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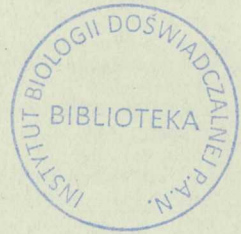
CAWTHRON INSTITUTE, NELSON, N.Z.

THE PARASITE OF THE WOOLLY APHIS IN
NEW ZEALAND.

PROGRESS OF THE WORK OF DISTRIBUTING APHELINUS MALI
DURING THE SEASON 1923-24.

R. J. TILYARD,

M. A., Sc.D. (Cantab.) D.Sc. (Sydney), F.N.Z. Inst., F.L.S., F.E.S., C.M.Z.S.,
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The past summer has seen a great increase in the work of distributing this valuable parasite throughout New Zealand, and is also memorable for the fact that, only three years from the date of its original introduction, the parasite has succeeded in practically eliminating the woolly aphis from large areas of orchard country in the Dominion. The unexpected and almost phenomenal success recorded from all parts of the country has been, I think, almost entirely due to the steady and persistent manner in which large numbers of carefully bred and packed specimens in healthy conditions have been sent out from the Cawthron Insectarium. During the past season this work, as in the previous year, was under the charge of Mr. A. Philpott (Assistant Entomologist). Anticipating a large increase in the number of applications, and also in view of other pressing lines of research, a second Assistant Entomologist was appointed in the person of Mr. E. S. Gourlay (late Assistant in the Biological Department, Canterbury College, Christchurch). Also, during the heaviest part of the season (December to February) a third assistant had to be temporarily engaged to help in the arduous work of catching and packing the parasites. In spite of this extra help, the whole of the applications received could not be dealt with, and a number have had to be held over until the following season.

The letter-file devoted to *Aphelinus* at the Cawthron Institute is full of appreciative letters about the work done by the parasite in the orchards of the Dominion during the past year. It does not seem necessary to quote from these, but it is noteworthy that the most outstanding results have been obtained in those provinces in which the work of distribution has been going on most extensively and for the longest

time, viz. in Auckland and Nelson. The remarkable difference in the summer climates of these two regions during the past year (one having been wet and the other dry) shows that the success is not due to an exceptionally favourable season. That the strain of *Aphelinus*, which is being propagated in New Zealand, is exceptionally vigorous, is proved by its recent success in South Africa, where a consignment of twigs was sent a year ago by the Cawthron Institute. The Entomologist at Cape Town reared 2000 specimens from these twigs, and the parasites were liberated in Colonel Gordon's orchard at Elgin. Latest advices are that they are doing excellent work there. Some years ago *Aphelinus mali* was introduced into the Transvaal for the purpose of checking the woolly aphis, but it does not seem to have been successful there. It will, therefore, be of the greatest interest to watch the progress of the New Zealand consignment during the next few years in and around Elgin. If it succeeds where the original introduction failed, the chief reason will probably prove to be the fact that the New Zealand strain is a cross between varieties taken from three widely separated parts of the United States, whereas the original South African lot were all bred from a single strain.

During the winter of 1923, twelve new apple trees were planted in tubs in the Cawthron Insectarium; these, together with the eight in use in the previous year, were infested early with woolly aphis, and the first lot of *Aphelinus* which emerged from the over-wintered pupae were placed on them. These were allowed a free hand with the aphis until near the end of November, when they had sufficiently increased in number to allow of the work of picking and distribution to

begin. The number of *Aphelinus* emerging increased steadily throughout December, and a maximum gathering of from a thousand to fifteen hundred per diem was reached in January and February. Towards the end of February the daily number declined, and the work of distributing the parasite was discontinued at the end of March i.e. just over four months after it was begun.

The careful and painstaking way in which both Mr. Philpott and Mr. Gourlay carried out the work of picking, packing and distributing the parasites calls for high praise and my best thanks are due to them both. I also wish to thank the numerous consignees who responded to our request that the empty tubes should be returned, thus considerably facilitating the work; in only a very few instances were tubes not returned or sent back so badly packed that they were received broken.

Fruitgrowers throughout the Dominion are urged to save all prunings which show the presence of dead swollen aphids, as these are one of the principal sources of the early spring brood of *Aphelinus*. The Cawthron Institute itself can dispose of as many such prunings during the present winter as growers may care to send, not only to fill urgent orders for far distant parts of New Zealand (i.e. places where it is almost impossible to send the parasite alive during summer owing to the length of the journey by post) but also for a number of urgent orders wanted for Australia, where the growers are by now fully awake to the value of the parasite.

We are also anxious to impress on all orchardists that, if our small staff is to cope successfully with other very pressing problems which still await solution, such as finding a natural enemy for mealy-bug, earwig, apple leaf-hopper, and other serious pests, a great deal of the heavy work of distributing

Date.	Number sent.
November 26	300
	300
December 3	300
	300
December 4	300
	300
	400
December 5	300
December 6	400
December 17	300
	500
	300
	400
	500
	400
December 18	400
	400
	400
	400
	400

Aphelinus must be taken off their hands. Mr. Rice already does the bulk of the distributing work for Hawke's Bay, and Mr. Davey has very kindly offered to do the same for Poverty Bay next year; but these two districts only account for a very small portion of the total number of applications. We should like to see the whole of the Auckland, Wellington, Christchurch and Central Otago applications dealt with by means of supplies from local orchards already in possession of *Aphelinus*. The gain to those growers who undertook this work would be the knowledge that they had set free the staff of the Biological Department of the Cawthron Institute for the more difficult work of finding remedies for other pests. If any orchardists' association is willing to undertake this work during the next season, we shall be very glad to send them a complete list of all applications from their district which have been, or may be in the future, received by us.

The total number of *Aphelinus* sent out from the Cawthron Institute during the season 1923-24 to all parts of New Zealand is a little short of 90,000, compared with 33,000 in the previous season. This number is made up as follows:—

Province.	Number.
Auckland	22,350
Hawke's Bay	2,600
Taranaki	650
Wellington	11,000
Nelson	40,300
Marlborough	2,100
Canterbury	6,100
Otago	3,800
Westland	400
Total	89,300

The following are the details of the distribution of the parasite throughout the season 1923-24:—

DISTRIBUTION IN THE AUCKLAND PROVINCE.

The total of 22,350 parasites sent to this province was made up as follows:—

Name and Address.
Mr. H. Smith, Te Hana.
Mr. F. T. T. Smith, Port Albert.
Mr. G. Chignell, Tinopai.
Mr. J. McKenzie, Okaihau.
Mr. R. S. Wiggins, Broadwood.
Mr. A. Findlay, Maramarua.
Mr. A. S. Gresham, Te Kuiti.
Mr. F. W. Snelling, Edgcombe.
Mr. J. M. Ranstead, Matangi.
Mr. E. S. Green, Swanson.
Waikumete Fruitgrowers' Association.
Mr. L. Carter, Silverdale.
Mr. F. Levesque, Massey.
Te Kauwhata Fruitgrowers' Assn.
Mr. F. C. Rollit, Auckland.
Mr. C. A. Fox, Waihi.
Mr. A. T. Pattie, Tauranga.
Mr. F. A. Ryde, Paeroa.
Mr. H. M. Neal, Port Albert.
Mr. E. N. Sache, Henderson.

Date.	Number sent.	Name and Address.
December 19	600	Mr. H. Davey, Gisborne.
December 24	350	Mr. W. H. Main, Tirau.
December 31	500	Mr. C. Hallet, Te Teko.
January 3	500	Mr. C. A. Robinson, Te Kuiti.
January 7	300	Mr. A. W. Fleming, Roto.
	400	Mr. E. E. Tatam, Whakatane.
January 8	1100	Mr. H. Davey, Gisborne.
January 14	400	Mr. G. Clarke, Ohura.
January 15	400	Mr. A. Findlay, Maramarua.
	400	Mr. G. H. Smith, Kokako.
January 21	300	Mr. E. E. Tatam, Whakatane.
January 22	400	Mr. R. S. Wiggins, Broadwood.
January 23	300	Mr. E. E. Tatam, Whakatane.
January 24	300	Mr. J. M. Ranstead, Matangi.
January 28	300	Mr. F. Levesque, Massey.
January 29	300	Mr. E. H. Sache, Henderson.
	300	Mr. C. Hallet, Te Teko.
January 30	300	Mr. M. Neal, Port Albert.
	300	Mr. W. H. Main, Tirau.
	300	Mr. A. Oldfield, Waiuku.
February 4	400	Mr. A. T. Pattie, Tauranga.
February 5	400	Mr. L. A. McDonald, Nukuhau.
	300	Mr. D. C. Chalmers, Whakatane.
February 7	400	Mrs. M. Baldwin, Waerenga.
	300	Mr. J. Turner, Kaipara.
February 19	500	Mr. C. Hallet, Te Teko.
	500	Mr. J. Turner, Paparoa.
February 20	500	Mr. D. C. Chalmers, Whakatane.
February 25	400	Mr. J. Archibald, Papakura.
	800	Te Kauwhata Fruitgrowers' Assn.
February 26	500	Mr. J. Cullen, Maungaturoto.
March 3	500	Mr. A. V. Pettman, Hokianga.
March 5	500	Mr. D. C. Chalmers, Whakatane.
March 10	500	Mr. L. A. McDonald, Nukuhau.
	500	Mr. L. Carter, Waitemata.

A considerable number of the above recipients have written reporting the success of the parasite on their orchards, and in a number of cases have also reported the quick spread of the parasite to adjoining properties. Several cases of the *Aphelinus* having successfully parasitised the black aphid on lemon trees are reported, and it would seem to be well established by now that the parasite will attack any dark-

coloured aphid. In view of this fact, the Commissioners for the Murrumbidgee irrigation areas in New South Wales have recently written and applied for a consignment to enable them to cope with the black aphid, which is doing so much damage to orange and lemon orchards there. This request will be complied with as soon as we can get sufficient prunings to enable us to send over a good consignment during the winter.

DISTRIBUTION IN HAWKE'S BAY PROVINCE.

Few applications have been received at the Cawthron Institute for *Aphelinus*, and we understand that Mr. Rice, orchard instructor at Hastings,

and Mr. Davey, who carried on his work while he was away, have been supplying the parasite locally from the progeny of the original consignment sent to them in 1922. The following are the details of those supplied direct from here:—

Date.	Number Sent.	Name and Address.
December 6	300	Mr. P. Chalk, Napier.
December 22	400	Mr. H. T. Arrow, Waipawa.
February 11	400	Mr. E. H. Williams, Hastings.
March 3	500	Mr. R. Pattison, Kumeroa.
March 4	500	Mr. J. Clark, Dannevirke.
March 5	500	Mr. E. H. Williams, Hastings.

A total of 2600 for the Province.

DISTRIBUTION IN THE TARANAKI PROVINCE.

Taranaki is not a fruitgrowing province, and hitherto we had not

received any applications from there for *Aphelinus*. During the past season, however, two applications were received and filled as follows:

Date.	Number Sent.	Name and Address.
December 12	300	Mr. A. R. Bates, Kaponga.
December 15	350	Mr. E. Brewster, New Plymouth.

We hope that the 650 parasites sent out may do such good work that other owners of apple trees in Taranaki may decide that it is worth their while to get rid of the Woolly Aphid also.

DISTRIBUTION IN THE WELLINGTON PROVINCE.

supplied to Wellington during the past season, as follow:—

A total of 11,000 Aphelinus have been

Date.	Number Sent.	Name and Address.
November 28	300	Mrs. Watson, Bulls
November 29	300	Mr A. Brown, Foxton.
	300	Mr. T. H. Bradley, Wanganui.
	300	Mr. H. Taylor, Levin.
December 3	300	Mr. C. Phillips, Carterton.
December 5	300	Mr. A. C. Holms, Levin.
	400	Mr. R. B. Wyley, Wanganui.
December 12	300	Mr. P. Waldmann, Pongaroa.
	400	Mr. J. Benefield, Wanganui.
December 13	300	Mr A. Marshall, Halcombe.
	400	Mr. F. H. Outram, Palmerston North.
December 14	300	Mr. A. J. Thomson, Manawatu.
	300	Mr. F. S. Tomlinson, Feilding.
	400	Mr. A. D. Thomson, Lower Hutt.
December 19	400	Mr. E. Robinson, Taihape.
	500	Mr. H. McMillan, Palmerston North.
December 20	400	Mr. C. J. Munro, Palmerston North.
	400	Mr. R. A. Holmes, Lower Hutt.
	400	Mr. R. S. Moore, Awahiri.
December 24	500	Mr. C. Phillips, Carterton.
	500	Mr. T. H. Bradley, Wanganui.
January 10	400	Mr. P. Waldmann, Pongaroa.
	400	Mr. F. Farmer, Oroua.
February 6	400	Mr. P. Waldemann, Pongaroa.
February 14	200	Mr. J. M. Barr, Foxton.
February 28	400	Mr. N. C. Davidson, Te Horo.
March 4	500	Mr. J. M. Barr, Foxton.
March 6	500	Mr. O. Tiller, Palmerston North.
March 11	500	Mr. G. H. Davey, Feilding.

DISTRIBUTION IN THE NELSON PROVINCE.

throughout the Nelson Province was just over 40,000, as against about 15,000 for the previous year; the details of the distribution were as follow:—

The number of Aphelinus distributed

Date.	Number Sent.	Name and Address.
November 23	300	Mr. L. McKay, Lower Moutere.
	300	Mr. E. C. Bensemann, Mabana.
November 28	300	Mr. W. Cederman, Riwaka.
	300	Mr. D. S. Robinson, Wakefield.
November 29	300	Mr. J. Cooper, Lower Moutere.
November 30	300	Mr. H. Tucker, Tasman.
	300	Mr. C. Higgs, Mapua.
	300	Mr. H. Pickup, Stoke.
December 7	300	Mr. C. Baldwin, Stoke.
December 10	300	Mr. H. Tucker, Tasman.
December 13	300	Mr. C. Higgs, Mapua.
December 15	300	Mr. F. Whitwell, Wakapuaka.
December 22	650	Mr. W. H. Simpson, Redwood's Valley.
December 27	1000	Mr. D. S. Robinson, Wakefield.
December 28	500	Mr. H. Pickup, Stoke.
December 29	450	Mr. K. Lucas, Stoke.
December 31	500	Mr. H. Tucker, Tasman.
	100	Mr. A. Philpott, Nelson.
January 4	500	Mr. F. S. Smith, Tasman.
January 5	600	Mr. K. Lucas, Stoke.
January 9	500	Mr. J. Blanch, Mapua.
	500	Mr. E. L. Griffith, Tapawera.
January 11	500	Mr. R. McArtney, Nelson.
	300	Mr. O. Barton, Stoke.
January 12	400	Mr. J. Adamson, Nelson.
January 16	500	Mr. E. W. James, Umukuri.
	400	Mr. R. J. Marshall, Stoke.
January 17	400	Mr. H. Taylor, Stoke.
	300	Mr. S. Smallbone, Richmond.
January 18	700	Mr. J. Lindup, Mariri.
January 19	400	Mr. H. Powell, Stoke.
January 23	400	Mrs. A. E. Hopkinson, Tasman.
January 25	300	Mr. E. W. James, Umukuri.
	300	Mr. J. Gray, Mariri.
January 26	300	Mr. H. Rowe, Nelson.
January 28	300	Mr. H. Taylor, Stoke.
January 31	300	Mr. E. T. James, Tasman.
	400	Captain Leonard, Tasman.
	300	Mr. E. H. Tucker, Tasman.
February 2	300	Mr. L. Frost, Stoke.
	300	Mr. S. Wing, Stoke.

Date.	Number Sent.	Name and Address.
February 4.....	300	Mr. J. B. Williams, Braeburn.
February 8.....	400	Mr. M. R. Ching, Stoke.
	400	Mr. G. Monopoli, Stoke.
February 9.....	200	Mr. P. C. Hurst, Nelson.
	200	Mr. T. Usher, Bishopdale.
February 11.....	300	Mr. J. Taplin, Wakatu.
	300	Mr. N. W. Wood, Braeburn.
February 12.....	300	Mr. L. Thomas, Upper Moutere.
	300	Mr. E. W. Robinson, Mariri.
	300	Mr. H. J. Heath, Wakefield.
February 13.....	300	Mr. W. Marriage, Tasman.
	300	Mr. J. Thomason, Tasman.
February 14.....	300	Mr. A. Everett, Pokororo.
	300	Mr. E. C. Fry, Riwaka.
	300	Mr. S. Thawley, Mahana.
February 15.....	400	Mr. Giblin, Richmond.
February 16.....	400	Mr. M. E. Deck, Tasman.
February 18.....	400	Mr. H. Ibbotson, Upper Moutere.
	400	Mr. E. Skelton, Westport.
February 20.....	500	Mr. F. H. Every, Wakatu.
February 21.....	400	Mr. H. Everett, Riwaka.
	500	Mr. J. H. Addison, Tasman.
February 22.....	500	Mr. T. H. Gray, Mariri.
	500	Mr. A. E. Lindup, Mariri.
February 23.....	400	Mr. J. Richards, Nelson.
February 26.....	500	Mr. R. G. Tunncliffe, Karamea.
February 27.....	600	Mr. D. Hainz, Mariri.
	400	Mr. A. Wilkinson, Murchison.
February 28.....	400	Mr. A. Rowling, Lower Moutere.
February 29.....	500	Mr. T. Usher, Bishopdale.
	500	Mr. P. C. Hurst, Nelson.
March 1.....	400	Mrs. Fletcher, Collingwood.
March 6.....	500	Mr. R. Black, Stoke.
March 7.....	500	Mr. E. Deck, Tasman.
	500	Mr. H. Taylor, Stoke.
March 8.....	400	Mr. C. W. Pitts-Brown, Stoke.
March 11.....	500	Mr. F. I. Dawson, Tasman.
March 12.....	400	Mrs. Deck, Motueka.
	200	Mr. W. Tiller, Nelson.
March 13.....	300	Mr. L. F. Ellis, Motueka.
	300	Mr. A. Rigg-Wither, Stoke.
March 14.....	400	Mr. A. R. Frost, Stoke.
	400	Mr. S. Winn, Stoke.
March 15.....	300	Mr. R. P. Hudson, M.P., Motueka.
March 17.....	300	Mr. H. Ford, Redwood's Valley.
	300	Mr. G. Deck, Harakeke.
March 18.....	1000	Mr. G. A. Newport, Braeburn.
March 19.....	300	Mr. W. Marriage, Tasman.
	300	Mr. C. Grant, Mahana.
March 20.....	300	Mr. S. G. Brown, Tasman.
	300	Mr. A. G. Tillson, Braeburn.
March 21.....	400	Mr. A. Everett, Lower Moutere.
	400	Mr. T. P. Henderson, Lower Moutere.
March 22.....	300	Mr. J. Empson, Belgrove.
March 24.....	400	Mr. B. F. Cropp, Waiti.
March 25.....	400	Mr. A. H. Calvert, Redwood's Valley.
	400	Mr. F. I. Dawson, Tasman.
March 26.....	400	Mr. T. James, Tasman.
March 27.....	400	Mr. A. E. Holdaway, Braeburn.
	300	Mrs. Fletcher, Collingwood.
March 28.....	300	Mr. J. W. Hall, Ruby Bay.
March 29.....	400	Mr. J. W. Hall, Ruby Bay.
March 31.....	500	Mr. J. W. Hall, Ruby Bay.

The outstanding feature of the above list, as compared with that of the previous year, is that the parasite has now been sent to the more distant parts of the province, such as Westport, Karamea and Collingwood, while it has been spread more thickly than ever amongst the orcharding districts. The result should be that, next year, there

ought not to be a single neglected orchard or back garden with apple trees in it which will not possess the parasite, and thus these neglected and overlooked sources of reinfection from Woolly Aphis will be automatically cleaned up without the need of spraying. The benefit in the prevention of reinfection of the commercial orchards should be a marked one.

DISTRIBUTION IN CANTERBURY PROVINCE.

A total of 6100 parasites was sent out

Date.	Number Sent.
November 28	400
December 6	300
December 12	300
December 13	300
December 14	400
December 21	400
	500
	500
January 3	400
January 29	300
February 4	300
February 6	400
February 15	400
March 3	400
March 11	500

DISTRIBUTION IN THE MARLBOROUGH PROVINCE.

During 1923-4, applications were received for the first time from the Marlborough Province, and it is hoped that the growers there will realise the value of the parasite and apply for a

Date.	Number Sent.
November 30	400
December 5	400
December 28	500
February 13	400
March 24	400

DISTRIBUTION IN OTAGO AND SOUTHLAND.

Considerable difficulty is experienced in getting the parasite alive by post to these districts, some of which are more than a week distant from Nelson by post. This accounts for the number sent out, 3800, being only about the same as last year. It is intended to supply growers with parasitised twigs during the winter as far as possible, so that the parasites may be bred out and liberated fresh in the orchards in the spring. The details of distribution during the summer months were as follow:

Date.	Number sent.	Name and Address.
Dec. 10	300	Dr. Gladstone, Alexandra.
Dec. 10	400	Mr. L. S. Tonkin, Etrick.
Dec. 11	300	Mr. R. Kinnaird, Alexandra.
Dec. 11	400	Mr. F. G. W. Duncan, Etrick.
Dec. 13	300	Mr. R. Jefferis, Otiake.
Jan. 14	400	Mr. J. Froggatt, Long Bush, Southland.
Jan. 21	300	Dr. Gladstone, Alexandra.
Jan. 21	300	Mr. H. Turner, Etrick.
Jan. 24	400	Mr. L. S. Tonkin, Etrick.
Jan. 28	400	Mr R. Kinnaird, Alexandra.
Mar. 17	300	Mr. J. Mitchell, Oamaru.

to the Canterbury province in 1923-4, as compared with 2300 in the preceding season. The details are as follow:—

Name and Address.
Messrs. Baylis and Son, Fendalton.
Mr. B. O. Warrington, Cheviot.
Mr. A. Williamson, Atekaieke.
Mr. G. Ward, Temuka.
Mr. S. Unwin, Winchester.
Mr. T. Butchers, Timaru.
Mr. G. Hancox, Temuka.
Mr. B. O. Warrington, Cheviot.
Mr. J. J. Breen, Amberley.
Mr. T. Butchers, Timaru.
Mr. A. Williamson, Atekaieke.
Mr. S. Unwin, Winchester.
Mr. T. Butchers, Timaru.
Dr. G. Archey, Christchurch.
Mr. G. Ward, Temuka.
Mr. E. F. Taylor, Timaru.

great many more during the coming season. The number sent out last season was 2100, which, though a satisfactory start, is far too small an amount from which to expect any marked success. The details of distribution were as follow:—

Name and Address.
Mr. F. Dillon, Blenheim.
Mr. J. A. Lambert, Kaituma.
Mr. F. Dillon, Blenheim.
Mr. K. Ford, Blenheim.
Mr. H. J. Shirtcliffe, Rapaura.

DISTRIBUTION IN WESTLAND PROVINCE.

Westland is not a fruitgrowing centre, but a single application was received from Mr. H. Nankervis, Greymouth, to whom a consignment of 400 *Aphelinus* was sent on February 18.

PROGRESS OF THE WORK OF INTRODUCING APHELINUS INTO AUSTRALIA.

New Zealand fruitgrowers will be interested to learn that, of the consignments sent over to Australia during the winter of 1923, those sent to Western Australia (Mr. L. J. Newman, Government Entomologist, Perth), and Queensland (Mr. E. Jarvis, Entomologist, Stanthorpe, Q.), have been successfully established, and the work of distribution to orchardists in these two States was carried on during the past summer. The consignment sent to New South Wales was lost through over-strict application of quarantine conditions; we are, however sending further supplies during the present winter, and hope to hear of a successful introduction in the coming spring. As regards the other three States, nothing has been heard of the consignments

sent, though quite a number of inquiries from orchardists in these States have been received asking how they can get supplies. The parasite can only be introduced into an Australian State per medium of the Government Entomologist for such State; so that where, as in Tasmania, there is no Government Entomologist, and no available insectarium for the rearing of the parasites, the orchardists have little hope of successfully introducing them.

In concluding this article, I wish to thank all those orchardists who have helped on the good work of spreading this valuable little insect by closing in trees and rearing the insect themselves, as well as spreading it to their neighbours. The work done by *Aphelinus* should be an object lesson to all fruitgrowers; like the busy bee, it works without cessation at its appointed task, and is a tiny machine of unlimited potentiality for good, requiring no attention except

the initial one of a good start off in any given district. Its rate of increase is so great that it is easily able to catch up with the aphid before the ripening and picking period is reached. The result should be that, in a year or two, when the whole of New Zealand is fully occupied by the parasite, our orchardists should be in the fortunate position of not having to bother about the Woolly Aphid any further. The Cawthron Institute will keep the parasite going as long as the growers show a desire to have it; but, if they will consult the lists given in this article, and do their best to obtain supplies locally from the nearest growers who already possess the parasite, they will lift a great deal of the heavy burden of distribution from the shoulders of the staff of the Biological Department, and enable more time and energy to be given to those very pressing problems of insect control which are as yet unsolved in New Zealand.

