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HEDGEROW SHRUBS AND LANDSCAPE HISTORY: SOME SHROPSHIRE EXAMPLES

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ABSTRACT

This paper examines the diversity of hedges in both upland and lowland areas of Shropshire in relation both to natural factors and landscape history. Diversity is only weakly related to age, and even this relationship is confounded with mode of origin of the hedges concerned. In lowland areas, old lane hedges and those from assarted woodland are richest, and contain woodland species rare elsewhere. Hedges from regular enclosures are poorer, although those on former common pasture are richer than those on one-time open fields. Smallholders' hedges are somewhat intermediate, and contain many useful species.

The upland pattern is similar, except that diversity is usually greater because of the presence of upland species with good colonising powers. These results are compared with those from elsewhere, and the value of hedgerow shrub analysis as a tool for landscape historians is discussed.

INTRODUCTION

Recent studies have shown that the age and mode of origin of a hedge influence the diversity and composition of its shrub flora. Hooper (1970) has shown that the number of species in a standard 30 yard (c.27m) length is strongly correlated with the age of the hedge (dated from documentary evidence). He has suggested that the formula: number of shrub species per 30 yard length × 100 = age of hedge in years can be used to give an approximate age to a hedge for which there is no documentary evidence, at least in areas where a similar relationship based on historical evidence is known to hold: the East Midlands, Kent and Sussex, and Devon. The underlying cause of this relationship is the planting of a single-species hedge which then acquires extra species by colonisation (Pollard, Hooper & Moore 1974).

Pollard (1973), however, has found that some Huntingdonshire hedges, associated with former woodland, are richer in species than those planted in open land and have species of shrub and herb indicative of woodland origin. Such hedges are comparatively rare in the "planned landscape" (Hoskins 1955) of the East Midlands, and they are also much older than the much more frequent hedges resulting from the organised enclosure of the medieval open-field systems. Consequently, their presence does not have much effect on the general relationship described by Hooper.

In Shropshire, however, the age/species diversity relationship does not appear to hold (Pollard, Hooper & Moore 1974). Woodland relic hedges do differ botanically from others (Helliwell 1975), and they are more frequent in the "ancient countryside" of assarts, early piecemeal enclosures and smallholdings characteristic of Shropshire (Hoskins 1955, Rowley 1972). Further, documentary evidence shows that multi-species planting has been common (Plymley 1803).

Shropshire is thus unlike other areas surveyed in detail. We present here the results of hedgerow surveys in various parts of Shropshire, relating them to documentary evidence of landscape history, and assessing their value as an aid to the landscape historian.

THE STUDY AREAS AND THEIR LANDSCAPE HISTORY

The Shropshire landscape contains a variety of hedge patterns, resulting from the enclosure of medieval open fields, from the assarting of woodland, and from the colonisation and improvement of heath and waste. All of these patterns have occasionally been modified to suit changing agricultural needs.

It is a particular feature of the county that these different patterns can be found close together, often within a single parish or township. This contrasts with parts of the southern and eastern Midlands in which large areas show a single pattern of landscape history. The largely pastoral economy of the county accounts for much of this: access to extra waste and woodland eliminated the need for a strictly regulated rotation, and enclosure of open-field systems is generally early, often piecemeal and usually by private agreement rather than by Parliamentary Award.

Our study areas were chosen to represent a range of landscape history, climate and soil typical of the county (Figure 1). In general, we have taken areas with at least some documentary evidence of landscape history, but two areas near Clun and Ludlow without such evidence are included for comparative purposes.

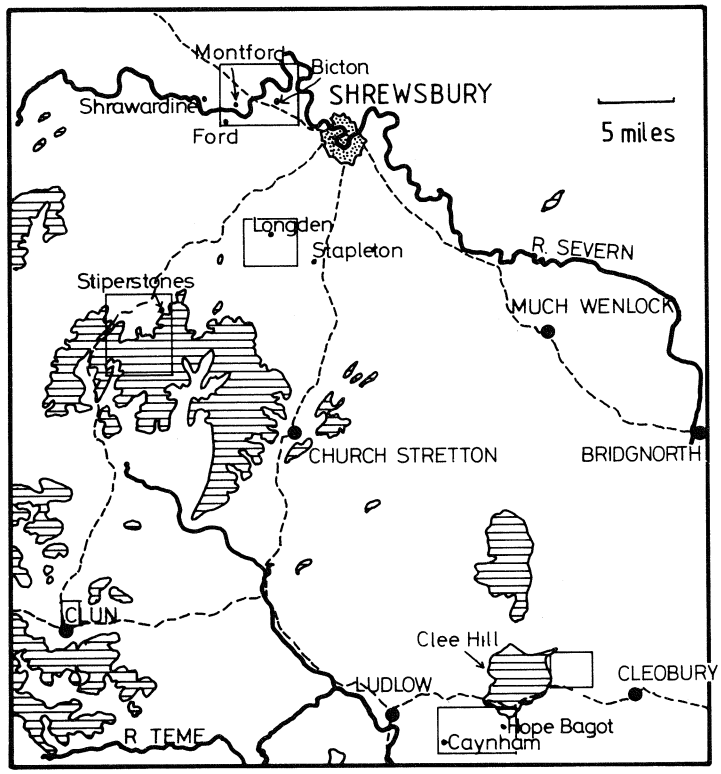

FIG. 1.

A map of southern Shropshire, showing location of study areas (boxed). Land over 300m hatched, major roads shown as dotted lines.

1. *The lowland areas: Montford, Bicton and Longden parishes*

Montford and Bicton are adjacent and are taken together (Figure 2). The ancient township of Bicton and Calcott was once part of the parish of St Chad, Shrewsbury. Bicton village stands on a well drained moraine ridge, and in the Middle Ages was surrounded by three open fields, whose extent can still be traced from field names and traces of ridge and furrow. Enclosure was by private agreement; parts of the system were still open in 1694 (Deed, CRO), but the whole had been enclosed by 1724, and divided between four farms in a manner which has survived with some modification to the present (Paddock Deeds). The initial enclosure produced very irregular farm boundaries so that the process of exchanging detached closes had to continue (Deeds SPL ref 1320) and the last such exchange in 1845 (Paddock Deeds) also involved the insertion of an extra hedge. Further additions resulted from the diversion of the main Holyhead Road in 1835 as part of Telford's scheme of improvements (Deposited plans CRO).

Earlier hedges may be incorporated in the enclosure, particularly those between

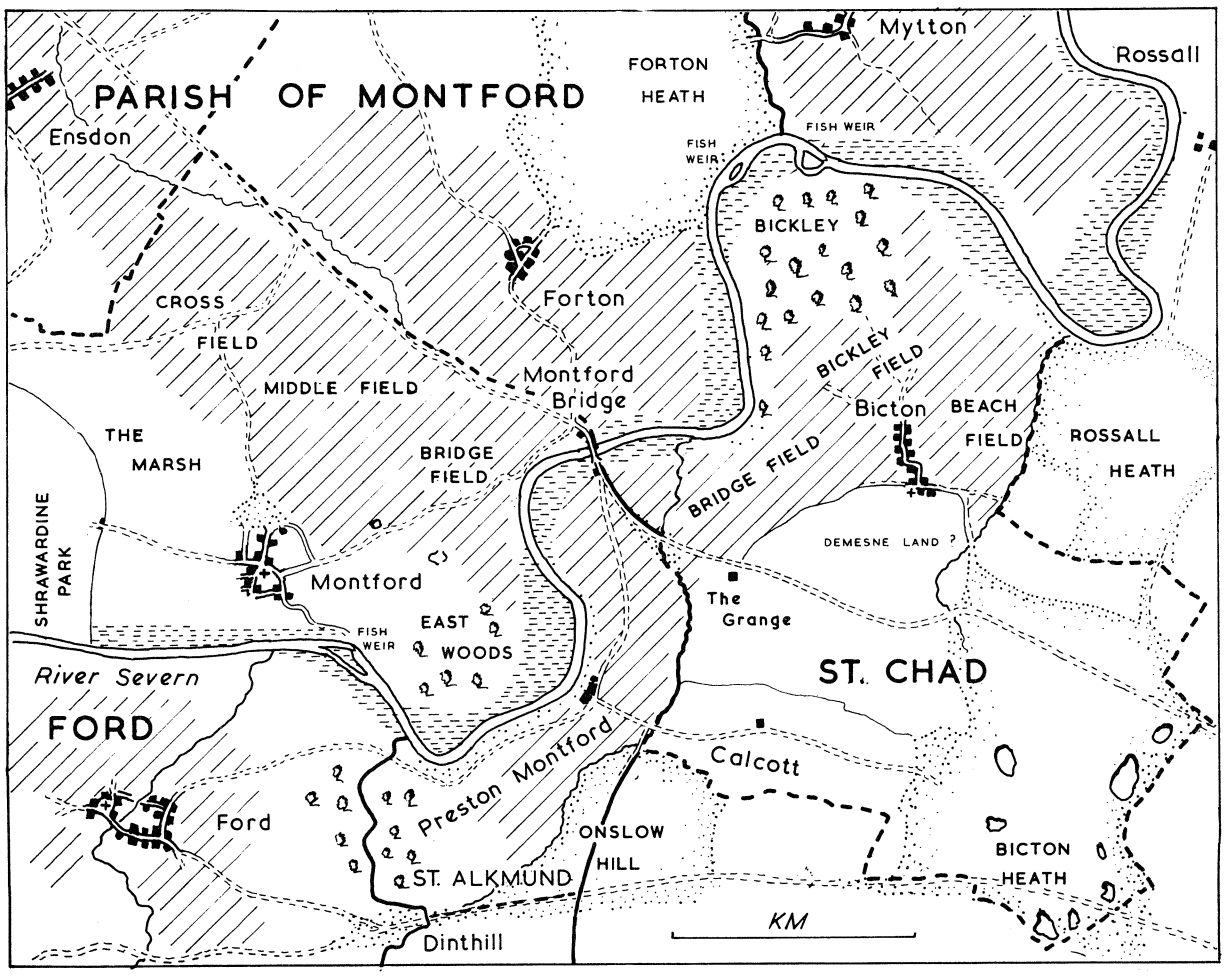

FIG. 2.
A map of the Bicton-Montford area

the open fields (if present), but only one old boundary can be clearly recognised, running from the village to Grange Farm. It has a crooked line, and even where destroyed its site is marked by a lynchet. The clearest evidence of ridge and furrow is found north of this boundary only, and it seems possible that it marks the northern limit of demesne land, or of Grange Farm, probably founded by Buildwas Abbey, to which most of the manor had been granted in the twelfth century (VCH Salop. Vol II).

Boundaries in the vicinity of Bickley Coppice may also be older—the woodland was larger in the Middle Ages, judging by field shape and lack of ridge and furrow, and some of these fields might be classed as assarts.

The south-eastern part of Bicton was heath in medieval times, rendered difficult land by impaired drainage and kettle-holes. Early encroachments are mostly irregular smallholdings exploiting better patches; the whole heath was enclosed systematically in 1768 (Award CRO)—leaving us the regular minor roads and rectangular fields.

The history of Calcott is obscure, but both the lane to Preston Montford and the boundary between Calcott and Grange Farm may be ancient.

A number of hedges in Bicton have disappeared in the last 30 years.

Montford has a similar early history. The open fields to the north of the village were enclosed in the early eighteenth century (Glebe Terrier 1685, Estate Map 1728, Powis collection CRO). The initial enclosure pattern did not persist, however. The estate was acquired by Robert Clive in 1762, who subsequently reorganised the farm boundaries in 1771. This allowed further improvements of hedge layout by stages during the following century, including a well documented reorganisation of old hedges on the site of the open fields in 1881, (leases of 1771, Tithe map 1846, CRO and Anon 1884). Virtually the only very old hedges remaining are along the lanes, which still show crooked lines typical of a medieval origin in contrast to the straighter patterns on either side.

Longden (Figure 3) has a pattern of landscape history common to most parishes of Ford and Condover hundreds (VCH Salop VIII). The small open field system was enclosed by the seventeenth century, and the common, derived from woodland, in 1804, while the western part of the township was assarted, probably in the fourteenth and fifteenth centuries.

2. *The upland areas:- The Stiperstones and Clee Hill*

The higher parts of the south Shropshire Hills were woodland and waste in the Middle Ages, and were gradually cleared and used as common grazing. In the Stiperstones area (Figure 4) such commons were widespread (Pannett 1969). As mining expanded in the region in the eighteenth and nineteenth centuries, such land was used for cottages and smallholdings by the new mining population, leaving a distinctive pattern of field shapes, even in areas above 300 m (Pannett, Thomas and Ward 1973). At Stapeley the earliest intakes were made before 1734 (Kinton map, 1734 CRO) on the most favourable land; others were added later (Chirbury tithe map 1843 Hereford CRO), but most of the common has remained open. Some nearby commons, however, were enclosed by Parliamentary Act and Award in 1820, producing a characteristic landscape of straight roads and large, regular fields. (Inclosure Award 1820 CRO). At Pennerley, near the Stiperstones, encroachment of commons was progressive over a sixty year period, the earliest being low down, and

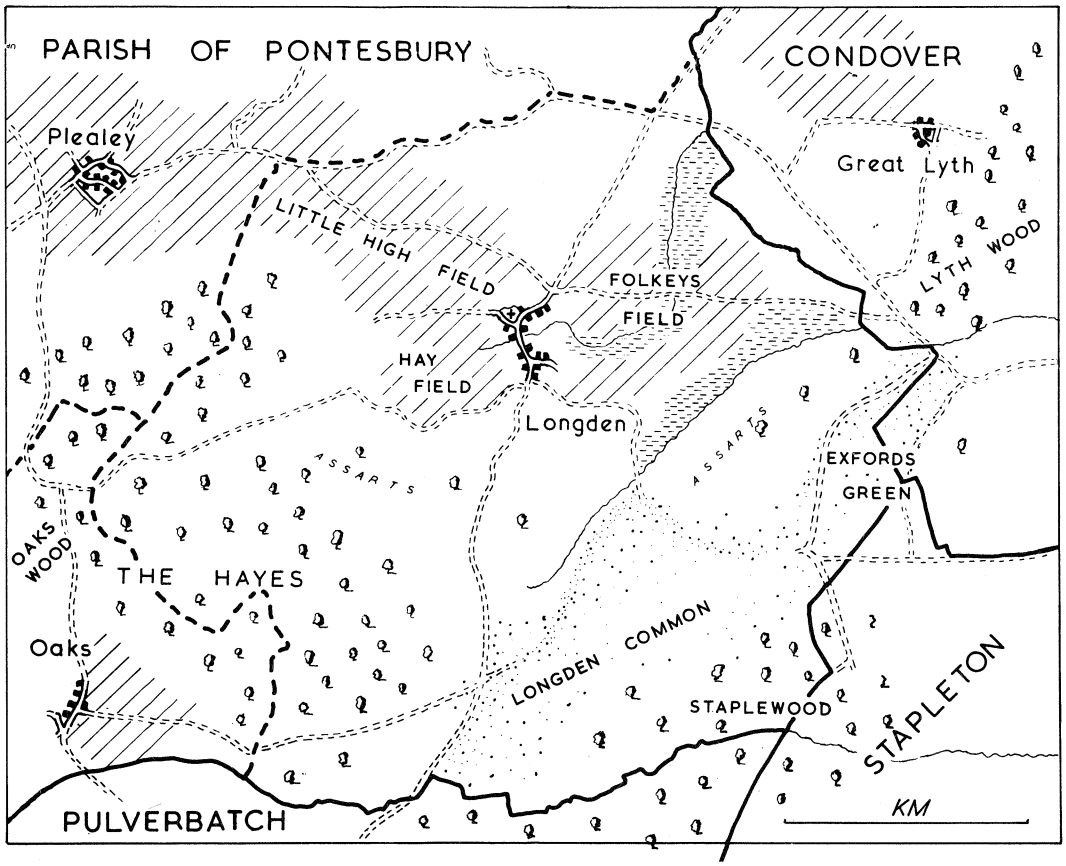

FIG. 3.
A map of the Longdon study area

the latest well over 400 m up (Ordnance Survey field sheets 1816-32, Worthen tithe map 1847, Hereford CRO. Ordnance Survey 1881 6″ to mile).

The enclosed land below and to the west of the Stiperstones lay in the old forest of Hogstow, part of the demesne of the Norman lordship of Caus. The woodland was being assarted during the later Middle Ages, (Anon 1951) and also in the late sixteenth century when the old estate was broken up (VCH Salop VIII). The basic enclosure pattern seems to have been complete by the mid-eighteenth century, if not earlier (Tankerville Survey 1797), but the early, irregular fields of Hogstow Farm were subsequently subdivided again in the mid nineteenth century to provide more smallholdings for the local mining community (Pannett, Thomas and Ward 1973).

The south-eastern slopes of Titterstone Clee Hill are subject to impeded drainage, and there are wet heath areas and other areas of poor soils at much lower altitudes than on the Stiperstones (c.200 m) (Burnham and Mackney 1964). Most of the area sampled lies in Hopton Wafers parish (Figure 5), and includes the still unenclosed Catherton Common, which is dotted with irregular smallholdings associated again with a local early mining industry, in this case coal (Rowley 1972). Oreton Common nearby was regularly enclosed in 1850, and there are a few other modern enclosure hedges. The area is traversed by a number of old lanes, often with substantial banks

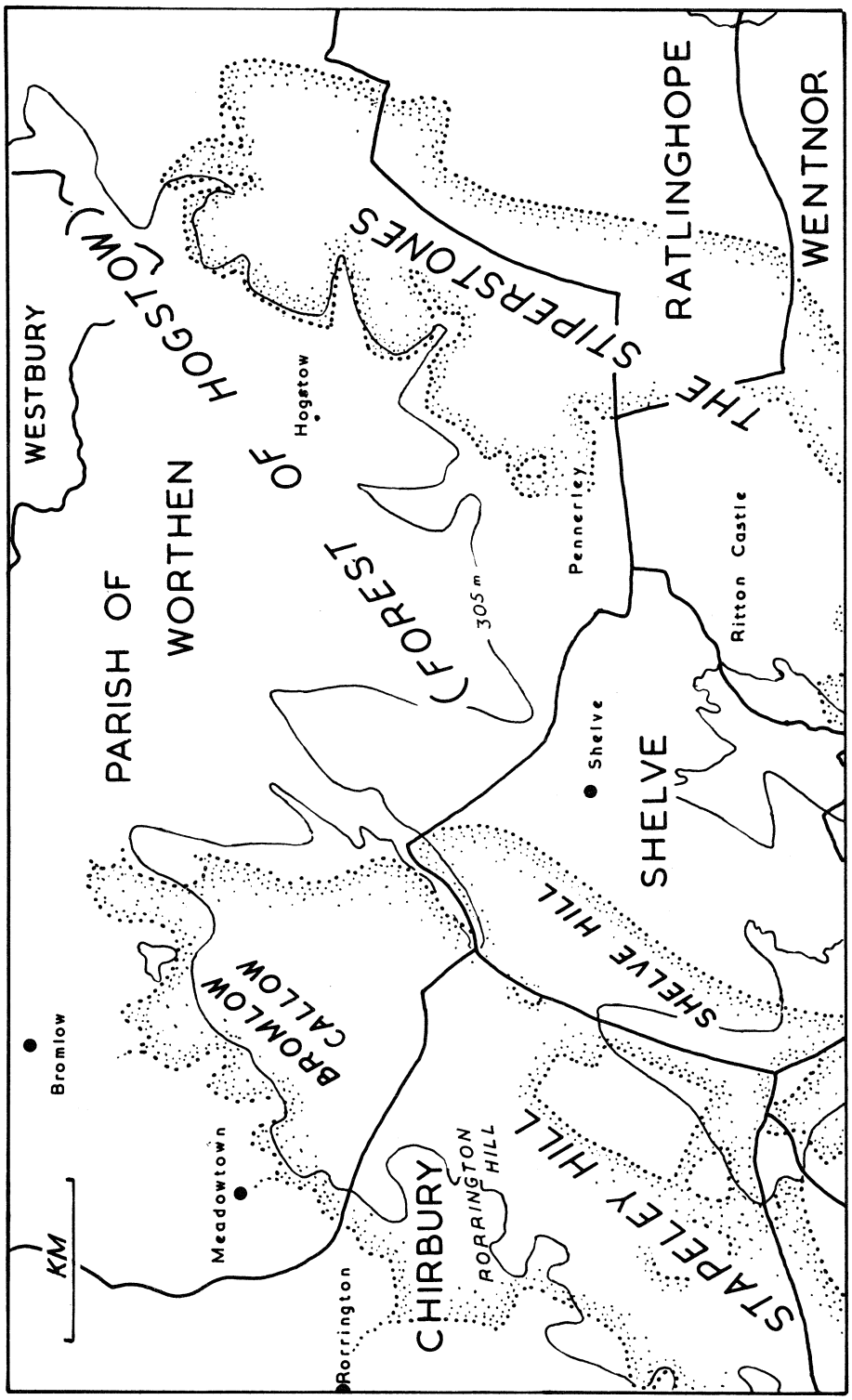

Fig. 4
A map of the Stiperstones study area

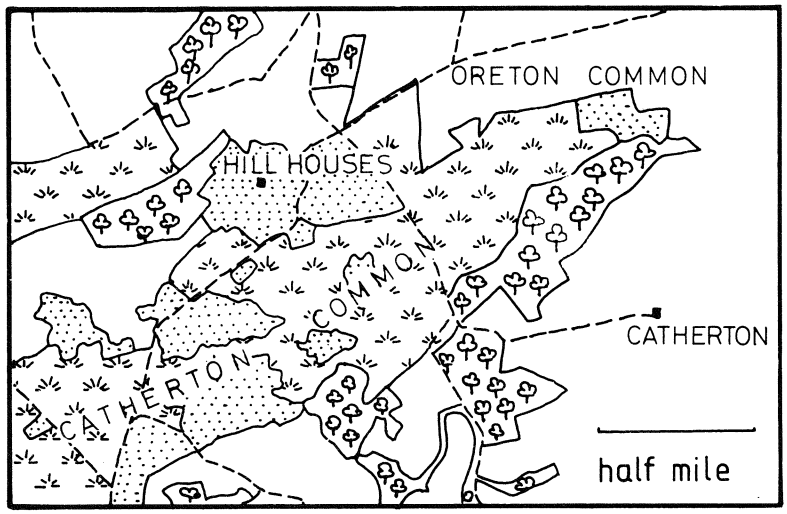

FIG. 5.

A map of the Clee Hill study area. Roads shown by dotted lines. Present land use is indicated by symbols: blank areas=regular enclosed fields; spotted=irregular smallholdings; tussocks=unenclosed commons; trees =woodland.

and ditches. Some samples from these lie south of the commons, possibly passing through the one-time open fields of Hopton Wafers.

3. *Undocumented areas*

At Clun, we can divide our samples into those from old lanes and those from obvious regular enclosures, probably of the nineteenth century. The previous history of the enclosures is unknown.

In the parishes east of Ludlow, the only documentary evidence we have comes from tithe maps of the mid-nineteenth century, which reveal a landscape similar to that of the present. The rather irregular field pattern does not suggest late enclosure, but we do not know if the many townships in the area had open-field systems. The present settlement pattern is scattered.

METHODS

Thirty yard (c.27 m) sections of hedgerow were placed and their tree and shrub species recorded using the methods of Pollard, Hooper and Moore (1974), who give an example of an appropriate recording form. No attempt at random sampling was made, as even randomly selected lengths in the same area may not be independent in origin. The main restrictions in choice of sampling length are (i) that choice of length should not depend on prior inspection of the hedge, and (ii) that intersections with other hedges should be avoided. All woody plants were recorded, but only those regarded by Pollard, Hooper and Moore (1974) as hedging species were used in analysis; which excludes brambles and climbers such as ivy, honeysuckle and clematis.

Some species present difficulties of identification. Nearly all oaks were pedunculate *(Quercus robur)* or hybrids and were always scored as one species. Both common elm *Ulmus procera* and wych elm *U. glabra* occur, but there were occasional ambiguities in student records and all elms are counted as one species. Both are

planted, but reliable records of *U. glabra* are particularly common in woodland relic hedges. Roses *Rosa* spp are all regarded as one species following Pollard, Hooper and Moore (1974), while willows *Salix* spp were counted as either long leaved (white willow group) or broad leaved (sallow group), the latter being much the most frequent. Downy and silver birches *Betula pubescens* and *B. pendula* were reliably distinguished, but virtually never occurred in the same sample—downy birches were frequent in the wetter parts of Catherton Common and silver birches in drier areas elsewhere.

The samples were mostly made by teams of adult students attending courses at Preston Montford Field Centre and at Ludlow, but samples made by RADC during a study of hedgerow snails (Cameron, Down and Pannett in preparation) are included. Plant nomenclature follows Clapham, Tutin and Warburg (1968). (Appendix A).

RESULTS

1. *Lowland areas: Bicton, Montford and Longden*

There are 138 samples from this area. Additional samples from the undocumented Upper Calcott area of Bicton are discussed briefly later. Ninety-five samples come from dateable hedges. The undated samples are from old lanes and the possible demesne boundary (Bicton), which are probably very old, and from smallholdings. Figure 6 shows the relationship between number of shrub species and age of hedge for all dateable samples.

Describing and testing this relationship presents problems. Hooper (1970), using similar data from elsewhere, has calculated the regression of age on number of species, using the latter as the independent variable (for a statistical explanation see

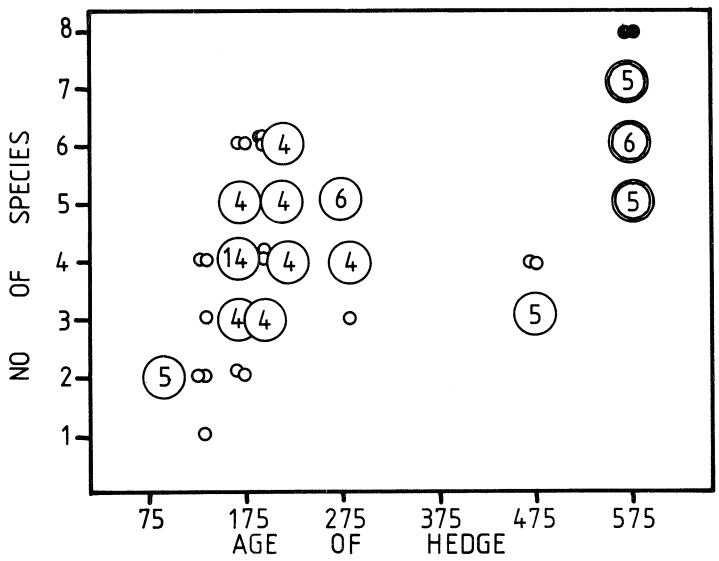

FIG. 6.

The scatter of number of shrub species on age of hedge in the lowland study areas. Numbers inside large circles indicate number of hedges lying on the point. Small open and single large circles=enclosure hedges. Small filled and double large circles =assart and old lane hedges.

Campbell 1967). This is a sensible procedure when observed data on species are being used to predict age, but in biological terms it is clear that number of species is dependent on age, and not *vice versa*. For Hooper's data, the regressions of age on species and species on age give very similar results, (Hooper, *personal communication*) but for our more variable data they do not (Table 1a). In both cases, there is a highly significant positive association of age and number of species, but the rates of increase of species with age differ considerably, as do their estimates of the number of species in a newly made hedge. In either case, the association has low predictive value for individual samples: for a hedge with 4 species, for example, the 95% confidence limits of the predicted age span 520 years.

There is a further difficulty. We have two kinds of hedge—those planted during the enclosure of open land, and those resulting from the assarting of woodland. The assart hedges are also the oldest hedges, and inspection of Figure 6 suggests that it is the contrast between these two types of hedge which contributes most to the species/age relationship. Recalculating both regressions without the assart hedges (Table 1b) confirms this. Neither is significant for enclosure hedges alone.

Table 1. *Regression analyses of the relationship between age of hedge and number of shrub species in the lowland study area, where y=a +bx. 95% confidence limits for values of y are minimal at the mean value of x; they will be slightly larger at the extremes (Campbell 1967).*

	(a) All samples n=95		(b) Enclosure hedges only n=77	
	Species (y) on age (x)	Age (y) on Species (x)	Species (y) on age (x)	Age (y) on Species (x)
Intercept a (value of y when x=0)	2.81 species	6.08 years	3.48 species	180.6 years
Slope b	0.0054	64.36	0.0021	9.68
Standard error of b	±0.00077	±9.12	±0.0017	±7.82
Student's t	7.04	7.05	1.24	1.24
Probability	<0.001	<0.001	ns.	ns.
95% Confidence limits for y at mean value of x	±2.40 species	± 262 years	—	—
Change in mean no of species per 100 years	0.54 species	1.55 species	—	—

Table 2 shows species composition and mean number of species by hedgerow category and area. There are no significant differences in mean number of species between the two areas for hedges of the same type, but there are between types in both areas. "Demesne" hedges are richest, and assart and old lane hedges are richer than those from regular enclosures. Within the enclosure hedges, smallholders' hedges are richer than those of regular enclosures on commons and heaths (and this is true even for the regular enclosures of smallholders' allotments resulting from the enclosure of Forton Heath in 1780), while the open-field enclosures are poorest, even where they pre-date the enclosure of commons (especially Longden).

The species composition of assart and old lane hedges are also very similar, even where the latter pass through areas of one-time open field. Dog's mercury *Mercurialis*

Table 2. *Sample details for the lowland area. Frequencies of very rare species omitted.*

% frequency of species	Longden			Bicton & Montford					
	Assarts	Old Lanes	Open Fields	Commons	Demesne	Old Lanes	Open Fields	Commons	Small-holdings
Ash	22	8	0	13	25	18	14	24	50
Blackthorn	89	100	57	48	75	91	46	6	78
Crab Apple	11	0	0	0	0	9	0	0	11
Dogwood	11	0	0	0	75	0	0	0	6
Elder	28	33	0	9	75	45	57	53	33
Elms	0	25	0	9	75	18	18	12	33
Field Maple	33	58	0	0	50	64	4	6	11
Hawthorn	94	100	100	100	100	100	100	100	100
Hazel	89	67	29	9	100	91	7	6	39
Holly	67	58	14	26	0	18	14	41	67
Oaks	50	67	29	35	50	36	14	71	11
Roses	72	83	100	96	100	82	43	88	78
Sycamore	5	17	0	57	0	0	4	18	17
Willows	44	0	0	9	0	0	0	0	0
No. of samples	18	12	7	23	4	11	28	17	18
Mean no. of species	6.22	6.25	3.28	4.08	7.75	5.82	3.32	4.35	5.83
Standard error	0.24	0.31	0.18	0.20	0.63	0.42	0.24	0.28	0.30

perennis, a typical woodland herb, is also frequently found in these hedges but not elsewhere; this, and the frequent occurrence of hazel and field maple suggest that all these hedges can be regarded as "woodland relic hedges" in the terms of Pollard (1973).

There are some local differences in species composition within enclosure hedges. Elder is rare in Longden, and blackthorn is rare on Bicton Heath, where it appears to be replaced by holly, while sycamore is abundant on Longden Common and oak at Bicton. Differences in the frequencies of oak, holly and blackthorn probably reflect different planting policies—holly is certainly planted in the 1880 hedges at Montford.

If these rather miscellaneous differences between areas are ignored, we can compare species composition overall in the main hedgerow types (Figure 7). Hazel and maple show up as species of the woodland relic hedges, while blackthorn and holly show similar but less striking distributions. All four species are also more frequent in smallholders' hedges than in regular enclosures. Blackthorn and damson were not always reliably distinguished; the latter is in fact much commoner in smallholders' hedges than elsewhere. It is included in "blackthorn" in Figure 7. Ash is also a frequent smallholders' species.

2. *Upland areas. The Stiperstones and Clee Hill*

There are 87 samples from the uplands. Forty-three of them can be dated, but they fall into only two categories:- assarts of the mid sixteenth century or earlier and enclosures dating from c1790-1850. The latter group is very heterogeneous with respect to soil and altitude, but a direct comparison of the assart hedges and the nineteenth century hedges intermixed with them near Stiperstones village shows that the assart hedges are richer. We thus have the same problem as in the lowland area—that hedge category and age are confounded.

Table 3 shows species composition and mean number of species by hedgerow categories. The highest hedges (above 400 m) at Pennerley are separated from other smallholders' hedges; they are near the limit of improved agriculture in this area.

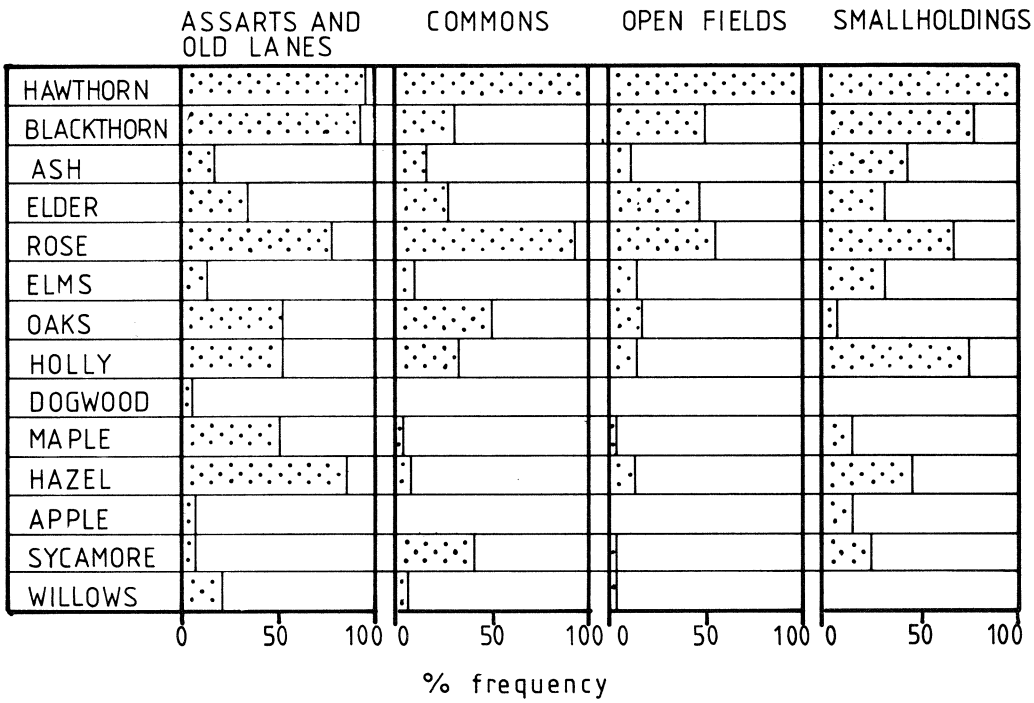

FIG. 7.
Percentage frequency of occurrence of the commoner shrubs and trees in lowland hedges.

Table 3. *Sample details for the upland areas. Frequencies of very rare species omitted*

	Clee Hill				Stiperstones			
	Old Lanes	Commons	Small-holdings	Assarts	Sub-dividing Hedges	Commons	Small-holdings	High Small-holdings
Ash	30	0	0	18	20	20	8	17
Beech	25	0	0	6	0	20	0	0
Blackthorn	55	0	0	65	100	0	50	0
Crab Apple	10	9	0	6	10	0	17	0
Dogwood	15	0	0	0	0	0	0	0
Elder	25	0	0	59	10	0	42	33
Elms	0	0	0	6	0	100	8	0
Field Maple	10	0	0	29	0	0	8	0
Hawthorn	90	63	50	76	100	100	100	83
Hazel	95	27	67	94	30	0	83	17
Holly	85	82	100	71	20	20	83	17
Oaks	80	36	83	35	50	80	17	33
Roses	85	18	50	71	70	80	92	0
Sycamore	20	0	0	6	0	0	17	0
Yew	10	0	0	6	0	0	0	0
Birches	75	82	100	12	20	20	33	33
Rowan	45	18	100	59	50	0	58	83
Alder	15	0	0	6	0	20	0	0
Willows	30	18	83	6	40	20	8	0
No. of samples	20	11	6	17	10	5	12	6
Mean no. of species	8.10	3.54	6.50	6.88	5.30	5.20	5.67	3.83
Standard error	0.41	0.31	0.56	0.41	0.45	0.66	0.31	0.48

There is a marked contrast with the lowland area (and with lowland hedges in England generally) in that there are high frequencies of upland shrubs tolerant of poor or waterlogged soils: alder, birches, gorse, rowan and willows. Some smallholders' hedges are dominated by these species, especially at high altitudes at Pennerley and in the waterlogged parts of Catherton Common (Clee Hill). Elsewhere they occur in addition to the usual variety of species, and although frequent, rarely dominate a sample. None are ideal hedging plants, and while they have probably been planted by smallholders for lack of alternatives, their occurrence elsewhere is due to colonisation; seed sources are abundant and most set seed prolifically.

Apart from this general upland effect, the differences between hedgerow types are similar to those in the lowland area (Figure 8). Assart and old lane hedges are richest, and have high frequencies of hazel and maple. Regular enclosures are poorer, while smallholdings are intermediate, except for the poor hedges at Pennerley. Within the regular enclosures there is evidence of variations in planting policy. At Oreton Common (Clee Hill) hedges are of hawthorn, birch and holly, at the Stiperstones, hawthorn and blackthorn, while at other commons nearby roadside hedges, mainly of hawthorn, have oaks and elms planted at regular intervals. Holly is also popular with smallholders in all areas.

3. *Undocumented areas: Clun, Caynham-Hope Bagot and the Upper Calcott area of Bicton*

Table 4 gives details of samples made in these areas. In Clun, we can separate the samples into those from winding roads and tracks (presumably old) and those from

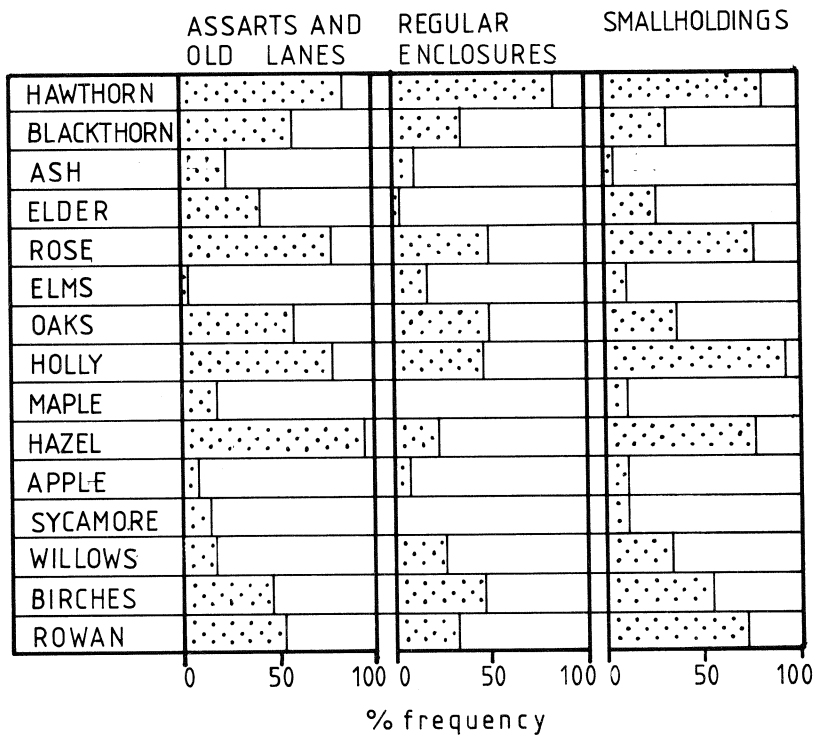

FIG. 8.

Percentage frequency of occurence of the commoner shrubs and trees in upland hedges.

Table 4. *Sample details for areas without historical evidence. Very rare species omitted.*

	Clun		Caynham	Bicton: Upper Calcott
	Lane and track	Regular enclosure	All hedges	Property boundary & lane
Ash	50	17	42	34
Blackthorn	75	100	52	62
Crab Apple	8	0	2	0
Dogwood	0	0	18	0
Elder	75	17	60	46
Elms	50	0	24	27
Field Maple	25	0	34	15
Hawthorn	92	100	96	100
Hazel	67	0	86	42
Holly	8	0	64	31
Oaks	0	17	30	31
Roses	75	83	64	65
Sycamore	25	0	4	12
Willows	0	0	8	0
No. of samples	12	6	50	26
Mean no. of species	5.83	3.33	6.02	4.69
Standard error	0.31	0.42	0.22	0.29

large straight-sided fields (presumably regular enclosure, probably nineteenth century). The roadside hedges resemble the woodland relic hedges of our main lowland study area, and the others the enclosure hedges.

In Caynham and Hope Bagot we cannot classify the hedges at all. Collectively, they resemble the woodland relic hedges of Montford and Longden. There is no sign of bimodality in the number of species per sample, and it seems likely that the majority of samples come from hedges with the same history and mode of origin.

In the Upper Calcott area of Bicton, most of our samples come from a lane and from a property boundary believed to be old. There are no significant differences between the lane and boundary, and all samples are combined. Two further samples from connecting hedges are much poorer. In terms of number of species, these hedges are superficially similar to those of Bicton Heath nearby, while in terms of species composition they resemble smallholders' hedges, having more hazel, maple and blackthorn than the regular enclosures. Detailed inspection of the results suggests that these hedges might be much modified remnants of woodland relic hedges, subject to realignment and replanting in patches—hazel is scattered all over the area, as are hawthorn-dominated hedges. Other small patches of possible replacement or realignment are visible in Montford nearby. The hedges dividing fields within the property are poorer, and probably of later date.

Discussion

A. *Determinants of hedgerow composition and diversity*

The species diversity and composition of a hedge will be determined by its original composition, and by any subsequent colonisation and extinction. The addition of species to a hedge after its creation may also result from deliberate planting, especially of trees. The original composition and colonisation will in turn depend on a complex of natural and human factors (Figure 9).

In areas such as Huntingdonshire (Pollard, Hooper and Moore 1974), subject to extensive early clearance, and with most hedges being planted with one or two

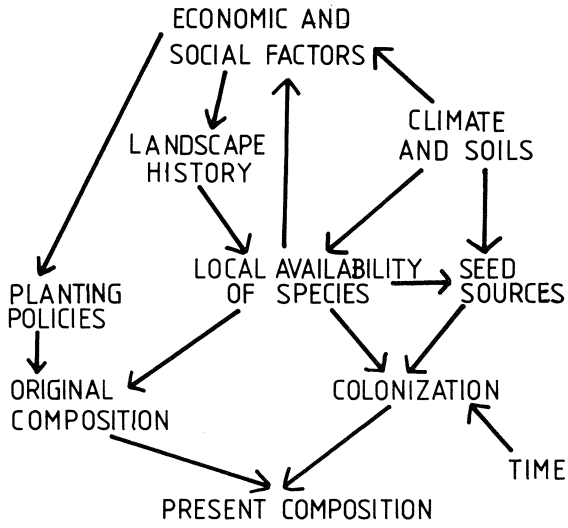

FIG. 9.

Diagrammatic representation of the major influences on hedgerow shrub composition.

species only, the effect of time on colonisation appears to be the primary determinant of species diversity. Rates of colonisation will vary from place to place, however, according to available seed sources, climate and soils (Pollard, Hooper and Moore 1974, Rands and Nau 1975). In the more varied landscape of lowland Shropshire age accounts for only 34% of the variance in number of species, as opposed to 85% in Huntingdon, and effects of age are, in any case, confused with those of mode of origin.

The effects of climate, soils and available seed-sources are seen most clearly in the contrast between lowland and upland areas, the latter having high frequencies of species seen only rarely elsewhere. These upland species tend to occur in addition to the normally planted species, and those which are woodland relics (see below), so that, unexpectedly, these poor upland areas tend to have richer hedges than the lowlands.

The effect of mode of origin is seen most clearly in the woodland relic hedges. Pollard (1973) has shown that such hedges in Huntingdonshire are not only richer than typical enclosure hedges, but also have high frequencies of certain species which are rare elsewhere—species which are not usually planted, and are poor colonisers. Considering differences in climate and soils the similarities between Pollard's woodland relic hedges, those of lowland Shropshire (assarts and old lanes) and of Warwickshire (Cameron, unpublished) are considerable (Table 5), while those of upland Shropshire also resemble the others if the specifically upland species are discounted. Hazel appears as the most frequent indicator of woodland origin. Age appears to have little influence on these hedges—those of Huntingdon being mostly early medieval (1080-1300) while many of those in Shropshire are Tudor (1500-1600). These hedges frequently hold woodland herbs as well, of which dog's mercury *Mercurialis perennis* is the most common and conspicuous. Such herbs are rare in other hedges. Confirmation of the association of such woodland indicators in hedges comes from the roadside survey of the Shropshire Flora Project (Sinker, Packham and Truman, 1979). In a series of 78 randomly chosen roadside verges in

Table 5. *Comparison of frequencies of various shrub species in woodland relic hedges in Shropshire, Warwickshire, and Huntingdon.*

	Lowland Shropshire	Upland Shropshire	Warwickshire	Huntingdon
Ash	17	24	60	48
Blackthorn	93	59	54	97
Dogwood	5	8	5	45
Elder	34	41	71	27
Field Maple	49	19	17	64
Hazel	83	95	91	58
Holly	51	78	43	0
Oak	51	59	51	21
Privet	0	0	0	21
Rose	78	78	63	64
Spindle	0	0	0	36
Mean no. of species	6.1	6.1	7.3	5.9

Shropshire, hazel, field maple and dog's mercury show a striking association (Table 6) with many more samples containing all three species or none than would be expected by chance. Field maple is never found in sites without hazel; dog's mercury in only two sites without hazel.

It is notable that the woodland relic character of old lane hedges in Shropshire is retained even in areas that were once open field or common pasture. In the East Midlands, roads passing through open fields were not usually hedged, and no significant differences between roadside hedges and others were detectable (Pollard, Hooper and Moore 1974). This early hedging of lanes may relate to the greater numbers of grazing animals kept locally and passing through to market, and perhaps also to the rarity of wheeled traffic requiring to make wide detours to avoid ruts.

Variation in the composition and diversity of enclosure hedges in Shropshire is not due primarily to age, but to planting policies. Both documentary (Plymley 1803) and biological evidence suggest that planting policies in Shropshire were very different from those in the planned landscape further east. Mixed hedges are common, and while some hedges were of hawthorn alone (sometimes with elms or oaks at regular intervals), many were of holly or blackthorn, and some of oak, elm

Table 6. *Occurrence of hazel, field maple and dog's mercury in roadside samples of the Shropshire Flora project (see text). Data courtesy of Charles Sinker. Expected values are those assuming no association between the species.*

	Samples with hazel			Samples without hazel		
	with maple	without maple		with maple	without maple	
with dogs mercury	35	12	47	0	2	2
without dogs mercury	5	13	18	0	11	11
	40	25	65	0	13	13

	Observed	Expected
Samples with all three species or none	46	22.2
Samples with one or two species	32	55.8

$\chi^2_1 = 35.65$; $p<0.001$

and even birch (on Clee Hill), and mixed plantings of these are common. Blackthorn tends to occur in older hedges, as in Warwickshire (Cameron, unpublished) whilst holly is especially favoured in the upland areas and on commons.

Smallholders' hedges are distinctive. In the lowland area they are richer than those of regular enclosures, and contain high frequencies of useful species: damson, plum, crab apple and possibly hazel for food, and the universally popular holly as a reserve food for stock. Decorative species such as privet and laburnum also occur—the distinction between a garden and a field is blurred on these holdings. In the upland areas these useful species are usually not as frequent, although there are areas at Pennerley and the Stiperstones (not sampled by us) in which laburnum or willows are common—the latter sometimes being rare hybrids presumably selected for basket work (C. A. Sinker; *personal communication*). Other smallholders' hedges in the uplands appear to contain an almost random sample of what is available, regardless of suitability, and there are in consequence marked local variations—for example between the marshy Catherton Common with downy birch, willows and alders, and High Pennerley (Stiperstones) with gorse, broom, and rowan. Many smallholders' hedges resemble woodland relic hedges in the occurrence of hazel, but the absence of woodland herbs and the characteristic layout of field boundaries distinguish them.

We have not sampled any hedges in Shropshire which correspond to the Saxon parish boundary hedges of Huntingdon. The possible demesne boundary hedges in Bicton may be of similar antiquity, but in both cases we do not know what the original composition may have been. Probably initial diversity and considerable subsequent colonisation account for their exceptional richness.

Our study of Shropshire hedges thus emphasises the complexity of influences on their composition, and provides a contrast with the apparently simpler situation further east. It emphasises the importance of woodland relic hedges as refuges for woodland plants with poor powers of dispersal (Helliwell 1975), an importance which also extends to invertebrate animals with poor dispersal powers. (Cameron, Down and Pannett, in preparation).

B. *The use of hedgerow shrub-counts in landscape history*

Counts of shrub species in hedges in Shropshire cannot be used simply to date the hedges. Extreme caution and prior checking against documented areas is necessary before dating hedges by this method is attempted in other areas of similar landscape history. On the other hand, woodland relic hedges can be identified with a fair degree of reliability, and thus there is the possibility of distinguishing areas of assart from those of one-time open field systems which though widespread did not occupy the greater part of the land surface, and were enclosed early on by private agreement; documentary evidence is rare, and field boundary patterns are not sufficiently distinctive. The undocumented areas investigated here, Caynham—Hope Bagot near Ludlow and the Upper Calcott region of Bicton, both appear to contain mostly woodland relic hedges, albeit much disturbed and with later additions in the latter area. Clearly the samples so far taken have not included areas that were once open fields—though in Caynham at least such a system probably existed. In any case, it is probably unwise to rely on biological evidence alone, and a combination of biological field and documentary evidence is clearly best, as illustrated by Hewlett's (1973) study of a Kent Parish.

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APPENDIX A

Scientific names of shrub species mentioned in the text. (Clapham, Tutin & Warburg 1968)

Ash	*Fraxinus excelsior*	Gorse	*Ulex europaeus* & *gallii*
Alder	*Alnus glutinosa*	Hawthorn	*Crataegus monogyna*
Beech	*Fagus sylvatica*	Hazel	*Corylus avellana*
Birch, Silver	*Betula pendula*	Holly	*Ilex aquifolium*
Birch, Downy	*Betula pubescens*	Oaks	*Quercus robur* and *petraea*
Blackthorn	*Prunus spinosa*	Privet	*Ligustrum vulgare*
Crab Apple	*Malus sylvestris*	Rose	*Rosa* spp.
Damson	*Prunus domestica*	Rowan	*Sorbus aucuparia*
Dogwood	*Cornus sanguinea*	Spindle	*Euonymus europaeus*
Elder	*Sambucus nigra*	Sycamore	*Acer pseudoplatanus*
Elm, English	*Ulmus procera*	Willows	*Salix* spp.
Elm, Wych	*Ulmus glabra*	Yew	*Taxus baccata*
Field Maple	*Acer campestre*		