

ADDRESS TO THE CEYLON ASSOCIATION IN LONDON*

C. H. GADD.

It is usual, I think, for officers of the Tea Research Institute, when addressing this Association, to speak mainly of the work carried out in their respective divisions. My division is concerned primarily with the diseases of the tea bush. As, however, the future of the Institute is shortly due for consideration, I propose to speak more generally of the Institute's work instead of confining my remarks to pathological subjects.

On July 1st, 1926, the nucleus of the scientific staff of the Tea Research Institute entered a rather bare, empty bungalow in Nuwara Eliya which then became its temporary headquarters and laboratories. On that day a new organ, or gland, was grafted on to the body of the Ceylon Tea Industry. It was somewhat in the nature of an experiment, though one which had been successfully performed on other industries with beneficial results. A great part of the industry looked upon that experiment with confidence, but there was a small minority which regarded it possibly as mere foolishness from which no good could come — like experimenting with monkey gland treatment on a body showing no sign of senility.

As with most such experiments, it was watched very closely at first by all interested parties. That interest often became vocal in the form of a question "What is the T. R. I. doing?" In many cases the tone of voice implied genuine interest, but in others it supplied an emphatic answer as well. Nowadays that question is rarely heard — not because interest has waned, nor because our quarterly journal and other publications, conferences and addresses to Planters' Associations supply at least a part of the answer, but because the Institute has become accepted as an integral part of that great body, the Ceylon Tea Industry. So long as a man is healthy he does not stop to ask what is the condition of his heart or digestive organs. Such questions arise mainly at the onset of illness.

* An address given by Dr. C. H. Gadd, Mycologist of the Tea Research Institute of Ceylon, to members of the Ceylon Association in London and their friends in the Council Chamber of the Rubber-Growers' Association (Inc.), 19, Fenchurch Street, London, E.C.3, on Monday, 18th June, 1933.

That attention is being directed towards the Institute at present is not due to any suspected unhealthy condition of the Institute. As you know, the Institute is maintained by the proceeds of a cess levied on the Industry, and that cess is fixed by Ordinance. The amount of that cess is this year due for reconsideration. The purely financial aspect of that question has been presented to you in a memorandum by the Director, so instead of elaborating that aspect I propose to say something of the benefits derived by the Industry from that expenditure.

The main functions of the Institute, as its name implies, is Research; yet it serves other functions too, which are rather apt to be overlooked. The Director at various times has reviewed the work of the Institute. Such reviews have been concerned mainly with the research activities. To-day I should like to emphasise some of its other functions which are apt to be overlooked or, perhaps, accepted without fully realising their important value.

Before joining the staff of the Institute on July 1st, 1926, when the temporary laboratories at Nuwara Eliya were first opened, I was on the staff of the Agricultural Department at Peradeniya for a period of nearly six years, and so can speak from personal knowledge of the relationship between science and tea culture both before and after the establishment of the Tea Research Institute.

When I joined the Ceylon Government Agricultural Department, its main divisions which had close connection with the Tea Industry were the mycological and entomological laboratories and the Experiment Station at Peradeniya. Consequently, from the scientific side, more was known about the diseases and pests of tea than about the tea bush in health. There was also a steadily growing demand for more scientific research from the planting community. The direction of that research was not clearly enunciated, but it was evident that there was plenty of scope for useful work in the directions of manufacture, manuring, pruning and other field operations. Although such subjects were often discussed at Estate Products Committee meetings, there were no members of the staff especially delegated to study those particular problems solely.

During my period of service with the Agricultural Department, there was a marked increase of its activities and in the scope of its work. That extension was mainly, if not wholly, for the benefit of what may be termed "native agriculture;" and the major industries profited little thereby. It became evident that if the Tea Industry was to get the scientific help it desired it would have to finance its own Institute. And so the Tea Research Institute came into being. Since then Ceylon has been granted a new Constitution

which has now been operating for some few years. There can be no question that, during this period, the Government agricultural work has exhibited an even stronger bias towards native cultivations. This bias is justifiable no doubt and may in part be due to the existence of separate research stations for tea, rubber and coconut. To what extent the Ceylon Agricultural Department, under the new conditions with increasing demands for attention to villagers' agricultural problems, could have assisted the Tea Industry, particularly during the slump, must be left to your own judgment. The Tea Research Institute, however, receives no subsidy from Government although tea is the most heavily taxed industry in the Island.

When the Institute commenced operations it was realised that considerable scientific work had been done on the pathological side and that precedence would have to be given to the purely agricultural (including soil and field experimentation) and manufactory problems. Consequently, the Agricultural and Biochemical Divisions, together with the Physiological Division which was instituted later to study such problems as pruning, propagation and selection, became, and still are, the largest. Although the Institute is divided into departments for administrative purposes, it is better to regard the staff as a whole as a team working for a common end. Each man of that team is now a specialist whose particular study is some aspect of the tea bush, and if he claims a knowledge of any crop plant, that plant is tea.

When the staff began work, its main problem was not to decide what particular piece of research work each member should begin on, but how best could the advisory work be handled. Information had to be collected and sifted to separate the grain from the chaff. That preliminary work disclosed the tremendous gaps in our knowledge and these had to be filled, temporarily at least, as quickly as possible. Had there been no gaps, there would have been no need for research, but the gaps were only too evident and many still are. This early advisory work was essentially team work and each member of the staff did his best to make advice emanating from the Institute the best possible. We also made a point when formulating advice to give the reasons on which it is founded. Advisory work must be based on the results of research investigations, but is probably not generally recognised how much research has to be carried out solely for immediate advisory purposes. For the want of a better name I would call this "uncompleted" research — uncompleted because isolated points are investigated as the need arises and opportunity occurs. In the course of time these isolated investigations may be fitted together. Nevertheless they are of vast importance in so far as advisory work is concerned.

In addition to "uncompleted" research I would also mention "Confidential Research." By this I mean work, the results of which are not published in our general publications. Examples are "Factory Hygiene" and "Foreign matter in Tea." Although the results of such investigations are not published in our Journal, they form an important basis of advisory work.

I think it can be fairly claimed that the Institute early gained the confidence of the planting community in Ceylon and also continued to earn that confidence. The steady increase in advisory work in all divisions affords some proof of that statement. The extent of advisory work cannot be measured entirely by the number of letters written. The articles in *The Tea Quarterly* tend to eliminate a number of letters on those subjects, and much is done by discussion. It is generally recognised that the Institute is now a source of reliable information on all matters concerning tea culture. We do not claim to be able to answer all questions definitely, nor do we claim to be infallible, but we do maintain that the opinions we express are unbiased, in so far as a human being can be entirely unbiased, and that they are based on a careful study of the subject.

As a direct consequence of advisory work and the regular issue of publications like *The Tea Quarterly* which are widely read and closely studied, the Institute has become an important educational factor. It may not be necessary for me to elaborate this point, but I should like to mention one or two points. Our work with the small-holder is essentially educational, and the beneficial effect of such instruction is to be seen in a large number of village gardens. When I say that the Tea Research Institute has become an educational factor, I do not mean to imply that the Institute is teaching the planter the fundamentals of his job, but I submit that the practical planter's outlook to his job is gradually changing. He is not so ready to take *ex cathedra* statements as gospel. He demands and is critical of the data on which the conclusions are based. At one time, I was of the opinion that the only part of a technical paper on an agricultural subject which was carefully read by the planter was the summary of conclusions. That is not the case now. The reasons for the conclusions have assumed greater importance. In other words the outlook is becoming more scientific.

One result of this is a growing tendency of planters to discuss their ideas and intended experiments with the scientific staff before putting them into operation. In this respect the staff is often able to give assistance. Sometimes, the scientist can show that the idea is based on fallacious principles and then, I imagine, the agents and directors hear little more about it. But when the staff approves

the idea as worth-while, the suggestion is put to higher quarters with more confidence and the work is undertaken with greater enthusiasm. In my experience the planting community of Ceylon has always been progressive. The more scientific outlook is, however, rationalising the procedure more. Possibly the best examples of this rationalisation are to be found in factory work.

Now I should like to say a few words concerning controversy. To put it quite baldly I would say that controversy is a function of the Institute. This may appear a somewhat startling statement to make, so for a few minutes I would like to elaborate this statement.

Scientific progress is very largely dependent on criticism. You will find that a mass of controversy has centred round all great scientific theories. I need, perhaps, only mention two — Darwin's theory of evolution and Einstein's theory of relativity. The former and older one has not yet entirely passed the controversial stage while the latter I think has. It really amounts to this: a theory is not completely proved until it can be shown to account for all relevant data. In a way the importance of a subject can often be roughly estimated by the amount of controversy centring round it. The amount of controversy should not, however, be measured by the heat evolved. That is no criterion. What is true of major work is also largely true of minor investigations. The results must withstand criticism.

Fortunately, the main mass of criticism does not reach the lay ear. Nevertheless it exists as it should do. It is likely to occur first in the Institute itself, secondly between Institutes working on the same crop, and lastly between what for convenience I would term "independent workers." It is criticism in the last category which is likely to reach the lay ear, particularly when the lay Press considers it worth featuring, and then it is called controversy.

I should like to illustrate these points with examples from my own division. The first is an example of criticism within the Institute. While carrying out investigations on a certain problem, I came across evidence which suggested a new explanation of the causation of a certain disease of tea known as Diplodia. I took my evidence and views to Mr. T. Petch who was then the Director of the Institute. It may be necessary to explain that the view regarding the causation of Diplodia disease which had held the field for many years, viz. that the cause was a fungus attack, had been put forward and published by Mr. Petch himself. My views were, therefore, a direct attack on his own work. It would have been a simple matter for him to have smothered my criticism at birth and to have instructed me to get on with the problems awaiting solution and not waste

time trying to upset views which had become accepted. That was not Mr. Petch's view of scientific research. I was told to go ahead. He watched my work with kindly interest and bombarded me with criticism, constructive and destructive. When my views were made public they had Mr. Petch's backing and support, and I doubt whether the planting community ever realised that those views had been controversial. My own opinion is that that work was the better for having to stand up to keen criticism, and I am deeply indebted to Mr. Petch for the kindly criticism he gave me on all occasions, particularly on those occasions when I found myself working along lines contrary to his own opinions.

The view I then put forward also indicated methods of preventing the disease which was causing considerable losses to low-country companies. Those preventive measures concerned pruning. That the methods of prevention were practicable and efficient have since been amply proved both by experiment in the physiological division of the Institute and by general experience in the field.

Controversy between institutes working on the same crop will in most cases be settled amicably and without much publicity. Differences of opinion can be smoothed out by further work on both sides to clear up the points under dispute.

It is the third type of controversy which often places the planter in a quandary, i.e., when experts differ and their differences are given prominence in the Press. An example of this type occurred shortly after I joined the Institute when, at an Agricultural Conference, the Government Mycologist put forward views concerning the causation of root disease not only of tea but of practically all crops in the tropics. These views were directly contrary to those of both Mr. Petch and myself who had worked on root diseases of tea in particular. I considered it to be my duty to oppose those views immediately and to indicate that they had not the backing of the Tea Research Institute. This gave rise to a controversy which attained a good deal of publicity.

I sometimes think that some members of the planting community obtain a certain amount of enjoyment out of watching scientists disagree. In fact they will sometimes search for disagreement by sending specimens to two scientists for opinion. If the scientists agree well and good, but if they disagree and the advices differ I sometimes wonder what the planter does about it. It must sometimes happen that both scientists are right because the specimens submitted to each are not the same. One may be a case of *Poria* and the other of *Ustulina*, as I have known to happen. In that case both scientists were right and the planter merely perplexed.

But in the controversy we were discussing it was obvious that we couldn't both be right. Many planters found the position rather difficult. Here were two different views and advices. Which was he to follow? The estate agents and company directors no doubt have been somewhat irritated by that or similar experiences. Had there been no Tea Research Institute the Government Mycologist would have been the official adviser to the Industry and the difficulty might not have arisen, though I think there would have been wonderment as to why the causation of plant diseases should change with new appointments to a government post.

The then Government Mycologist's views were taken up by other mycologists elsewhere and further investigated. The present position is that in general his view has been abandoned as untenable, and the controversy is dead. In this case the Tea Research Institute fulfilled a function in preventing the Industry from following a line of action which would not have been to its benefit.

The safeguarding of the Industry in that way, I submit, is an important function of the Institute. Although the staff makes a specialist study of tea, it also follows the results obtained by workers with other agricultural crops to ascertain whether progress made there is likely to be applicable to tea. That such conclusions are not immediately accepted in no way implies criticism of the work in its relationship to the particular crop from which the data are collected, but it does afford a safeguard against the Tea Industry taking over results prematurely from workers on other crops. To take a simple case, the beneficial value of lime in general agriculture has been demonstrated amply, but we also know that if lime is applied to tea soils the effect is likely to be detrimental. A disease of tea seedlings known as "Bitten off" has been demonstrated to be due to the soil being insufficiently acid. The poor yields of tea in the surrounds of certain factories is largely due to the too liberal application of wood ashes from the drier furnaces which has much the same effect as lime in altering the soil reaction. Our observations in no way question the truth of the effect of lime on other crops, but we know that any generalisation concerning it should not be applied to tea. This example is, perhaps, of interest because at one time lime was recommended for use in the treatment of tea root diseases. That recommendation was based largely on a knowledge of the effect of lime on fungus root diseases of other crops, but, with an increasing knowledge of the tea plant and its diseases, that recommendation has had to be radically altered. We now know that lime has no value in the treatment of the common root diseases of tea.

Recently, a view has been put forward that diseases never attack a really healthy plant, and that if disease occurs, it is a warning that there is something wrong agriculturally. This view has been summarised in the one sentence "Pests in a sense are nature's inspectors or visiting agents." If that view is accepted as true for tea, the logical conclusion is that expenditure under the heading "Pests and Diseases" in the estimates of so many companies is sheer waste, because that expenditure is directed towards the removal and not the support of such useful agents. It is a view, however, with which I cannot agree, as, in my opinion, there is no true foundation for such a broad generalisation. I do not deny the importance of proper agricultural treatment and its value in the control of certain diseases, but I am absolutely convinced that such diseases as the Poria root disease can never be controlled by cultural treatment alone.

If a disease occurs and is reported from an estate, it does not follow that the cultural and manurial treatment of that estate is wrong or in any way deficient. In the majority of cases the incidence of disease in the tea fields has nothing whatever to do with the cultural policy. Diseases have not all a common causation, nor is there a universal method of eradicating disease. In my opinion, there never will be one. We may as well hope that plague and pimples, cancer and colds, typhoid and toothache will all yield to one common treatment. So long as tea is grown commercially funds will be required for the control of pests and diseases. Increased expenditure on cultural operations, manuring, etc. will never eliminate the necessity for direct attack upon the fungi and pests which cause so many diseases of tea.

When the Institute expresses an opinion in any way opposed to views expressed elsewhere, you may rest assured that the Institute has very good reasons for doing so and you will find that the Institute gives its reasons for the view it expresses. Nobody likes to be told that he is wrong and less still does he like to be proved to be wrong. That applies equally to an institute staff as to an individual and so, before the Institute enters a controversy, it very carefully considers the grounds for so doing and the risks to its reputation involved. If, however, the Institute failed to enter a controversy for fear of coming down on the wrong side of the fence the Institute would have failed in its duty.

If that view is accepted it will be obviously unfair to criticise the Institute for entering a controversy and disclosing relevant facts concerning the matter under discussion in its relationship to tea; still more unfair is it if the criticism is launched before the Institute is proved to be wrong. In such matters the Institute must express

its unbiased opinion without fear or favour from any section of the Industry. Again the Institute does not claim infallibility, but it does claim that its views are based on a specialised study of the tea crop and that such views are expressed in good faith for the welfare of the Industry.

I have here attempted to indicate some of the more important functions of the Institute other than research, functions which I think are apt to be overlooked when evaluating such an Institute. Research is the primary function of the Institute, but I think that that would have little value if it were completely divorced from other functions I have referred to here.

I have said very little about the work of the division of which I am in charge, but I should be pleased to answer to the best of my ability any specific questions you may wish to put to me concerning it or other work of the Institute.

Mr. Andrew Young enquired whether, during the last five or six years when it had not been possible to make liberal provision for cultivation, Dr. Gadd had discovered any increase in pests and diseases, and what positive steps the Institute advised for the treatment of the leaf disease which was now attacking Grevilleas?

In reply to the first question, Dr. Gadd said that there had been no noticeable increase in diseases generally or of any particular pest during the period referred to. More difficulty had been experienced, however, in dealing with a root-disease such as *Poria* in cases where the removal of affected bushes had been stopped through lack of funds.

To the second question, Dr. Gadd said there was no simple answer that could be given. The disease, so far as is yet known, attacked Grevilleas only and there was no risk of it passing on to the tea. Its distribution was curious, as it was more prevalent in the low-country and at the bottom of hillsides, with a tendency to vanish on the higher slopes; it was difficult to explain why it should pass out within such small changes of elevation. It reminded him in some ways of the first occurrence in about 1925 of *Oidium* in rubber which appeared on a number of estates spread over a wide area, since when there had been little increase in the area affected. Both diseases were, perhaps, controlled by some climatic condition impossible to define.

The only direct step possible was to remove the Grevilleas, but he did not consider such a course necessary immediately, as some trees were likely to survive attack. Spraying to kill the fungus was

a possible measure of control, but as this would mean a succession of sprayings during the year the cost would be prohibitive.

Fortunately, the disease had not as yet occurred in Uva, but mainly in the low-country where *Grevillea*s could be easily replaced.

Mr. Horner said that he had recently received information of an attack of the disease near Badulla.

Dr. Gadd said that he would like to verify the report personally before expressing any opinion, as mistakes had been made before through confusing this disease with another which kills isolated branches but is not a disease of the leaf.

The President enquired whether the newly discovered parasite, which seemed to be dealing satisfactorily with *Tortrix*, was spreading of its own accord?

Dr. Gadd replied that, when the first consignment of the parasite was received from Java, it was liberated on St. Coombs, but some time later appeared to have vanished. However, after a cage had been prepared to house a second consignment in the field, numbers of the original importation were found firmly established half-a-mile or so away. The indications were that it would not be necessary to depend upon artificial propagation.

Mr. Clifford Figg enquired whether there were any signs of Phloem Necrosis spreading from higher elevations?

Dr. Gadd replied that a careful lookout was being kept in other districts and before he left Ceylon it had been identified on an estate where the superintendent had known it 25 years, not as a disease, but as a condition of the tea. The spread of the disease had not noticeably increased, but only its intensity. Field evidence suggested that such spread as there was, was slow.

So far all attempts deliberately to infect bushes with Phloem Necrosis had failed.

In reply to an enquiry from Mr. Megginson, Dr. Gadd said this disease had not so far been found in young tea.

Mr. Masefield, referring to the research which it was proposed should be conducted into the quality of tea, pointed out the risk that, if chemists were asked to conduct such an inquiry, a formula might eventuate for synthetic tea or for giving to low-country tea the characteristics of the up-country product.

In reply Dr. Gadd said that the investigation into the quality of tea would not be a simple matter and would call for a high

standard of specialised chemistry. He was of the opinion that the results which would follow would be of help in manufacture, as it was impossible at present to follow the chemical changes which occur during the various stages of manufacture, and he did not consider that Mr. Masefield's fears were likely to be realised.

In expressing the thanks of the Meeting to Dr. Gadd for his interesting address, the President said that, at the start, the Institute had had to win the planter to new ideas for the formulation of which it was responsible.

Now that confidence had been won the Institute must bear the greater responsibility for giving young planters the right lead.
