

Medieval Woodland, Agriculture and Industry in Rockingham Forest, Northamptonshire

By GLENN FOARD

ROCKINGHAM Forest is the most intensively studied of Northamptonshire's medieval forests. It saw extensive clearance for agriculture in the medieval period but large tracts of woodland survived and these were increasingly intensively managed. Though primarily nucleated, a dispersed component to the settlement pattern did develop in the forest which was not seen in the champion landscapes of the county. The area supported a range of industrial production, in particular an important iron industry, based upon the local ores, and fuelled, at least in the medieval period, by a substantial charcoal industry. Geology was the primary determinant of the distribution of woodland in the Saxon period, but at the local level survival of woodland in the post-Conquest period was influenced by a range of tenurial and other factors, including management for deer and the presence of large scale iron and charcoal production.

THE EXTENT OF SAXON WOODLAND IN NORTHAMPTONSHIRE

The woods surviving in the modern county of Northamptonshire, almost without exception, represent the remnants of three major Saxon woodlands, situated on boulder clay-covered watersheds between the Rivers Welland, Nene and Ouse. Between the Nene and the Ouse lay Bromswold, which was mainly in Bedfordshire and Huntingdonshire, and further south-west were Salcey and Whittlewood, mainly in Northamptonshire but extending into Bedfordshire and Buckinghamshire. Between the Welland and Nene, and wholly within the county, lay the large tract of woodland which, after the Norman Conquest, became known as Rockingham Forest.¹ The surviving woodlands were first comprehensively mapped in the 18th and early 19th century, by which time extensive clearance had taken place but before the great losses which followed enclosure in the mid-19th century (Fig. 1).²

¹ The national distribution and character of woodland in 1086 is discussed in H. C. Darby, *Domesday England* (Cambridge, 1986) 171–207; Northamptonshire Domesday woodland is discussed briefly and mapped in I. B. Ferrett, 'Northamptonshire', 404–7 in H. C. Darby and I. B. Ferrett, *Domesday Geography of Midland England* (Cambridge, 1954).

² Woodland extent from digital mapping in Northamptonshire Sites and Monuments Record (SMR) from Eayre's map of Northamptonshire, revised by Jeffreys, 2nd edition 1791, from Bryant's map of Northamptonshire, 1827, and 1st edition 1-in. Ordnance Survey mapping.

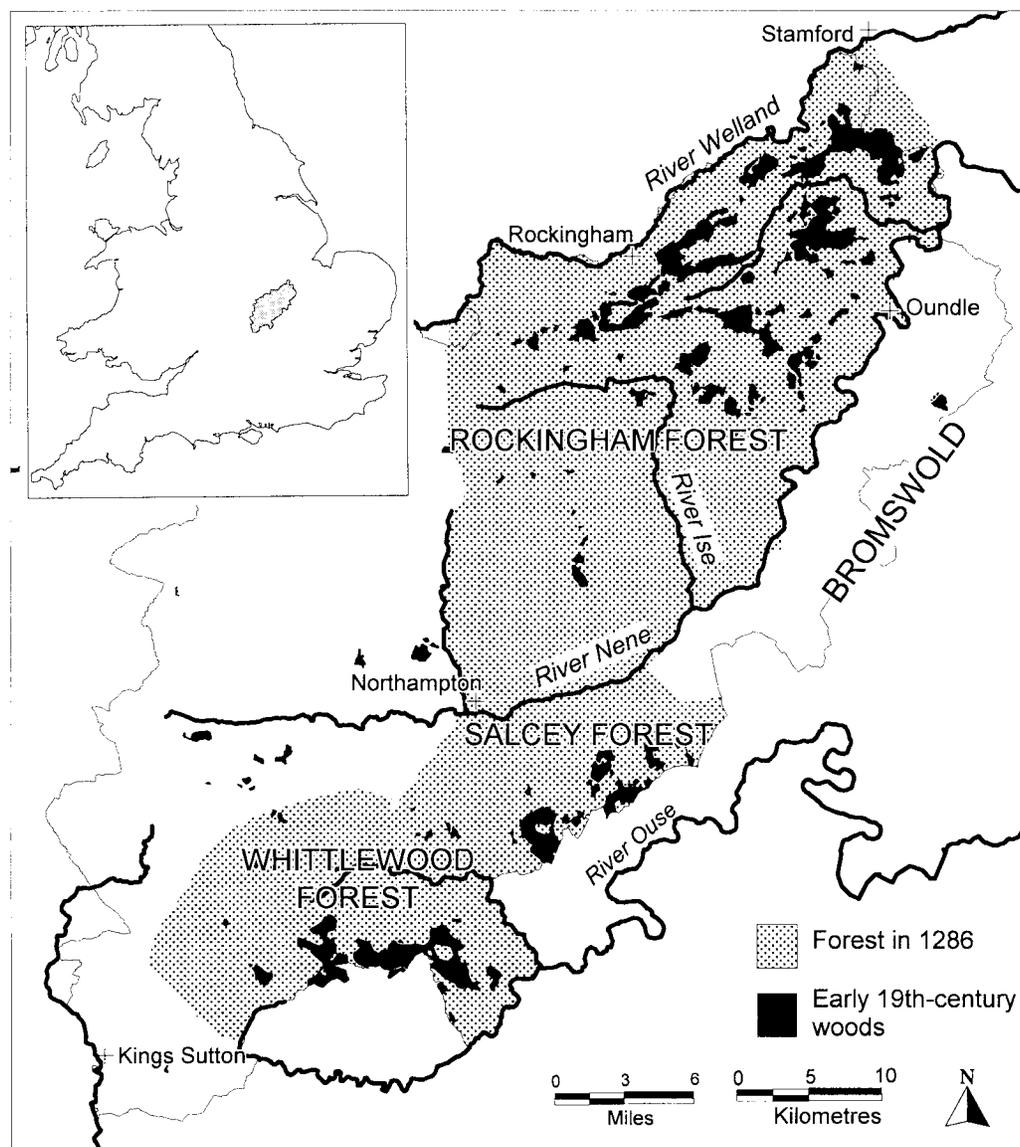


FIG. 1

Northamptonshire forests in the 13th century, with early 19th-century woodland extent.

The boulder clay geology generally resulted in heavy, poorly drained and intractable soils.³ Before modern drainage this produced the most marginal land for agriculture within the county, even yielding inferior quality grass, and hence

³ Geological mapping is from the British Geological Survey (BGS) 1:10,000 scale mapping for Rockingham Forest but 1:500,000 scale for rest of county. Small but significant areas of boulder clay in the Corby/Harringworth area are missing due to mineral extraction prior to BGS survey.

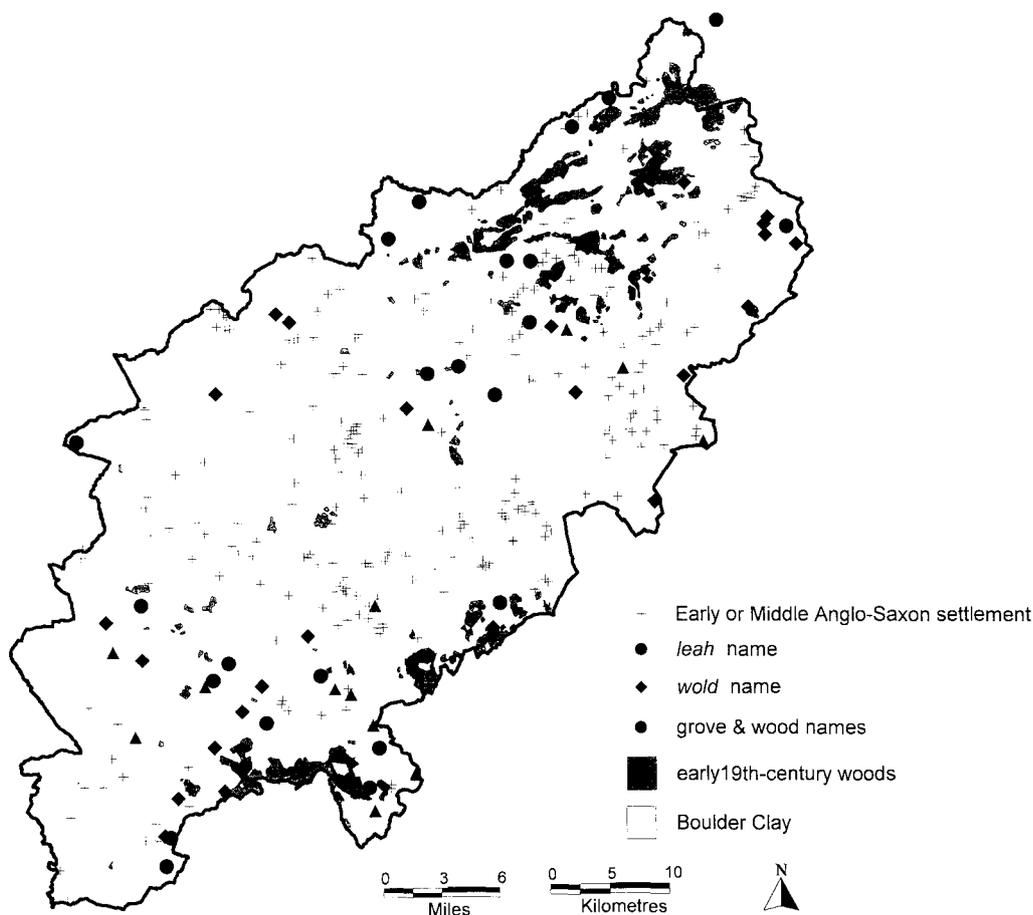


FIG. 2

Woodland, geology and Early or Middle Anglo-Saxon settlement in Northamptonshire.

was best used for woodland.⁴ There were, however, limited areas on the periphery of the county where limestone plateau without clay capping was also wooded, as at Easton on the Hill near Stamford, while in the adjacent Soke of Peterborough these poor, thin soils also supported some medieval heathland.⁵ Documentary, place-name and archaeological evidence indicate that in the Saxon and medieval periods it was on the extensive areas of boulder clay that woodland was concentrated, whereas Early-Middle Saxon settlement, the medieval villages and the core of the open fields were found largely on permeable or mixed geologies (Fig. 2). Because the boulder clay plateau is dissected by rivers and streams, which have exposed a range of permeable geologies, the field-land and woodland of the

⁴ S. H. Beaver and D. M. Allen, *Northamptonshire and the Soke of Peterborough* (Land Utilisation Survey, V, part 58, London, 1943).

⁵ D. Hall, *Northamptonshire Heathlands Past and Present* (unpubl. rep. for Northamptonshire Heritage and English Nature, 1997) in SMR.

county were always in close proximity, particularly in Rockingham Forest. This contrasts markedly with some other regions, such as Warwickshire where the Felden and Arden were geographically separate zones.⁶

During the Late Saxon period all woodland belonged to individual manors. In 1066 the largest tracts were attached to the royal manors, such as (Greens) Norton and Gretton, or those which may previously have been royal manors, such as Oundle, which are likely to have had administrative functions in the Middle Saxon period. It is possible that the main woodland tracts were each associated with a territory of the Middle Saxon period: Rockingham with the province of Oundle, Salcey with Northampton and Whittlewood with Kings Sutton.⁷ In 1086 the majority of woodland was still in royal control. The Abbot of Peterborough's estates, including Oundle, comprised the second largest holdings with many lesser woods belonging to other manors scattered throughout the woodland areas. Domesday offers the possibility of mapping woodland distribution but the data have to be treated with great care (Fig. 3). Firstly there is the problem of conversion of Domesday, and other medieval woodland statistics, to modern spatial measures. This is complicated by the variation in standards employed both between and within forests. Most of the woods of Rockingham Forest were measured with the 21 ft pole from at least the 14th century but for purlieu woods an 18 ft pole was used.⁸ However, conversion from customary to statute measure is essential if valid comparisons are to be made with later mapping to recover regional patterning, or to contribute to analysis of individual woods. Various attempts have been made to convert Domesday woodland leagues and acres to statute acres, most notably by Rackham, whose formula is used here.⁹ There are also several major omissions specified in 1086 in important royal manors, as a result of afforestation, and thus woodland in the heart of the forest is significantly under-represented. In addition Domesday seems to omit without comment some lesser woods, as for example at Rothwell where none is recorded in 1086 even though more than 100 acres (40 ha) of woodland is documented there in the 13th century.¹⁰

The association of woodland with particular manors and their related townships may have originated in the allocation of rights which had previously been shared by member settlements of a Saxon estate. Typically townships were established which extended from the agricultural land up into the woodland zone, because the field-land and woodland lay in such close proximity. Where this could not be achieved detached blocks of woodland were allocated. For example, the

⁶ S. J. Wager, *Wolds, Woods and Groves: the Woodland of Medieval Warwickshire* (BAR Brit. Ser., 269, Oxford, 1998); D. Hooke, *The Anglo-Saxon Landscape: The Kingdom of the Hwicce* (Manchester, 1985) 15–6 and 99–151.

⁷ G. Foard, 'The administrative organization of Northamptonshire in the Saxon Period', *Anglo-Saxon Stud. Archaeol. Hist.*, IV (1985), 185–222.

⁸ The problem of medieval woodland acres is considered by C. E. Hart, *Royal Forest, a History of Dean's Woods as Producers of Timber* (Oxford, 1966), 321, and by P. A. J. Pettit, *The Royal Forests of Northamptonshire 1558–1714* (Northamptonshire Record Soc., XXIII, Northampton, 1968), 8–9; for the use of the 21 ft pole in Oundle woods in the 14th century, PRO, Patent Rolls 19 Richard II.

⁹ Terrett, *op. cit.* in note 1, states that calculations of acreage cannot be made; Darby, after discussing the difficulties, provides generalised mapping with acreage for leagues: *op. cit.* in note 1, 179 and 190–3; Rackham gives acreage = length x breadth x 7, with a league taken as 12 furlongs or 1.5 miles; O. Rackham, *Trees and Woodland in the British Landscape* (London, 1981), 59–60.

¹⁰ G. Foard and J. Ballinger, *Northamptonshire Extensive Urban Survey: Rothwell* (unpubl. rep. for English Heritage, 2000) in SMR.

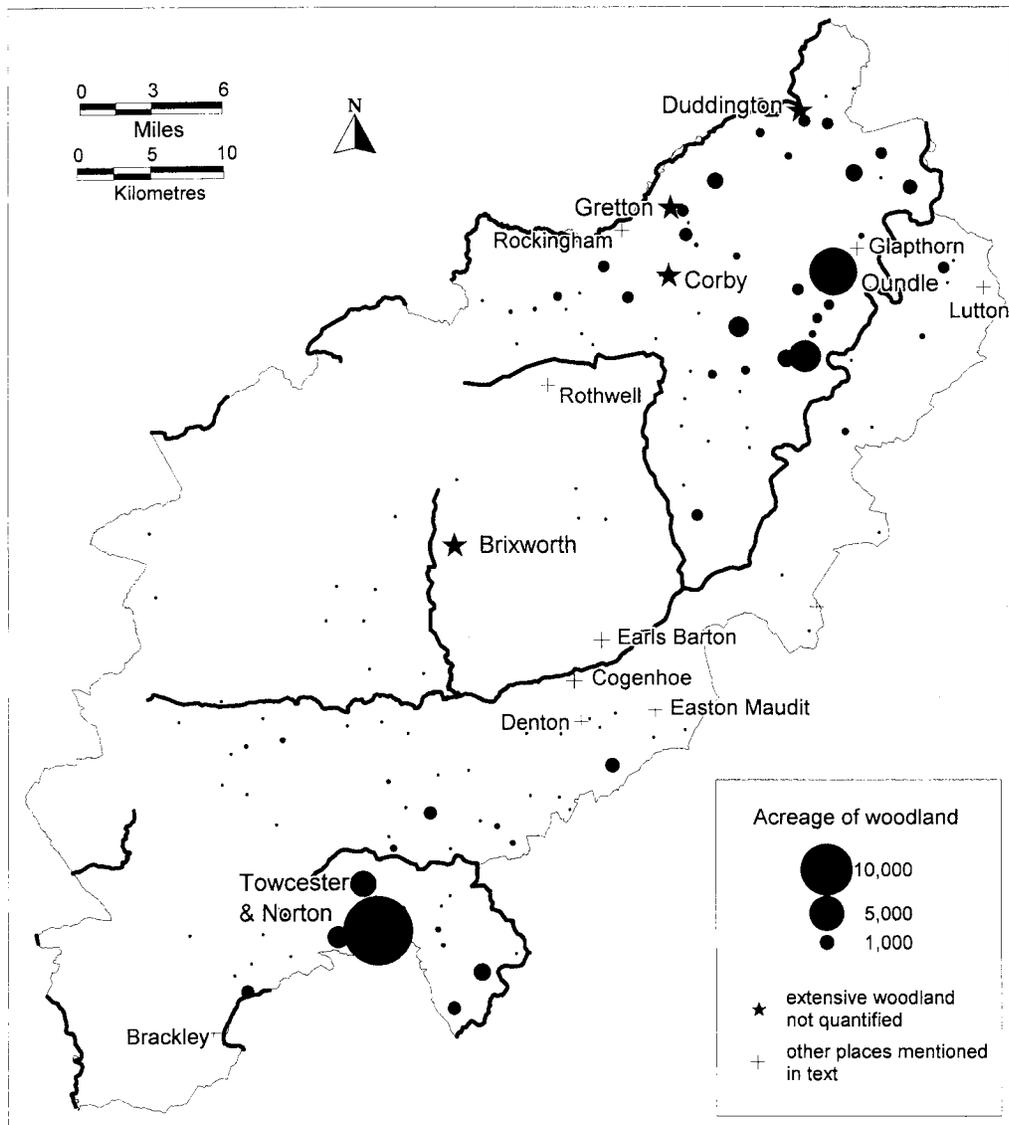


FIG. 3

Domesday woodland (where known, detached woodland is shown in actual location).

1086 woodland of half-a-league by one furlong belonging to Cogenhoe probably lay 8 km to the South of the village in the detached portion of the township, recorded in later documents, in the heart of Salcey Forest. Nearby lay Barton Broil, a detached portion of (Earls) Barton, an estate centre on the opposite side of the Nene to Cogenhoe. More speculative but perhaps indicative of further areas of detached woodland, Great Doddington, an adjacent dependency of Barton, shared its name with the township of Denton or 'Little Doddington' which lay adjacent to

Barton Broil.¹¹ Even if a block of woodland was detached in this way, occasionally small areas of woodland also existed in the main township, as in Brackley which had most of its woodland detached in Whittlewood Forest but immediately adjacent to the village itself lay the Grove, first recorded in 1170–80.¹² In yet other cases it would appear that rights were not allocated as consolidated blocks of land to individual townships and hence some townships retained common rights in particular areas of woodland, as for example with Glaphorn's rights of common in the adjacent Totenho Walk in Rockingham Forest.¹³ Indeed it is possible that, as is well documented later, the detached blocks of woodland were in many cases allocated in the medieval period to resolve disputes over common rights in such situations, rather than being associated with the original creation of townships by the fragmentation of larger estates in the Middle or Late Saxon period.

In contrast to the areas which were afforested following the Conquest, and thereafter protected from clearance to some degree, Bromswold had already suffered large-scale clearance by 1086. However, there must still have been substantial woodland in Huntingdonshire, for in 1070 Hereward the Wake was said to have evaded capture in '*Bruneswald*' before his attack on Peterborough.¹⁴ In Northamptonshire it is only remembered in the 'wold' names of furlongs and great fields and the occasional small wood in the clayland parishes on the county boundary between Newton Bromswold, Leighton Bromswold and Lutton, known in the 15th century as '*Lutton juxta Brouneswold*'.¹⁵ The wolds in the Whittlewood area generally lie on the periphery of the Domesday woodland, though in Salcey at least one wold name lies in the heart of Yardley Chase. In contrast Bromswold and most other wolds in the county appear to have been separate areas, possibly more discrete than Fox suggests, on the boulder-clay watersheds straddling a number of townships. It has been suggested that these Saxon woods were not nearly as extensive or continuous as the main woodlands, such as Rockingham and Whittlewood but, given the lack of direct evidence from this region for the Saxon period, it needs to be proven that they were not simply cleared earlier and more completely.

ROCKINGHAM FOREST BEFORE 1066

Rockingham Forest is the most intensively studied tract of medieval woodland in Northamptonshire, having been the subject of intensive aerial survey by the author since 1977 and various projects of excavation, field survey and documentary research by others over many years, including mapping of woodland extent from

¹¹ Foard, *op. cit.* in note 7; J. E. B. Gover, A. Mawer and F. M. Stenton, *The Placenames of Northamptonshire* (Cambridge, 1975), 137 and 146.

¹² Magdalen College, Oxford, B95 and D119.

¹³ G. Foard, 'The Saxon bounds of Oundle', *Northamptonshire Past Present*, VIII (1991), 179–89.

¹⁴ C. Hart, 'Hereward the Wake', *Proc. Cambridge Antiq. Soc.*, LXV (1974), 28–40.

¹⁵ Gover et al., *op. cit.* in note 11, 154, 193 and 204; Warmington Wold from 1621 Survey of Warmington in Northamptonshire Record Office (NRO); Ashby Wold from Public Record Officer (PRO) SC6 Hen VIII 2781; Sibbertoft and Clipston wolds from G. Foard, *Naseby: The Decisive Campaign* (Whitstable, 1995), p. 212, 217 253 and 276; H. S. A. Fox, 'The people of the Wolds in English settlement history', 77–104 in M. Aston, D. Austin and C. Dyer (eds.), *The Rural Settlements of Medieval England* (Oxford, 1989).

17th- and 18th-century estate maps.¹⁶ What is lacking however is a detailed documentary study, such as that available for the Forest of Dean, to complement Pettit's work on Rockingham Forest in the post-medieval period.¹⁷ Fieldwork has revealed very little evidence of neolithic or Bronze-age activity on the boulder clay but some Early Iron-age and a high density of Middle Iron-age to later Roman settlement existed throughout the forest, including in areas wooded in the medieval period. Such evidence has led to a general assumption that most, if not all, of the woodland had been cleared for agriculture before the end of the Roman period and that the Saxon woodland was formed primarily through the abandonment of agricultural land after A.D. 400. However, given the extent of the evidence discussed below for charcoal burning serving the medieval iron industry, it would appear from the distribution of the major Iron-age and Roman iron industry which, like its medieval counterpart, would have required large quantities of charcoal fuel, that substantial areas of woodland must have survived in the Roman period.¹⁸ Unfortunately the evidence for the Roman industry is still too poorly quantified to attempt any sort of calculation as to overall output of iron and hence to estimate the likely extent of woodland it would have required. In general terms one can perhaps extend the logic to include the association between the pottery industry and woodland, which certainly holds true in the medieval period, suggesting that woodland in the Roman period may have been far more extensive than has recently been allowed. For example, the pottery industry of the Upper Nene valley may indicate woodland on the adjacent claylands.¹⁹ The loss of the industry from that area later during the Roman period may even reflect loss of woodland to agriculture at that time, although some woodland did return in the post-Roman period. Neither should it be assumed that all or even most of the woodland clearance in the Iron Age and Roman period was for arable exploitation. There have been almost no substantial excavations of settlement on the boulder clay to provide good evidence as to the agricultural economy. It may have been primarily pastoral, because far less alluviation occurred in the river valleys during the Iron-age and Roman expansion than took place during the massive Late Saxon

¹⁶ For example J. M. Steane, 'Excavations at the deserted medieval settlement at Lyveden', *J. Northampton Mus. Art Gallery*, II (1967), V (1969), IX (1971), but especially XII (1975); B. Bellamy, *Geddington Chase: The History of a Wood* (Irthlingborough, 1986); B. Bellamy, 'Anglo-Saxon dispersed sites and woodland at Geddington in the Rockingham Forest, Northamptonshire', *Landscape Hist.*, XVI (1994), 31-8; P. Foster, *Changes in the Landscape: An Archaeological Study of the Clay Uplands in the Brigstock Area of Northamptonshire* (unpubl. BA dissertation, University of Sheffield, 1988); G. Foard, 'The medieval pottery industry of Rockingham Forest, Northamptonshire', *Medieval Ceramics*, XV (1991), 13-20; B. Bellamy, D. Jackson and G. Johnson, 'Early ironworking in the Rockingham Forest area', *Northamptonshire Archaeol.*, forthcoming; woodland mapping in Pettit, op. cit. in note 8, 21.

¹⁷ Hart, op. cit. in note 8.

¹⁸ For evidence as to the scale and importance of the Roman industry see D. A. Jackson, 'Great Oakley and other Iron Age sites in the Corby Area', *Northamptonshire Archaeol.*, XVII (1982), 3-23; D. A. Jackson, 'Archaeology at an ironstone quarry in the Harringworth-Wakerley area 1968-79', *Northamptonshire Archaeol.*, XVI (1981), 14-33; D. A. Jackson and T. M. Ambrose, 'Excavations at Wakerley, Northants, 1972-75', *Britannia*, IX (1978), 115-242; D. A. Jackson and R. F. Tylecote, 'Two new Romano-British Iron working sites in Northamptonshire', *Britannia*, XIX (1988), 275-98; D. N. Hall, 'The countryside of the South East Midlands and Cambridgeshire', 337-50 in D. Miles (ed.), *The Romano-British Countryside* (BAR Brit. Ser., 103(ii), Oxford, 1982); ironworking mapping in figure 8 based on SMR data including work by Bellamy, Hall and from RCHM, *An Inventory of the Historical Monuments of the County of Northampton*, I (London, 1975) and II (London, 1979).

¹⁹ RCHM, *Northamptonshire, An Archaeological Atlas* (London, 1980), map 12.

and medieval expansion of arable over much of the same area.²⁰ Indeed the whole evolution of the boulder-clay landscape over the last two and a half millennia may prove to have been largely one of changing intensity of woodland and pastoral activity, the Roman period representing a high point of exploitation and the Early–Middle Saxon period a low point, but one in which primarily pastoral functions were still retained. Large-scale arable cultivation may prove to have featured only in very brief interludes during the medieval and modern periods.

Fieldwalking surveys conducted since the early 1970s show a high density of dispersed Early–Middle Saxon settlement mainly on permeable geologies across Northamptonshire, in many respects matching the pattern seen in the Iron Age and Roman period. However, on the boulder-clay settlement seems to have all but disappeared countywide before Early–Middle Saxon pottery was introduced. The intensive study at Raunds has shown a retraction from Bromswold while other fieldwork shows a retraction from the heart of Rockingham Forest on to the primarily permeable geologies along the narrow valleys which dissect the boulder clay plateau.²¹ Most of the exceptions are of activity associated with iron production, as seen at Geddington, although evidence from the intensive Brigstock survey, interpreted as relating to shepherding or even charcoal burning, is more equivocal and demands further investigation.²² Though the massive demographic collapse postulated for the Early Saxon period, on the pre-1970s fieldwork evidence is no longer tenable, at present we are far from being able to compare the actual density of population between the Roman and the Early–Middle Saxon periods using the settlement evidence now available.²³ It is unclear to what degree the retraction had been completed before A.D. 400. Neither can we yet determine the extent to which the shift from the boulder clay was a result of overall population decline as opposed to the redistribution of settlement and agriculture with intensification of activity on the permeable geologies. There is also a lack of palaeo-environmental evidence to demonstrate the chronology or to confirm the extent of woodland regeneration. In exceptional circumstances there may be waterlogged deposits in deep ditches on some of the most poorly drained boulder clay plateau areas, as seen at Easton Maudit in Salcey Forest, but in general the only potential is from the palaeo-channels in the river valleys and so, where forest and river come into close proximity, this must be an important priority for study.²⁴ Whatever the exact reasons and dating, by the Late Saxon period woodland had expanded over Iron-age and Roman settlements and fields across much if not all of the boulder clay of Rockingham Forest east of the River Ise. When the next major demographic expansion began, probably in the later 9th or 10th century, it appears at first to have been based on the intensification of land-use on the permeable geologies,

²⁰ M. Robinson, 'Overview of the Saxon and medieval environmental archaeology of the West Gotton Area', draft paper for the Raunds Area Project overview volume, copy in SMR.

²¹ S. Parry, *Raunds Area Survey: an Archaeological Study of the Landscape of Raunds, Northamptonshire, 1985–92* (London, forthcoming); records in SMR.

²² Bellamy, op. cit. in note 16; Foster, op. cit. in note 16.

²³ C. C. Taylor, *Village and Farmstead* (London, 1983), 109–11; A. E. Brown and G. Foard, 'The Saxon landscape', 71–75 in P. Everson and T. Williamson, *The Archaeology of Landscape* (Manchester, 1998).

²⁴ D. Hall, 'Pre Roman Iron Age sites at Bozcat and Strixton, Northamptonshire', *Bedfordshire Archaeol. J.*, 6 (1971), 17–22.

involving the creation of the open field systems associated with the growth of nucleated villages. Soon, however, it led to an expansion of arable agriculture, though in most cases not settlement, across large parts of the boulder clay plateau.

THE POST-CONQUEST FOREST

Soon after the Conquest, responsibility for management of much of the woodland was detached from the royal manors, with the creation of three royal forests in Northamptonshire. In 1086, for example, it was recorded of the king's manor of Brixworth that 'To this manor belongs one woodland which paid 100s. a year; it is now in the King's forest'.²⁵ By 1157 this forest took its name from the important royal castle of Rockingham, together with which it was often administered, although it was subdivided into three bailiwicks managed from the royal manors of Rockingham, Brigstock and Kings Cliffe. The forests were areas of legal jurisdiction related to the management of the king's hunting preserves and encompassed extensive tracts of woodland, but they could also incorporate open fields and villages. At the same time as extensive woodland clearance for agriculture was taking place, in the late 11th and 12th centuries, the areas covered by forest law expanded dramatically, reaching their maximum extent in the later 12th century. At Oundle, for example, Thorold, Abbot of Peterborough (1070-98), gave Vivianus a quarter-hide in Warmington, a sixth of a hide in Oundle and half a hide in Churchfield 'of which the king took half into the forest'.²⁶ While the king controlled the use of timber and underwood and the rights of the chase, the manorial lords still retained ownership of the land. Later one finds specific woods belonging to individual manors, and many were assarted, under royal licence, by these lords. Management of the land for hunting did have a substantial effect on land-use. In 1086 the woodland belonging to Fotheringhay was worth ten shillings only when it bore mast (used as pannage for pigs) and when the king was not hunting in it.²⁷ The longer term effects were equally significant, with the core of Whittlewood, Salcey and Rockingham Forests protected from clearance, to a degree, by their special legal status.

By 1286 Rockingham Forest extended from the walls of Northampton to the south bridge at Stamford although, as nationally, the forest was already in decline. Some areas within these bounds had already been released from forest restrictions, as for example with the late 12th-century grants at Oundle.²⁸ Currently our best guide as to the broad distribution of woodland within the forest in the 13th century comes from the records of fines paid by landowners creating assarts, clearances of woodland for agriculture within the royal forest, which list the acreage of each

²⁵ *Domesday Book*, 219d; the organisation of the royal forests is described in R. K. J. Grant, *The Royal Forests of England* (Stroud, 1991).

²⁶ W. T. Mellows (ed.), *Henry Pytchley's Book of Fees* (Northamptonshire Record Soc., II, Northampton, 1932).

²⁷ *Domesday Book*, 228b; Terrett, op. cit. in note 1.

²⁸ J. Steane, 'The Forests of Northamptonshire in the Early Middle Ages', *Northamptonshire Past Present*, V (1973), 7-17; M. L. Bazeley, 'Extent of English forests in the 13th Century', *Royal Hist. Soc. Trans.*, 4th ser. (1921); E. King, *Peterborough Abbey 1086-1310* (London, 1973).

assart (Fig. 4).²⁹ The 1286 perambulation may reflect a far wider distribution of woodland in the later 11th century, when the bounds were being established, than that seen in the early 13th century. However there is a close correlation between the distribution of Domesday woodland and that of the 13th-century assarts, with woodland concentrated particularly to the North and East of the River Ise. If woodland to the West of the Ise had previously been more extensive then clearance had already progressed rapidly in the Late Saxon period. Only perhaps associated with Brixworth manor did a large block of woodland survive into the medieval period.³⁰ This woodland may have been on the clayland watershed to the East of Brixworth, indicated by the distribution of woodland placenames, such as Old and Walgrave, and by the few surviving remnants of woodland such as Sywell, Hardwick and Mawsley woods.³¹ It may also be significant that the most substantial assarting in this part of the forest in the 13th century was on the nearby royal manor of Faxton. Large areas of land were disafforested in the new perambulation of 1299 which, although excluding a number of substantial woods that were in private hands, broadly defines the core of the then surviving woodland.³² It focused particularly on the royal estates, with their hunting lodges, showing the influence of royal ownership in the survival of woodland.

Because of its more limited extent and early clearance the woodland history of the land to the South-West of the River Ise, excluded in 1299, has received little attention and will prove the most difficult to reconstruct. It is therefore on the forest landscape to the North-East of the Ise that our study will concentrate. Here extensive tracts of woodland remained throughout the medieval, despite continued and in some places large scale clearance, one of the largest examples being some 500 acres (202 ha) of assarts in Rushton.³³

WOODLAND CHARACTER AND MANAGEMENT

Woodland in the medieval period should not be viewed merely as marginal land beyond the limits of what was economically viable for agricultural production. Almost without exception it lay on the least productive land, but large areas of similar land were cleared during the period. Woodland was a valuable resource which was being retained for good economic reasons and effectively managed in competition with arable agriculture. For example a survey of Rothwell in 1521 stated there was:

*A goodly wood called Rothwell Wood wherein be many fair Oakes and other buylding tymbre worth to be solde . . . the same woode must of necessite be saved for mayntaynyng of the Lordshippes of Rothwell Navesby and other Lordships in those partes whereas is noe Woode to be had for money.*³⁴

²⁹ J. A. Raftis, *Assart Data and Land Values: Two Studies in the East Midlands 1200-1350* (Toronto, 1974). A few placenames have not been located and so could not be mapped from the published statistics, in which there are also small but consistent minor errors of transcription, but the original records do use statute acres: Hart, *op. cit.* in note 8, 321.

³⁰ *Domesday Book*, 219d.

³¹ Gover et al., *op. cit.* in note 11, 128 and 180.

³² B. Bellamy, 'The perambulation of Rockingham Forest of 1299', *Norhamptonshire Past Present*, VI (1982), 303-8.

³³ Raftis, *op. cit.* in note 29.

³⁴ Valor of possessions formerly of the Duke of Buckingham, NRO, X881; the historic character, management and methodology of study of woodland is reviewed in Rackham, *op. cit.* in note 9, and more extensively in O. Rackham, *Ancient Woodland: its History, Vegetation and Uses in England* (London, 1980).

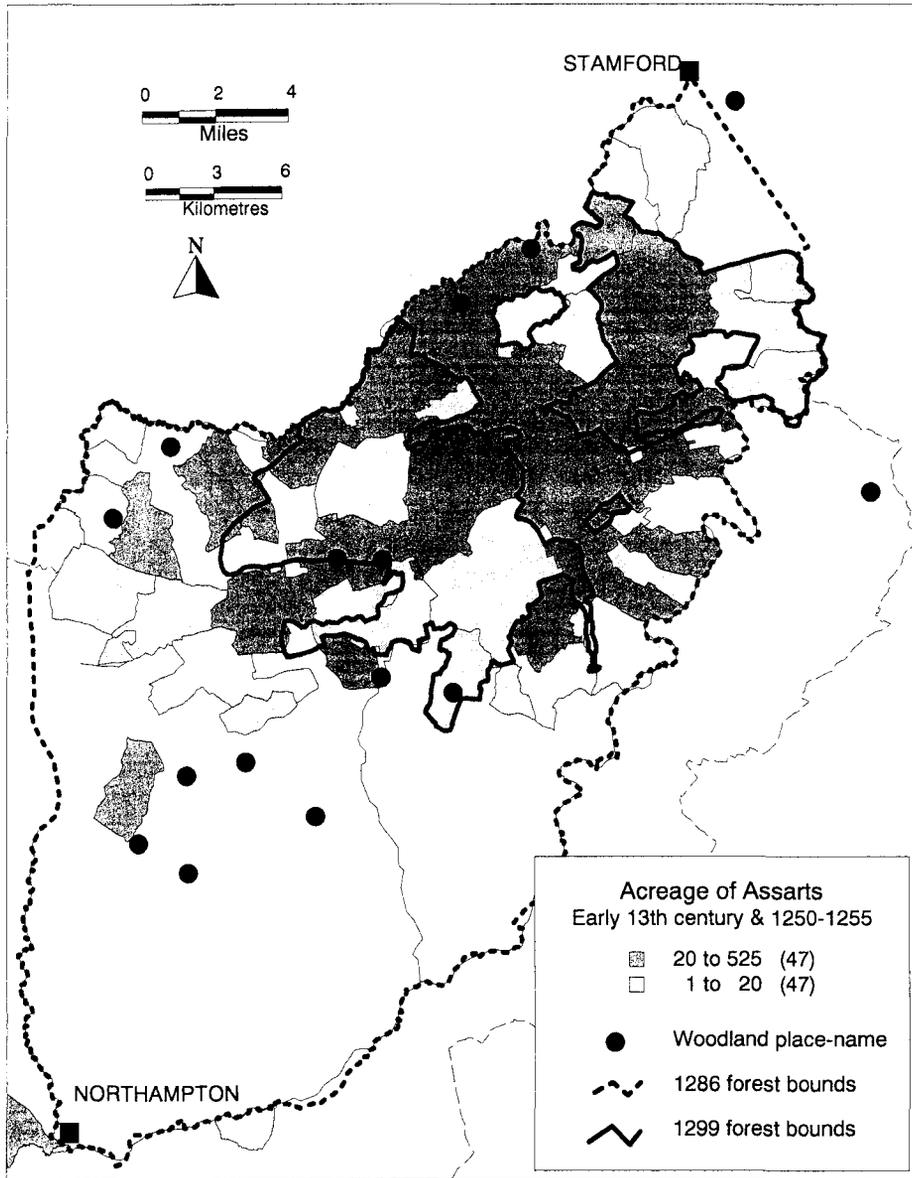


FIG. 4
Rockingham Forest in the 13th century.

Land-use change in the medieval forest was the result of a complex balance of economic and tenurial factors, which is best studied through a detailed case study. For this the Oundle area has been chosen, representing probably the largest and best documented example in the forest of medieval expansion of agriculture at the expense of woodland. However it also shows clearly that, as pressure on land grew,

the remaining tracts of woodland themselves were increasingly intensively managed.

Oundle provides the only significant pre-Conquest boundary perambulation in Rockingham Forest and, because held by the Abbot of Peterborough, it is well documented. The charter provides a broad picture of the landscape in the 10th century which can be closely related to the geology, topography and to later land-use, providing a model against which other areas of the forest, for which we have only medieval documentation, can be compared (Fig. 5). The woodland identified in the Late Saxon bounds of Oundle lordship corresponds broadly with the former extent of woodland reconstructed from medieval and post-medieval sources.³⁵ The Saxon woodland lay almost exclusively on the boulder clay-capped watersheds and contiguous areas of Oxford clay, while the open-field arable lay along the Nene valley with lesser 'felds' set back within the woodland zone in the tributary valleys, all on the permeable or mixed geology. The 'felds' were connected by 'rodes': linear clearings, which cut across the claylands or ran along the minor valleys. 'Leys' are also encountered in close proximity to the woods and are likely to be clearings within the woodland areas because, like the 'felds', they are associated with permeable or mixed geology, as for example the 'little sand ley' on the charter bounds. The 'felds' are associated with medieval settlements (e.g. Benefield and Churchfield, with archaeological evidence for several other probable single farms of Late Saxon date on the permeable geology in the Lyveden valley) whereas the 'leys' are towards the periphery of the townships, though whether one relates to arable and the other to pasture is unclear. 'Ley' names throughout the forest are often associated with valleys, both large and small, typically with mixed geologies, cutting through or adjacent to the clayland. There are also a number of settlements within forest valleys where 'wic' names may imply villages originating as single farms, as at Southwick and Blatherwycke, a few specifying a pastoral function, as in Hardwick.³⁶ Any such landscape of isolated farms was probably being swept away by the 10th century with the massive expansion of open-field agriculture, which appears to have included the establishment of a few completely new townships like Newton and Woodnewton.³⁷ Many of these settlements, which may still have been no more than hamlets in the 10th century, are likely to have experienced substantial growth through the clearance of woodland for arable.

The Saxon bounds specify the inclusion of woodland in Benefield, beyond the township of Oundle. This probably reflects an earlier control by the manor of Oundle of much of the surrounding territory, the other settlements being dependent hamlets, and represented in 1086 by its ownership of woodland 3 leagues long by 2 leagues wide, a total only exceeded in Northamptonshire by the royal manor of (Greens) Norton, in Whittlewood Forest.³⁸ Though not specifically

³⁵ Foard, *op. cit.* in note 13.

³⁶ Gover et al., *op. cit.* in note 11; other deserted 'wic' places remain to be identified including Hardwick in Bulwick, NRO TB 34, and possibly even a Boleswyk, a wood name near Grafton Underwood in 1299; 'ley' names are frequent within the forest, five being recorded in the 1299 perambulation, but have not been systematically studied; Bellamy, *op. cit.* in note 32.

³⁷ B. Bellamy, 'Little Newton: a central Northamptonshire deserted village', *Northamptonshire Archaeol.*, 27 (1996), 200-10.

³⁸ *Domesday Book*, 221b and 219c.

identified in the charter bounds, it is likely that by this time the floodplain of the River Nene was already used as meadow, as it was throughout the later and post-medieval periods. The lordship of Oundle thus can be seen to have provided a good balance of meadow, arable and woodland resources.

The history of woodland in the Oundle area is largely one of contraction in the face of clearance for agriculture. However even at the height of agricultural expansion Oundle still retained a number of woods. In 1292 there is reference to the woods of Banho, Totynhoc, Hilles and Southawe, and in 1309 to Frenshawe.³⁹ Moreover there is evidence discussed below for Late Saxon or early post-Conquest ironworking in Southawe wood, of later medieval ironworking and pottery production in nearby Potters Lyveden, as well as field-name evidence indicative of iron working of some date in Glaphorn, showing that the woodland had a range of industrial as well as other uses.

An idea of the character of the woodland can be gained from 16th-century records. In 1536 the 208 customary acres of woodland in Oundle were valued, upon the sale of timber in an average year, at between one shilling and eight pence and one shilling and six pence per acre.⁴⁰ In 1565 Pepley Wood comprised 26 customary acres and was well stocked with oaks, the oldest not more than a century old, while the underwood was stocked with willow, ash and oak, but the greatest part was thorns. In 1570 the mature trees were cut and sold leaving only the young standard trees. Parke Wood, of 100 customary acres, was not so well stocked with old oaks but it was of similar growth and the underwood was the same. Hills Wood was 'indifferently replenished' with young oaks and the underwood was 'very thick bein set with willow and oak and some ash and thorne'. This wood was sold in 1569. Little Hawe, of 30 customary acres, was set with young oaks and the underwood was of willow and oak with much hazel and very much thorn. Southawe was not described.⁴¹

The woods were of importance as sources of fuel and of timber for building, but increasingly these rights, like others, were strictly controlled and one finds various tenants being fined for illegally felling trees and taking away firewood.⁴² Where a wood was within the forest then the use of its products was controlled by the king's forester, but if it was excluded from forest jurisdiction a lord might also impose increasing control. This can be seen from a dispute in 1385, when the rector of Oundle claimed the right to cut and carry away trees and underwood in the Abbot's woods in Oundle without licence whenever he wanted for the fires of his rectory. He was allocated the surface or 'vesture' of the wood - the trees, underwood, shrubs and saplings - in 36 customary acres 1 rood in Southawe Wood, being about half of the wood as it survived at enclosure in 1813. He was allowed to cut the trees when he required, although the areas he cut were to be enclosed to preserve the succeeding growth of trees.⁴³ This confirms that by the

³⁹ King, *op. cit.* in note 28, 81-2; account roll of Biggin, 1309-10, NRO, F(M)2389.

⁴⁰ W. T. Mellows (ed.), *The Last Days of Peterborough Monastery* (Northamptonshire Record Society, XII, Northampton, 1947), 6-14.

⁴¹ Measured with 18 ft pole; survey of Oundle and Biggin, NRO, ML116.

⁴² Oundle court roll, 1500 A.D., NRO, Rockingham archive, B.15.79.

⁴³ Measured with the 21 ft pole and the specified bounds laid out in part with boundary stones, PRO, Patent Rolls, 19 Richard II; described as Parsonage or South Wood in 1565, NRO, ML117, 92.

late 14th century some of the woodlands were being managed by coppicing, although it is probable that the system has much earlier origins as elsewhere in England.⁴⁴ The coppice management technique is described in the forest in 1547, when the coppices were to be fenced with hedge and ditch, with timber being felled for gates and posts, to protect the young growth against common cattle for seven years. While enclosed the keepers were paid to maintain the hedges, which were presumably dead hedges as used again today in Pipewell Woods to protect coppice from deer.⁴⁵ In 1450 just four years' protection were required in Corby Hill woods, which is in line with the shorter average cycles seen elsewhere in the medieval England.⁴⁶ The earthworks associated with coppice boundaries of Geddington Chase, mapped in c. 1600 but possibly of medieval origin, have been surveyed and described for the surviving woodland.⁴⁷ In the adjacent areas of the Chase, now cleared, the 1600 boundaries have not survived but there is soilmark evidence for an earlier, undated pattern of curving ditched boundaries, suggesting that there may be a longer and more complex history to coppice management, as earthwork evidence also indicates in Salcey Forest.⁴⁸

Most of the woods were opened up at certain times of the year as wood pasture. Such pasture will have been of particular importance to clayland townships such as Benefield whose land, unlike Oundle itself, did not extend to the flood plain meadows of the main river valley. The exercise of these common rights could be just as destructive in the longer term as cutting down the wood, particularly if there was overstocking, because the intensive browsing simply destroyed all new growth leading to an increasingly open wood pasture and potentially ending in total clearance. The evidence of charcoal hearths discussed below would suggest such clearance did occur in limited areas of the forest. The clearest examples are in areas of intercommoning such as Weldon Plaine and adjacent land which was common pasture in 1587 but which had been wooded, presumably in the medieval period, on the evidence of the dense distribution of charcoal hearths.⁴⁹

It is not surprising then to find that such rights were subject to strict controls. Pasture and pannage in some woodland was solely the right of commoners of the township within which the wood lay; in some the rights might be shared between adjacent townships and in others, from at least the 12th century onwards, all common rights might be extinguished, though this generally followed clearance or emparking. For example, in 1400 Oundle Park Wood, lying within the Abbot's deer park where an upcast bank is specified, was contrasted to the woods of Lytylhawe, Southhawe and Les Hilles which were 'neither private nor enclosed'.⁵⁰

⁴⁴ M. L. Faulk and S. A. Moorhouse, *West Yorkshire: An Archaeological Survey to 1500 AD*, 3 (Wakefield, 1981) 682; Rackham, *op. cit.* in note 9, 72.

⁴⁵ Pettit, *op. cit.* in note 8, 105.

⁴⁶ Once the 44 customary acres were felled they 'must sufficiently hedge and close' the woodland for four years: British Library (BL), Add. Ch. 41632.

⁴⁷ Bellamy, 1986, *op. cit.* in note 16, 19–20.

⁴⁸ Soilmark mapping in SMR; D. Hall, *Salcey Forest, Northamptonshire, Archaeological Interpretation Survey* (unpubl. rep. for Northamptonshire Heritage and Forest Enterprise, 1996), in SMR.

⁴⁹ NRO, FH 272.

⁵⁰ BL, M.53892.

The tenants of Oundle manor in 1565 each paid two shillings for the right of pannage, the feeding of hogs on beechmast and acorns within the woods in Oundle township. These rights were in all the lord's woods, except Park Wood, from seven years after every sale of the same wood.⁵¹ The rights in Park Wood had probably been extinguished when the deer park at Biggin had been created in the early 14th century.⁵² The woodland areas were also important for the grazing of cattle. In 1321 the park was worth thirteen shillings and four pence per annum for the underwood and pasture, over and above support of the beasts of the chase.⁵³ At Harringworth, near Corby in the North of the forest, the lodge to the deer park actually incorporated two great cow houses in 1272.⁵⁴ When common rights were extinguished, cow pastures were typically allocated in lieu of those rights, as for example with Glaphorn and Oundle cow pastures which replaced pasture rights held by the tenants of those townships in Biggin.⁵⁵ This process of enclosure and removal of common rights continued into 16th century. In Biggin for example there was a dispute over further enclosure in 1503 between the Abbot of Peterborough and the township of Benefield which led to various 'injuries and tribulations' to Edward Greenhall who held it from the Abbot.⁵⁶

Management for deer (Fig. 6)

Management for deer had been the primary purpose of the establishment of areas under forest law and remained an important factor restricting woodland clearance throughout the medieval. During the period an increasing number of deer parks were established by the king or, with royal grant, by other lords, following the trend of formalising and demarcating areas for specific land-use as the medieval landscape became more and more intensively used. To retain the deer the parks were encompassed by a ditch with external bank surmounted by a timber pale or, occasionally and usually very late as at Harringworth Old Park, by a stone wall. Whereas most ramparts were quite modest, like the original at Harringworth, some were far more massive, as at Biggin where in places it survives as an earthwork some 2 m high. A few parks are recorded in Domesday but none are mentioned in Northamptonshire, though several may perhaps already have existed. There were two major phases of documented deer park foundation in Northamptonshire, peaking in the mid-13th century and then, after a significant dip, again in the first half of the 14th century, with a small new group in the late 15th and early 16th century.⁵⁷

The distribution of deer parks in the county follows the national pattern of close association with woodland, although in a few cases they were created by the

⁵¹ NRO, ML116.

⁵² King, *op. cit.* in note 28, 85.

⁵³ J. Sparke, *Historiae Anglicanae Scriptores Varii* (London, 1723), 189.

⁵⁴ PRO C133/2(7).

⁵⁵ Foard, *op. cit.* in note 13.

⁵⁶ Mellows, *op. cit.* in note 40, xi and lii.

⁵⁷ G. Foard, fieldwork notes in SMR; Darby, *op. cit.* in note 1, 202–3; J. Steane, 'The medieval parks of Northamptonshire', *Northamptonshire Past Present*, V (1975), 211–33, p. 219.

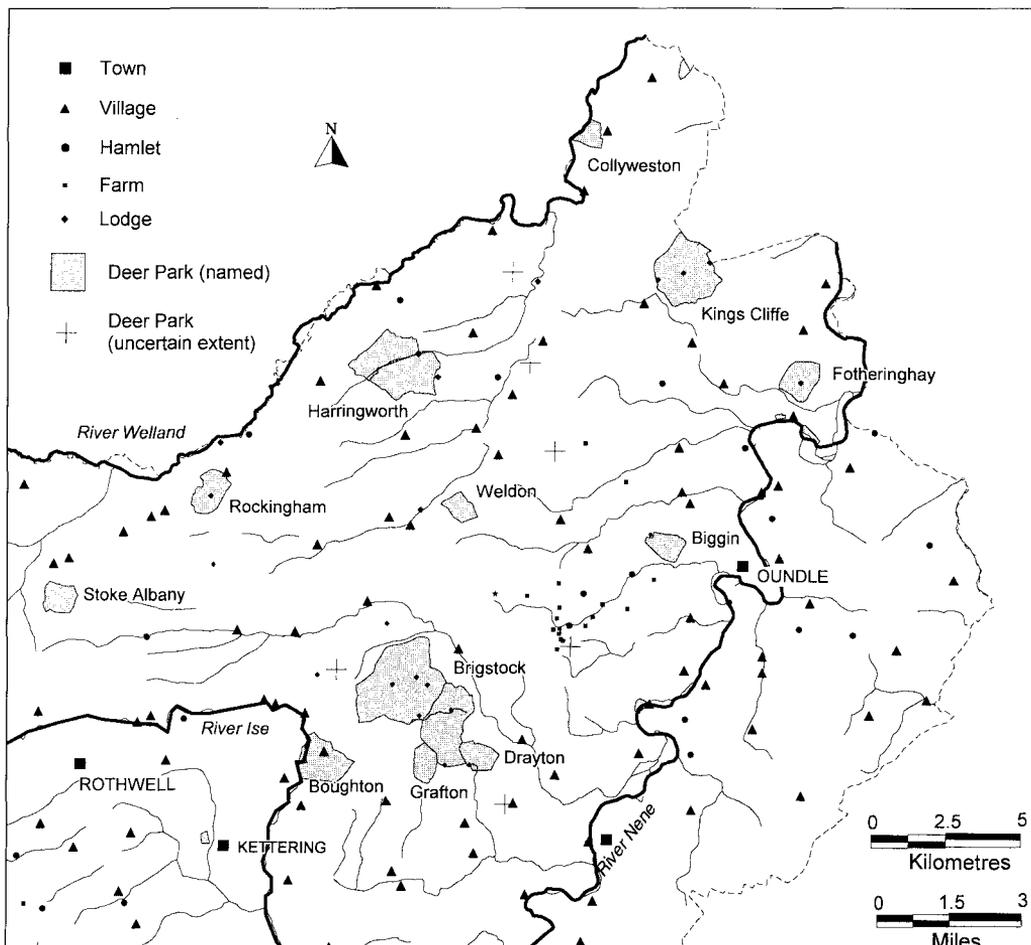


FIG. 6

Medieval settlement and deer parks in Rockingham Forest.

removal of areas of land from agriculture.⁵⁸ Those established on arable land tend to be of the latest phase, when the pressure on land was reduced and when parks were being constructed adjacent to major residences. There are, however, a few medieval cases of emparking of arable, for example at Biggin where the park was created largely on boulder clay in the early 14th century, on the 12th-century assart which spanned Benefield, Oundle and possibly Glaphorn townships. Except for the present Park Wood, which presumably was never cleared in the medieval period, the park is covered by ridge and furrow which has the characteristics of medieval cultivation rather than later farming post-dating the park. There are,

⁵⁸ The extents of parks in Northamptonshire are mapped in RCHM, *op. cit.* in note 19, but few have been subject to detailed earthwork recording; G. Foard, survey notes in SMR for Brigstock, Biggin and Harringworth; for a national overview of deer parks and warrens see L. Cantor, 'Forests, chases, parks and warrens', in L. Cantor (ed.), *The English Medieval Landscape* (London, 1982), 56-85.

however, questions about the significance of ridge and furrow within some other parks. For example, the Upper Lawn in Brigstock Great Park contains ridge and furrow, apparently of medieval form, which would have to be contemporary with the park, whereas the slight traces of ridge and furrow elsewhere in that park can probably be attributed to brief phase of illegal cultivation during the Civil War.

The royal parks at Brigstock were by far the largest in Rockingham Forest. There had been woodland 15 furlongs long and 1 league wide attached to the royal manor in 1086 and the area suffered only limited clearance in succeeding centuries, as seen from the assart figures for the first half of the 13th century.⁵⁹ As a result extensive tracts of woodland survived here until disafforestation in the 17th to early 19th centuries. Although emparking provided protection for the woodland from the effects of clearance for arable, it did not always restrict rights of pasturage and pannage nor did it necessarily always lead to effective woodland management, particularly from the later 14th century onwards when parks were increasingly leased out as pasture. In the Brigstock parks poor management had resulted in significant decline by the 16th century. In 1565, when stocked with a thousand deer and still used for hunting, the 2,250 acres (910 ha) in the two parks contained only 910 acres (368 ha) of woodland. Of this 750 acres (304 ha) were already seriously wasted, consisting of only old maple and thorn, while in the whole park only 700 oaks remained.⁶⁰

The loss of trees within the parks was not, however, restricted to the effects of poor management. There was also a requirement for some open land within the park to provide pasture for the deer. This can be seen at Harringworth where the parks came to encompass almost all of the boulder clay in the southern part of the township. The Old Park, comprising as much as 500 acres (202 ha), was established by the lord of Harringworth, following a royal grant in 1232, in that part of Harringworth Wood called Stockes and extending from the common field as far as Langlegh Trench.⁶¹ The latter was apparently a narrow strip of open ground, set on the mainly permeable geology of the narrow valley which cuts through the boulder clay plateau dividing the medieval area of Harringworth woods in two. Although a private park, in 1285 the king's forester maintained the right to have chase within Harringworth Park, as part of the forest, but in the 1291 perambulation the whole of Harringworth was excluded from the forest. Before 1587 a New Park of 600 acres (243 ha) had been established immediately to the South of the Old Park, encompassing all of the remaining Harringworth and most of the adjacent Bulwick woods.⁶² By 1619 the whole of the Old Park had apparently been cleared of woodland although, where not quarried in the 20th century, the surviving distribution of charcoal hearths confirms that it had been previously wooded. An area of about 200 acres (81 ha) within the New Park was also cleared to create Bushy and Nether Lawns, an open area of grazing for both deer and cattle. This

⁵⁹ Air photos in SMR; particular of the manor, rectory and parks of Brigstock, 1694, NRO X361; *Domesday Book*, 219d; Raftis, *op. cit.* in note 29.

⁶⁰ Pettit, *op. cit.* in note 8, 171.

⁶¹ J. Bridges, *The History and Antiquities of Northamptonshire*, I (Oxford, 1791), 316.

⁶² Mapping of Old and New Parks from RCHM, *op. cit.* in note 18, I, p. 52, with corrections by the author from field investigation; NRO, map 4527, map 763b, TB 18, FH272; and Eayre and Bryant, *op. cit.* in note 2.

had previously been wooded for it too contains more than 40 charcoal hearths, though whether clearance was progressive through intensive grazing outside the protection of the coppice boundaries or whether there was intentional removal is not clear. Post-medieval maps show similarly large lawns elsewhere within the forest, such as Benefield Lawn, while there were lawns of over 200 acres (81 ha) in Brigstock parks and a 100 acre (40 ha) lawn in Drayton park.⁶³ Such lawns must have been a significant if localised influence in woodland clearance in the heart of the forest.

Warrens, established from the mid-13th century onwards mainly for the management of rabbits, unlike deer parks, did not represent a significant influence in woodland management. Though numerous, they tended to be both very small and less closely associated with wooded areas. For example the Old Warren at Harringworth was established on limestone geology within the open field area and comprised just 6 acres (2.4 ha).⁶⁴

Frequently within the deer parks but rarely within warrens lodges were constructed, representing probably the most common and certainly the most specialised dispersed element in the settlement pattern of the forest. Hunting lodges were sometimes moated and ranged from very small structures, perhaps lasting only a few years, to quite substantial sites, occasionally associated with their own warren or fishpond, as seen in the royal parks at Brigstock.⁶⁵ In Harringworth park the lodge, also with its fishpond and great cow houses, was already constructed in stone and roofed in stone slates by 1272, though the building which survives today represents a 15th-century replacement with later extensions.⁶⁶ Many of the lesser lodge sites still await identification, while major manors, usually set within the forest villages might also serve the same purpose. Such was the case with the royal manors in the villages of Geddington, Kings Cliffe, Brigstock, the royal castle in Rockingham and also the isolated Biggin Grange, which became a major hunting lodge of the Abbots of Peterborough.⁶⁷

CLEARANCE FOR AGRICULTURE AND ITS IMPACT ON SETTLEMENT

When land was taken into the forest, rights of common persisted and seem to have determined which settlement would later assart which area of woodland. It appears to have been true for Glapthorn while the Saxon boundary charter for Oundle confirms this was the case with Biggin, the great assart created in the second half of the 12th century by the Abbot of Peterborough (Fig. 7).⁶⁸ The legal dispute over Biggin between the Abbot and the king's forester makes it one of the best documented of all assarts in the forest, showing that in the 12th century the

⁶³ NRO, FH272; maps of 1602 and 1603 of Brigstock parks in Hatfield House; and NRO, ML141; Steane, *op. cit.* in note 57, 223.

⁶⁴ NRO, map 763a; countywide distribution of warrens from SMR.

⁶⁵ Brigstock parks but not the lodges are briefly described by RCHM, *op. cit.* in note 18, I, 21–3; Old Lodge in the Great Park, probably that described by H. M. Colvin, *The History of the King's Works*, 2 (London, 1963), 902, and Queen's Lodge in the Little Park and various lesser lodges and the park pales have been identified from documentary and earthwork evidence: Foster *op. cit.* in note 16.

⁶⁶ RCHM, *An Inventory of Architectural Monuments in North Northamptonshire* (London, 1984), 87–8.

⁶⁷ Colvin, *op. cit.* in note 65.

⁶⁸ King, *op. cit.* in note 28.

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FIG. 7

Ridge and furrow near Oundle within that part of the medieval deer park laid out on the Biggin assart. The earthwork of the park pale excludes a rectangular area next to the Hall, the site of the monastic grange called Biggin, then runs into the distance and turns left alongside the modern road. *Photo: Northamptonshire County Council.*

land had been commonable to the villagers of Benefield, Glapthorn and Oundle. In Oundle, as elsewhere, we have seen that some of the lord's woods at the edge of the township were retained throughout the medieval period and were exploited for timber, underwood, pannage and pasture whereas immediately beyond the bounds, in Biggin, there was large-scale clearance for agriculture. The exact reasons why, during the post-Conquest period, one piece of woodland was assarted while an adjacent one was not may be unclear, but it seems to have far more to do with administrative and tenurial factors than the agricultural potential of different areas of boulder clay. This is in contrast to the situation in the Saxon period, when population pressure was far less, where it would appear that land-use potential, determined primarily by underlying geology, was the major factor influencing whether land was arable or woodland.

Schumer identified three types of assart in Wychwood Forest and these can also be recognised in Rockingham Forest. The first, perhaps always the earliest,

involved incorporation within existing open fields and led to the reinforcement of the pattern of nucleated settlement. As in Wychwood, this probably explains the concentration of irregular open-field systems in Rockingham Forest compared to the champion lands, with examples of ten or more great fields in one township.

At Glapthorn, if our reconstruction of the Oundle charter is correct, fields such as Whitelie and Highlie were probably being cleared and incorporated into Glapthorn's open field system after 971, producing a complex pattern of nine great fields by 1470.⁶⁹ This type of clearance resulted in the growth of the existing nucleated settlements rather than generating new settlements. The expansion of small settlements through woodland clearance may have been important in determining the nature of the medieval settlement pattern in the forest. The early 'felds' in small areas of mainly permeable geology probably each contained one or in some cases possibly paired hamlets across a stream. Where woodland was available within the township, clearance appears to have allowed these settlements to grow into substantial villages. This was probably the case in Benefield, which appears to be the largest single area of medieval clearance in the heart of the forest, where, significantly, it was the king's forester who was intensively assarting in the 1160s. It had two settlements, Netherthorpe on the small area of mixed geology containing the castle and church as well as tenement rows, and on the boulder clay the double row of Upthorpe.⁷⁰ In other cases, such as Churchfield or Perio, where the land unit was small and there was little woodland which could be cleared for new arable, the settlements remained small hamlets.⁷¹ The 1301 Lay Subsidy reveals fifty-five taxpayers in Benefield but only nine in Churchfield.⁷²

The other two types of assarting resulted in hedged fields held in severalty, representing either small encroachments from the edge of open fields held by free or villein tenants, or larger areas carved from the woodland by a lord or by a free tenant under licence from the lord. In Rockingham Forest in most cases these too were exploited from an existing village but some were managed from a new isolated settlement within the assart itself, providing a new component to the settlement pattern.

The records of assarting show that in the 13th century clearance continued in most townships within the forest to the North-East of the Ise. Exceptions within this area, such as Oundle, generally result from earlier exemption from forest law and hence absence from the records, rather than necessarily an absence of further woodland clearance. In Glapthorn there were more than 45 acres (18 ha) of assart established in the first half of the 13th century.⁷³ This included the clearance of both Carmlestibbing and Provost Closes, which was well advanced by 1299 and comprise in all some 170 acres (69 ha).⁷⁴ These clearances from the forest were

⁶⁹ B. Schumer, *The Evolution of Wychwood to 1400: Pioneers, Frontiers and Forests* (Leicester, 1984), 50; Foard, op. cit. in note 13; D. Hall, *The Open Fields of Northamptonshire* (Northamptonshire Record Soc., XXXVIII, Northampton, 1995), 272; NRO, map 2901; D. Hall, *Turning the Plough* (Northampton, 2001).

⁷⁰ King, op. cit. in note 28; Gover et al., op. cit. in note 11.

⁷¹ Foard, op. cit. in note 13, fig. 2; RCHM, op. cit. in note 18, I, 17-18; A. E. Brown and C. C. Taylor, 'Four deserted settlements in Northamptonshire', *Northamptonshire Past Present*, V (1975), 178-98.

⁷² RCHM, op. cit. in note 20, I, 18 and 87.

⁷³ Raftis, op. cit. in note 29.

⁷⁴ Foard, op. cit. in note 13.

from Perio Chase and Totenho Walk, in Cliffe Bailiwick, where Glapthorn villagers had rights of free pasture. This later phase of clearance resulted in the creation of enclosed agricultural land separate from the open fields of Glapthorn. Carmlestibbing was held as demesne of Browne's manor, though it was still apparently exploited from the existing village. In contrast Provost Closes had been cleared and a new farm established to directly exploit the land, which was common pasture, for in 1338 the manor of the provost of Cotterstock College was endowed with 'le south side of Totenhoe' with the houses and buildings on the same, presumably on the site of the present Provost Lodge.⁷⁵

There are various other examples of isolated farms being created in this way and it is likely that a significant number still await identification within the forest. However only in the Lyveden valley to the South-West of Oundle did clearance result in the establishment of a more extensive dispersed settlement pattern. The existence of hamlets within small township divisions, like Potter's Lyveden with twenty-one taxpayers and Little Lyveden with six taxpayers in 1301, is not unique within either the forest or the county as a whole.⁷⁶ It is the concentration of isolated farms and hamlets that is unusual, being a pattern more typical of the woodland zones of North Bedfordshire and Buckinghamshire and small parts of the adjacent Whittlewood and Salcey Forests.⁷⁷ The dispersed pattern seems to coincide with a very fragmented medieval manorial structure. At least seven separate small manors had holdings in Churchfield and Lyveden.⁷⁸ It is possible that there is a direct causal relationship between the size of land unit, of settlements and the degree of manorial fragmentation.

The isolated settlements could be created by both smaller and the largest of landowners. The single carucate Wakerley fee, a dependent manor in the town of Oundle, held a close in a former woodland area adjacent to Southawe Wood which was known after clearance, at some time before 1395, as Stibbing Close.⁷⁹ A moated site was established within Stibbings, an area of some 100 acres (40 ha), which is probably the 'Wodehous' which is first recorded in 1292.⁸⁰ The adjacent unenclosed arable represents clearances which, in contrast, were incorporated into the open fields of Oundle, for the names include Stubb Half Acre and Bushaw furlong. In this case a more typical three-field system remained, probably because the assarted land was just a small addition to a system already well developed by the late 10th century. Some 70 of the 120 customary acres of the Wakerley carucate lay in this area of open field mainly adjacent to the Stibbings, perhaps indicating that the very origins of the fee might lie in the process of assarting.⁸¹ It is also absent from Domesday and the 1125-8 survey of Oundle, though this does not prove a late 12th-century origin for the fee.⁸²

⁷⁵ PRO, Charter Rolls, 12 Ed III m.10 n.15; present on Fayre's map, op. cit. in note 2.

⁷⁶ Steane, op. cit. in note 16.

⁷⁷ C. Lewis, P. Mitchell-Fox and C. Dyer, *Village, Hamlet and Field* (Manchester, 1997).

⁷⁸ Foard, op. cit. in note 13.

⁷⁹ A close next to 'Dovehouse Close at the Woodhouse' formerly Wakerley's, 1565 survey, NRO, ML.116; John Wakerley held a tenement called 'la Wodhous', BL, M.53892, f.107.

⁸⁰ RCHM, op. cit. in note 18, I, 71, site 12; 'Le Wodehous', 1292, account roll, NRO, Rockingham A/4/33; NRO, Oundle Inclosure Map.

⁸¹ NRO, ML.116; Foard, op. cit. in note 13; Hall, op. cit. in note 69, 325.

⁸² T. Stapleton, *Chronicon Petroburgeuse* (London, 1849), 158.

The Abbot of Peterborough, in 1086 the largest owner of woodland in the forest after the king, was responsible for what was probably the largest assart of all associated with a single farm, that already referred to as Biggin. Between the 1160s and the early 14th century, the Abbey created an assart covering more than a thousand acres (405 ha) within the bounds of the Oundle Saxon charter, and there built Biggin Grange, the largest demesne farm on the Peterborough estates.⁸³ This represented a major investment which produced a large profit. The creation of the assart and grange at Biggin is the clearest physical expression in the landscape of the changing economic reality of the later 12th century, with the development of direct exploitation of and capital investment in the demesnes rather than exploiting them through leases to tenants. Clearance continued at Biggin in the late 12th and early 13th centuries. Even in the early 14th century assarts were still being made there, although the size of the clearances were much reduced, undoubtedly because the available woodland was substantially reduced and perhaps because the competing economic reasons for the retention of the rest became stronger as the area of woodland declined. By 1291 Biggin had 400 customary acres leased to tenants and 500 under cereal. The grange employed a reeve, heyward, two carters, swineherd, dairymaid, twelve ploughmen, three shepherds, a cowman and a forester. By comparison Oundle manor employed a reperevee, heyward, two carters, swineherd and dairymaid, but only four ploughmen and one shepherd.⁸⁴ The latter cannot be accounted for only by the smaller size of the demesne but rather must be a result of cultivation of the land primarily by paid labourers; whereas Oundle demesne could call on far more tenant services as an ancient manor in a substantial small town, Biggin had just a handful of tenants in the hamlet of Churchfield. Though the land of Biggin was apparently never organised as an open-field system attached to a peasant settlement, there is extensive ridge and furrow of typical medieval form to show that the land was still cultivated in strips. In 1321 the 170 customary acres of demesne arable in Oundle manor were valued at six pence per acre, while 200 customary acres in Biggin were worth only three pence per acre and the 260 newly broken there were valued at just one penny per acre.⁸⁵ Much of Northamptonshire's woodland zone was always marginal for arable agriculture and it would be that area which would be returned most readily to pasture or woodland in any major recession. This clearly happened in the 5th century although in the later 14th and 15th centuries, when the economic collapse was not as intense, the reversion was largely to pasture. In some areas like Clipston and Brayfield on the Green, however, a transition to furze (gorse) did occur where grazing pressure was sufficiently low.

The forest thus appears to have experienced a somewhat different development of settlement as well as land-use during the medieval period compared to the champion lands. A model of development for Rockingham Forest can be suggested which should be tested by further archaeological investigation. The re-planning of the Late Saxon period had probably transformed the forest areas just as it had the

⁸³ In 1199 Richard I released 400 acres (162 ha) of assart, reserving only his hunting in the woods: King, *op. cit.* in note 28.

⁸⁴ Account Roll of Oundle and Biggin in 1300-1: NRO, F(M)2388.

⁸⁵ Sparke, *op. cit.* in note 53.

rest of the county, though from what may prove to have been a distinct, mainly pastoral agricultural system with farms or small hamlets, into one of nucleated settlement and open fields, possibly with a few isolated farms surviving through the Late Saxon period. But whereas the champion lands saw open fields that generally abutted one to another by the Norman Period, in the forest the open fields were generally divided by substantial tracts of woodland, except along the narrow valleys. This provided a potential for further expansion and during the 12th and 13th centuries some townships in the forest saw continuing growth of their open fields, with the clearance of areas of mainly boulder clay, enabling the growth of hamlets into villages. A few hamlets remained, probably where they had little or no room for expansion, but many villages did not reach anything like their full potential as large tracts of land remained under woodland. In the 10th and 11th century the most efficient way for a lord to exploit his land had presumably been through tenant farmers working common fields and growth at that time resulted in nucleated villages. The dispersed component to the forest landscape was apparently created largely at a time when economic conditions had changed such that lords tended to manage their demesne in hand. Thus the process of assarting in the later 12th and 13th centuries created land held in severalty and a dispersed component to the settlement pattern that was generally absent from the champion landscape. Isolated farms both large and small, were newly established on some of the assarts across the forest, although where there was an unusually fragmented tenurial pattern there was a distinct concentration of new farms and a few hamlets. The establishment of deer parks, particularly in the 13th century, created the lodges as another significant dispersed element of the settlement pattern typical of the forest but rare in the champion lands. In contrast, the growth in industrial production within the forest, although leading to the further expansion of some villages and hamlets, like Stanion and Potters Lyveden, did not apparently result, except possibly in the Lyveden valley, in the establishment of new permanent settlements. The iron and charcoal industries did, however, provide a very temporary component to the settlement pattern across much of the forest, though little evidence has yet been recovered as to the nature of these ephemeral settlements.

Despite the substantial scale of clearance and in some places of industrial development, the forest north-east of the Ise remained less densely settled than the champion lands and, though several of its villages, such as Kings Cliffe and Geddington, acquired functioning markets, it never had the wealth to support its own small town.⁸⁶ Hence in the medieval period, as in the Roman, the forest looked to the wealthier lands of the Nene, Welland and Ise valleys for its urban centres, especially Oundle, Stamford, Rothwell and Kettering.

The economic recession of the late Middle Ages saw settlement desertion and shrinkage and the reversion of much arable land to pasture, but it was not on the scale of the early Saxon period and so relatively little land reverted to woodland. However it was not until the recovery was well under way in the 17th century that Rockingham Forest seems to have experienced another major phase of woodland clearance to match that of the medieval period. In most cases this seems to have

⁸⁶ G. Foard, *The Medieval Town in Northamptonshire*, in preparation.

been associated with the process of disparking, disafforestation and enclosure. For example, in Brigstock parks woodland clearance followed swiftly after disparking, when sold by the crown in 1602 to Sir Robert Cecil. He cleared and sold the timber from both parks over the next two to three years and turned it all over to pasture for cattle, enclosing the land and allocating a 228 acre (92 ha) cow pasture to the tenants of the township in lieu of common rights. In 1612 the parks were officially disafforested, though a prohibition of tillage was still retained.⁸⁷ In contrast the unemparked woodland in the forest generally survived until enclosure in the 19th century, when large tracts were again cleared, as in the northern half of Geddington Chase and most of Morehay Walk, now in Southwick.⁸⁸ The reasons for any particular clearance in the medieval or indeed the post-medieval period may be complex, but there had been fundamental changes between the 13th and the 17th centuries which shifted the economic balance between conservation and clearance in the heart of the forest. The declining value placed on the area for hunting was only one factor. There had also been a range of medieval industries to be found in the forest, and the fortunes of two of these in particular may have been intimately linked to the fate of the woodland: iron production and its fuel supplier the charcoal industry.⁸⁹

THE IRON INDUSTRY (Fig. 8)

Since the early 18th century it has been known that a major iron industry once existed in Rockingham Forest, which also extended north across the Welland into the medieval Rutland Forest. Morton, writing in 1712, describes:

*the huge quantity of slags, the refuse of the ore which swims upon the metal in its fusion, which are met with in that Woody Tract, I mean in the Fields that are reasonably presum'd to have been formerly part of Rockingham Forest. We meet with so great a quantity of these, that we may well conclude, abundance of Wood was consum'd that way. In the district betwixt the Ise and Willowbrook, there is scarce a Lordship, at least in the Northerly part of that District, but has these slags in greater or lesser Plenty scatter'd up and down in their fields. In some places they lye amassed together in huge heaps; and particularly at Gretton on the south side of the town, and at Finshed. At these two places there are many waggon loads of them. . .*⁹⁰

Such evidence is not unique. In addition to the well-known iron-production areas of the Forest of Dean, Cumbria and the Weald, there are many locations in England where iron has been produced on a smaller scale, as for example revealed in recent systematic survey in the Blackdown Hills in Devon, or the substantial numbers of mainly undated iron bloomeries identified during fieldwalking from slag patches in North Bedfordshire, North-East Buckinghamshire and the adjacent

⁸⁷ Pettit, *op. cit.* in note 8.

⁸⁸ Bellamy, 1986, *op. cit.* in note 16; Ordnance Survey 1st edition one-inch map, 1824; 1st edition six-inch map 1885.

⁸⁹ For a general discussion of woodland crafts see J. Birrell, 'Peasant craftsmen in the medieval forest', *Agricultural Hist. Rev.*, 17 (1969), 91-107; medieval ironworking, D. W. Crossley, 'Medieval ironsmelting', 29-41 in D. W. Crossley (ed.), *Medieval Industry* (CBA Res. Rep., 40, 1981), and J. Geddes, 'Iron', 167-88 in J. Blair and N. Ramsay (eds.), *English Medieval Industries* (London, 1991), and post-medieval ironworking, G. Hammersley, 'The charcoal iron industry and its fuel, 1540-1750', *Econ. Hist. Rev.*, 2nd ser., 26, (1973) 593-613.

⁹⁰ J. Morton, *The Natural History of Northamptonshire* (London, 1712), 549-50.

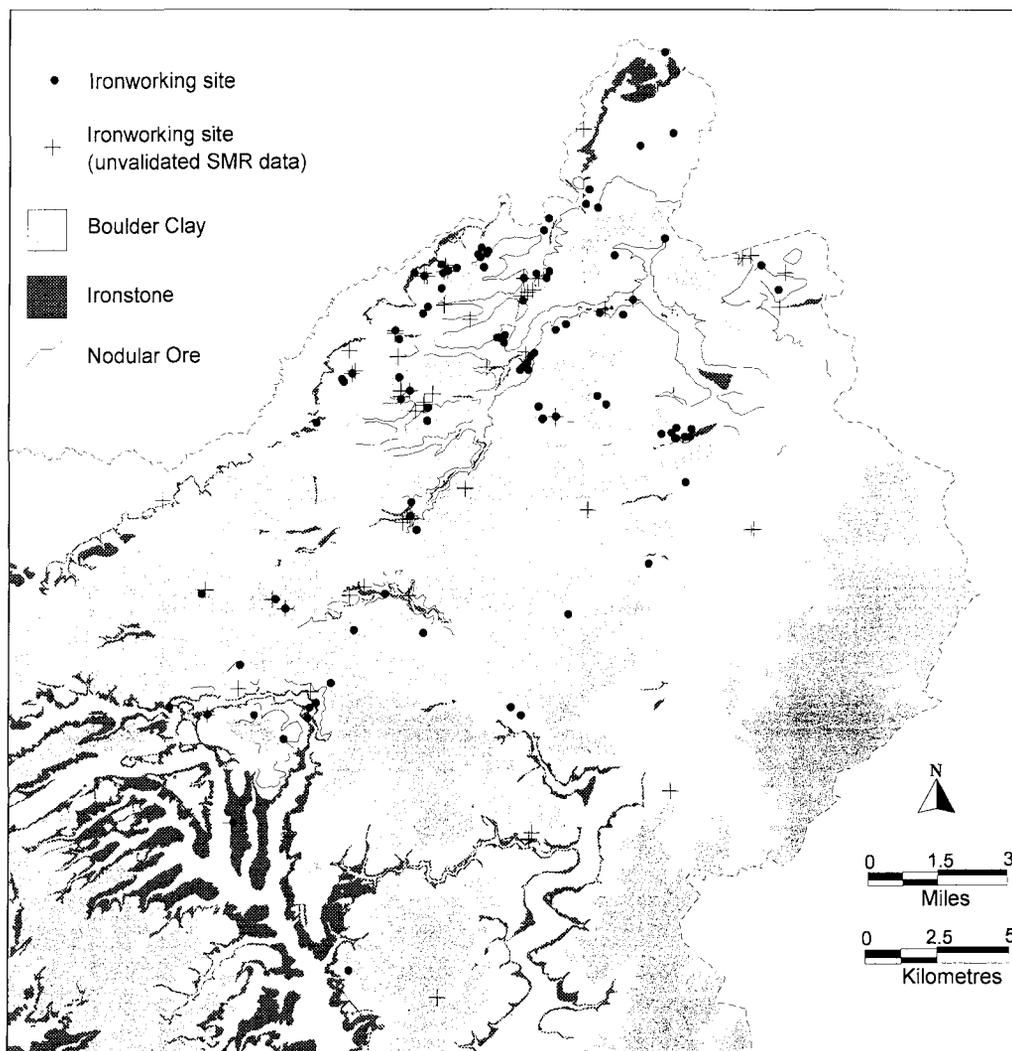


FIG. 8

Ironworking sites, all periods

(after Bellamy et al., *op. cit.* in note 16, and Hall, *op. cit.* in note 18).

part of Northamptonshire.⁹¹ Unfortunately direct comparison of the scale of the industry between areas and sites is very difficult on present evidence, due to the inconsistency between surveys in quantifying and mapping the iron slag. Amongst

⁹¹ H. F. Cleere and D. W. Crossley, *Iron Industry of the Weald* (Leicester, 1985); M. Bowden (ed.), *Furness Iron: The Physical Remains of the Iron Industry of Furness and Southern Lakeland* (London, 2000); Hart, *op. cit.* in note 8; F. Griffith and P. Weddell, 'Ironworking in the Blackdown Hills: results of recent survey', 27-34 in P. Newman (ed.), *The Archaeology of Mining and Metallurgy in South West Britain* (Historical Metallurgy Soc., vol. 13 no 2, 1996); an intensive survey of N. Bedfordshire and extensive survey of slag scatters in part of Rockingham Forest has been published in Hall, *op. cit.* in note 18 and D. N. Hall and J. B. Hutchings, 'The distribution of archaeological sites between the Nene and Ouse valleys', *Bedfordshire Archaeol.*, 7 (1972), 1-16.

the more effective mapping has been the intensive survey of Chellington in Bedfordshire, where the distribution pattern of what is apparently smelting slag has been well integrated into a parish wide analysis of medieval land-use, but even here the absence of adequate information on the size or weight of slag recovered is a limitation.⁹²

In Rockingham Forest, putting aside any potential for confusion between smelting and smithing slag, the picture appears to be one of three different types of distribution. Firstly there are broad spreads of relatively small quantities of iron slag, found in some of the valleys in Rockingham Forest, for example in the former open fields of Bulwick, and in very small quantities in some places on the clayland, as at Brigstock.⁹³ A clayland distribution is however much more typically and intensively seen in the North Bedfordshire area, most clearly demonstrated at Chellington.⁹⁴ Though some slag may have reached the fields through manuring from ironworking where it occurred in village tenements, this is very unlikely to account for most of the dispersed slag distributions. It may more often indicate the impact of medieval agricultural expansion on the remains of small early-medieval or earlier ironworking sites, hundreds of years of agriculture having destroyed the furnaces and fragmented and dispersed the slag.

Secondly there are more intensive concentrations of slag, where normal fieldwalking quantification is not practicable. These distributions occur in many parts of the Forest but mainly in the valleys and are also typical of parts of the clayland in North Bedfordshire, extending into Northamptonshire in Bozeat and Easton Maudit.⁹⁵ These slag patches represent individual sites of small furnaces, such as that excavated at Brigstock.⁹⁶ The only published excavation of a dated medieval example is from near Easton Maudit, part of the medieval North Bedfordshire industry, which revealed a diffuse area of slag and fines 20 m by 28.⁹⁷ It had been heavily disturbed by medieval and modern cultivation but contained a dense area of slag of only 4 m by 7 in extent. The furnace itself had been destroyed. In some cases, as in Easton Hornstocks at Easton on the Hill, there are surviving earthwork slag heaps of similar scale which have escaped any cultivation and where preservation of furnaces and any associated activity is likely to be very good.⁹⁸

Finally there are the large surviving slag heaps, sometimes at least 20 m across and several metres high, as at Fineshade. In Laxton parish there is even a small valley choked with slag deposits comprising more than 10,000 cu m and implying thousands of smeltings, though in this case probably all of Roman date.⁹⁹ Slag heaps are known from the North Bedfordshire area, for example in Harrold Park Wood, but are rare and relatively small compared to those of Rockingham

⁹² A. E. Brown and C. C. Taylor, 'Chellington Field Survey', *Bedfordshire Archaeol.*, 23 (1999), 98-110.

⁹³ Hall, *op. cit.* in note 18; Foster, *op. cit.* in note 16, 60a and 67-8.

⁹⁴ Brown and Taylor, *op. cit.* in note 92.

⁹⁵ Hall, *op. cit.* in note 18.

⁹⁶ Foster, *op. cit.* in note 16.

⁹⁷ D. Hall, 'The excavation of an iron-smelting site at Easton Maudit, Northamptonshire', *Bedfordshire Archaeol.*, 16 (1983), 91-5.

⁹⁸ Bellamy et al., *op. cit.* in note 16.

⁹⁹ P. Crew, 'Laxton revisited: a first report on the 1998 excavations', *Hist. Metall.*, 32 (1999), 49-53.

Forest.¹⁰⁰ The overall scale and intensity of production appears far greater in Rockingham Forest than anywhere else in the region in the Roman, Saxon and medieval periods. What is needed, however, is the application of a standardised methodology in the quantification of the slag to enable direct comparison between these different situations to enable the effective characterisation of the industries.

Morton believed that there was no iron ore in Northamptonshire and that it had been imported for ironworking due to the extensive areas of wood for fuel. Aware of the references in 1086, discussed below, to smiths paying dues to local manors in the 11th century, he attributed the evidence of early ironworks to the Saxon period, even suggesting that this was the reason why much of the woodland had been cleared. In the 19th century various claims of Roman ironworking sites were made and some indeed were correctly dated, but others are now known to be of the Saxon or medieval periods, as at Churchfield and Bulwick. This may indicate that other such sites, like that within Kings Cliffe village which were said to be Roman, may also be of later date.¹⁰¹

It was archaeological investigations by Jackson in the 1970–80s, mainly in advance of ironstone extraction for the modern iron-smelting furnaces at Corby, that suggested Northamptonshire had the most important iron industry in the region from the early Iron Age onwards. The furnaces excavated at Laxton, with diameters of 1.5 m, are claimed to be the largest so far recorded from Roman Britain.¹⁰² It was thought that the majority of the iron slag and ironworking sites found in the Rockingham Forest were likely to be of Iron-age and Roman date because watching briefs on many square kilometres of soil stripping for ironstone extraction in Rockingham Forest did not yield any conclusive medieval or Saxon evidence, despite identifying numerous ironworking sites. However while some of the furnaces, such as those at Wakerley and Laxton, were well dated, many of the recorded areas of slag and excavated furnaces were not securely dated but assumed to be of prehistoric and Roman date.¹⁰³ Ongoing work by Bellamy and Johnson is producing important new evidence which, remarkably, is giving increasing support to Morton's original interpretation. The results show that an iron industry survived in the forest throughout the Saxon period and suggest that Northamptonshire may have had a Saxon iron industry of national importance. In part of the former Geddington Chase in particular, scatters of Early-Middle Saxon pottery are associated with iron slag indicating the presence of bloomeries, isolated in the woodland not within settlements.¹⁰⁴ Rockingham Forest has provided some of the most extensive evidence of Early-Middle Saxon ironworking so far recovered anywhere in England with a number of C¹⁴ dates, some for substantial slag heaps, from the 6th to the 8th century, including evidence from Blatherwycke, Fineshade

¹⁰⁰ Hall, *op. cit.* in note 97.

¹⁰¹ E. T. Artis, *Durobrivae* (London, 1828), pl. I; RCHM, *op. cit.* in note 18, I, 71(11) and 24(2), 59(1).

¹⁰² Jackson, *op. cit.* in note 18; Jackson and Tylecote, *op. cit.* in note 18; Roman ironworking in the East Midlands has been reviewed in F. Condon, 'Iron production in Leicestershire, Rutland and Northamptonshire in antiquity', *Leicestershire Archaeol. Hist. Soc. Trans.*, 71 (1997), 1–19, and I. Schrufer-Kolb, 'Metallurgy of Roman Britain: The East Midlands perspective', paper presented at the International Symposium on Archaeometallurgy in Central and Western Asia, 1997.

¹⁰³ RCHM, *op. cit.* in note 20, I, 49(5), 105(6), 87(10), 59(7).

¹⁰⁴ Bellamy, *op. cit.* in note 16.

and Easton on the Hill.¹⁰⁵ Two other furnaces, together with evidence also suggesting primary smithing, have been excavated by Wall, on the north-east edge of the forest at Wittering, dating to the 7th to 9th century.¹⁰⁶ There have been comparable individual dates from the Early and Middle Saxon periods from various other sites across the country. Only at Ramsbury in Wiltshire has a group of furnaces yet been published, although one must expect many more such sites when systematic C¹⁴ dating is applied to slag heaps and patches in other ironworking areas, as in the Blackdown Hills where dates from the 2nd century B.C. to the 10th century A.D. have recently been obtained.¹⁰⁷

TABLE I
SMITHS (*FABRI*) AND BLOOM SMITHIES (*FERRARII*) RECORDED FOR
NORTHAMPTONSHIRE IN 1086

MANOR	LORD	TYPE	PAYMENT	
			pre-1066	1086
<i>ROCKINGHAM FOREST</i>				
Deene	Westminster Abbey	fabri	?	32/-
Gretton	king	ferrarii	?	0
Duddington	king	?	?	0
Corby	king	ferrarii	?	0
<i>WHITTLEWOOD FOREST</i>				
Towcester	king	fabri	100/-	0
Greens Norton	king	fabri	120/-	0

In the mid-11th century there were two main foci of iron production in Northamptonshire, one in Whittlewood, the other in Rockingham Forest (Table 1). These Domesday references have sometimes been misunderstood in the past. In 1066 there had been *ferrarii* or bloom smithies attached to several royal manors, but the industry had apparently disappeared by 1086. At Gretton, for example, the surveyors found 'very much is lacking from this manor which belonged to it before 1066, both in woodland and *ferrarii* and in other payments'.¹⁰⁸ The same is said of Corby, while at Duddington, which belonged to Gretton, although no specific mention is made of ironworking this may be implied where Domesday says 'much is lacking from it which belongs to the revenue, in woodland and in *other things*'. In Towcester and (Greens) Norton in Whittlewood the smiths (*fabri*) had paid 100 shillings and £7 respectively, but there also by 1086 they paid nothing.¹⁰⁹ All these manors had or previously had substantial areas of woodland attached to them. The loss of the income from the smiths in both places does not, however, represent the demise of the industry. It is simply the transfer of the land into the forest, as

¹⁰⁵ Bellamy et al., *op. cit.* in note 16.

¹⁰⁶ Furnaces consisting of sub-oval pits about 2.2 m long, 0.6 m wide and 0.15 m deep, A.D. 575-875 and 680-905; William Wall, note in *Hist. Metall. Soc. News*, 41 (1991), 2-3.

¹⁰⁷ H. Hamcrow, 'Angles, Saxons and Anglo-Saxons: rural centres, trade and production', *Studien zur Sachsenforschung*, 13 (1999), 189-205; Frances Griffith, *pers. comm.*

¹⁰⁸ *Domesday Book*, 219c.

¹⁰⁹ *Domesday Book*, 219d and 219c.

specified at Brixworth. This is confirmed by the fact that the one non-royal manor where the industry is recorded continued to render payment in 1086, for its land had not yet, presumably, been incorporated into the forest. This was Deene, a small manor belonging to Westminster Abbey, where two smiths still paid thirty-two shillings in 1086. This is also the only reference to ironworking not on a royal manor, but it is possible that it had been a royal grant, perhaps from the king's adjacent manor at Gretton.¹¹⁰ The absence of reference in 1086 to ironworking in a manor does not however necessarily mean that no ironworking was taking place, as the archaeological evidence from Southwick would seem to demonstrate. Similarly there is no Domesday record of ironworking in the adjacent areas of Rutland, Lincolnshire or the Soke of Peterborough, yet 11th-century furnaces have been excavated in Stamford and its environs while archaeological evidence, equally undated as much of that in Rockingham Forest, means that the potential still exists for a substantial Late Saxon and post-Conquest ironworking industry extending into these areas.¹¹¹

Ore and fuel sources

Because of the weight of ore and the volume of charcoal required, large-scale bloomery production was always concentrated where high-quality ores and woodland were in close proximity. The very presence of extensive woodland in North-East Northamptonshire in proximity to ore deposits may not be a coincidence but rather, in part at least, a response to the fuel needs of the iron industry. To understand the local distribution of ironworking within the forest it is necessary to examine in detail the distribution of the fuel and raw materials, although clay for the construction of the furnaces will not have been a significant consideration because it was been readily available from the various Oolite or Estuarine clays outcropping in the valley sides throughout the forest.

Many ore sources across England were exploited during the medieval period, but there are three high-quality ore locations which are relevant for all pre-industrial period iron production: the Forest of Dean, Cumbria, the Weald and the Jurassic Scarp, which includes Rockingham Forest. In Rockingham Forest the highest quality ore source was the band of iron nodules found within the 20 cm-thick Junction Beds.¹¹² These outcrop extensively in the central and eastern portion of the forest, where streams have cut down through the Upper Estuarine series to the Lincolnshire Limestone. The likely extent of this ore source has been mapped here, based on the boundary between the Upper Estuarine and Lincolnshire Limestone, although it must be noted that the Junction Beds are not present at every location where the two strata meet. There is a broad correlation between the outcrops and the distribution of ironworking evidence. The presence of production away from these outcrops may in part be explained by the fact that the nodular ore bed is occasionally present where the Upper Estuarine Series is directly on the

¹¹⁰ Darby, *op. cit.* in note 1, 266-8; *Domesday Book*, 222d; *Domesday Book*, 222b; but the Saxon royal charter confirming the grant is considered a forgery P. H. Sawyer, *Anglo-Saxon Charters* (London, 1968), nos. 1040 and 1043.

¹¹¹ R. F. Tylecote, 'Recent work on early ironworking sites in the Stamford area', *Bull. Hist. Metall. Group*, 4 (1970), 24-7.

¹¹² R. F. Tylecote, *The Prehistory of Metallurgy in the British Isles* (London, 1986), 189.

Lower Estuarine, although it is never well developed there and such association rarely occurs in the forest. There are also localised situations where a thin nodule bed exists on top of the Estuarine Limestone and at the base of the Great Oolite Clay. There are also limited outcrops of Northampton Sand and Ironstone (NSI) within the forest. This is generally a lower quality ore although, due to oxidization, the surface outcrops contain a higher iron content than deep mined ores, and they were used in some cases.¹¹³ There are several locations, such as Gretton, where major slag heaps lie in close proximity only to this source and others, such as Southwick, where both are present. It may be significant that where there are extensive NSI deposits but no nodular ores towards the SW. and NE. extremities of the forest there is little ironworking evidence. However until there is extensive fieldwork, including geophysical survey, to recover the exact location of many of the quarries associated with the main areas of smelting there will remain some doubt as to the relative importance of the two ore sources.

A small number of sites also lie at a distance from any obvious ore source. This may be explained by the evidence from Potters Lyveden where the furnaces are some 3.5 km from the nearest recorded ore outcrop. Whereas most ore deposits in the Jurassic are carbonate ores, surface deposits have in some places weathered to limonite. At Lyveden the small quantity of iron nodules associated with the excavated medieval furnaces were of limonite, said to be found as pebbles in the gravel of the stream and in surrounding fields.¹¹⁴ However in considering ore sources the limitations of the 1:10,000-scale mapping by the British Geological Survey should also be noted, in the light of the evidence from Southwick where the excavated Late Saxon quarries into NSI deposits lie 200 m from the nearest mapped location.¹¹⁵ Most importantly, until there is more consistent and adequate quantification of the volume of slag in each location it is difficult to make an effective assessment of the correlation between geology and ironworking.

The quantities of ore required will have been substantial, with an ore to iron ratio of approximately 6:1 for bloomery smelting, though this would vary significantly according to the quality of the ore. The only evidence so far recovered from Rockingham Forest is for extraction of ore from small quarries, although mines of various types would have been technically possible and are reported from elsewhere in England. As is true nationally, the chronology of iron ore quarrying is poorly understood in the forest. Quarry pits have been identified as earthworks in close association with several bloomery sites, as for example in Hollow Wood in Harringworth and in Oundle (Southawe) Wood. The latter was previously believed to be Roman but now known to be, at least in part, associated with 11th or 12th century ironworking.¹¹⁶ However the issue is confused by the presence of swallow holes in some areas of limestone, which can be quite extensive as in Wakerley Great Wood, lying close to the nodular ore outcrops and at Easton Hornstocks

¹¹³ J. H. Taylor, *Geology of the Countryside around Kettering, Corby and Oundle* (London, 1963), 73-6; D. A. Jackson, *Roman Ironworking at Stanion, Northamptonshire*, unpubl. rep., 1985, in SMR.

¹¹⁴ Steane, op. cit. in note 16, XII, 7.

¹¹⁵ G. Johnson, B. Bellamy and P. Foster, 'Excavations at Southwick, Northamptonshire', *Northamptonshire Archaeol.* (forthcoming).

¹¹⁶ RCHM, op. cit. in note 18, I, 38(4), 71(11); Bellamy et al., op. cit. in note 16.

close to slag heaps.¹¹⁷ Although occasionally quarry pits have been recorded in association with earlier ironworking, as with the Roman quarries measuring 30 m by 15 m cut into NSI near Stanion, the most securely dated Late Saxon or medieval quarries are at Southwick.¹¹⁸ There two pits of Late Saxon date, one 8 m by 3 m and at least 2 m deep, the other 4.5 m by 2.35 m and 1 m deep, have been examined in excavations within the village, cut into NSI deposits in a very confused geological situation. These lay immediately adjacent to the furnaces as they contained slag in the backfill and are associated with at least one ore roasting hearth. The quarries need not however always lie immediately adjacent to the furnaces: in the Weald during the post-medieval period, for example, ore transport occurred over more than half a kilometre.¹¹⁹ There is, however, nothing as yet within the forest to compare with the scale of quarrying recorded as earthworks in the Blackdown Hills, with intercutting quarries and spoil heaps extending over many acres on several sites on the Greensand plateau.¹²⁰ This may in part be explained by the very different nature of some ore deposits in Rockingham Forest, the potential nodular ore outcrops extending in a very narrow band in the valley sides over a length of more than 150 km. However the NSI deposits can be more extensive, as in Bloomfield at Southwick where they cover some 50 acres (20 ha). This and most other ore outcrops lie outside the woodland and so it is possible that many of the quarries are obscured by medieval as well as later cultivation and will require more intensive survey to reveal their full extent.

Charcoal was required to fuel the iron furnaces and this was produced almost exclusively in the woodland on the boulder clay plateau (see below). If the ore was being taken for smelting to the fuel source then the slag distribution should concentrate on the boulder clay. However the ironworking sites in Rockingham Forest, unlike North Bedfordshire, largely avoid the boulder clay. Instead they concentrate in the valleys or at valley edges in close proximity to the ore outcrops. There is rarely direct association of bloomeries with fuel sources, except in the few locations where the woodland extended down into the valley on to the mixed geologies. The spatial association between the undated furnace and the 13th- or 14th-century charcoal hearth excavated in Brigstock Park is almost certainly coincidental, given the dense distribution of charcoal burning in the Park. This would seem to match the situation elsewhere in the country in the post-medieval period where charcoal was transported up to a maximum of 5 to 8 km but ore was transported less than 1 km.¹²¹ Also a substantial investment may have been made in the construction of the larger bloomeries, which may have remained in use over many years and hence represented a long-term fixed asset, although there is reference in the Forest of Dean to movable forges in the 13th century.¹²² In contrast, charcoal production was far more mobile, covering probably many

¹¹⁷ 1:15,000 scale map of Wakerley Great Wood: Roberts Mapping, 1988, for Nene Valley Orienteers and Forestry Commission, in SMR.

¹¹⁸ Cleere, *op. cit.* in note 91, 78; D. A. Jackson, *op. cit.* in note 113; Johnson et al., *op. cit.* in note 115.

¹¹⁹ Crossley, *op. cit.* in note 89, 12.

¹²⁰ Griffith and Weddell, *op. cit.* in note 91.

¹²¹ Hammersley, *op. cit.* in note 89, 606.

¹²² Crossley, *op. cit.* in note 89, 12; M. S. Giuseppi, 'Some fourteenth century accounts of ironworks at Tudeley, Kent', *Archaeologia* LXIV (1913), 145-64; Hart, *op. cit.* in note 8, 46-7.

hundreds of acres both within a coppice in any year and almost certainly following a cyclical process of woodland management from coppice to coppice over as much as 15 years or more. The majority of bloomery sites do, however, lie within 1 km of an area of demonstrated charcoal production or of surviving ancient woodland which is likely to conceal charcoal burning evidence, hence a continual supply of charcoal could be expected to be achieved over a distance of as little as 2 to 3 km from any furnace. However, because the villages, ore outcrops and streams all lie in close proximity within the narrow valleys which cut through the forest, any apparent associations need to be examined through detailed survey to understand exact reasons for the positioning of the furnaces.

Bloomeries

Iron was produced by the bloomery method, giving a malleable iron direct from the ore by smelting, rather than producing a liquid iron which required higher temperatures only achieved during the post-medieval period in blast furnaces. The bloom was then refined by primary or bloom smithing, either at the smelting site itself or at a separate forge, probably within a few miles at most. This involved heating and hammering to drive out most of the remaining slag and to produce a consistent, consolidated billet of iron. Only then could artefacts be manufactured through secondary smithing, or the billet sold on to smiths elsewhere.¹²³

The major problem with the bloomery sites has not been their identification, because the slag deposits produce long lasting and very visible remains, but rather the general lack of dating evidence for the sites away from medieval settlements, which has only recently begun to be addressed by radiocarbon dating. The best evidence for the range and character of the remains of medieval bloomery sites in the forest is provided from excavations at Potters Lyveden, where ironworking preceded pottery production, with well-preserved evidence from the period 1050–1150.¹²⁴ Adjacent to the stream there was a circular stone hearth 1.7 m in diameter reddened from burning. It is suggested that the ore was washed and then roasted and crushed on the hearth. However there is no record from the excavation of the typical red ore fines normally associated with roasted ore and if, as reported, this was smelting of limonite ores then roasting may not have been necessary. However the ores of the Jurassic Scarp are usually found as carbonate ores which have to be roasted prior to smelting to drive off carbon dioxide and produce a ferrous oxide, which when crushed produces iron fines, small red particles of roasted ore. A Late Saxon roasting hearth 1.4 m by 1.1, with a base of clay and rubble forming a shallow bowl, has been identified at Southwick while various other sites, such as Easton Maudit, have yielded evidence of fines.¹²⁵ Unfortunately, unlike charcoal hearths, both the roasting hearths and the slag patches are rarely

¹²³ G. McDonnell, 'Iron working process', *Hist. Metall. Soc. Data Sheet* 3 (1995), P. Crew, 'Bloomery iron smelting slags and other residues', *Hist. Metall. Soc. Data Sheet* 5 (1995).

¹²⁴ Steane, *op. cit.* in note 16, 4–9 and 21–2.

¹²⁵ Johnson et al., *op. cit.* in note 115; C. Mahany, A. Burchard and G. Simpson, *Excavations in Stamford, Lincolnshire, 1963–9* (Soc. Medieval Archaeol., Mon. Ser. 9, 1982).

identifiable as soilmarks from aerial survey, and then only when photographed in colour, and so require intensive ground survey.

At Lyveden, adjacent to the circular hearth, was a charcoal pit 1.2 m in diameter and an associated intense charcoal deposit 0.2 m thick, likely to be related to the preparation of the charcoal for its mixing with the ore. Within 5 m of this was the base of a clay-lined bowl shaped furnace, 0.67 m by 1.06 internally, and leading into it a trench 5 m by 0.45 full of black ash. In addition to the slag deposit in the furnace bottom there were found adjacent 35 kg of tap slag. Another clay-lined smelting hearth lay nearby with a shaft 0.53 m in diameter associated with 15 kg of tap slag. During the smelting process this waste product would drop to the base of the furnace where in many cases an arch was opened and it was run off from the furnace, creating large quantities of tap slag, which has a distinctively ropey structure. The bloom could then be removed and the furnace re-used. The published interpretation of the Lyveden furnaces as types having no provision for tapping of slag appears to be in conflict with the presence of what is described as tap slag. On the basis of excavations elsewhere in England, a charcoal store and other structures, including a shelter for the furnace, might be expected on a smelting site but were not found at Lyveden.¹²⁶ However large quantities of pottery did indicate that there was contemporary domestic activity in close proximity. Neither was there any evidence of a forge on the site but, contemporary with the later pottery production on a tenement to the West and believed to lie within a building, was iron slag, charcoal, burnt clay, coal and fire reddened stones. This was interpreted as a smithing site.

There is evidence of Late Saxon and early post-Conquest smelting within a number of other medieval settlements in the forest (Figs. 9-10). In Southwick village there are excavated slag deposits and furnace lining dumped in iron ore quarries, associated with the ore roasting.¹²⁷ Intensive excavation at the Prebendal Manor at Nassington, a royal estate centre in the Late Saxon period which has revealed a good sequence of buildings of Late Saxon and later date, has also yielded quantities of slag, some in large pieces, together with much burnt clay and fragments of tuyère, the air inlets of the clay furnace structure which took the bellows.¹²⁸ The Nassington smelting evidence is all of Late Saxon date, but as yet no *in situ* furnaces have been located. In Geddington there is evidence of 12th-century slag which suggests that furnaces lie behind the tenements at the S. end of the village, although in the absence of modern excavation it is possible that this is the site of the documented 12th-century forges. There are also several other locations in Geddington village which have produced medieval slag, including a 12th-century pit with a substantial quantity of slag and also a small smelting furnace.¹²⁹ At Stanion a relatively poorly preserved single furnace of the 12th century with some associated slag was revealed in a watching brief in a close at the

¹²⁶ J. H. Money, 'Medieval ironworkings in Minepit Wood, Rotherfield, Sussex', *Medieval Archaeol.*, XV (1971), 86-111.

¹²⁷ Johnson et al., *op. cit.* in note 115.

¹²⁸ P. Foster and J. Baille, *pers comm.*; *Northamptonshire Archaeol.*, 23 (1991), 94.

¹²⁹ Bellamy 1986, *op. cit.* in note 16, 23.

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FIG. 9

Soilmarks of Iron-age settlement enclosures within an area of former medieval woodland in the Great Park at Brigstock. The various roughly circular black patches are the sites of medieval charcoal burning hearths. *Photo: Northamptonshire County Council.*

N. end of the village, adjacent to the tenements of medieval potters.¹³⁰ Another probable medieval furnace has come from Rushton. At Great Weldon one building associated with ironworking has been excavated. The stone building, approximately 6 m by 9.7, contained 13th-century activity comprising two hearths of clay and stone with associated deposits of ash and slag, presumably rakeout from the furnaces, a wider distribution of slag across the floor and a pit outside the building containing slag. In all just under one cubic metre of slag was recovered. However, this was a small-scale excavation and there are severe limitations in the report, with no description of the types of slag, and so it is not possible to be certain whether smelting or smithing was taking place. There are also reports of 'considerable' quantities of slag and cinder to the West of the church and elsewhere in Great Weldon, while similar finds have come from Glapthorn and Wakerley. The undated evidence from Bulwick and Kings Cliffe villages may also prove to be medieval.¹³¹

¹³⁰ *Northamptonshire Archaeol.*, 16 (1981), 205.

¹³¹ J. E. White, 'Excavations in Hardwick's Field, Great Weldon, 1973', unpubl. rep. in SMR; W. T. Reedy, 'The first two Bassets of Weldon', *Northamptonshire Past Present*, IV (1970), 298.

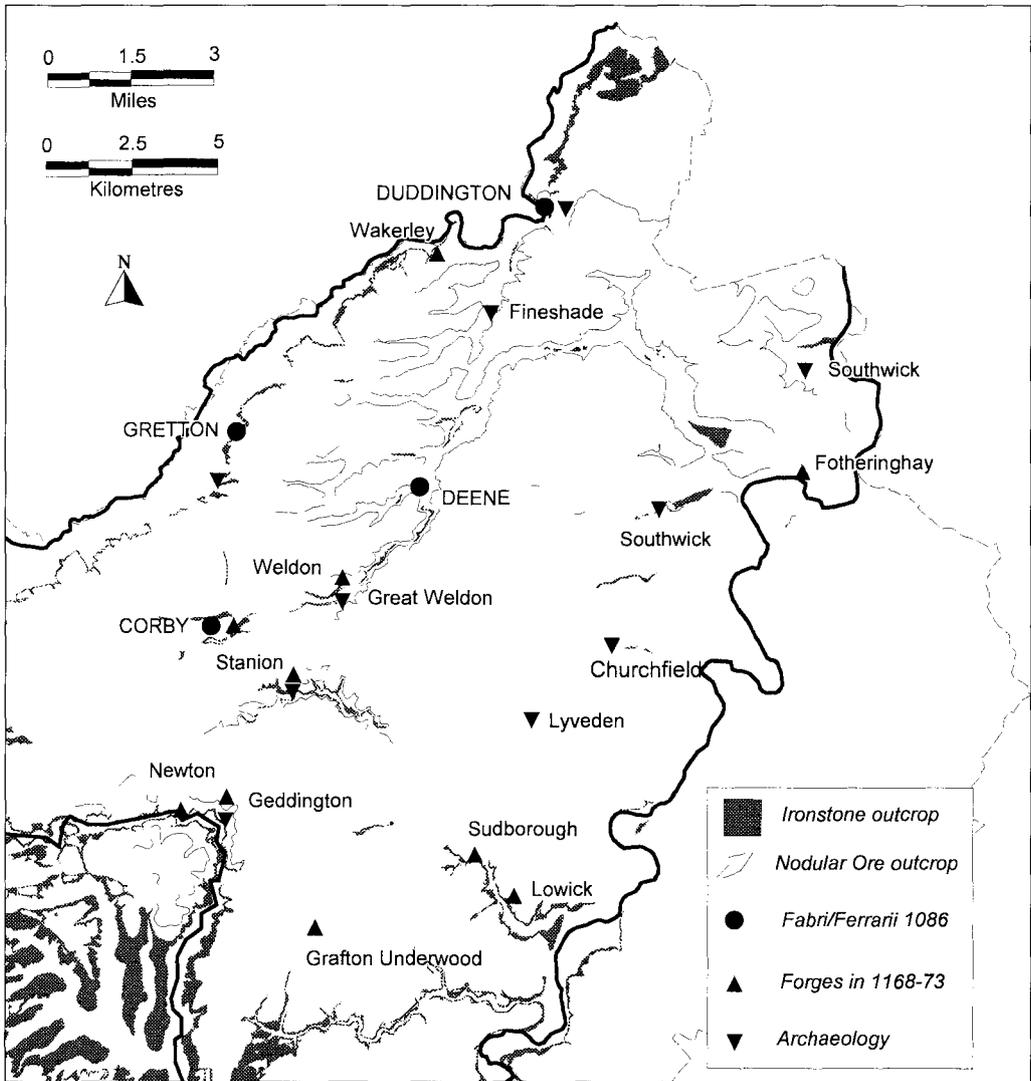


FIG. 10
Late Saxon and post-Conquest ironworking.

Evaluation prior to development during the 1990s within a number of other forest villages, most notably Little Weldon, has, however, failed to produced evidence of ironworking. Though such evaluation needs to continue, it seems likely that some villages within the ironworking areas were not involved in the industry. In others it may be restricted to specific parts of the village and it is possible that eventually a correlation with individual manors will be revealed, as appears to be the case with pottery production in Stanion.¹³²

¹³² Foard, *op. cit.* in note 16.

Until recently almost the only securely dated evidence for Late Saxon and later medieval bloomeries was from the medieval settlements. The clearest example of large-scale production not associated with a village or hamlet is at Fineshade. However this site is exceptional in being directly associated with the 12th-century Castle Hymel, replaced in the 13th to 16th century by Fineshade priory, but never associated with a peasant settlement. In describing the vast quantities of iron slag in Rockingham Forest, Morton refers to huge slag heaps at Fineshade, where:

*there are many waggon loads of them, At Fineshed there seems to have been both an Iron Forge and Furnace. The Mill for the Forge is suppos'd to have stood at the east end of the present pools, where afterwards was a water-mill for grinding corn. The mill for the furnace, for which a lesser stream would serve, is suppos'd to have stood a little higher on the same chanel, in the corner of Laxton Field; where appears a part of a bank which seems to have been made for collecting water to a head. And just by it are many cart-loads of slags in heaps. The water was supply'd by a small rill that comes from some springs in Laxton Field call'd Ashwells.*¹³³

Several of the slag heaps and slag patches north of the castle in and adjacent to 'Sendry Wombe', a close recorded in 1545, have been dated to the 11th to 13th century.¹³⁴ Another slag heap, to the South of the castle, matches the location of a documented early 13th-century ironworks. The castle of the Engayne family was demolished around 1205 and the priory of St. Mary established on part of the site. In its foundation grant the new priory was given 'the whole valley below the place of the *ferrariis*, next to Stubbeswelle, as far as the channel of Perewell . . .'.¹³⁵ The boundary of the lordship at the upper end of the valley, as recorded on the 16th-century map, runs immediately adjacent to the large slag heap on the west side of the stream, which presumably represents the site of the 13th-century ironworks and is where Morton locates the forge. The site was described by Bridges in 1720: 'Adjoining to Linwood and the brook, is a small hill raised from cinders, the remains of ironworks antiently erected here. About Mr. Kirham's house there are yet lying cinders and several pieces of melted iron'.¹³⁶ However, without more intensive fieldwork and further absolute dating it will be difficult to fully disentangle the evidence for there are also the major Roman ironworks in the immediately adjacent part of Laxton parish.¹³⁷

While Fineshade is exceptional in being an isolated castle and monastery, it is now clear that other bloomeries lie within the open fields of various forest villages, in many cases close to the ore outcrops. In a few cases there is field or furlong name evidence from the 16th and 17th century which might support such a conclusion. At Southwick there is a *Bloomfield* name associated with slag deposits on NSI some 500 m to the East of the village with other ironworking evidence in the intervening area. At Glaphorn there are *smythye hill furlong* and *syndirhilles* in West or Upthorpe Field, adjacent to another NSI outcrop 1 km west of the village.¹³⁸ Until recently

¹³³ Morton, op. cit. in note 90, 549–50.

¹³⁴ 'Sendry Wombe' or 'Sendry Home': Feoffment, 3 May 1545, NRO, Monckton (Fineshade); map of Fineshade circa 1588, PRO, MR 398; Bellamy et al, op. cit. in note 16; S. Parry, *Fineshade Abbey, Northamptonshire: Archaeological Evaluation* (unpubl. rep., 1998, in SMR).

¹³⁵ W. Dugdale, *Monasticon* (London, 1655, 73).

¹³⁶ Kirkham's was the country house which had replaced the priory after the dissolution: Bridges, op. cit. in note 61, 307.

¹³⁷ Crew, op. cit. in note 99.

¹³⁸ NRO, Bru O.v.81 and Map 2991; terrier of 1550–1, NRO, Westmorland 4xii6; Johnson et al., op. cit. in note 115.

the only firm medieval date for completely isolated sites from Northamptonshire was the single small smelting site excavated on the edge of Salcey Forest in the parish of Easton Maudit.¹³⁹ However Bellamy argued from fieldwalking evidence in Rockingham Forest, where there is some association between slag patches and small quantities of pot sherds of medieval date, that in the Middle Ages there were itinerant smiths working on small bloomeries at a distance from the villages.¹⁴⁰ This he has now confirmed with a series of Late Saxon and later medieval radiocarbon dates from several isolated furnaces sites in Gretton, Fineshade and Oundle.¹⁴¹

It can now be seen that the apparent focus of the industry on medieval settlements was due to the lack of good dating evidence for the numerous smelting sites known throughout the forest. Only when more sites have been securely dated and the slag quantified will it be possible to determine what proportion of the bloomeries of medieval date lay within the settlements, immediately adjacent to them or on isolated sites, and the relative chronology and importance of the sites in each type of location. Although the furnaces associated with slag patches in cultivated land may have been destroyed or severely damaged, as at Easton Maudit and Brigstock, very good preservation may be expected where furnaces lie within or on the edge of substantial earthwork slag heaps, as is suspected with the furnace located within a slag heap in Sendry Holme at Fineshade.

There is enormous variation in the size of the furnaces on different sites and of different periods. The Roman furnaces at Laxton were more than twice the diameter of the largest of the two Lyveden furnaces while it in turn was ten times that of the tiny Early or Middle Saxon furnace from Hunsbury Hill near Northampton, which was just 0.25 m in diameter.¹⁴² However, although at sites like Lyveden production may have been on a relatively modest scale, both in terms of the number and size of the furnaces as well as the quantities of slag, sites like Fineshade are far more extensive and imply far larger scale production. Until excavations have taken place on more well-preserved furnaces, especially on the larger slag-heap sites, the size and longevity of the furnaces established and the slag deposits quantified, the true scale of production during the Late Saxon and post-Conquest period will remain uncertain.

Forges or bloom smithies

To produce useable iron, following smelting, there was the need for a further process of heating and hammering to drive out the majority of the remaining slag from the bloom. Not surprisingly therefore the ratio of slag to iron on a bloomery site will be far greater than that where only a forge existed for the refining of the bloom. At Bordesley the slag from forging the bloom was estimated at just 33% or less of the weight of the forged iron. The forging process also generated the very distinctive residue known as hammerscale. Previous fieldwork has not always

¹³⁹ Hall, *op. cit.* in note 97.

¹⁴⁰ Bellamy, 1986, *op. cit.* in note 16, 23–4.

¹⁴¹ Bellamy et al., *op. cit.* in note 16.

¹⁴² D.A. Jackson, 'Iron Age and Anglo-Saxon settlement and activity around the Hunsbury Hillfort', *Northamptonshire Archaeol.*, 25 (1993), 37–8; Crew, *op. cit.* in note 99; Steane, *op. cit.* in note 16.

distinguished between smelting and smithing slags and hence no medieval forge can yet be identified with confidence within the forest. Such medieval sites have not, however, been found elsewhere and so are likely to be located within the forest, as the documentary references to forges suggest, while the limited national evidence also suggests that iron was typically traded in the form of refined bars rather than as unrefined blooms.¹⁴³

The documentary records in 1086 are to bloom smithies (*ferarii*) or smiths (*fabri*), while most of the later references are to forges (*fabrici*). Tylecote suggests that this is because the individual output of the local bloomeries was too small to attract the attention of the king.¹⁴⁴ However there is some doubt as to the significance of the use of the two terms in 1086, while at Fineshade bloom smithies are recorded in 1205.¹⁴⁵ Indeed it is possible, as is indicated in the Forest of Dean, that the ownership of forges included the bloomeries, and even that the smiths were also in some cases the charcoal burners.¹⁴⁶

TABLE 2
PAYMENTS FOR FORGES (*FABRICI*) IN NORTHAMPTONSHIRE IN 1168-9

PLACE	PERSON	PAYMENT	FORGES
		Marks/Pence	
Lowick?	Richard of Lowick	0.5 = 8od	1
Sudborough?	Gervase of Sudborough	0.5 = 8od	1
Grafton Underwood	Richard de Humez (lord of manor)	1 = 16od	1
Geddington	Ralph Medici	4 = 64od	4
Geddington (1171-3)	Humphrey son of William	1 = 16od	?
Newton	Richard de Pec	0.5 = 8od	1
Stanion	the king (lord of the manor)	0.5 = 8od	1
Corby	the king (lord of the manor)	0.5 = 8od	1
(Great) Weldon	Geoffrey Ridel (lord of the manor)	0.5 = 8od	1
Wakerley	William de Lavelei (lord of the manor)	1 = 16od	1
Fotheringhay	the king of Scotland (lord of the manor)	1.5 = 24od	?

In 1168-9 there were new forest pleas listing payments for thirteen forges (*fabrici*) made within the forest (Table 2).¹⁴⁷ Three for which no payment had been made were listed again in 1169-70. Thereafter payment remained outstanding until 1178-9 on the four forges in Geddington. In 1171-3 Humphrey son of William is also recorded for Geddington, owing one mark, presumably for a single forge there. In the mid-13th century there are similar payments recorded in the Forest of Dean, but for between 25 and 30 forges, rising to 60 later in the century, indicating a much larger scale of production than in Rockingham Forest, although this may in part have been a result of economic development over the intervening

¹⁴³ G. Astill, *A Medieval Industrial Complex and its Landscape: The Metalworking Watermills and Workshops of Bordesley Abbey* (CBA Res. Rep., 92, York, 1993); Peter Crew, pers. comm.

¹⁴⁴ Tylecote, op. cit. in note 112.

¹⁴⁵ Dugdale, op. cit. in note 135.

¹⁴⁶ Hart, op. cit. in note 8, 46-9; Birrell, op. cit. in note 89, 97-8.

¹⁴⁷ Pipe Rolls Society, 13, 1890, 76-7.

century.¹⁴⁸ The 1168–79 enquiry sought to exact payments from all the existing forges within the forest area, representing in effect a licensing of forges, but it may not represent a complete list, because the Forest Eyres relate only to forges in villages under forest law. As we have seen in the case of Oundle, exemption from forest law had been granted in the second half of the 12th century to some manors lying within the bounds of the forest. It is therefore possible that other forges existed that were not recorded in the Pipe Rolls.

By the late 12th century, if not earlier, water-powered forges had been introduced into England to mechanise the process. The watermill would drive the tilt hammer or ‘olyvers’ and drive the bellows. Astill discusses in detail the remains to be expected on forge sites and Tylecote compares the frequency of fulling mills, which will have had a similar construction, and water powered forges.¹⁴⁹ However, contrary to Tylecote’s assertion that water power is not generally available in Rockingham Forest, there are substantial streams running through the forest. Already by 1086 there were more than a dozen watermills along the Harpers and Willow brooks and the upper Ise, though less common and worth far less than those along the Nene. There were also water-powered fulling mills recorded in the forest during the later Middle Ages, as for example at Kettering in 1292, Brigstock in 1328 and Geddington in the mid-15th century.¹⁵⁰ There was therefore sufficient water power to drive forge mills, as Morton claimed had been the case with the pond at Fineshade, which lay immediately next to the Sendry Wombe slag heaps, while the excavated ironworks site at Weldon lay adjacent to a large pond recorded in the late 16th century that could also perhaps have driven a tilt hammer.¹⁵¹ There has, however, been no adequate modern excavation of a Saxon or post-Conquest forge site in the forest and so one cannot be certain as to the character, scale or even the exact location of these sites.

The construction of a mill will have been a substantial capital investment, most likely to have been made by a monastic house or secular manorial lord. The application of water power will have restricted the potential location of these forges and may have had the effect of concentrating iron production on to a few larger sites. However the blooms could have been brought from a considerable distance to the forges, while it is also possible that smaller scale production continued at manual forges long after the 12th century, as appears to be the case in the Forest of Dean.¹⁵²

There is an unsubstantiated reference to a 15th-century iron furnace and a royal cannon foundry in Geddington Woods, however Pettit could find no evidence of the iron industry in Rockingham Forest in the later 16th and 17th centuries.¹⁵³ It therefore seems likely that the industry had decayed in if not before the 15th century, but the reasons for its decline have yet to be determined. The early demise

¹⁴⁸ Hart, *op. cit.* in note 8, 47.

¹⁴⁹ Astill, *op. cit.* in note 143; Tylecote, *op. cit.* in note 112.

¹⁵⁰ Account Roll of Kettering, NRO, Rockingham Castle Archive, A/4/33; ‘Le Walkmilne’ at Brigstock, NRO, Brigstock court roll, 23/6/1335 roll 42; account roll of Geddington, 1455–1462, NRO X 351A : Box 10 no 30.

¹⁵¹ NRO, FH 272.

¹⁵² Hart, *op. cit.* in note 8, 46.

¹⁵³ C. Wise, *The Montagus of Boughton* (Kettering, 1888), 11; Pettit, *op. cit.* in note 8.

of the bloomery at Lyveden may well have been due to the limited nature of its limonite ore source. However, given the scale of the smelting that was achieved at Laxton in the Roman Period, it seems unlikely that the more usual ore sources within the forest were unsuitable for the larger scale production that was occurring in the later medieval and post-medieval period in areas like the Weald. Similarly Tylecote's suggestion of a lack of water power in the forest to drive the forges has been shown to be incorrect. There is growing evidence that the blast furnace was in use in Europe before the 15th century but the expansion of its use from the Weald to other parts of England is thought to have much to do with abundant or cheap charcoal supplies. The lack of evidence for it in Northamptonshire, despite the presence of suitable ores, may prove significant in the study of the development of the industry nationally in the late medieval period, though the Northamptonshire industry may already have been in terminal decline if not already long extinguished by that time.

The blast furnace's main advantage was that it produced liquid iron and so allowed casting, while the major increase in the scale of production came only with the ability to fuel it with coal or coke in the 18th century. It was not however until the mid-19th century that it became economic for iron production to begin again in Northamptonshire, using the new technology and on a scale unimaginable in the medieval period. As a result of the reintroduction of the industry a significant part of the archaeological evidence for its medieval and earlier predecessors was sadly destroyed in mineral extraction between 1850 and the closure of the Corby furnaces in 1980. Unfortunately the evidence of the industry is still under major threat, from development in the villages but most of all from intensive arable agriculture. A great deal of the evidence for ironworking in Rockingham Forest is being rapidly eroded by cultivation, as the excavation at Brigstock has revealed. A small number of slag heaps lie within pasture fields but as yet none of these are scheduled. Only where the sites lie within woodland is their future more secure but even here they need to be identified to enable them to be taken into account in woodland management schemes.

Secondary smithing

A separate process of secondary smithing was required to produce finished artefacts from the output of the iron producers' forges. This process produced its own distinctive waste deposits, including hearth bottom slags and hammerscale.¹⁵⁴ Charcoal was again a fuel for this secondary smithing but coal was also increasingly used, as seen at Lyveden, the only smithy so far excavated in Rockingham Forest.¹⁵⁵ In the Roman Period there is extensive evidence from the unwalled small town of Ashton and the suburbs of the walled town of Durobrivac, near Peterborough, showing that this smithing was taking place on a large scale in an urban context as well as on some rural sites in the lower Nene valley.¹⁵⁶ With the possible exception of Stamford, where both iron production and a pottery industry thrived until the

¹⁵⁴ D. Starley, 'Hammerscale', *Hist. Metall. Soc. Data Sheet*, 10 (1995); Astill, op. cit. in note 143, 300.

¹⁵⁵ Steane, op. cit. in note 16, XII, 21-2.

¹⁵⁶ Condron, op. cit. in note 102.

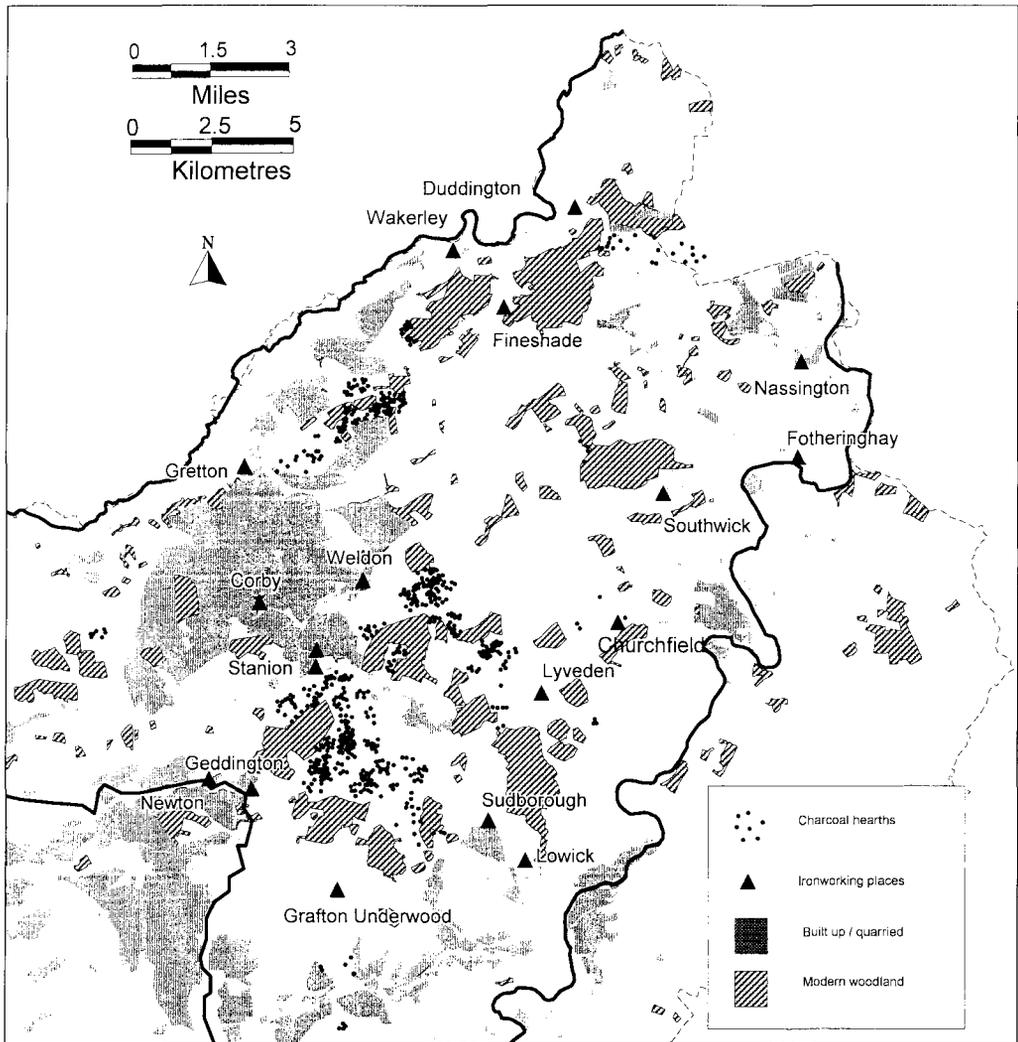


FIG. 11

The Late Saxon and post-Conquest charcoal and iron industries in Rockingham Forest.

12th century, in the Middle Ages there is as yet no evidence for a concentration of secondary smithing in the towns surrounding the forest. This may be a reflection of the relative scale of the Roman and medieval industries, or a lack of archaeological investigation, but it could simply be that secondary smithing generally took place in the forest villages alongside the primary smithing.

Charcoal production (Fig. 11)

Charcoal fuel could represent as much as 50% of the running cost of an iron furnace, with about 12 kg of charcoal required to produce 1 kg of iron, so it is to be

expected that a major charcoal burning industry accompanied the ironworks of Rockingham Forest.¹⁵⁷ It has been said that there are no charcoal production sites known in England before the medieval period and that they are rare before the 18th century.¹⁵⁸ Because large parts of Rockingham Forest are now under arable it has been possible to use aerial survey to recover the wide distribution of soilmarks representing charcoal hearths.

Soilmark evidence During the late 1970s and 1980s hundreds of patches of intensely black soil were recorded during systematic autumn and winter aerial survey of the forest. On field inspection of specimen hearths in good conditions, the density of charcoal in the soil as well as the extent of the soilmark clearly distinguished the charcoal hearth from more recent soilmarks relating to burning during hedge or wood clearance.¹⁵⁹ Many of the hearths can thus be confidently distinguished where the soilmarks have been photographed in good condition. Some of the evidence is more difficult to interpret because of poor soil conditions or possibly, in some cases, as a result of ongoing destruction of the soilmark due to cultivation for a long period. In a small number of cases it is also possible that the dark soilmarks will prove to be furnace sites, as discussed above. Hence although the broad pattern is certain, without ground inspection it is not possible to be confident of every identification. The hearths are, almost without exception, on boulder clay and thus clearly related to the distribution of woodland. Harringworth deer parks provide a good example of the density and pattern of distribution of these charcoal hearths, though none of these have yet been dated. There is no correlation with stream courses and while hearths often lie on plateau areas, as in Harringworth Park Lawn, they are also found on gently sloping valley sides, as seen to the West of Harringworth Old Lodge. The density of hearths is variable but is of the order of one per 5 acres (2 ha) and they appear to be spread generally across the former woodland zones.

A pattern of cyclical use of each woodland, related to the sequence of growth and harvesting of coppices, may be expected. The soilmarks are frequently oval rather than circular and some are irregular in shape, perhaps indicating re-use a number of times, although only a few examples of clearly overlapping hearths are known. Where good soilmarks exist, the individual hearths generally have a maximum dimension of between 9 and 20 m and, though some smaller examples are seen, these tend to be poor soilmarks. The excavated and dated example in Brigstock Great Park, visible as a soilmark approximately 20 m across, showed the area stripped of soil for construction of the hearth was 11 m in diameter, with the

¹⁵⁷ D. W. Crossley (ed.), 'Sidney Ironworks Accounts 1541-1573', *Camden Fourth Series*, 15; idem, 'Ralph Hogg's Ironwork Accounts, 1576-81', *Sussex Archaeol. Coll.*, 112 (1974), 48-79; charcoal burning techniques discussed in L. Armstrong, *Woodcolliers and Charcoal Burning* (Horsham, 1978); J. M. Dowsett, 'Charcoal burning', *Geographical Mag.* (1946), 387-92; H. L. Edlin, *Woodland Crafts in Britain* (Newton Abbot, 1973), 160-5.

¹⁵⁸ Crew, *op. cit.* in note 123.

¹⁵⁹ Bellamy, *op. cit.* in note 9, 24; Foster, *op. cit.* in note 16, 70. Both 'hearth' and 'pit' are extensively used in medieval sources from the Forest of Dean, while 'clamp' and 'kiln' are also used in later primary and secondary sources. Hearth is used here as it is the description Morton gives to production sites in 18th-century Northamptonshire and it seems to accord best with the excavated evidence from Brigstock. The absence of earthworks associated with charcoal patches in the forest argues against the use of the term 'pit'.

fire having been laid on the subsoil.¹⁶⁰ This compares favourably with evidence from the New Forest where charcoal hearth earthworks, including banks, range from 9 to 18 m in diameter, though 20th-century hearths there were 6 m in diameter.¹⁶¹ Passmore suggests that this may be because they were fired a number of times and the debris became spread much wider than the actual hearth diameter. It may also be due to the process of clearance of the debris during the dismantling of the hearth, the best preserved sites having a surrounding bank of at maximum 1 m high. The soilmark sites in Rockingham Forest are all completely levelled, but detailed inspection of selected ancient woodland here and in Whittlewood and Salcey, even immediately adjacent to good soilmark distributions, has failed to locate any trace of the type of earthwork noted in the New Forest, even though various other medieval and earlier earthworks have been located.¹⁶²

Aerial reconnaissance has been extended to other forest areas in the region. Not surprisingly, given the Domesday references to ironsmiths there, Whittlewood Forest has yielded clear evidence. This is supported by occasional documentary references from the 13th century to charcoal burners and placenames such as Colsters in Wappenham, indicating the presence of the industry though not apparently on a comparable scale to Rockingham Forest. Even Salcey has its Collers Hyerne in Yardley Hastings.¹⁶³ However, although Morton records charcoal production in Salcey Forest in the 17th century, aerial survey has failed to find any evidence, except in the very eastern corner of the forest around Easton Maudit, Bozeat and the adjacent area of clayland in Bedfordshire, associated with the ironworking industry reported by Hall.¹⁶⁴ Single flights have also been conducted over the Forest of Arden in Warwickshire and Rutland Forest confirming the lack of such evidence reported by other aerial survey programmes, though as in Salcey the surviving tracts of woodland could conceal some hearths. There has been an apparent failure elsewhere in Britain to locate any soilmark evidence comparable to that in Rockingham Forest. Intensive aerial survey covering the ironworking area of the Blackdown Hills in Devon, with the specific objective of seeking charcoal hearths, has failed to find any evidence, but this is likely to be because the woodland was on the valley slopes which are still wooded or under pasture.¹⁶⁵ The absence of evidence in some other areas may in part be due to the lack of adequate survey, because the presence of soilmarks of charcoal burning hearths has been noted but not apparently surveyed in the Weald. All the substantial ironworking areas of the Middle Ages and earlier, where there has been

¹⁶⁰ D. A. Jackson, 'The excavation of an Iron Age site at Brigstock, Northants, 1979-81', *Northamptonshire Archaeol.*, XVIII (1983), 7-32.

¹⁶¹ A. Passmore, 'Surviving evidence of the New Forest charcoal burning industry', *Industrial Archaeol.*, 1 (1964), 27-35.

¹⁶² Hall, op. cit. in note 48; D. Hall, *Northamptonshire Forests: Archaeological Interpretation Survey, Part 2* (unpubl. rep. for Northamptonshire Heritage and Forest Enterprise, 1997, in SMR).

¹⁶³ Henry the Charcoal Burner of Abthorpe in 1260-80, while property at Thornborough in N. Buckinghamshire produced charcoal in 1256: G. R. Elvey (ed.), *Luffield Priory Charters* (Northamptonshire Record Soc., XXII and XXVI, Northampton, 1968 and 1975), part 1, no. 192, part 2, no. 646a; Gover et al., op. cit. in note 11, 279 and 154.

¹⁶⁴ Morton, op. cit. in note 90; Hall, op. cit. in note 18, fig. 1.

¹⁶⁵ Griffith and Weddell, op. cit. in note 91; Griffith, pers. comm.

significant woodland clearance for arable, would therefore repay aerial survey to recover soilmark evidence of charcoal production.

Chronology and method of production A charcoal industry must have accompanied iron production during the Iron Age, and Roman and Saxon Periods, just as it did in the later Middle Ages. It has been suggested that Iron Age and Roman charcoal was produced in the long narrow channels which have been found on various ironworking sites in the forest. These do not seem to be of the right scale, character or form to serve the purpose. Although in parts of Europe charcoal is said to have been made in small pits, and there is some evidence from Switzerland and possibly Belgium for production in linear hearths, classical authors describe a method like that recorded in England in the post-medieval period.¹⁶⁶ There is no evidence at present which would associate the charcoal hearths recorded from aerial survey with the pre-medieval industry, although this needs further study, particularly through a programme of radiocarbon dating. It is conceivable that there was a more extensive pre-medieval distribution which only survives where the evidence escaped long-term medieval cultivation and so is interspersed with the medieval hearths. The evidence from Chellington, suggesting medieval fields expanding over areas where ironworking had taken place, may explain the absence there of charcoal hearths, the slag, though dispersed, possibly surviving better under long-term cultivation than the relatively shallow charcoal deposits.¹⁶⁷ There has, however, been no study of the long-term effects of cultivation on charcoal hearth soilmarks.

The charcoal industry continued in Northamptonshire as late as the 18th century, though undoubtedly on a far smaller scale after the demise of iron production, and some hearths are likely to be of post-medieval date. In 1564 one parcel of coppice in Geddington Wood is recorded as having been cut for charcoal production.¹⁶⁸ In 1608 some 20 customary acres of Salcey Forest were reserved for the making of 30 loads of charcoal from faggots for the royal palace at Holdenby, while in 1612 there were 137 loads of charcoal from Rockingham Forest supplied for the king while on progress.¹⁶⁹ Morton also refers to charcoal burners working in the early 18th century in Kings Cliffe, Apethorpe, Woodnewton, Nassington and Yarwell, 'and other towns on the borders of Rockingham Forest', while as late as 1724 charcoal was made at Deene for the use of the Brudenell estate.¹⁷⁰ However according to Pettit 'Wood sales accounts argue strongly against (charcoal burning) being done on a large scale in the Northamptonshire crown woods, as almost all of the underwood was sold in small parcels to different people', though he does admit that the tops and lops may have been sold for charcoal burning, as Morton confirms.¹⁷¹

¹⁶⁶ Tylecote, *op. cit.* in note 112, 141; Bellamy, *pers. comm.*; Crew, *op. cit.* in note 99 and *pers. comm.*; Cleere et al., *op. cit.* in note 91.

¹⁶⁷ Brown and Taylor, *op. cit.* in note 92.

¹⁶⁸ Bellamy, *op. cit.* in note 16, 15.

¹⁶⁹ PRO, E.101/538/22, quoted by Pettit, *op. cit.* in note 8, 124n; Morton, *op. cit.* in note 90, 11.

¹⁷⁰ Morton, *op. cit.* in note 90, 488; J. Wake, *The Brudenells of Deene* (London, 1953), 234.

¹⁷¹ Pettit, *op. cit.* in note 8, 160.

Charcoal was used for domestic purposes and for various crafts other than iron smelting in the medieval period, but only the sheer quantity of charcoal required by the iron bloomeries can explain the scale of the charcoal burning industry which has been revealed in Rockingham Forest. A large 13th-century manor might purchase something of the order of 5 cwt of charcoal in a year, while the whole Deene estate in 1724 burnt just one ton in the year.¹⁷² At a ratio of 12:1 the charcoal requirements of a small medieval ironworks, producing 4 tons of bloom a year as at Tudeley, would be of the order of 48 tons per year, equivalent to that required by about 200 large manors. Cleere has calculated that 24 acres of coppice woodland harvested on a 12-year cycle would produce sufficient charcoal wood to roast the ore for and charcoal to smelt one ton of iron per annum. A smaller ironworks, if Tudeley was in any way typical, would have required the output of some 100 acres of coppice for sustainable production.¹⁷³ A bloomery of the Bishop of Durham in 1408–9 produced over 24 tons of iron in the year, suggesting that long-term production of a large medieval bloomery might require some 600 acres of woodland.¹⁷⁴

No systematic attempt has been made to identify documentary evidence for charcoal burners, and hence no indication can be given as to the relative importance of the industry in local employment. However a few documentary references have been located to the industry. At Brigstock there was a Hugh Whyting, charcoal burner, who in 1280 was making charcoal in Gretton, and another charcoal burner is recorded as working in Brigstock manor at about this time as well as another family there named Coleman.¹⁷⁵ In 1255 there was also a William the charcoal maker in Geddington.¹⁷⁶ In the mid-14th century charcoal burning continued in Brigstock, for when the Queen's Park was being encompassed by a new pale it was ordered that the wood cut down should be either sold or made into charcoal.¹⁷⁷ Documentary evidence can give some indication as to the chronology of the industry, but only through an extensive programme of archaeological investigation will it be possible to determine its true chronological range.

In Brigstock Great Park two of the intensely black soilmarks recorded by aerial photography have been excavated and confirmed as a discolouration of the soil by charcoal. A sample of the undisturbed charcoal taken from the base of one hearth yielded a radiocarbon date of A.D. 1190–1400 (720 ± 70 BP; HAR-4928) and also produced two unstratified sherds of medieval pottery.¹⁷⁸ The second excavation confirmed the identification and yielded a few 13th- or 14th-century

¹⁷² Charcoal use in the Wellingborough manor ranged between 13 and 26 quarters per annum: F. M. Page, 1936, *Wellingborough Manor Accounts 1258 to 1314* (Northamptonshire Record Soc., VIII, Northampton, 1936); the Kettering manor account roll of 1292 specifies 10 quarters: NRO, Rockingham Castle Archive, A/4/33; the Deene estate produced and used 93 quarters of charcoal in 1724: Wake, op. cit. in note 170, 234.

¹⁷³ Cleere, op. cit. in note 91, 99–100; Armstrong, op. cit. in note 157, 75–6; Hammersley, op. cit. in note 89, 603–5; Hart, op. cit. in note 8, 181.

¹⁷⁴ Tylecote, op. cit. in note 112, 206.

¹⁷⁵ J. Bennett, *Women in the Medieval Countryside: Gender and Household in Brigstock Before the Plague* (New York, 1987); Bridges, op. cit. in note 61, II, 312; G. J. Turner (ed.), *Select Pleas of the Forest* (Selden Society, XIII, 1899), 34.

¹⁷⁶ Calendar of Miscellaneous Inquisitions, Henry III, vol. 1, 1219–1307, no. 1205.

¹⁷⁷ Calendar of Patent Rolls, Edward III, 1348–50, 552.

¹⁷⁸ Jackson, op. cit. in note 160, 19 and 31.

sherds sealed beneath a burnt clay layer, while fieldwalking elsewhere within the Park has also yielded thirteen charcoal hearths showing a clear association with quantities of later medieval pottery.¹⁷⁹ One other possible charcoal hearth has been excavated near Corby. It comprised an area of topsoil containing extensive pieces of charcoal and dark stained soil, revealed in fieldwalking but not in magnetometer scanning. Unfortunately it had been heavily disturbed by ploughing with no stratified deposit surviving below the topsoil, hence there is a high probability the 20th-century radiocarbon date was the result of contamination.¹⁸⁰

The charcoal from the excavation at Brigstock was all of oak, but it is uncertain whether this is typical of production throughout the forest. Indeed Tylecote's claim that nationally the charcoal used in iron furnaces up to the 13th century was mainly oak may not be correct as oak was recognised by classical authors as a difficult charcoal to smelt with. The charcoal from the Easton Maudit bloomery was 85% oak and although that used in the furnaces at Lyveden also included hazel, ash, hawthorn, blackthorn and field maple, the proportions relative to oak are not reported.¹⁸¹ The Brigstock charcoal itself proved to be very well carbonised. It had been produced under well-controlled conditions and entirely from carefully selected wood between 50 mm and 100 mm in diameter. This would suggest coppice management, though comparative evidence is needed from a number of other charcoal hearths to determine if this was, as one might suspect, the normal practice.

Although only a small proportion of the soilmarks show overlapping hearths, it is likely that, as was the practice of more recent charcoal burners, individual hearths were re-used a number of times over a period of many years, the charcoal burner making use of the waste from earlier burns to provide the top covering of the new hearth.¹⁸² Archaeological evidence for this is only likely to survive, if at all, in well-preserved sites in ancient woodland and none have yet been excavated. It is likely that we are seeing the results of cyclical exploitation within a well-regulated coppice management system, probably continuing over many decades, if not centuries. Evidence for management of the woodlands as coppices is widespread in Rockingham Forest in the post-medieval period and, as we have seen at Oundle and elsewhere, there is good evidence for such management during the Middle Ages.

The archaeological evidence can be interpreted by reference to later descriptions of charcoal burning. In the early 18th century, according to Morton, the charcoal in Rockingham Forest was made:

of the tops of oaks, or any other offal-wood. That of Blackthorn is the most durable. . . . here their wood for charcoal is chiefly oak; for indeed they have little other wood for their purpose. Six loads of wood will make but one of charcoal. The method of making it is as follows. They cut the Branches into all strait Picces, and place them all upright in three several Lofts and

¹⁷⁹ Foster, *op. cit.* in note 16, 43–4 and 70–1.

¹⁸⁰ J. Coward, *Evaluation and excavation of Archaeological Sites along the line of the Corby South Trunk Main, Corby, Northamptonshire* (unpubl. rep. by University of Leicester Archaeological Services, 1997, in SMR).

¹⁸¹ Tylecote, *op. cit.* in note 112, 131; Peter Crew, pers. comm.; Hall, *op. cit.* in note 97; Steane, *op. cit.* in note 16, 158–60.

¹⁸² Practice in the Wyre Forest in the earlier 20th century as reported by a retired charcoal burner in the 1970s: James Bond, pers. comm.

Stories in a conic or rather a cupolo form, having first struck a stake of wood into the ground, in the middle of the lowest floor or story for the rest to lean upon. Such a pile they call their hearth. They cover their hearth with a thin covering of straw, either wheat or barley straw or stubble. The straw they cover with fine sand in a layer of about the same thickness as is the sand. They leave a hole at the top of the pile, and at that, they put in their fire, which is two or three lighted brands: then they cover up the hole. They make here and there small outlets for the smoak: and as the heap burns down lower, they make the like vent-holes still lower, with forktines or the like. A whole hearth will be coal'd in 6 or 7 days. They never suffer the hearth to flame; for flame wo'd consume the wood. Sometimes they'll coal a log two or three foot thick entire as it is. Having coal'd it, 'tis riven into splinters, and is found to be as black within as without. Sometimes they mingle coal-dust with their sand.¹⁸³

In the early 20th century, hearths or 'pits' were still being fired in the New Forest, Hampshire, and a report of the techniques of construction of the hearth at that time has been recorded.¹⁸⁴ The charcoal burners set up the charcoal pits wherever a suitable supply of timber was available, the fuel was not generally moved to the pit. A circular area 14 ft (over 4 m) in diameter was first surrounded by a bank about 2 ft (0.6 m) high, presumably made by scraping away the topsoil from the area to be occupied by the hearth or re-using the debris from an earlier burn. Cord wood was laid around the top of the bank to retain the vertically stacked cord wood which was then packed into the central area. The average hearth would take about 1000 cu ft (28 cu m) of wood. At the centre short lengths of crooked wood were stacked about a central pole 8 ft high. The wood on the bank was lastly incorporated and then the whole stack covered, packing the gaps between the cord wood, with six inches of gorse tops. The bank of soil was then spread over the whole stack in a 6 in. layer and soaked with water. The hearth was fired by embers placed in a central hole that had been left in the top, and then sealed, with vent and air holes being made in the sides. The hearth would be watched day and night, with short lengths of dry wood being fed in at the top four times daily. After three days no more was added and then on the fourth the hearth had subsided to about 5 ft (1.5 m) high. The fire was extinguished with water and the hearth sealed. When cooled the outer covering was removed. The whole process took a week.

Scale and distribution of production The recorded distribution of charcoal hearths in Rockingham Forest is far from complete due to losses to modern quarrying and development, and the masking effect of surviving woodland and pasture. In just one or two cases have potential hearths been identified in surviving woodland where disturbed by tree throw or rabbit disturbance. Whereas arable land readily yields evidence to aerial survey, where land remains under woodland or permanent pasture the identification of charcoal hearths by ground survey has rarely been successful. There is no evidence of earthworks comparable to those in the New Forest, although in 1717 Daniel Eaton does mention 'hills and pits where charcoal

¹⁸³ Morton, op. cit. in note 90, 488.

¹⁸⁴ A. Passmore, op. cit. in note 161; other descriptions are found in Armstrong, op. cit. in note 157; a reconstruction burn in the 1970s is described in N. A. J. Wilde, 'Charcoal burning in the Wyre Forest', *Quarterly J. of Forestry* (October 1974).

us'd to be burnt' in Deene.¹⁸⁵ That the distribution is indeed far more extensive than that seen from aerial survey is confirmed by field-name evidence for charcoal production in specific blank areas. A *Colershawe* is recorded in the forest in the early 13th century; in Southwick a wood called *Colesteres* is recorded in 1641 and can be identified as a compartment within the present Southwick Wood; at Great Oakley there was Colliers Close and Colliers Field in an area now quarried; in Geddington Chase there was a Collers Sale and Charcoal Riding, while the former Colepit Coppice has produced soilmarks of numerous charcoal hearths; there was also a Colegap Field in Stanion in 1635 which might relate to charcoal burning.¹⁸⁶

More than 600 charcoal hearths have been recorded by aerial survey in Rockingham Forest from an area of some 27 sq km. In the 17th century, based on the mapping by Pettit and including Brigstock parks, there were approximately 93 sq km of woodland. Of this, 14 sq km have been lost to development and mineral extraction and a further 33 sq km remain as woodland and so are inaccessible to aerial survey. The vast majority of the remaining 46 sq km are accessible, except for a small percentage that is under pasture. These 46 sq km have yielded over 600 hearths, though 400 of these are from an area of just 15 sq km. From the remaining 47 sq km which are either not accessible or have been destroyed, at the very least another 600 charcoal hearths might be expected, giving a minimum of 1,200 hearths. This evidence can be put into context by the record in 1282 of some 2,990 former charcoal hearths or 'pits' in the Forest of Dean where the industry employed several hundred charcoal burners.¹⁸⁷ More than 550 of our hearths have come from a central zone of the forest, in the area between Fineshade, Corby and Brigstock, the same part of the forest where the iron industry appears to have been most heavily concentrated. The greater proportion of the destroyed and currently wooded areas which were woodland in the 17th century also lay within this same area and so one thousand hearths is likely to represent a gross underestimate. However, unless excavation in the woodland shows that only a proportion of hearths would survive in ploughland, causing many to be lost in the assarting of the 12th and 13th centuries as well as under post-medieval and modern cultivation, the margin of error is unlikely to place the total anywhere near 2,990. Hence one must conclude that the charcoal industry of Rockingham Forest was considerably smaller than that of the Forest of Dean, with similar implications for the relative scale of the iron industry as well.

In making calculations as to the scale of the industry it is not simply a case of counting the hearths. Until there is a systematic programme of dating we cannot be certain what percentage are medieval, but there is also the problem of the potential regular re-use of many of the hearths, as has been recorded in the Wyre Forest and Forest of Dean in the 20th century.¹⁸⁸ What is required is the careful and complete excavation of a number of hearths which have never been ploughed,

¹⁸⁵ Hall, *op. cit.* in note 162; J. Wake and D. C. Webster (eds.), *The Letters of Daniel Eaton* (Northamptonshire Record Soc., XXIV, Northampton, 1971), no. 110.

¹⁸⁶ Raftis, *op. cit.* in note 29; Pettit, *op. cit.* in note 8; NRO, map 895; Bellamy, 1986, *op. cit.* in note 16, 16 and 62; NRO, map 1381.

¹⁸⁷ Hart, *op. cit.* in note 8, 24.

¹⁸⁸ James Bond, *pers. comm.*

which requires the identification of the hearths in surviving ancient woodland or the limited areas of permanent pasture, such as the parkland around Fermyn Woods Hall at Brigstock, which was ancient woodland. In the absence of clear earthwork evidence of charcoal hearths this will demand a systematic programme of geophysical survey or test pitting to identify suitable sites. Further aerial survey is also required, not only to fill out the pattern as limited areas of pasture are converted to arable, but also to record the speed at which the soilmarks of the hearths are dissipated, if at all, as a guide to the potential destruction of other hearths by earlier cultivation phases.

Despite the incompleteness of our evidence from Rockingham Forest, a clear pattern is revealed. The charcoal hearths were within the woodland, which was almost all set on the higher clayland. The charcoal would have had to be transported no more than 4 km to a medieval settlement, well within the 5–8 km range recorded as acceptable elsewhere in the post-medieval period by cost and fragility, while isolated bloomery sites generally lie in even closer proximity.¹⁸⁹ Hence the charcoal hearths can be seen broadly to reflect the distribution of the medieval ironworks and of the iron ore outcrops.

Only a handful of hearths have been identified in the eastern part of the forest. This might suggest, at least in part, why the woodland in the Oundle area could be cleared for agriculture while in other places it was protected. When examined in more detail the pattern appears even more instructive (Fig. 12). The large area of Fermyn Woods, to the North-East of Brigstock, which is not wooded now, has remained as pasture, hence the apparent absence of charcoal hearths. Many but not all of the smaller gaps in the Brigstock parks have a similar explanation. In contrast a large part of the former woodland in the eastern area of the forest has been ploughed and yet has yielded almost no charcoal hearths. The hearths appear to be concentrated, not only in known former woodland, but also in land such as Benfield and Weldon Plainses over which manors shared common rights in the medieval period but where no record of former woodland has been identified. Hence, incidentally, the charcoal hearth evidence may provide the potential for absolute dating to determine the date after which such land was converted from wood pasture to open grazing.

The archaeology of the medieval and earlier charcoal-burning industry is a relatively neglected topic. Not only is it worthy of study in its own right, especially given the current lack of knowledge of the nature and location of charcoal production in the pre-medieval period for the ironworks, it may also offer a unique insight into the management regime of large tracts of woodland. On the evidence from the Brigstock excavation it is likely that a systematic programme of investigation would yield information as to whether the woodland was being managed as coppice and the approximate age at which any coppice was cut, from the diameter of the charcoal. It may also indicate the balance of types of tree within the woodland, particularly where tops and lops were being exploited, but also the types being coppiced. Comparison could then be made over time and between

¹⁸⁹ Hammersley, *op. cit.* in note 89, 606.



FIG. 12
Medieval charcoal burning and land-use in the Brigstock/Oundle area.

different coppices and between crown and purlieu woods. It may also be possible in some circumstances to provide a basic chronology for the clearance of woodland.

OTHER INDUSTRIES

Other important industries are found within Rockingham Forest, most notably the production of building stone in Weldon and stone slate in Collyweston and Easton on the Hill.¹⁹⁰ Although a significant component of the forest economy, their location was not determined by the presence of the woodland itself. Some other industries such as lime burning and tanning may have been attracted to the forest by their need for fuel or other woodland products, but the only other large-scale industry which was located in the forest because of the availability of fuel was the pottery industry. A somewhat different but complementary pattern is revealed in the pottery industry compared to the iron and charcoal industries. It has been previously described in some detail and so is only briefly reviewed here.¹⁹¹ In the Late Saxon and early post-Conquest period there was major pottery production in Stamford, on the northern edge of the forest, but in Northamptonshire from at least the 12th century the pottery industry was woodland based. In Rockingham Forest the industry centred on Stanion and Potters Lyveden, with other kilns at Upper Lyveden, and later outliers further to the East at Glapthorn and Woodnewton, while pottery production has also been suggested at Great Weldon. The potters' workshops and kilns are always found within tenements in the villages or hamlets, as seen in the excavations at Potters Lyveden. The industry was located in minor manors and tended to avoid the major ironworking villages. Suitable clays are widely distributed through the forest, so it was apparently fuel which was the key locational factor. The manorial lords could have provided access to fuel in their demesne woodlands, if they obtained a royal grant of their woods free of 'regard', especially if the woods were not exploited by 'colesters' producing charcoal for the ironsmiths. In the Lyveden valley, despite wide-scale modern arable farming, our survey has failed to find more than a handful of charcoal burning hearths, though more may exist in the small areas of surviving woodland. This may be because iron production at Potters Lyveden was on a small scale and was replaced by the pottery industry in the early 13th century. More profit was perhaps to be made here from potting and agriculture than from iron production, in the absence of substantial ore outcrops. At Stanion, however, such ores were available, so we must perhaps look more closely to the manorial factors for an explanation of the distribution of potters. The two Domesday manors in Stanion can be accurately defined from post-medieval sources. All the pottery kilns so far identified lie within the Upper Hall manor and none within the Nether Hall manor. Whereas Upper Hall manor included a significant area of woodland, the Nether Hall, a dependency of the royal manor of Brigstock, had no potters and almost no woodland. The Upper Hall's access to a source of fuel may have enabled

¹⁹⁰ R. M. Scrjeantson, and W. R. Adkins (eds.), *The Victoria History of the County of Northampton*, 2 (London, 1906), 293-8.

¹⁹¹ Foard, *op. cit.* in note 16; B. Bellamy, 'Medieval pottery kilns at Stanion', *Northamptonshire Archaeol.*, 18 (1983), 153-61; Reedy, *op. cit.* in note 131; a brief national review of the medieval pottery industry is in J. Cherry, 'Pottery and tile', 189-209 in Blair and Ramsay, *op. cit.* in note 89.

its lord to establish a pottery industry to enhance the income of the manor. Unfortunately all the relevant woodland has been destroyed by quarrying so we may never know for certain when and if these woods were exploited by the charcoal burners.

While other industries in the forest survived into the post-medieval period, it would appear that the pottery, iron and probably also to a large degree the charcoal industries had gone by the end of the 15th century. They may perhaps have succumbed to the major recession of the later 14th century, which appears to have caused the demise of commercial activity in the market villages of the forest. Released from the demand for charcoal and then with the demise of the deer parks, as Pettit has shown, a significant phase of woodland clearance was under way by the early 17th century, especially in the areas of the forest which had largely escaped medieval clearance.

CONCLUSION

The medieval rural economy of Northamptonshire, and indeed probably much of England's 'central province' of nucleated settlement and open fields, was above all else founded on intensive arable production. There had been major capital investment by lords in the means of production since at least the 10th century, with the laying out of the open fields, the planning of nucleated villages of tenants to work the demesne as well as their own land, the construction of watermills, and the investment in large demesne farms which, in the expansion of the 13th century, were increasingly managed 'in hand'. It is true that agriculturally related industrial processing, sometimes on a large scale, could exist in this rural context. For example, there may have been a significant malting industry, revealed in the excavated and documentary evidence from the Raunds Area Project.¹⁹² There was also apparently a significant medieval rural cloth industry in the county, judging from the few fulling mills which have come to light by chance during other documentary research, but which still awaits adequate investigation. However with the exception of the towns and market villages, which show the usual range of craft production, the economy of this landscape was still probably dominated by arable production in a way that many other regions of England were not.¹⁹³

There were of course specific townships where the localised existence of high-quality natural resources led to a concentration of industrial activity, as with the building stone production of Weldon and Helmdon or the stone slate production of Collyweston and Easton on the Hill. It is probably coincidence that the best-known of these lie within or on the edge of the forest zones in Northamptonshire, but in the woodland areas of the county there may have been a significant exception to the broader pattern of rural occupation. Pettit noted the presence of an unusually high concentration of rural craft production in Rockingham Forest in his study of the 16th- and 17th-century forest and this may be a pattern which has medieval or earlier origins. Not only were there medieval potters, smiths and

¹⁹² Parry, *op. cit.* in note 21.

¹⁹³ Foard, *op. cit.* in note 86.

charcoal burners; other trades include the 13th-century Thomas the Tanner from the tiny hamlet of Perio near Fotheringhay, and the tanner, tailor, cobbler and carpenter in the late 13th to early 15th century at Potters Lyveden.¹⁹⁴ First and foremost the forest industry is related to the presence of valuable raw materials and especially of fuel, but it may also relate to the lower arable potential of the land. There was perhaps both a need and an opportunity, at both a peasant and a seigneurial level, for supplementing the rural economy by investment in industrial production. In the iron and charcoal industries in particular we see this on a large scale in medieval Rockingham Forest, perpetuating production which had originated in the early Iron Age and continued at varying levels of intensity until the 14th or 15th centuries. The very existence of the woodland and its survival through the 13th century in the face of large-scale clearance for agriculture seems to have been determined by an economic balance of profitability in which the existence of industry may have played an important role alongside management for deer and for timber production.

These forest-based industries have not received the level of study which they deserve. In particular the charcoal-burning hearths, quarries, bloomeries and forges require far more documentary study, field survey and excavation if we are to adequately understand the scale, organisation, tenurial associations and chronology of what may have been one of the most important rural industries in Northamptonshire in the later Middle Ages. Only then will it be possible to establish how the industry compares in scale and importance to that of the Weald and the Forest of Dean. Its Saxon origins also appear from recent work to provide another, important topic for research. If the best-preserved sites are to be located, there is a need to exploit geophysical survey techniques to identify charcoal-burning sites within woodland. Although the bloomeries may generally be identifiable from slag heaps, the bloom smithies and secondary smithing sites, where the slag quantities are much smaller, may also need similar survey.¹⁹⁵

The primary purpose of the present work was to develop a framework for the archaeological investigation of the medieval Rockingham Forest. It is clear that although there has been extensive ironstone extraction there in the 19th and 20th centuries, there are still large parts of the forest where good archaeological survival has been demonstrated or can be expected. The extensive areas which are now under arable offer the potential to explore the wide-scale patterns of land-use and industry, while the substantial tracts of surviving woodland should provide extensive well-preserved historic landscapes for more intensive study. The Fineshade area is perhaps the most promising as it appears to represent a focus not only for the post-Conquest industry but also of Roman ironworking and has recently produced evidence of Saxon ironworking. There are not only the earthworks of the ironworks. In Wakerley Great Wood in particular is the largest extent of nodular ore outcrop within a surviving ancient woodland context, promising exceptional preservation of quarrying and other ironworking remains.

¹⁹⁴ NRO, Bru.C143; Steane, *op. cit.* in note 16, 54.

¹⁹⁵ G. McDonnell, 'Geophysical techniques applied to early metalworking sites', *Hist. Metall. Soc. Data Sheet*, 4 (1995).

However, because of the absence of a village, the Fineshade area may be somewhat atypical and other areas also require detailed study. Indeed all medieval settlements within the forest must be examined, to establish where industrial production occurred, including secondary smithing, and on what scale.

In this way it should be possible to develop a detailed understanding of the character and development of later-medieval settlement and economy in a woodland context which, together with the ongoing studies of the medieval towns of the county, will correct our picture of the post-Conquest economy of Northamptonshire, which is currently dominated by the intensive arable agriculture of its very visible open fields and nucleated villages.

ACKNOWLEDGEMENTS

Thanks are due especially to Burl Bellamy for comments on the text and various information and advice on the iron industry, arranging access to sites and providing information recovered as part of his and Gill Johnson's important ongoing investigation of iron production in Rockingham Forest, and to James Bond and Peter Crew for many valuable comments on the text and for pointing out comparable and contrasting evidence from elsewhere in England. The aerial photography was funded by RCHME and Northamptonshire County Council, while Phil Markham conducted part of the mapping of the soilmark data through the English Heritage (formerly RCHME)-funded National Mapping Programme. Thanks also to Gill Johnson, David Hall, Dennis Jackson, Jane Baille, Pat Foster, Graham Cadman, Dr Judith Bennett and Professor Christopher Dyer for advice and information.