

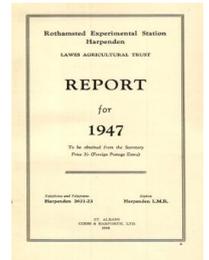
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# Rothamsted Report for 1947

[Full Table of Content](#)



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## Bee Department

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## BEE DEPARTMENT

By C. G. BUTLER

On 1st October, 1946, the advisory work and disease diagnosis, including the examination of sample brood combs submitted under the Foul Brood Disease of Bees Order, that has in the past been carried out by members of the Bee Research Department, was taken over by the National Agricultural Advisory Service of the Ministry of Agriculture and Fisheries. This advisory work is now being continued and extended by the N.A.A.S. bee-keeping officers under the supervision of Mr. P. S. Milne, who had previously been looking after this part of the Bee Department's work. This bee-keeping unit of the N.A.A.S. is at present sited at Rothamsted alongside the Bee Department the members of which, having been released from advisory work, are now able to devote all their energies to research.

This, then, is the first report of the Bee Department in recent years in which no mention is made of advisory work carried out by members of the Department. The resignation of Mr. Milne from the Rothamsted staff and the transference of the advisory work to the N.A.A.S., together with the removal of the Bee Department to Rothamsted Lodge, have necessitated a thorough reorganisation. As a result it has been possible, almost for the first time, to plan a number of long term researches in the knowledge that the advent of an unexpected amount of advisory work will not in future be likely to upset the programme and necessitate abandonment of work that has been commenced.

### POLLEN COLLECTING BEHAVIOUR OF HONEYBEES

During the summer of 1947 C. R. Ribbands made observations on the behaviour of honeybees when collecting pollen and, to a lesser extent, nectar, in a specially planted garden of Shirley Poppies, Eschscholtzias and Nasturtiums, from all three of which the bees collected pollen only, and *Limnanthes* and *Nemophila*, which yielded both nectar and pollen. The bees were anaesthetised and marked in such a way that individuals could readily be recognised and their movements recorded from day to day.

It was concluded that foraging honeybees exhibit a pattern of trial and error learning of considerable complexity. They compare the ease of obtaining a load from the flowers which they happen to be working with their memory of the ease with which they have obtained loads from the same and other sources in the past, and continually choose the best of those alternative crops with which they become acquainted.

A paper describing this work in full has been prepared for publication (135).

### THE EFFECT OF ANAESTHETICS UPON FORAGING BEHAVIOUR

In an investigation of methods of anaesthetising and marking bees C. R. Ribbands has found that chloroform is a very satisfactory anaesthetic for bees and does not affect either their memory or behaviour. However, pollen collecting bees that are anaesthetised with either carbon dioxide or nitrogen usually cease to collect pollen and harvest only nectar. If bees that have been collecting from a plant which yields both nectar and pollen are anaesthetised with

carbon dioxide or nitrogen they frequently return on recovery to the same plant, but henceforth collect nectar only from it. It is hoped to study the effects of these anaesthetics in detail during 1948. The results that have so far been obtained suggest that carbon dioxide produces a physiological change in the bee (possibly as suggested by V. B. Wigglesworth by reducing the rate of oxidation of acid metabolites) which is equivalent to ageing. This hypothesis is compatible with O. Mackensen's discovery that if virgin or inseminated queen bees are anaesthetised with carbon dioxide it reduces the period that elapses prior to the commencement of oviposition.

#### POLLEN TRAPPING

The study of the floral sources from which bees obtain their pollen has been continued by J. Simpson. In addition to daily collections of pollen, by means of a pollen trap, from a colony at Rothamsted, weekly collections were made by means of similar traps at a number of outside centres. The work of identification of the pollens collected is not yet complete but the results that have been obtained so far show several interesting features.

At Rothamsted by far the greatest yields of pollen were obtained from charlock and red clover. Between 27th May and 26th June 80 per cent. of the pollen came from charlock, while from 1st to 17th August practically nothing but red clover pollen was collected. In contrast to this scarcely any pollen was collected from white clover at any time during 1947. These features were also shown, though to a lesser degree, in the data obtained from other southern areas where trapping was carried out. On the other hand in a trap in Yorkshire a considerable amount of white clover pollen was obtained, but little red clover pollen.

Considerable quantities of pollen were also obtained in some areas from unexpected sources. In June large quantities of grass pollen were obtained in Essex, while in London at about the same time privet and chestnut were important sources of pollen.

Quantities of mixed loads containing pollen and fungal spores were collected on several occasions, which suggests that fungus was attacking the flowers from which the pollen was gathered.

#### THE POSSIBLE HARMFUL EFFECT OF VARIOUS HERBICIDES ON HONEYBEES

Experiments designed to discover any possible effect of the recently developed selective herbicides on pollinating insects, particularly on the honeybee, were commenced by G. D. Glynne Jones in May, 1947. In preliminary laboratory experiments the two "hormone type" herbicides, M.C.P.A. (2-methyl-4-chlorophenoxyacetic acid) and D.C.P.A. (2:4 Di-chloro-phenoxy-acetic acid) were not found to act as contact poisons to the honeybee but they can act as stomach poisons. Dinitro-ortho-cresol and its sodium salt were found to be highly toxic to the honeybee both as contact and stomach poisons. DNOC and especially sodium dinitro-ortho-cresylate have been found to be repellent to the foraging honeybee. In glasshouse experiments a 1 per cent. solution of sodium dinitro-ortho-cresylate was found to be sufficiently repellent to prevent a hungry bee from feeding upon sugar syrup to which it had been added.

Preliminary field experiments have indicated that poisoning of bees may be anticipated if the DNOC compounds are used to destroy charlock whilst it is actually in flower.

#### SULPHONAMIDE TREATMENT FOR AMERICAN FOUL BROOD

Work on the use of sulphonamides for the treatment of colonies infected with American Foul Brood has been continued by P. S. Milne. It would seem that these drugs are unlikely to prove to be of such value in cases of this disease as had been hoped.

#### ADULT BEE DISEASES

A study is being made on the distribution of Nosema and Amoeba diseases. There is evidence that the incidence of Nosema disease has increased considerably. A further survey of the distribution of Acarine disease is also being made.

#### BEE BREEDING

Thanks to the discovery by Laidlaw of a new valve in the genitalia of the queen honeybee and modification by Mackensen and Roberts of Watson's technique of instrumental insemination, it is now possible to produce inseminated queens which are as satisfactory in their behaviour as naturally mated ones. This technique has been studied in detail at Rothamsted during 1947 and is now being applied successfully. The way now appears to be open to make a determined attempt to breed improved strains of bees for such purposes as the production of honey from various crops, the pollination of specific seed crops such as red clover, wax production, etc. It is intended to expand this work as quickly and as extensively as possible. Artificial insemination of queen bees will undoubtedly prove to be a most useful tool in the solution of many problems in bee research.

#### THE EFFECTS OF WEATHER CONDITIONS UPON HONEYBEE ACTIVITY

A study has now been made of the data obtained from the colonies of bees that have been kept on balances during the last twenty years. This material is now being prepared for publication.

#### OTHER STUDIES

Observations have also been made on the methods of communication practised by honeybees, home-finding and orientation, colony balance, etc.