

SAVERNAKE FOREST OAKS

By Dr. Jack Oliver and Mrs Joan Davies, B.Sc.

High View, Rhyls Lane, Lockeridge, Marlborough, Wiltshire, SN8 4ED, UK
Joan Davies, Ballard's Piece, Forest Hill, Marlborough, Wiltshire, SN8 3HN, UK.

Savernake Forest is in Wiltshire, south east of Marlborough. It is in the North Wessex Downs Area of Outstanding Natural Beauty and most of the present extent of Savernake Forest has been designated as a Site of Special Scientific Interest.

The history of the Forest goes back for a thousand years or more. It became a Royal Forest soon after the Norman Conquest and Richard Esturmy was appointed the first Warden. This Office has continued in the same family and they acquired absolute ownership of the Forest in the 16th century. The present owner is the Earl of Cardigan, who is the 31st hereditary Warden of Savernake Forest.

In 1939, the silviculture rights of the Forest were leased to the Forestry Commission.



The above aerial photograph was taken in November 1999.

The present extent of Savernake Forest is about 905 hectares. The forest lies on a plateau of Upper Chalk covered by Clay-with-Flints at about 180m above sea level. The area is dissected by dry valleys in which the Chalk is exposed. In addition, in the southern part, there are small deposits of Reading Beds and Bagshot Sands, together with the clay, which gives rise to particularly acid conditions.

In 1999/2000 Dr Jack Oliver carried out a survey of the oak trees in Savernake Forest. The results were published as 'Savernake Forest Oaks, by Jack Oliver and Joan Davies' in the Wiltshire Archaeological and Natural History Magazine, 2001. We expected to find all or most of the oak trees to be the Pedunculate Oak. Instead, following detailed examination of the leaves, leaf and acorns stalks, we found that the two native oak species were both common and regenerating naturally. The Pedunculate and Sessile Oaks occurred in roughly equal quantities, whether as veterans or as the much more numerous saplings. Neither species was as common as the hybrid between them *Quercus x rosacea*. Commonest of all were intermediate trees of all ages which appeared to be introgressed, hybrids back-crossed with either parent.

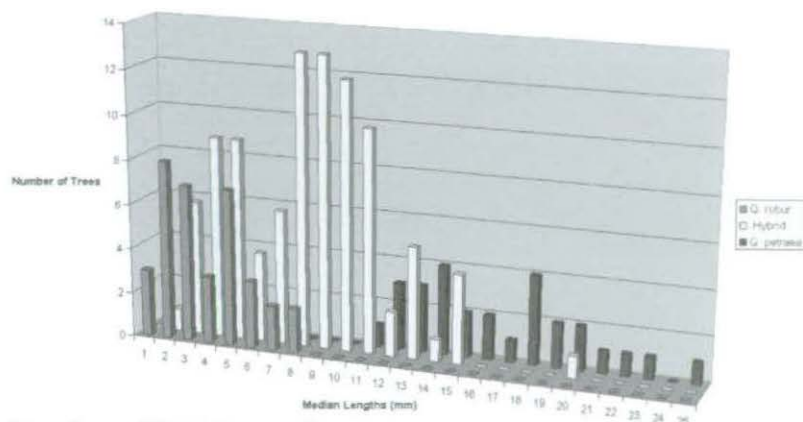
Identification

The main features scrutinized for each of the oaks were those that discriminate best between the two native oak species: petiole (leaf-stalk) lengths, peduncle (acorn stalk) lengths and pubescence (where available), leaf bases (two features) and pubescence or not on the underside of the leaves (examined by binocular microscope at $\times 30$ magnification). Some attention was also given to the number of leaf lobes and the depth and regularity of the leaf-lobing. Based on the preceding, the taxonomic designation was decided for each tree. On any one tree, pubescence and petiole length were much more constant than leaf shapes, leaf bases and peduncle lengths.

Petiole lengths

Specimens were taken from 159 of the largest oaks in Savernake Forest, usually one or more branchlets of average size and appearance for the tree in question, carrying between 5 and 40 leaves. The petioles were measured to find the minimum and maximum lengths for that tree, giving the spread (or range) from which the median value was calculated. There was found to be variation in both the petiole lengths and spread for different oaks. Some oaks (all *Q. robur*) had most leaves with no petioles, and at the other extreme there was a *Q. petraea* whose petioles reached 30mm.

Petiole Lengths



Three Types of Hybrid Intermediacy

1. Indeterminate Features

Petiole and/or peduncle lengths fitting neither *Q. petraea* or *Q. robur*; but between the two, very weakly cordate and auriculate leaf bases, leaf lobing and outline indeterminate, scattered very small 2 or 3-rayed stellate hairs only visible with a 15 or 20x lens on some leaves. Sometimes one character is fairly firm, but counteracted by others pointing to the opposite parent.

2. Discrepant Characteristics

There were 2 great oaks and several small ones with tiny or no petioles and without peduncles. An equal number had petioles over 15mm and peduncles over 30mm. There were some oaks fitting *Q. robur* in all respects except for dense sublaminar brush and stellate pubescence. Others had leaves like *Q. petraea* in outline, with long petioles, but were wholly glabrous.

3. Variable Features

Leaves were found which fitted *Q. robur* and/or *Q. petraea* on a single tree. Lammas leaves aside, seasonal and annual variability could be considerable. Petioles were usually shorter nearer the trunk. Peduncles varied most of all, from 0.1mm to 60-80mm on a single tree or even on one branch, especially when a proportion of acorns were stunted.



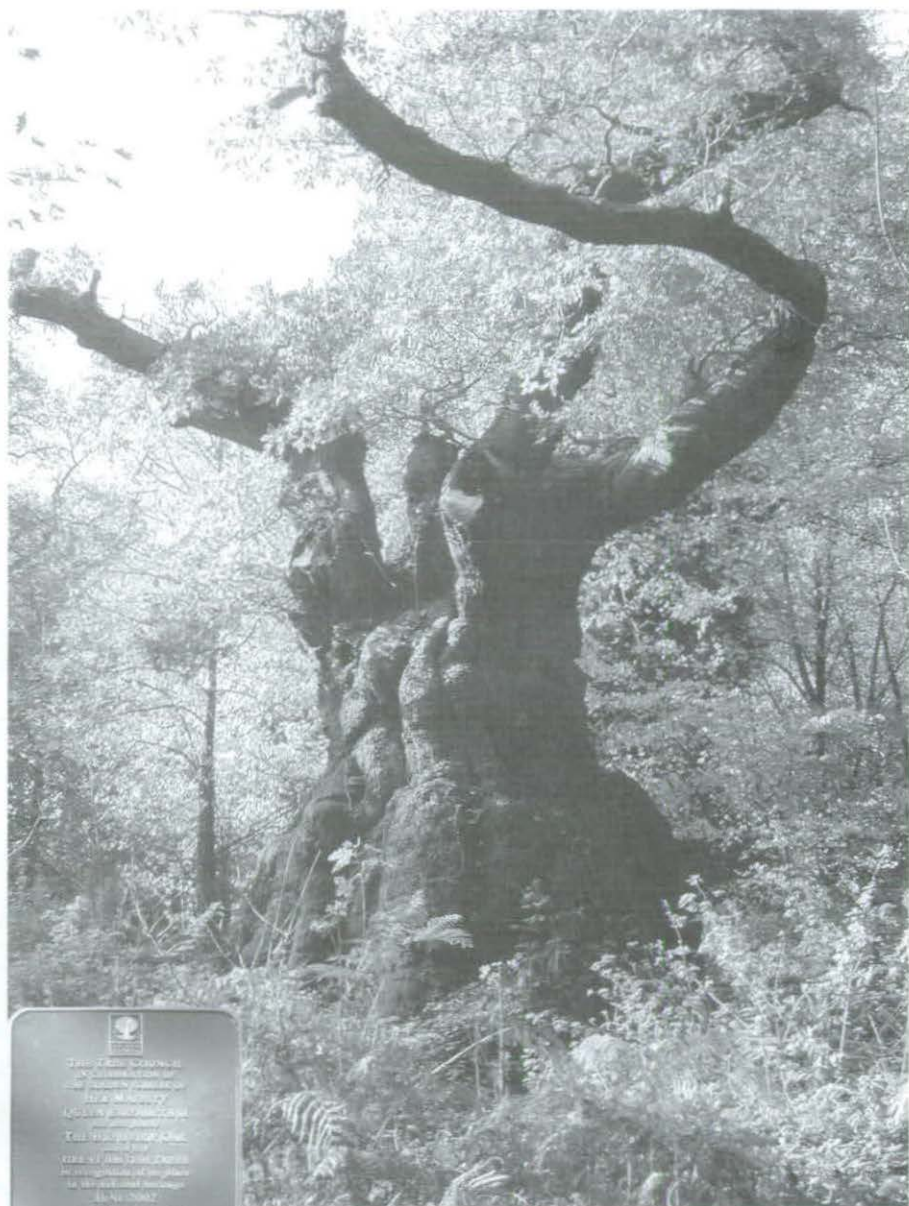
The Crockmere Oak, *Quercus petraea*, May 2000

photo © Joan Davies, 2000



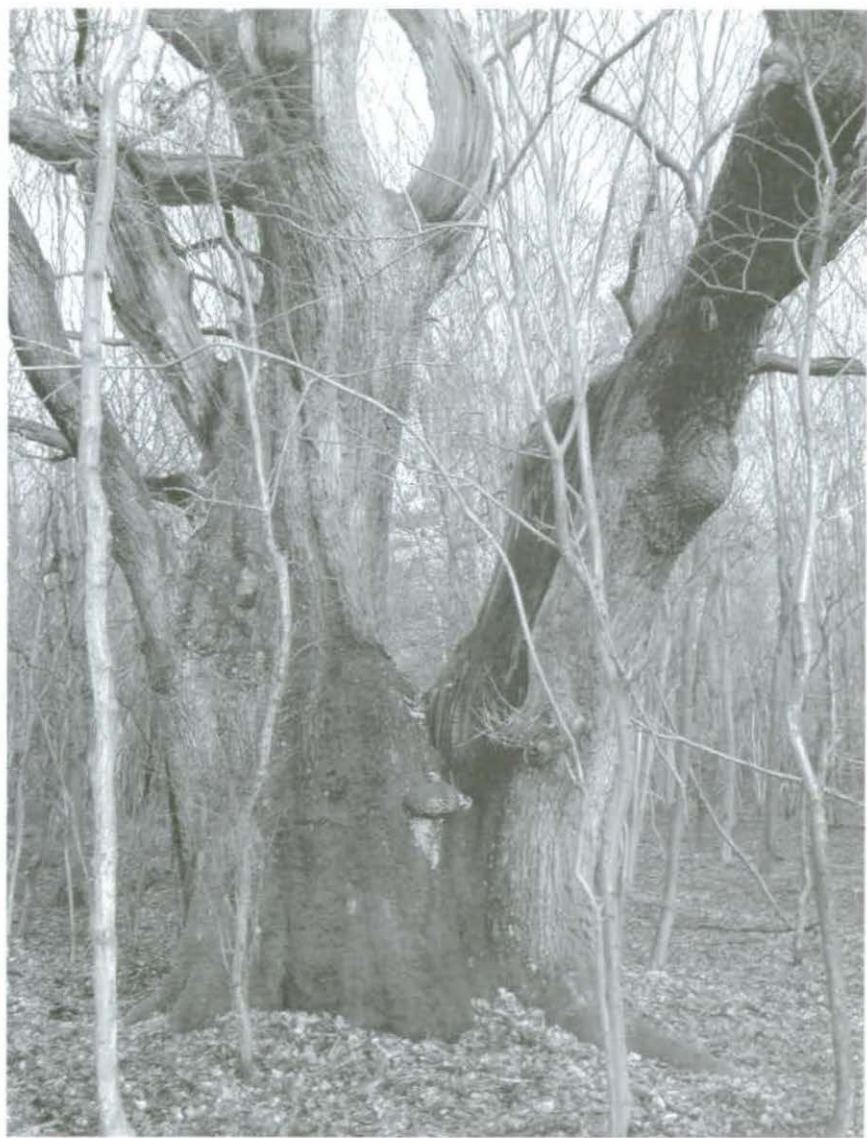
The Cathedral Oak, *Quercus robur*, May 2000

photo © Joan Davies, 2000



The Big Belly Oak, *Quercus x rosacea*, October 1999

photo © Joan Davies, 2000

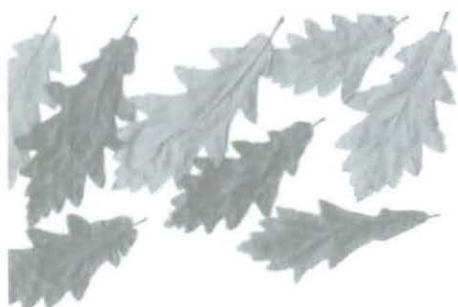


The Surveyed Oak, *Quercus x rosacea*, January 2001

photo © Joan Davies, 2000

THE BIG BELLY OAK

An example of Taxon Identification
using mid July sunlit leaves
and peduncles from the tree



Q. robur characteristics

Q. petraea characteristics



Leaf shape-Outline Most elliptic, some oblanceolate



Leaf shape-Base Nearly all cordate or subcordate, most obliquely so
(the cuneate one shown in the picture is exceptional)



Leaf auricles Nearly all leaves auriculate or subauriculate



Intercalary veins Variable on about half the leaves (but often weak)



**Leaf lobing
Numbers per side** Average 5.5



**Leaf lobing
Shape & dissection** Some triangular, most semi-regular, leaves not very
deeply incised



Petioles Very variable. 50% under 10mm, 50% over 10mm,
mostly near or just under 10% of leaf length



Leaf pubescence Laminar surface (underneath);
stellate hairs widespread 3-6 rayed.
Leaf vein sides & angles; vertical brush hairs, 3-8 rayed
& medusoid hairs (tangled & sinuous) 3-7 rayed.
Consistent for all leaves



Peduncles Variable, but few over 20mm.
However, mostly little or no pubescence



Overall *Q. x rosacea*, but just on the side of *Q. petraea*



The Original Cluster Oak,

Q. robur var *cristata* (Henry 1917)
Savernake Forest, August 2003



Leaves of the Original Cluster Oak
November 2001



The original Savernake Cluster Oak has completely glabrous leaves.

Most descendants derived by planting acorns from this original tree also have glabrous leaves, but the micrograph below shows an exception.



Hairs on the under surface of a leaf from
one of the six Savernake Arboretum Cluster Oaks

The longest brush hairs are 0.6mm & longest stellate hairs are 0.15mm.

This tree therefore must have *Q. petraea* or *Q. x rosacea* (more likely) as the pollen parent.
The photograph was taken by Jack Oliver using a Trinocular High Power Microscope with oblique side lighting

photos © Joan Davies, 2000

References

- Oliver J.E. 2000. *Quercus x rosacea* in Savernake Forest. *BSBI News* 84 31-34
- Oliver J.E. & Davies J.M. 2001. Savernake Forest Oaks. *Wilts Archaeological & Natural History Magazine* 94 24-46.
- Oliver J.E., Davies J.M & Titchen A. 2003. Cluster Oaks Originating from Savernake Forest. *BSBI News* 92 23-24