# SCIENTIFIC BOOKS

*The Biological Control of Insect and Plant Pests: A Report on the Organization and Progress of the Farnham Laboratory.* By W. R. THOMPSON. His Majesty's Stationery Office, London. 124 pp., 8 plates. Royal octavo. E. M. B. 29.

*The Cocoanut Moth in Fiji: A History of its Control by Means of Parasites.* By J. D. TOTHILL, T. H. C. TAYLOR and R. W. PAINE. Imperial Bureau of Entomology, London, published for the Government of Fiji. vi + 269 pp., xxxiv plates, 119 text figs. Imperial octavo.

AMONG the very many useful and important things that the Empire Marketing Board has done for the British Empire, its support of the Imperial Bureau of Entomology appeals strongly to workers in applied entomology all over the world. And the publications listed above must appeal to every one interested in agriculture.

Dr. W. R. Thompson, a Canadian by birth and for many years working as one of the foremost experts of the U. S. Bureau of Entomology, has for more than twenty years been studying various aspects of natural control, perhaps especially that part of this control brought about by the insect enemies of injurious insects. This long study by a man who is as sound a thinker as he is as an observer, and who in addition was the first of the entomologists to apply mathematics to the solution or explanation of such problems, renders his writings most important and provocative of lucid thought. When Dr. Thompson left the service of the United States government and became the superintendent of the Farnham House Laboratory it was a sad day for us; but we were readily consoled by the thought that all this work is for the ultimate good of all peoples and that the British Empire, including as it does possessions in practically every faunal zone of the globe, affords him a broader field for study and for the exploitation of his sound ideas.

The Farnham House Laboratory was not founded until 1927, and it exists for the furtherance of the control of the pests of agriculture and forestry by what is termed the biological method. The present publication is perhaps principally a report on the organization and program of the work of the laboratory, but it contains a most important general account of the problems that arise in natural control work and of the theoretical considerations that indicate lines of necessary research. No one could have done this better and more authoritatively than Dr. Thompson, and the paper under consideration will long be studied by those who wish to engage in such work in the most intelligent way.

The whole general problem is discussed in a most competent way, but students will probably welcome especially the section entitled "The Principles and Organization of Work on Biological Control," since it not only points out many vitally important things but gives consistently the reasons. No one without Dr. Thompson's long experience, beginning about 1910 in the gipsy moth parasite laboratory, could have done this so competently. Of especial interest is the long and somewhat philosophical treatment headed "The Results of Experiments." The author repeats some of his more or less theoretical arguments previously published, but restrains his mathematical tendencies to a single formula, much to the advantage of his non-mathematical readers.

The work already under way at the laboratory is discussed in some detail, and it is a delightful surprise to learn of its great scope. Not only are well-advanced investigations on the parasites of more than 21 insect pests of prime importance under way, but the control of noxious weeds, a subject of vital importance in New Zealand and Australia, has been assigned to the laboratory. A long list of projects submitted by dominions and colonies is given, and a partial but sufficiently full bibliography follows.

The Farnham House Laboratory is probably as well situated as it could be in England. It is well equipped and well staffed, and under its present most able director we may look for important results. The eight plates are for the most part photographic representations of the laboratory, its apparatus and methods.

There have been several dramatic and apparently completely successful experiments in the transfer from one country to another of parasitic or predatory insects. The introduction of the Australian *Novius cardinalis* into California in the 1880's heads the list. On the basis of that classic experiment has been founded most of the later work which now has become world wide. No introduction into continental regions has quite equaled it in its finality, although the introduction of *Prospaltella berlesei* from the United States into Italy to destroy the mulberry scale seems to approach it, and the carriage of *Aphelinus mali* from the United States to France, New Zealand, Australia and a number of other countries to kill the woolly apple aphis has been a repeated success.

Moreover, many other experiments of this sort have been moderately successful.

But, as has often been pointed out by writers, such introductions into islands of a simple native fauna and flora have a far better chance of success, as has been shown strikingly in the work that has been going on for nearly forty years in Hawaii. In fact it is fair to say that the important sugar industry of those islands almost owes its existence to-day to the work of this character done by Perkins, Muir and their colleagues and successors.

And now another dramatic achievement of this insular character has been brought about, and the story is told in all necessary scientific detail in the second of the publications listed above.

Copra is, next to sugar, the most important industry in Fiji, and since 1877 the foliage of the cocoa palms has been eaten by the larva of a zygaenid moth (*Levuana iridescens*) in increasing amounts until by 1924 the industry was threatened with absolute ruin. The green palms all over the island had become a dingy gray. Attempts to retard the increase and spread of the insect had utterly failed. In 1924 at the Wembly exposition in London, Sir J. M. Hedstrom, of Fiji, consulted with the home authorities and on the advice of Dr. (now Sir) G. A. K. Marshall it was decided to undertake a competent, and if necessary, long-time entomological investigation. Mr. Tothill, who had had much experience in biological control investigations in Canada and the United States, was appointed director of the campaign with Messrs. Taylor and Paine as assistants. The campaign was financed by a tax of two shillings and sixpence per ton of copra and an equal contribution from the general revenues, making an annual budget of £5,000.

It soon developed that a curious situation existed. The insect could be found only in Fiji, and yet no native parasite existed there. Explorations by H. A. Simmonds (then acting entomologist) in 1923, including the New Hebrides, Bismarcks, Solomon Islands, Lord Howe Island, Norfolk Island and North West New Guinea, did not result in the finding of the pest or of any allied species. It was therefore necessary to look elsewhere and to find if possible closely allied insects that were parasitized. Therefore Mr. A. M. Lea, government entomologist of South Australia, was sent to Malay and Java and eventually discovered and imported several parasites from Java of the allied genus Artona.

To cut a long story short, one of these parasites sent in from the Federated Malay States by Mr. B. A. R. Gater was a tachinid fly described by Aldrich as *Ptychomyia remota,* and this fly has proved to be the salvation of the islands. Although apparently normally a parasite of *Artona catoxantha,* it readily attacked the Levuana caterpillars and at the present time controls the pest perfectly.

The volume published by the Imperial Bureau of Entomology for the government of Fiji is wonderfully well done. In the introduction the authorship of the respective parts is carefully explained, and in the body of the book there is given in detail the history of the plague, an account of the recent campaign and a full account of the Levuana moth from the systematic, morphologic and biologic points of view and a very full account of the parasites and of the zygaenid moths most closely related to *Levuana iridescens.* The plates are beautifully done, a number of them being in colors.

The great value of the tachinid flies has always been recognized by the agricultural entomologists, but this is the first time in the history of parasite introduction that one of them has accomplished such a dramatic result. We are indeed fortunate that the whole story has been published and with such detail as to its scientific aspects.

L. O. HOWARD

U. S. BUREAU OF ENTOMOLOGY

# SCIENTIFIC APPARATUS AND LABORATORY METHODS

## A VARIABLE RESISTANCE PNEUMOGRAPH AND AN ELECTROMAGNETIC TAMBOUR

IN making kymograph or photographic records of such variables as muscle movements the use of air pressure systems, *i.e.,* pneumographs and tambours, involves several difficulties. Air leakage possibilities are always present, and, what is sometimes even more productive of error, the pneumatic system requires the making of records in close proximity to the variable being recorded. The constant attention which must be paid to such apparatus has made it appear that electrical equipment might be utilized to the exclusion of air systems.

The device described is basic for a large number of specific pieces of apparatus which may be constructed by the individual experimenter.

Fig. 1 shows the light, soft iron lever carrying a mirror or marking directly on the kymograph drum. The excursions of the lever may be delimited by a variable resistance (R). The primary control of the