The production by woodpeckers (Picidae) of rows of 'peck marks' on the stems of healthy trees is well documented for various European countries such as Czechoslovakia (Turček 1954) and Germany (Gatter 1972). It is known as 'tree ringing' or 'drilling', and the Great Spotted Woodpecker *Dendrocopos major* is the species most commonly implicated; Turček considered the Black Woodpecker *D. martius* the second most important species, followed by the Green Woodpecker *Picus viridis* and the Three-toed Woodpecker *Picoides tridactylus*.

It is invariably stated that the holes are made for the purpose of obtaining...
Sap-sucking by woodpeckers

Row of 'puncture-type' marks on stem of young oak *Quercus* (4-cm diameter) (J. N. Gibbs) sap, as with North American sapsuckers *Sphyrapicus*, and there is certainly evidence for this. Turček (1954) reported a Great Spotted Woodpecker repeatedly returning to drink sap bleeding from a newly ringed maple *Acer*, and a sequence in Heinz Sielmann's (1973) famous film 'Woodpecker' shows a Middle Spotted Woodpecker *D. media* both ringing the bark and taking sap.

In this paper, I attempt to summarise the available information on this phenomenon in Britain and to discuss how far tree ringing is synonymous with sap-sucking.

Species of woodpecker involved

The only unequivocal sightings in Britain relate to the Great Spotted Woodpecker, which R. J. Jennings (1965 and *in litt.*) regularly observed pecking in Flaxley Woods, Forest of Dean, Gloucestershire, during 1959-65. He noted that the birds 'began at the top of the previous marks and worked downhill, just lowering themselves the length of their bodies when moving'. In 1963, G. J. R. Broadhead (1964 and *in litt.*) observed a Great Spotted Woodpecker at work for almost an hour in a young plantation of sycamores *Acer pseudoplatanus* at Wentbridge, South Yorkshire.
Nature of the damage

Fresh peck marks often have a sharp edge and seem to involve a simple puncturing of the bark, as if by a single blow (plate 44); sometimes, however, discrete pieces of bark are removed. The marks persist for many years, gradually becoming larger as the stem increases in size. If a stem is cut through a line of pecks, a corresponding fleck is usually found in the xylem of the year in which the mark was made (plate 45).

Tree species affected

Sample records of damage done to four different tree species in different locations are given in table 1.

Table 1. Sample records of peck-mark damage by woodpeckers (Picidae) involving a number of trees

Severity of damage is indicated by increasing number of crosses; damage illustrated in plate 46 would correspond to three crosses (++++)

<table>
<thead>
<tr>
<th>Tree species</th>
<th>Location</th>
<th>Age (yrs)</th>
<th>Approx. no. trees with damage</th>
<th>Average severity of damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caucasian lime</td>
<td>Hungerford, Wiltshire</td>
<td>15</td>
<td>35</td>
<td>+++</td>
</tr>
<tr>
<td>Tilia euchlora</td>
<td>Dyram, Avon</td>
<td>20</td>
<td>10</td>
<td>++</td>
</tr>
<tr>
<td>Pedunculate oak</td>
<td>Thetford Chase, Norfolk</td>
<td>20-40</td>
<td>500</td>
<td>++</td>
</tr>
<tr>
<td>Quercus robur</td>
<td>Alice Holt Forest, Hants.</td>
<td>40</td>
<td>100</td>
<td>++</td>
</tr>
<tr>
<td>Wych elm <em>Ulmus glabra</em></td>
<td>Crickhowell, Powys</td>
<td>20-50</td>
<td>20</td>
<td>++</td>
</tr>
<tr>
<td>Small-leaved elm</td>
<td><em>Ulmus carpinifolia</em></td>
<td>Alice Holt Forest, Hants.</td>
<td>15</td>
<td>20</td>
</tr>
</tbody>
</table>

*Note: * Damage to the small-leaved lime *Tilia cordata* on 'green healthy trees in full leaf' (Jennings 1965). Damage to this species has also been noted in Wiltshire and Gloucestershire (D. J. Rice in litt.). Peck marks have also been recorded on American lime *T. americana*, Oliver's lime *T. oliveri* (A. F. Mitchell in litt.) and Caucasian lime *T. euchlora* (plate 46). Examination of some rows of fresh marks on this last species in late June 1981 revealed the presence of small quantities of exudate on the bark just below the wounds; some fragments of bark had been removed. Heavy pecking of a lime in Leigh Woods, Somerset, was described by Wynne-Edwards (1933), but the species of lime was not identified.
Multiple rows of peck marks on 15-year-old Caucasian lime *Tilia euchlora*. With this species, fragments of bark may sometimes be removed (J. N. Gibbs).

Peck marks are very common on pedunculate oak *Quercus robur* in parts of southern England. Sections cut through trees from the Forest of Dean and Alice Holt Forest, Hampshire, show that they may be made in both dormant and growing seasons, and that the same tree may be revisited year after year and new rows of marks created. All damage seems to be of the puncturing type, and no exudation has been observed. Wounds made in June and July may...
be utilised for egg-laying by a gall midge *Resseliella*, and sizeable cankers can be formed (Gibbs 1982). The North American red oak *Q. rubra* may also be heavily pecked.

**ELM** Elm is evidently favoured. In Savernake Forest, Wiltshire, abundant peck marks were noted on the stem of a wych elm *Ulmus glabra*, while oaks of a similar size in the immediate vicinity were unaffected. As with oak, marks are of the puncturing type. Pecking on elm may result in the formation of cankers (plate 47), similar to but much smaller than those found on oak, and a species of *Resseliella* again appears to be responsible (J. N. Gibbs, unpublished data). Dutch elm disease has caused a dearth of elms of suitable size in much of southern Britain, and this may well have resulted in more pecking activity on other species.

**SYCAMORE** Serious damage to many young sycamores at Wentbridge occurred during the very severe winter of 1962/63. Single scattered wounds were observed at various points on the stem, and a single complete ring of marks at about 1.5 m. A discrete piece of bark had been removed at each point and allowed to fall to the ground. Sap flowing copiously from the complete ring saturated the bark (Broadhead 1964; R. T. Hurst, unpublished). As mentioned above, a Great Spotted Woodpecker was observed at work in the plantation.

In more recent studies by Dr J. Rishbeth (in litt.), in a stand of self-sown 20-year-old sycamores in the Brandon plantation, King's Forest, Norfolk, pecking activity appears to have begun in 1965 and to have continued for about ten years. In February 1970, fresh wounds involving the removal of fragments of bark were discovered; on one tree, sap was exuding from a row of marks at 0.9 m, but not from a similar row at 1.5 m. The only other record on maples in
Rows of peck marks on lower trunk of *Populus × berolinensis*. It is likely that these pecks were made at least ten years before the photograph was taken (J. N. Gibbs).

Britain is for the sycamore cultivar ‘Prinz Handjery’ at the Hillier Arboretum in Hampshire (A. F. Mitchell *in litt.*).

**OTHER SPECIES** Poplars may be quite conspicuously marked: two free-grown specimens of *Populus × berolinensis* at Alice Holt are covered with dense rows of peck marks from 8 m down to ground level (plate 48). Damage has also been recorded on willow *Salix*, but care should be taken not to confuse the conspicuous lenticels with peck marks (plate 49). Certain exotic trees
are attacked very commonly: these include Chilean beech Nothofagus procer/N. dombeyi, and Nyman's hybrid Eucryphia. There are also occasional records for box Buxus sempervirens, sweet chestnut Castanea sativa, ash Fraxinus excelsior and acacia Robinia pseudoacacia (A. F. Mitchell and G. Tuley in litt.).

Geographical distribution of damage
Most of the records have been in southern England. My colleagues and I, however, have seen peck marks on wych elm in Powys, Shropshire and Cumbria. Damage has also been recorded on poplars at Appin Wood, Argyll (J. Boluski in litt.); this could have been made only by the Great Spotted Woodpecker, as the ranges of the other woodpecker species do not extend so far north in Britain (Sharrock 1976).

Comparative records for Europe
The preferred tree species in Britain are also commonly attacked in Europe: in central Europe, Turček (1954) listed lime, oak and maple among the four favoured broad-leaved genera; the other genus is birch Betula, for which there is as yet no record for Britain. In Baden Wurtemberg, Gatter (1972) listed wych elm, oak, lime and Norway maple A. platanoides as the most important species. Zycha (1970) described the anatomy of peck-mark damage on red oak, and showed a photograph of small cankers on wych elm that are very similar to those in plate 47. Pecking on oak is also reported from central France (Morelet 1980). In Europe, pines Pinus are often attacked, as also are silver firs Abies alba and spruce Picea (Turček 1954, Zycha 1970). There are also occasional records for a wide range of native and exotic species.

Turček (1954) considered that most ringed trees were abnormal in shape or appearance, or were growing on unsuitable sites. This contrasts with our experience, where many pecked trees are well-grown individuals in parkland or hedgerow, or are dominant trees at the margins of plantations.

The role of spotted woodpeckers in North America
The behaviour of the Great Spotted Woodpecker in Europe prompts a comment on the situation in North America, where there has been some controversy as to whether the allied Hairy D. villosus and Downy Woodpeckers D. pubescens are ever responsible for sap-sucking. Since the work of Townsend (1932), it has been assumed that all rings of holes are made by the true sapsuckers Sphyrapicus. Ohman & Kessler (1964), however, reported on 'bird peck' damage to sugar maple Acer saccharum in the Upper Peninsula of Michigan, where there were differences in the 'timing, pattern and portion of the tree attacked' from that observed with the Yellow-bellied Sapsucker S. varius. It is particularly interesting to note that the marks comprised single rows of small holes, and that they were made so early in the season that it was somewhat difficult to reconcile them with the arrival of the Yellow-bellied Sapsucker from its overwintering grounds in the south. The possibility that the holes could have been made by a resident spotted woodpecker merits examination.

The reason for pecking
A clear distinction must be made between pecking of sycamore (and other
maples) and pecking of certain other species such as oak and elm. On sycamore, the activity takes place in the dormant season and involves bark removal; whereas on oak and elm much of the activity occurs in the summer, and the wound often involves only a simple puncturing of the bark. Maples, including sycamore, are unusual among trees in that, when the right climatic conditions prevail during winter, they will yield abundant
xylem sap (the basis for the maple sugar industry in North America). It seems probable that certain populations of woodpeckers have learnt that sycamores can be sources of moisture at a time when open water is frozen. This would be consistent with Broadhead’s (1964) report that the birds made trial pecks down the stem until they reached a level at which a copious flow of xylem sap occurred. As the observations of Rishbeth indicate, the rate of sap exudation can be greater near ground level than higher up the stem.

With species such as oak and elm, xylem sap is not available at any time of the year. Wounds in late summer can, however, result in the exudation of small drops of phloem sap. Perhaps it is this that the woodpeckers are seeking. Alternatively, pecking on these tree species might have no nutritional purpose. It seems likely that further information on this problem can be obtained only by detailed observations of woodpeckers at work. It is hoped that this review will stimulate ornithologists to carry out such studies.

Acknowledgments

This paper is compiled from observations made by many people and I am very grateful to them. I should like to express particular thanks to my colleagues Hugh Insley, Alan Mitchell and Graham Tuley for much information and helpful discussion. I am also very grateful to Dr John Rishbeth of the University of Cambridge for the detailed account of the damage to sycamores in Norfolk.

Summary

In Britain, the Great Spotted Woodpecker *Dendrocopos major* produces rows of 'peck marks' on the young stems of trees. Commonly affected genera include elm *Ulmus*, lime *Tilia*, oak *Quercus*, poplar *Populus* and sycamore *Acer pseudoplatanus*. On sycamore, pecking occurs in winter, and there is little doubt that xylem sap is taken. It is not clear, however, whether 'sap-sucking' is the reason for pecking activities on other trees such as elm and oak. More observations of the birds at work are required.

References


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