Comment on "The Infestation of Sirex Juvencus in Canterbury, New Zealand."

(R. Neil Chrystal, Lecturer in Forest Zoology, Imperial Forestry Institute, University of Oxford.)

Through the kindness of a friend I recently received a copy of "Te Kura Ngahere," the journal of the Forestry Club of Canterbury College, in which an article by Mr. A. F. Clark, bearing the above title, appears. I have been interested in the Sirex problem in New Zealand for some years past, and have recently taken up the study of one of the steel blue species, **S. cyaneus,** at Oxford. Last year, the question was raised regarding the possibility of obtaining parasites of the woodwasps for exportation to New Zealand, and I have been fortunate in being able to co-operate with the Imperial Bureau of Entomology in this work. It is not my intention to discuss here either the parasite work or my biological studies of **S. cyaneus** in Britain, as both these aspects of our work will be published elsewhere. My present object is to offer some criticisms on Mr. Clark's paper, which represents, in my opinion, the most detailed account of the woodwasp problem we have received from New Zealand so far.

The first part of this paper deals with the morphology and biology of the insect and here I do not find that my own observations on **S. cyaneus** agree in every particular; while in addition, I have myself made supplementary notes on certain phases of the life cycle, concerning which Mr. Clark is silent. It is, however, extremely interesting and important to know that, generally speaking, Sirex in New Zealand is still following the same habits as it has in its country of origin. Not that this is very surprising, as from what I have seen of these insects in the North American forests, where they have been very little studied biologically, I imagine that there also the details of the life cycle are similar.

Discussing the mode of attack, Mr. Clark speaks of the pairing habits. It would be very interesting to know whether he has actually observed pairing in the open, as in Europe pairing is rarely seen, and, according to one author, Borries of Denmark, it usually takes place in the tree tops.

On the details of oviposition, my observations on **S. cyaneus** and **S. gigas** differ radically from those of Mr. Clark. Firstly, while I have observed that the outer styles, which form the ovipositor sheath, do assist in the preliminary search for a suitable place for oviposition, I have noted in every case that once boring actually begins, these are not employed in any way, being withdrawn to their normal horizontal position. Photographs of ovipositing adults which I have in my possession prove this point quite conclusively. Secondly, as regards the depth of the oviposition tunnel in the wood, I find that the average lies between 14-17 mm. and further that in these tunnels, not one egg, but several are laid. I have found as many as seven in an egg tunnel of **S. cyaneus.** The details of oviposition and especially the season at which it occurs, are of the greatest importance in view of their relation to the activities of the Cynipid parasite, **Ibalia leucospoides** Hochenw., one of the parasites which we hope to send out to New Zealand this year. Thirdly, as regards the length of the larval tunnels, 2-3 inches is in my opinion a very low figure, my own experience being that 6-12 or even 15 inches represents an average figure. Here again our experience of the Ibalia parasite is of interest, as we have learned that when Sirex larvæ are found in short tunnels (2-3 inches long) near the surface, it is almost certain that they are parasitised.

From a consideration of the biology, Mr. Clark then proceeds to discuss the forest importance of the insect, and it is this part of his paper which I should like to discuss more fully here. He deals first of all with the importance of Sirex in the mills round Canterbury and concludes that the insect has not, so far, attacked sawn lumber, nor does it appear in the refuse except in logs of inferior grade, in which it was probably imported from the plantations. This is important, as Sirex does occur in European timber yards, and E. O. Essig in his book, "Insects of Western North America," records **S. areolatus** Cresson as attacking cured redwood lumber in Californian yards.

From the timber yard Mr. Clark proceeds to the plantations and here he has drawn some very important conclusions as a result of his work. The first of these bears out European experience, in that he finds Sirex to be polyphagous, e.g. three species of pine are specifically mentioned as host trees, and others are indicated. This has also been recorded by Miller in his bulletin on the Forest Insects of New Zealand. Secondly, no healthy, well grown trees were found attacked, and, further, the percentage of infection was so small in one very large area, that special strip methods of inspection were discarded as unnecessary.

These results lead up to a discussion of the causes which have favoured the presence of the insect in the plantations at all, and here Mr. Clark provides us with ample data. He describes overcrowded, under-thinned woods containing many sickly and suppressed trees. This provides us at once with ideal conditions for such an insect as Sirex. At Bottle Lake, "where the root system is a deep one, allowing a more regular supply of moisture to be obtained; attack by Sirex in the plantations is negligible." This latter finding confirms the previous ones and would seem to negative the suggestion which has been made by a previous writer that Sirex is a menace to green trees in New Zealand.

The presence of fungus disease is discussed as a forerunner to Sirex attack and a needlecast fungus, **Botryodiplodia pinea** is specifically mentioned. This fungus is cited by Dr. Curtis as a serious enemy of the pine, and may posibly rank in importance alongside such fungi as **Brunchorstia destruens,** which is such a serious enemy of the Corsican pine in Britain. I would suggest, however, that further inquiry should be made into this aspect of the problem to see whether or not root rot is present in addition, or whether bad soil conditions are alone responsible for the susceptibility of the trees to fungus attack, as we have found is sometimes the case with larch in Britain.

Under control measures, Mr. Clark's insistence upon the practice of sound methods of forestry is, of course, fundamental and needs no further comment. Reference is then made to the possibility of biological control, and a word or two on this may not be out of place.

At the present time, there are two parasites under observation in this country, **Rhyssa persuasoria** L., the large Ichneumon, and **Ibalia Leucopoides** Hochenw., the Cynipid wasp. Much information has been, and is still being collected, relative to the biology and host relations of both species, and this will be made available to the authorities in New Zealand in due course. The problems of parasite introduction are, as Mr. Clark says, many and difficult, and the present one is no exception to the rule. One all important factor in the success of the importation of the Sirex parasites will, I think, be the manner in which they are handled on their arrival in New Zealand. To collect a good stock, bred in captivity, should be the first consideration, and this should be followed by judicious liberation of colonies in suitable localities at the precise period when their activities are at their height. To get the parasites well started will be a feat in itself. To rely on them alone as the sole means of control would, in my opinion, be a mistake. They can, however, become valuable allies, and are therefore well worthy of any trouble expended upon them. Mr. Clark refers to the activities of birds in relation to insect control. In the case of Sirex I feel, and have already stated this elsewhere, that birds do not play such an important role in the control of Sirex, in Europe at any rate, as some writers would have us believe.

I consider Mr. Clark's paper to be of the greatest importance as a contribution to our knowledge of Sirex in New Zealand and in view of the fact that so many of the conclusions drawn in the case of **S. juvencus** are in accordance with my own work on **S. cyaneus** a closely allied species, I shall look forward to receiving more data from Mr. Clark upon the lines I have suggested. This information will be of the greatest value to us in our task of rendering assistance in collecting and dispatching parasites to New Zealand.

In conclusion, I wish to state that a preliminary paper on the parasites of **S. cyaneus** by Dr. J. G. Myers of the Imperial Bureau of Entomology, and myself, will appear shortly, and will be accompanied by my own paper on the biology of the same species at Tubney Wood, Oxford.

More detailed papers on the parasites will follow these, after the work of this present season has been brought to a close.

Reply to Comment.

The editor has received the following reply from Mr. Clark in regard to the points raised by Mr. Chrystal.

"I should, firstly, like to thank Mr. Chrystal for his interesting and constructive criticism of my article. With regard to the length of the borings, an all important point for the Rhyssa parasite, they are as stated.

Breeding experiments with Sirex were carried out under insectary conditions and copulation has not been observed by me, personally, in plantations.

The article dealt only with the Province of Canterbury, in which there is no record of sawn timber being attacked. A record exists of sawn timber being attacked in the North Island.

There are many other interesting points, particularly the point of the number of eggs deposited. Upon this point, much further work is being done as this is of the greatest importance when the Ibalia parasite is considered.

The results together with the conclusions drawn from the work upon distribution will be published in another journal."—A.F.C.