to acknowledge
the ~~misg~~ information from
Hawaii. The purpose of
this report of an expert does not
mean to have been brought forward
vide Anderson letter in G. O. (p. 11)
(4) 1/6/5/57.

See (from orders)

an order)

Print sharp
letter in his (Lipton's)
to coming to the
P.S. I to be his partner
18/6/67

for orders as to
whether the b.o. should
be printed. The
papers contain valuable
information
Yrs.
18/6/67

I stating that the question of
employing an editor to report from
the U.S. cannot be decided until
after the receipt of definite proposals
from the Southern Association,
Wm. C. C.

To the Hon: Mr H. P. Hodson
with Book for Operational & technical
copy to the Board of Res: R & R

420
Dec. 12-6.97
50
3

Read again G.O. $\frac{4384 - 85}{14.11.96}$
also eno. ~~3584~~ 3584

Order No 351 of 18th May 1897.

Communicated to
the Hon Mr H.P. Hodgson.

2. The following letter
acknowledging the receipt of the
second of the papers read above
will be sent to the Commr. of
Agriculture and Forestry, Honolulu

2
 m
 al & returned
 14/1/1917
 18/5/1917
 No. 352.
 The Commissioner of Assi:
 culture & Forestry, Honolulu

Sir,
 I am directed to acknowledge the receipt of your letter of 3rd March 1897 with the publication therein advised, regarding the entomological work of Professor Hoebe, and to convey the thanks of H.E. the Governor of Madras in Council for the great courtesy and readiness with which you have furnished the information asked for in my

my letter No 4585 of 14th Nov:
1896. I am to add that the
reference in question was made
to you at the instance of the
~~Representative of the~~ Planters Association
in Southern India and that
until definite proposals are
received from ^{that body} ~~him~~ H.E. the Gov
will not be in a position
C. ~~invariable~~ to state whether
it would be necessary to obtain
the services of a competent Ento-
mologist ~~should~~ ^{should} be obtained from
the United States.

Am.
17. 11. 97

W.H.
18/5/97

18/5/97

20/2

Government (1897) of Madras.
REVENUE.

Recd.

Regd.

1897.

Enclosures

Spare copies

G.O., No. 351, 18th May 1897.

MAY.

Lady Birds.

Communicating to the Hon'ble Mr. H. P. Hodgson a communication from the Commis-
sioner of Agriculture and Forestry, Honolulu, furnishing information regarding certain points
connected with the experiments made with — for the destruction of scale bugs.

GOVERNMENT OF MADRAS.

REVENUE DEPARTMENT.

READ—again the following G.O., Mis. No. 4584, Revenue, dated 14th November 1896:—

Read—letter from the Hon'ble Mr. H. P. HODGSON, dated 22nd September 1896.

ABSTRACT.—Forwarding certain notes regarding the spread of black scale bugs and the experiment conducted in Honolulu for their destruction.

Order—Mis. No. 4584, Revenue, dated 14th November 1896.

Enquiries will be made (1) as to the effect on the scale bugs in Hawaii of the introduction of the *Cryptolaemus montrozeri* and other species of lady birds, (2) as to what it would cost to procure a consignment of lady bird for experimental purposes in Madras, and (3) as to whether professor Koebele would consent to visit this Presidency for a brief period for the purpose of investigating the insect pests which attack coffee in Southern India and, if so, on what conditions.

The Commissioner of Agriculture, Hawaii, will accordingly be addressed.

(Signed) G. STOKES,
Ag. Secretary to Government.

To the Board of Revenue (Revenue Settlement,
Land Records and Agriculture).
„ the Hon'ble Mr. H. P. Hodgson.

Copy to the Secretary to the United Planters
Association of Southern India.

READ—again the following letter from the Acting Secretary to the Government of Madras, Revenue Department, to the Commissioner of Agriculture, dated 14th November 1896, No. 4585:—

His Excellency the Governor of Madras in Council has recently been given to understand that experiments have for some time past been conducted at your instance in Hawaii by professor Koebele with a view to the destruction, by the agency of the *Cryptolaemus montrozeri* and other species of lady birds, of the scale bugs and other insects which attack coffee. The subject being one of much importance to the planting community of Southern India, I am directed to request that if there is no objection you will be good enough to favour the Madras Government with such information as may be available,—

(1) as to the results obtained from the experiments which have been conducted,

(2) as to the approximate cost of obtaining a consignment of lady birds for experimental purposes in Madras and the source from which to procure such a consignment; and

(3) as to whether professor Koebele could arrange to visit Madras for a short period for the purpose of investigating the insect pests which cause damage to coffee in the Madras Presidency.

Should professor Koebele consider such a visit to be practicable, I am to enquire what salary and allowances he would consider sufficient remuneration for his services and on what conditions he would undertake the visit.

READ—the following letter from the Commissioner of Agriculture and Forestry, to the Acting Secretary to the Government of Madras, dated Honolulu, 3rd March 1897:—

Your communication dated 14th November 1896, in which you make certain inquiries concerning the entomological work of Professor Koebele was duly received.

I have delayed answering your letter until I could communicate with Professor Koebele who had departed from these islands on a mission to Mexico and Central America, in search of beneficial insects to send to this country.

I can offer you no encouragement that Professor Koebele's services will be available for the Madras Government, at least for two or three years to come, as he is under an engagement to this Government and to the Hawaiian Sugar Planters' Association, each paying one half of the salary and expenses. The salary paid to the professor is \$ 3,000, or six hundred pounds sterling per annum and all travelling expenses. Your first question, as to the results obtained from the experiments which have been conducted, I beg to answer as follows:—

Before the engagement of Professor Koebele, the vegetation of the Hawaiian islands was sorely infested by numerous coccids or scale insects, which were so destructive that any industry, except sugar growing, seemed impossible.

Particularly were the coffee trees infested with a terribly destructive scale insect (*Pulvinaria psidii*). The tree could not ripen its fruit, the berries turned black and dropped off long before they became ripe.

Tetranychus telarius (red spider) was also present as well as several other destructive scales infesting coffee trees. The outlook for the coffee planter was gloomy indeed, and no one had the courage to start a new plantation and it seemed but a question of a short time when the industry would cease to exist in this country.

Now, all is changed, the coffee trees are free of scale pests and blights, and new plantations are being started all over the islands. This wonderful change has been accomplished by the introduction in this country of the natural enemies of the scale pests that were present. The work of finding these natural enemies and sending them to this country was entrusted to Professor Koebele, and well has the work been done.

The professor has sent us beneficial insects from California, Australia, Ceylon, China and Japan and these keep our vegetation practically clear of scale pests. The professor is now on a mission to find and send to us parasites and beneficial insects for cut-worms and caterpillars that are injurious to sugar-cane, pastures and garden produce.

Question (2) as to the cost of obtaining a consignment of lady birds for experimental purposes in Madras and the source from which to procure such consignment—

The cost of such a consignment should be but trifling—an experienced collector can collect many hundreds of lady birds in a day. The method of packing them for shipment is to place the lady birds in small, practically air-tight wooden boxes, in which some slightly moistened moss has been placed; the boxes should then be wrapped in oil cloth so that no outside moisture can penetrate to the boxes. In order to safely carry the lady birds on journeys of over one week's duration, they must be carried in a temperature of between 30 and 40°F., this temperature can be found in the cold storage or ice room of all passenger steamships. If transshipment from one steamship to another is required on the journey, a trustworthy agent should be on hand to make the transshipment without delay, for if the lady birds are once thawed out it is fatal to make them cold again. In this manner they can be safely carried on journeys occupying from one month to six weeks.

As to the source from where to procure the lady birds, I am afraid that my advice will be of little service to you as I am not familiar with the coccids or scale insects affecting the vegetation of Madras, if there are any of the *Dactylopidi* present, the *Cryptolaemus montrozeri* will surely feed on them. Australia is the nearest country that can furnish that valuable lady bird as well as many other useful coccinelladae. China and Japan also have many indigenous species, some of which have proved of great value to these islands.

I would strongly advise against the wisdom of relying on the importation of one or two shipments of lady birds and judging from the effects of these importations as to what can be accomplished in this branch of applied entomology.

There are over 1,700 different kinds of coccinelladae or lady birds catalogued and probably many hundreds yet undiscovered, and all are, with very few exceptions, coccid or scale feeders, some such as the *vedalia cardinalis* will feed only on one scale, while others as the *Cryptolaemus* will feed on several.

In order to obtain the best results, all countries within reach of a month's or six weeks' journey, should be explored for the beneficial insects they can furnish, and the work should be entrusted only to a skilled entomologist, one who has made the life habits of beneficial and injurious insects a special study.

While all countries have their beneficial insects, they also have those that are injurious, and if the work of collecting is done by a person not thoroughly competent, injury instead of benefit might result.

(3) As to whether Professor Koebele could arrange to visit Madras for a short period for the purpose of investigating the insect pests which cause damage to coffee in the Madras Presidency—

In reply to this question I beg to say that I have communicated a copy of your letter to Professor Koebele and in reply he writes that he feels himself bound to the service of this country as long as we may require him.

I am about to visit the United States and shall be absent from these islands for three months. During my trip I shall visit some of the United States agricultural experimental stations and shall meet several entomologists of established reputation; among them I may find one who would be willing to undertake the work of searching for and introducing beneficial insects to Madras; should you desire to learn the result of my inquiries I shall be glad to send the same on receipt of a request from you.

I have mailed to you under separate cover one copy of the *Planters' Monthly* for December 1896 containing a report on insect pests. Two copies of the *Planters' Monthly* for February 1897 containing the report of the entomologist of the Hawaiian Government. Three copies of the reports of the *Minister of the Interior* containing the reports of the Commissioner of Agriculture and the Government Entomologist. One copy of the *Pacific Commercial Advertiser* for 27th February containing an article entitled "The Coffee Outlook."

ORDER—No. 351, Revenue, dated 18th May 1897.

Miscellaneous.

Communicated to the Hon'ble Mr. H. P. Hodgson.

2. The following letter acknowledging the receipt of the second of the papers read above and stating that the question of employing an entomologist from the United States cannot be decided until after the receipt of definite proposals from the Planters' Association, will be sent to the Commissioner of Agriculture and Forestry, Honolulu.

(True Extract.)

(Signed) G. STOKES,
Ag. Secretary to Government.

To the Hon'ble Mr. H. P. Hodgson,
with books for perusal and return.

Copy to the Board of Revenue (Revenue Settlement,
Land Records and Agriculture).

Exd. Shaik Karim.

50 Copies.

1897.

COMMISSIONER OF AGRICULTURE AND FORESTRY HONOLULU.

From

The Government of Fort St. George.

Recd.

Enclosures

Regd.

1897.

Spare copies

Letter, No. 352, 18th May 1897.

MAY.

CONVEYING the thanks of the Madras Government for the great courtesy and readiness with which the Commissioner of Agriculture and Forestry, Honolulu, furnished the information asked for regarding the destruction of scale bugs by lady birds.

REVENUE DEPARTMENT.

From

THE HON'BLE MR. G. STOKES, I.C.S.,
Acting Secretary to the Government of Madras,
Revenue Department,

To

THE COMMISSIONER OF AGRICULTURE AND FORESTRY, HONOLULU,

Dated Ootacamund, 18th May 1897.

SIR,

I am directed to acknowledge the receipt of your letter, dated 3rd March 1897, with the publications therein advised, regarding the entomological work of Professor Koebele, and to convey the thanks of

Miscellaneous.

His Excellency the Governor of Madras in Council for the great courtesy and readiness with which you have furnished the information asked for in my letter, No. 4585, dated 14th November 1896. I am to add that the reference in question was made to you at the instance of the Planters' Association in Southern India, and that until definite proposals are received from that body, His Excellency the Governor in Council will not be in a position to state whether it would be necessary to obtain the services of a competent entomologist from the United States.

I have the honour to be,

Sir,

Your most obedient servant,

(Signed) G. STOKES,
Ag. Secretary to Government.

Encl. Shaik Karim.

20. Copies.