Distribution of the Mistletoe

By D. J. COVE

In the winter of 1953-54 an enquiry was begun by the author into the status of the mistletoe (*Viscum album L.*) in the Bishop's Stortford district and this subsequently developed into a national survey through the co-operation of the Association of School Natural History Societies. The account below, which is reproduced by permission, is an extract from a fuller report which appeared in the Bishop's Stortford College Natural History Society's journal *COTURNIX* (1955/56). The enquiry, which is concerned with four main features of the mistletoe's mode of life: physiology, including its effect on the host-plant; factors affecting distribution; the host range; and evidence for and against the existence of physiological subspecies, is continuing, and records from our members would be welcome. They should be sent to Mr. A. Darlington, Biology Master, Bishop's Stortford College, Bishop's Stortford, Herts.—Editor.

FACTORS AFFECTING DISTRIBUTION

A DETAILED survey has been completed of the distribution of mistletoe in Hatfield Forest, a large area of open woodland and scrub containing a boating lake, accessible to the public, but protected to the extent that it is National Trust property. In this area, a very considerable number of hawthorns, five black poplars, and one each of horse-chestnut and walnut, are infested. The tallest of the hawthorns is c.25 feet, and all the infested trees appear to be old. A remarkable feature of the distribution in the forest is that a definite line can be drawn on a map to enclose all the parasited trees, the mistletoe being dense within the boundary line and totally absent outside it. It is apparent that the old hawthorns, many of which can be climbed with ease, are infested most heavily in the vicinity of the keepers' houses and along the main rides. Now, persistent attempts are made by visitors to gather the mistletoe in Hatfield Forest, but protection is enforced. If birds such as the mistle-thrush are the chief agents in distribution, then the parasite should germinate and reach maturity in most parts of the forest. Man, however, seems to be important as a biotic factor here, allowing it to grow only in areas where it is protected or inaccessible, and cutting it, wherever it is not, for decoration at Christmas.

Of the 831 infested trees reported as a result of the A.S.N.H.S. appeal, c.780 grew in property to which the public had limited access, c.30 in areas to which the public had free access, and the remainder were established in localities the nature of which was not recorded. This again seems to indicate that man is important as a biotic factor.

It has been observed that, on the larger trees, mistletoe tends to grow near the apex of the crown, or towards the sides, where it is beyond the easy reach of man. One possible explanation for this, which does not involve man, is that the light is too weak in the

centre of a tree for photosynthesis on the part of mistletoe. Another explanation might be that the birds distributing the seeds tend to frequent the outer parts of the tree's canopy.

THE HOST-RANGE

The "choice" of hosts shown by the mistletoe is one of the most interesting features of its mode-of-life, and the records of the 831 woody hosts which have come to hand have been sent in largely in response to the appeal for information by the Association. It is convenient to regard these plant forms as comprising 25 "types" (the term "species" cannot strictly apply in every case); and some idea of the mistletoe's adaptability can be gained from the fact that these include representatives of 13 different families of the *Spermatophyta*.

It is evident from the records submitted that, although *Viscum* parasitises a wide range of hosts, distribution through this range is very uneven. Of the 13 families involved, the *Rosaceae* alone account for nearly 70 per cent of the infested plants; and apple-trees (*Malus* spp.) are the commonest hosts by far (42 per cent).

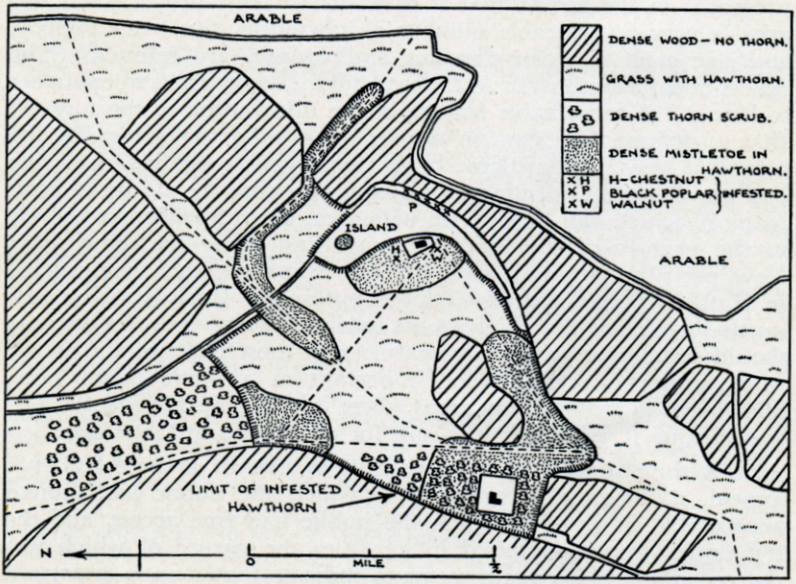

Fig. 1. DISTRIBUTION OF MISTLETOE IN HATFIELD FOREST. Note that it is strictly confined to the immediate localities of the main rides and the dwellings of the residents.

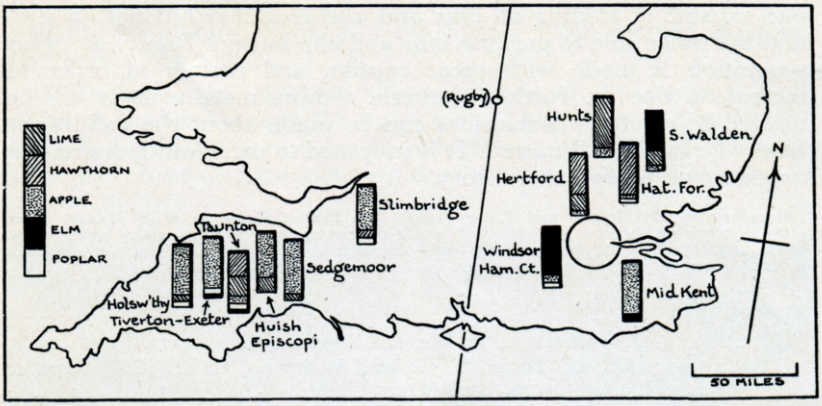

Fig. 2. DISTRIBUTION OF MISTLETOE AMONG FIVE MAJOR HOSTS IN CHIEF LOCALITIES FROM WHICH RECORDS HAVE BEEN SUBMITTED. In each block-column, the vertical value represents 100 per cent calculated on the basis of the number of trees infested.

Records of host-plants which are particularly worth noting include *Parrotia* (Cranbrook School), silver fir (*Abies alba* Mill.) (A. Darlington), and, in view of its association with mistletoe at the festive season, holly (*Ilex aquifolium* L.) (King's School Canterbury). In spite of all that one reads about the attention paid by Druids to mistletoe growing on oak, only a single case of an infested oak has been reported.

PHYSIOLOGICAL SUBSPECIES

Clapham recognises no subspecies of *V. album* native to Britain; but the present survey has produced some circumstantial evidence in support of the existence of "strains" differing in the range of hosts they infest. Thus, although apple is the commonest host over the country as a whole, the survey suggests that it is overwhelmingly so only to the west of a line Isle of Wight—Midlands, and that, east of this line, it is difficult to select a dominant host. Elm appears to be frequent as a host only in the vicinity of London. Again, our records appear to show that, in localities where apple and/or hawthorn are infested, the elm, although very common, is seldom parasitised; and vice versa. However, in localities producing either elm-infestation or that of apple or hawthorn, lime seems to be parasited on a small scale. A possible interpretation of this feature is that at least two physiological subspecies of mistletoe are involved,

one capable of feeding on lime and also *Rosaceae* but not on elm, and the other able to parasite lime and elm but not *Rosaceae*. This suggestion is made with great caution and mainly in order to indicate a line for further research. Many more records will be needed before firm conclusions can be made about the validity or otherwise of these "strains". It is proposed to carry out germination experiments to test the theory.

(According to McClintock and Fitter (1956) *The Pocket Guide to Wild Flowers* three races of mistletoe are now recognised of which the commonest grows on many broad-leaved trees, mostly apple and poplar, very rarely nowadays on oak; the others, very rare in Britain, grow respectively on pines and larches, and on firs. EDITOR)

BIBLIOGRAPHY :

(1) BARNES, B. Mistletoe, its life and legends. Discovery.
(2) CLAPHAM, A. R., TUTIN, T. G., and WARBURG, E. F. (1952) Flora of the British Isles, Camb. Univ. Press.

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