

OAK WOODS AND BIRCH WOODS

The following four papers are synopses of ones delivered in connection with the Annual General Meeting of the Society held at Monks Wood Experimental Station, Abbots Ripton, Huntingdon on 29th April, 1967.

BETULA L. IN BRITAIN

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Three species of *Betula* are native in Britain. One of these, the Dwarf Birch, *Betula nana* L., is almost restricted to Central and North Scotland, and is very distinct in its dwarf habit (and in other characters of leaf-shape and inflorescence); although hybrids occur locally with *B. pubescens*, it normally causes no taxonomic difficulty. The tree Birches, however, constitute a difficult taxonomic group which can only be understood on a world scale, and with cytogenetic, experimental study. To some extent we can be said to understand the broad outline of the picture.

It is possible to distinguish generally in Europe between a diploid species *B. pendula* Roth (*B. verrucosa* Ehrh.) with $2n = 28$, and a tetraploid aggregate ($2n = 56$), for which the name *B. pubescens* Ehrh. is best used. 'Pure' *B. pendula* is a tree up to 30 m, with slender, pendent, glabrous twigs beset with resin-glands, smooth silvery-white bark, dark bole with rectangular bosses, subglabrous biserrate leaves and a set of characters of fruit and catkin-scale. 'Pure' *B. pubescens* subsp. *pubescens* is a shrub or small tree up to 20 m with hairy, eglandular twigs not pendent, brownish or greyish bark, without rectangular bosses on the bole, with pubescent, coarsely serrate leaves, and other fruit and catkin-scale characters.

In areas of Europe where the native forest is relatively unaffected by man (e.g. Finland) there is little taxonomic difficulty in distinguishing between the two species, which are ecologically rather effectively separated, *B. pubescens* growing in wetter ground. In Britain, however, most Birch populations are secondary—Holme Fen is an excellent example—and many individual trees can be found with somewhat intermediate characters. The interesting questions relate to the nature and origin of these intermediates.

Johnsson (1944, 1945, 1949) gives an account of cytogenetic investigations in Sweden which, though incomplete, throw a good deal of light on the problem. It is extremely difficult, but not impossible, to produce a triploid F_1 hybrid ($2n = 42$) between *B. pubescens* and *B. pendula*; this plant is apparently completely female-sterile, and such plants have been found in nature. Some natural triploids with $2n = 42$ are not, however, the hybrid (which has obvious *B. pubescens* characters), but rather autotriploid *B. pendula*, differing mainly from the diploid in quantitative characters and sterility. Crosses involving the North American *B. papyrifera* threw some light on the micro-evolutionary relationships of the species; it seems likely that *B. pendula* (or other diploid taxa such as *B. japonica* Sieb., which is interfertile with it) is one parent of both the tetraploid *B. pubescens* and the hexaploid *B. papyrifera* ($2n = 84$).

The interesting question is: what is the other likely diploid parent involved in *B. pubescens*, or should we look for more than one to explain some of the enormous variability in the tetraploid? On purely morphological grounds the Central and East European shrub *B. humilis* Schrank is an obvious candidate; but, so far as I am aware, no genetical work has yet been done involving this species.

Cytological investigation of apparently hybrid populations in Britain could throw much light on the nature and extent of introgression from diploid to tetraploid, and the efficiency of isolating factors such as differing ecological preference, flowering time, etc. It is possible to get mitotic counts from young leaves (Skalińska *et al* 1959) so that some progress can be made in determining whether individual trees are triploid or not. Any 'hybrid-index' analysis of the field populations (cf Natho 1959) suffers from the severe disadvantage that our 'pure' reference-points are subjective . . . indeed, if some introgression is possible and if the tetraploid has a polytopic origin, we may be pursuing a will-o-the-wisp in looking for 'pure' *pubescens* at all!

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