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Brood Diseases of Bees

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The Distribution of Foul Brood in England

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DISTRIBUTION OF FOUL BROOD IN ENGLAND

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As Sir John Russell has said in his introduction, this conference was called together as the starting point for the investigation into the brood diseases of bees now to be undertaken at Rothamsted.

In a later paper Dr. Tarr gives a summary of the present state of the scientific investigation of the subject, but it has been thought well to give a brief description of the diseases in question as a guide to those who are unfamiliar with the symptoms, and the treatment usually recommended. This has been printed in the form of an appendix (p. 41). Obviously both the description and the treatment may be subject to revision as a direct result of the present research.

As soon as it was decided to hold this conference, copies of the following Questionnaire were sent out to the secretaries of all Beekeeping associations.

Questionnaire on Brood Diseases of Bees

- (1) Area covered by this report.
- (2) Localities where brood diseases have occurred within this district.
- (3) Years and time of year of outbreaks.
- (4) How long has disease been prevalent in your district?
- (5) Symptoms.
- (6) Has any attempt been made to differentiate between the different brood diseases?
- (7) Has the disease spread rapidly, (a) in apiary, (b) in district?
- (8) Race of bees (a) Usual in district. (b) Affected.
- (9) Steps taken and results.
- (10) General remarks.

The Questionnaire method is admittedly an imperfect means of getting information, but, assured of the goodwill of the beekeeping associations, to the extent of their support of the foul brood fund, we had reasonable ground for expecting the willing co-operation of association secretaries. The value of the replies received varied considerably for a number of reasons. The country is very unevenly covered by the beekeepers' organizations: some areas are well served by active associations with a well-organized system of branches; other counties have several societies, apparently at loggerheads. Secretaries also vary in their knowledge of their areas, and while some most valuable replies have been received, others indicate a

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certain amount of apathy, rival associations occupying the same area, and the non-member beekeeper, are a problem : the implication being that members of the reporting association have no disease, while the apiaries of neighbouring non-members are invariably suspect.

In assessing the value of reports it is necessary to bear in mind that some beekeepers consider that the admission of the existence of foul brood carries a stigma. It should be made clear that unless foul brood is neglected (or in the case of European foul brood when it may indicate a weak colony), there is no slur on the beekeeper. It is when bee disease goes undetected or untreated, or when material is exposed in such a manner as to cause re-infection or danger to neighbours, that a beekeeper is worthy of blame.

The fear of legislation and inspection may perhaps have influenced certain replies. A question asked in the House on May 15th might suggest that another bee disease bill is to be introduced into Parliament, but I feel that the very fact that the matter is now undergoing investigation here, is likely to postpone any rash proposal until some sort of answer can be given to the problems which we have set ourselves ; and it is to be hoped that our work may not be hampered by any attempt to force premature deductions.

In considering the replies which have been received, it seems that the confusion which has existed between various brood diseases in this country is even more complete than was supposed. The lack of proper facilities for diagnosis, except in a few areas, has evidently caused many county experts to make no attempt to differentiate between European and American foul brood. While such was the case, there was much to be said for the school which advocates the " Burn the lot " policy ; but it is difficult to believe that the existence of these incendiaries may not be one of the reasons why cases of brood disease are not always reported.

Four Welsh counties do not appear to have any association.

Ten counties did not reply to the questionnaire.

Four counties claim to be free from brood disease.

One county admits only one recent case.

The opinion that foul brood was more prevalent before the outbreak of Isle of Wight disease, and was largely cleaned up by the measures taken to combat that disease, has been expressed in several reports.

A map showing the reported cases and infected areas, based on the replies received has been prepared and is printed with this report : but as appears in the discussion Mr. W. Herrod Hemsall, who, as the Ministry of Agriculture Expert, has unique opportunities of observation all over the country, considers that it is very incomplete.

The detailed replies briefly summarized hereunder confirm the impression that brood diseases are more serious in the South-Western Counties.

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In most counties no attempt was made to distinguish between various brood diseases, but in Devon and Berkshire a microscopic examination is a matter of routine.

It will be seen that in most counties the policy is to destroy infected stocks. Certain areas report that the shaking method is effective for American foul brood when carried out by a competent expert. Disinfection of hives is usually done by means of a painter's blow lamp. In two cases it is stated that disinfection of combs has been tried but is not considered worth while. Treatment of the disease by means of drugs has few adherents, though "Izal," beta-naphthol and "Apicure" are all mentioned.

It will be noticed that some counties have a fund for compensation when stocks have to be burnt. This is interesting in connection with a scheme outlined in Mr. Illingworth's paper.

In some areas reinfection is thought to be due to bees in trees, hollow walls and the existence of old beekeeping appliances on the premises of those who take no further interest in bees.

Particularly helpful replies were received from Kent, Devon, Cornwall and Gloucester, and I would like to tender my especial thanks to those responsible for these reports.

County Reports in Detail

Northumberland.—No foul brood has occurred in Northumberland and N.W. Durham.

Cumberland and Westmorland.—Occurrence of foul brood stated to be rare; both types occur. Foul brood was prevalent in the days before the Isle of Wight disease outbreak. It is thought that some occurrences of brood diseases have been due to appliances which have been stored away since between 1910-1916 when Isle of Wight disease was at its worst.

Yorkshire.—An outbreak of American foul brood occurred in 1931 and 1932.

Derby.—Two cases have been reported in nine years. Probably brood diseases are more prevalent than is generally believed.

Leicester.—Cases occurred in 1933, the first for some years. The shaking treatment proved effective.

Nottingham and Lincoln.—No report was received.

Norfolk.—Spasmodic cases have occurred over a long period. The symptoms are punctured cappings and bad odour. There has been only one case of brood dying before the sealing stage. There is no doubt that the diseases are carried by a manipulator. In the Kings Lynn area, Italian bees appear to be resistant. The stocks affected have been those which were in a dirty and uncared-for condition.

Cambridge.—Several cases occurred in one locality five or six years ago. Three or four cases of single hives slightly infected occurred in the county in 1933. A bad attack of American foul brood occurred at Willingham forty years ago; forty stocks were burnt in one apiary. The treatment was effective.

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Peterboro' and District.—An isolated case occurred in the spring of 1922 and the stock was promptly burnt. No case has occurred since.

Oundle and District.—No case has occurred within the past five years.

Huntingdon.—The last cases were in 1908 and 1909. The bees were English and were destroyed.

Suffolk.—No report received.

Bedford.—Both diseases occur. The shaking treatment has been found effective. Other stocks have been burnt. European foul brood appears in a mild form and disappears without treatment.

Barnet.—There has been one case in 1934 probably contracted in the autumn of 1933. This was the first case for five or six years and has been destroyed.

Kent.—Sent in a very full report with a map. Foul brood was very prevalent from 1900-1910. The skep system had tended to keep the disease in check, but as bar frames came to be used so foul brood made headway.

From 1910-1920 foul brood was nearly eliminated owing to the destruction of the bee population by Isle of Wight disease. Later with improved education beekeepers have learned to recognize foul brood and to take adequate steps to deal with it. Since 1920 sporadic cases have occurred. Destruction of diseased bees and infected equipment and the scorching of hives has been the rule and has been successful. There was an increase of American foul brood in 1933 and there is still an area in the Faversham-Sittingbourne fruit district where it is known to exist. Kent now maintains a bee-disease service.

Surrey.—In the Riegate district cases occurred five or six years ago and were cleaned up by burning. Two slight cases occurred in the autumn of 1933.

In *Mid-Surrey* foul brood has given very little trouble, but three outbreaks have occurred at Leatherhead and Epsom. In one case, the infection was traced to the apiary of a non-member. The cases were treated by the destruction of brood and the use of Lysol and Creosote to disinfect the hives.

Sussex.—Foul brood is believed to be general in this county. A bad outbreak occurred at Rotherfield five or six years ago. A case in 1918 was attributed to the robbing of a keg of imported honey which was smashed close to the apiary. In an article published in "Bee Craft," March, 1933, the experiences of a beekeeper in the Crowbrough district are described, and the difficulty of diagnosis are

emphasized. There is an impression that a mild form of American foul brood exists, which may disappear without treatment.

The *Eastbourne* district is stated to be free. However, the reviewer has seen cases of an unrecognised brood disease in this neighbourhood.

Northants and *Oxford* sent no reply.

Buckinghamshire.—No report from the county association, but one isolated case was reported from Chesham.

Berkshire.—American foul brood has occurred sporadically since 1930. Microscopic diagnosis is always made before treatment. The shaking method is effective in the hands of an expert, but the casual beekeeper is always advised to destroy. It is noticeable that in some cases the disease is very infectious, and in others not at all. European foul brood is rare.

Middlesex.—Eleven stocks were destroyed in one apiary at Isleworth in 1933 for European foul brood. There were two cases of suspected American Foul Brood in 1931 and 1933. The stocks were destroyed and the hives disinfected. The treatment was effective.

Hants.—Foul brood, with symptoms corresponding to both American and European occurred all over the county. It is very prevalent in the New Forest. Bees in trees are considered to be responsible. Destruction of colonies, scorching of hives and burning of frames and quilts has been recommended in all cases. Artificial swarming and the use of disinfectants have not been successful. No attempt has been made to differentiate between the two diseases. The Isle of Wight has a considerable quantity of American foul brood.

Dorset.—Outbreaks occur all over the county. One report says, "The average beekeeper takes little interest in bee diseases and is too apathetic to worry whether the disease is present or not. The fear of having to destroy and burn bees and hives leads to the concealment of disease. It would almost seem that a return to skeps and box hives would be not an unmixed blessing."

Devon.—Foul brood has been present in Devon during the last three years. All samples are sent to Mr. John Falkner, Hon. Microscopist to the county Association, who has furnished very useful information of a technical nature. In addition to American and European foul brood, he distinguishes a form which for the present he calls "X brood," which he believes to be that described by Toumanoff in his book, "Les Maladies des Abeilles."

He gives the following table of the characteristics of the three diseases.

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<i>American.</i>	<i>European.</i>	" X "
80 per cent. capped.	Rarely 10 per cent. capped.	100 per cent. capped.
Odour sometimes strong, usually present.	Odour if present fairly strong.	Odour leatherish.
Adhesive scale.	Loose scale.	No scale, the mass sinks to base of cell.
Strongly ropy.	Non ropy.	Only ropy in the very last stage.
Pure <i>B. larvae</i> and its spores throughout.	<i>B. pluton</i> followed by <i>B. alvei</i> and its spores, alone or with other organisms.	A micro-picture of spores in predominance which are characteristic of neither <i>B. larvae</i> or <i>B. alvei</i> , associated with a micrococcus and a bacillus.

All Foul Brood colonies were destroyed except one, which was satisfactorily and safely treated by an expert with the artificial swarm and re-queening method. This was European. One other case of European was treated with " Apicure." Result—an outbreak the next year and destruction of the colony. He attributes the Chalk and Sac brood to wintering colonies in a damp locality. When aired and moved into full sun the trouble soon disappears of itself.

Somerset.—American foul brood has been endemic along the south side of the Quantocks since 1919. At Street a bad outbreak occurred in 1912 which disappeared in the autumn. Shortly after this, all bees in the district died out through Isle of Wight disease. Since then there have only been isolated cases. One reporter states, " We now think that American foul brood and European foul brood are the same disease."

Gloucestershire.—The disease has only just started. (Seven outbreaks.)

Wilts.—One case in Marlborough, the first for five years, is all that is reported. A case occurred two years ago on the Hampshire border.

Worcester.—foul brood has occurred in several districts, during the past four or five years. It appears to be spreading. All traces of bees seem to be affected. The shaking treatment has been tried but destruction is the usual course. The Association has taken steps to provide nuclei to replace stocks which had to be destroyed.

Shropshire.—No reply has been received.

Warwickshire.—Isolated cases crop up in all districts and are dealt with by beginning as soon as the Association authorities can hear of them. In one case the owner has refused access. A bad outbreak occurred in 1900 in South West Warwick.

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Cornwall.—The county is divided into three divisions and travelling experts appointed. Records are kept of all visits paid, the following table was furnished by Mr. Charles Harrison, the County Secretary.

Table showing incidence of Foul Brood in the County for those years for which records are available.

Year.	Apiaries visited.	Frame Hives.	Skeps.	Total Stocks.	Unclassified Disease.	Foul Brood.	Apiaries p.c. affected.
1899* ..	187	732	361	1093	—	44	23.6
1909 ..	258	—	—	1257	359	?	—
1910 ..	146	—	—	755	85	?	—
1911 ..	174	—	—	841	—	63	36.20
1912 ..	129	—	—	648	—	34	26.35
1913 ..	189	—	—	1090	—	71	37.55
1914 ..	199	—	—	844	—	82	41.20
1923 ..	—	—	—	—	—	2	—
1924 ..	152	528	119	647	—	3	1.9
1925 ..	244	683	215	898	—	3	1.2
1926 ..	325	1271	348	1619	—	1	0.3
1927 ..	452	1905	610	2515	—	4	0.88
1928 ..	597	2209	833	3042	—	7	1.17
1929 ..	667	3098	1032	4230	—	5	0.75
1930 ..	548	2528	772	3300	—	5	0.91
1931 ..	566	1961	257	2218	—	6	1.06
1932 ..	512	1650	184	1834	—	1	0.19
1933 ..	464	2306	265	2571	—	5	1.08

*The figures for 1899 are for the area west of St. Austell only. No survey for the eastern area appears to have been made.

The remarkable decline in foul brood from an average of 32.98 per cent in the pre-war period to an average of 0.84 per cent. for the years 1924-1933 is attributed equally to Acarine Disease and to the drastic treatment advised for its eradication. A case occurring in 1933 was imported from Essex by a new resident bringing ten stocks with their hives, one of which was found to be badly infected, but the owner disputed the experts' diagnosis and refused to destroy.

Staffs.—Two outbreaks have occurred since 1918. The affected colonies were destroyed. All beekeepers in the area were advised to fumigate super combs with formaldehyde and to medicate all food supplied, with beta-naphthol. The County Education Committee warned beekeepers against purchase of stocks from outside the county without previously consulting the county instructor.

Lancashire.—Isolated cases occur almost annually and are dealt with in the usual way.

Cheshire.—Outbreaks from time to time during the past twenty-five years. The disease is not prevalent but the county is apparently never quite clear. The disease is generally discovered by visiting

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experts, and rarely by the owner. In most cases it is attributed to American foul brood. Some cases have been due to bees brought in from other counties and in several cases re-infection has been due to neglected hives of non-members. In one case persistent re-infection of a village is ascribed to bees in a roof. It is thought that the disease will never be eradicated until all colonies of bees can be examined annually. The County Association is voting £10 a year to provide compensation for those who have allowed drastic measures to be taken. This probably resulted in more cases of foul brood being notified.

Conway Valley.—Only Sac brood known to occur.

Denbigh.—No Association.

Flint.—Endemic on the borders of Flint and Denbigh. It is also prevalent on N and W sides of Clwydian Range and coastal ranges about Flint Town.

<i>Merioneth</i>	}	No Association.
<i>Montgomery</i>		
<i>Radnor</i>		
<i>Brecon</i>		

Cardigan.—No answer.

Pembroke.—No answer.

Carmarthen.—The disease has been prevalent for some years in the Ammanford district and has been introduced from another district with a diseased stock. It was spread by robbing. In nearly all cases the disease was American foul brood. In one case European foul brood was seen. No case of the disease affecting Dutch bees has been noticed. The shaking method is usually successful. The hypochlorite and the formalin method of comb disinfection have been tried and found successful but were not considered worth the trouble. The Association has set aside a disease eradication fund. It is hoped that this will encourage beekeepers to report cases which they would otherwise be inclined to conceal.

Monmouth.—Is believed to be free from foul brood.

Glamorgan.—One case of American foul brood has occurred in the last four years. In the past distinction has been made between European and American foul brood. In mild cases a period of queenlessness together with spraying of combs with IZAL and feeding of IZAL syrup is reported to have been successful.