

THE PRODUCTS OF THE BLACKSMITH IN MID-LATE ANGLO-SAXON ENGLAND

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Part 4

Notes for Parts 1-3

1. For the purposes of this paper the following period sub-divisions have been adopted: Early Anglo-Saxon c. 400 - 650; Middle Anglo-Saxon c. 650 - 850; Late Anglo-Saxon c. 850 - 1066. At York the Middle Anglo-Saxon period is usually referred to as Anglian and the Late Anglo-Saxon period as Anglo-Scandinavian, but for the sake of brevity these terms have not been used here unless reference is specifically to York material.

2. *Aelfric's Colloquy*, trans. M. Swanton, *Anglo-Saxon Prose*, revised edn (London, 1985), pp. 107-15 at p.113.

3. See below notes 4 and 5.

4. Publication details of the principal Middle Anglo-Saxon sites are as follows. Flixborough: P. Ottaway, various contributions in D. H. Evans and C. P. Loveluck eds, *Life and Economy at Early Medieval Flixborough c. AD 600 – 1000: The Artefact Evidence, Excavations at Flixborough 2* (Oxford, 2009). Hamwic: the ironwork is largely unpublished, but see P. V. Addyman and D. Hill, Saxon Southampton: a review of the evidence. Part 2: industry, trade and everyday life, *Proc. Hampshire Field Club Archaeol. Soc.* **26** (1969), pp. 61-96, at pp. 65-6; P. Andrews, Iron objects, in M. F. Garner, Middle Saxon evidence at Cook Street, Southampton (SOU254), *Proc. Hampshire Field Club Archaeol. Soc.* **49** (1993), pp. 109-10; references to unpublished objects employ the site code followed by the small find number in the form SOU00.00. Thwing (Paddock Hill), East Riding of Yorkshire: the iron objects are unpublished, but there is a manuscript report by P. Ottaway - numbers used below take the form I000. York, Fishergate: N. S. H. Rogers, *Anglian and Other Finds from Fishergate*, *Archaeol. York* **17/9** (London, 1993).

5. Publication details of the principal late Anglo-Saxon sites are as follows. Goltho: I. H. Goodall, Objects of iron, in G. Beresford, *Goltho: the Development of an Early English Manor c.850-1150*, English Heritage Archaeol. Report **4** (London, 1987), pp. 177-87. Repton: the ironwork is largely unpublished (excavations by M. Biddle and B. Kjølbye-Biddle). Thetford: I. H. Goodall, Iron objects, in A. Rogerson and C. Dallas, *Excavations in Thetford 1948-59 and 1973-80*, East Anglian Archaeol. **22** (Gressenhall, 1984), pp. 76-106; I. H. Goodall and P. Ottaway, Iron objects, in C. Dallas, *Excavations in Thetford by B.K.Davison between 1964 and 1970*, East Anglian Archaeol. **62** (Gressenhall, 1993), pp. 96-116. Winchester: ironwork from sites within the city walls is published under various headings by I. H. Goodall in M. Biddle, *Object and Economy in Medieval Winchester*, 2 vols. Winchester Studies **7.2** (Oxford, 1990). Objects from the suburbs appear in H. Rees, N. Crummy, P.J. Ottaway and G. Dunn, *Artefacts and Society in Roman and Medieval Winchester:*

Small Finds from the Suburbs and Defences 1971-86 (Winchester, 2008). York: D. M. Waterman, Late Saxon, Viking and early medieval finds from York, *Archaeologia* **97** (1959), pp. 59-105; A. MacGregor, *Anglo-Scandinavian Finds from Lloyds Bank, Pavement and Other Sites*, *Archaeol. York* **17/3** (London, 1982); P. Ottaway, *Anglo-Scandinavian Ironwork from Coppergate*, *Archaeol. York* **17/6** (London, 1992); P. Ottaway and N. Rogers, *Craft Industry and Everyday Life: Finds from Medieval York*, *Archaeol. York* **17/15** (York, 2002), pp. 3005-12.

6. See, for example, S. O'Connor, Conservation of the Coppergate ironwork, in Ottaway, *Ironwork from Coppergate*, pp. 466-71.

7. See in particular: R. F. Tylecote and B. J. J. Gilmour, *The Metallography of Ferrous Edge Tools and Edged Weapons*, *Brit. Archaeol. Rep. Brit. Ser.* **155** (Oxford, 1986); and J. G. McDonnell, Metallography data, in Ottaway, *Ironwork from Coppergate*, microfiche p. 3:B12-14.

8. For further details on the types of iron ore to be found in Britain and their properties, R. F. Tylecote, *The Prehistory of Metallurgy in the British Isles* (London, 1986), pp. 124-8.

9. R. F. Tylecote, L. Biek and J. W. Haldane, Iron smelting residues, in C. Mahany, A. Burchard and G. Simpson, *Excavations at Stamford, Lincs. 1963-9*, *Soc. Med. Archaeol. Monogr. Ser.* **9** (London, 1982), pp. 135-44.

10. J. Bayley, Metalworking evidence, in Dallas and Rogerson, *Excavations in Thetford*, p. 107.

11. For details of the smelting process, Tylecote, *Prehistory of Metallurgy*, pp. 128-46.

12. C. F. Tebbutt, A Middle-Saxon iron smelting Site at Millbrook, Ashdown Forest, Sussex, *Sussex Archaeol. Collections* **120** (1982), 19-35.

13. J. Haslam, A Middle Saxon iron smelting site at Ramsbury, Wilts., *Medieval Archaeol.* **24** (1980), 1-64.

14. A. Burchard, A Saxo-Norman iron smelting site at Co-op in High Street, in Mahany, Burchard and Simpson, *Excavations at Stamford*, pp. 105-15; R. F. Tylecote, Recent work on early ironworking sites in the Stamford area, *Bull. of the Hist. Metallurgy Group* **4, 1** (1970), pp. 24-7; Tylecote, *Prehistory of Metallurgy*, p. 183.

15. R. F. Tylecote, A bloomery site at West Runton, *Norfolk Archaeol.* **34** (1967), 187-214.

16. Tylecote, *Prehistory of Metallurgy*, p. 145.

17. For the methodology of pattern-welding, J. W. Anstee and L. Biek, A study in pattern-welding, *Medieval Archaeol.* **5** (1961), pp. 71-93; Tylecote, *Prehistory of Metallurgy*, pp. 171-2.

18. Tylecote, *Prehistory of Metallurgy*, p. 146.

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19. V. I. Evison, Early inlaid Anglo-Saxon metalwork, *Antiq. J.* **35** (1955), pp. 30-45; for Late Anglo-Saxon examples from Winchester, section entitled: Inlaid iron objects, in Biddle, *Object and Economy*, pp. 160-3 (contributions by D. A. Hinton, M. Cowell and S. Keene).

20. Tylecote, *Prehistory of Metallurgy*, pp. 198-9.

21. The methodology of tinning is described by Theophilus in *On Divers Arts*, trans. J. G. Hawthorne and C. S. Smith (New York, 1979), p. 187. See also A. Oldeberg, *Metallteknik under Vikingatid och Medeltid* (Stockholm, 1966), p. 275; and P. Wilthew and P. Ottaway, Non-ferrous plating, in Ottaway, *Ironwork from Coppergate*, pp. 486-90.

22. Oldeberg, *Metallteknik under Vikingatid och Medeltid*; D. M. Wilson, Craft and industry, in *The Archaeology of Anglo-Saxon England* ed. D. M. Wilson (London, 1976), pp. 253-82 at p. 266.

23. J. G. McDonnell and P. Ottaway, Chronological and spatial distribution of slag, in Ottaway, *Ironwork from Coppergate*, pp. 476-80.

24. For example, P. Hallinder and K. Haglund, Iron currency bars in Sweden, *Excavations at Helgö*, **5.1**, *Workshop Part 2*, eds K. Lamm and A. Lundström (Stockholm, 1978), pp. 30-58.

25. Goodall, *Excavations in Thetford*, pp. 76-7, no. 1; G. Arwidsson and G. G. Berg, *The Mästermyr Find: A Viking Age Tool Chest from Götland* (Stockholm, 1983), p. 17, nos 110-1; Hallinder and Haglund, *Excavations at Helgö*, **5.1**, pp. 45-6.

26. Ottaway, *Ironwork from Coppergate*, pp. 492-510.

27. See below, Part 4, pp. 7-8.

28. McDonnell in Ottaway, *Ironwork from Coppergate*, pp. 511-12 and microfiche p. 3:C2.

29. E. J. E. Pirie, *Post-Roman Coins from York Excavations 1971-81*, *Archaeol. York* **18/1** (London, 1986), pp. 33-7; Ottaway, *Ironwork from Coppergate*, p. 525.

30. S. Pay, *Hamwic: Southampton's Saxon Town* (Southampton, 1987), pp. 10-11; S. M. Youngs and J. Clark, Medieval Britain in 1980, *Medieval Archaeol.* **25**, pp. 166-228, at p. 168.

31. Haslam, *Ramsbury*.

32. D. Perring, *Early Medieval Occupation at Flaxengate, Lincoln*, *Archaeol. Lincoln* **9/1** (London, 1981).

33. Ottaway, *Ironwork from Coppergate*, esp. pp. 478-80 and 492-510.

34. For Halton, R. G. Collingwood, *Northumbrian Crosses of the pre-Norman Age* (London, 1927), pp. 159-62, fig. 191.

35. London, British Library, Cotton Claudius B. IV, fol. 10; C.R. Dodwell, *Anglo-Saxon Art* (Manchester, 1982), pl. 13.

36. Archaeological evidence: L. L. Ketteringham, *Alsted: Excavation of a Thirteenth - Fourteenth Century Sub-manor House with its Ironworks in Netherne Wood, Merstham, Surrey*, Surrey Archaeol. Soc. Research Vol. **2**, pp. 25-31; P. J. Huggins and R. M. Huggins, Excavation of monastic forge and Saxo-Norman enclosure, Waltham Abbey, Essex 1972-3, *Essex Archaeol. and Hist.* **5**, 127-84. For illustrative evidence see, for example, London, British Library, Sloane 3983, fol. 5r; Tylecote, *Prehistory of Metallurgy*, p. 190, fig. 131.
37. Haslam, *Ramsbury*, pp. 17-8.
38. Caedmon manuscript: Oxford, Bodleian Library, Junius II, p. 54; T. H. Ohlgren, *Anglo-Saxon Textual Illustration*, Medieval Institute Publications, West Michigan University (Kalamazoo, 1992), pl. 16.28.
39. D. A. Hinton, *A Smith in Lindsey: The Anglo-Saxon Grave at Tattershall Thorpe, Lincolnshire*, Soc. Medieval Archaeol. Monogr. Ser. **16** (2000), pp. 23 -24, figs 14-15, no. 4. An earlier article on Tattershall Thorpe was published by D. Hinton as A smith's hoard from Tattershall Thorpe, Lincolnshire: a synopsis, *Anglo-Saxon England* **22** (1993), 147-66.
40. Ottaway, *Ironwork from Coppergate*, pp. 512-13, no. 2200.
41. For a comprehensive survey, M. Müller-Wille, Die frühmittelalterliche Schmied im Spiegel skandinavischer Grabfunde, *Frühmittelalterliche Studien* **11** (1977), 127-201.
42. Hand hammer defined by Arwidsson and Berg, *Mästermyr Find*, p. 30. Examples from: Goltho, Goodall, *Goltho*, pp. 177-8, no. 1; Tattershall Thorpe, Hinton, *A Smith in Lindsey*, pp. 20-22, figs 11-13, no. 1; Thetford, Goodall, *Excavations in Thetford*, pp. 76-7, no. 4; York, Ottaway, *Ironwork from Coppergate*, p. 514, no. 2201.
43. Ottaway, *Ironwork from Coppergate*, p. 516, nos 2204 and 2224.
44. Goodall, *Excavations in Thetford*, p. 77, no. 8.
45. For tongs from Old London Bridge, R. E. M. Wheeler, *London and the Vikings*, London Museum Catalogues **6** (London, 1927), p. 22. The tongs are also illustrated, along with the second pair from London, in F. Pritchard, Small finds, *Aspects of Saxo-Norman London: 2, Finds and Environmental Evidence*, ed. A. Vince, London and Middlesex Archaeol. Soc., Special Pap. **12** (1991), 120-278, at p. 135 (second pair is no. 21).
46. Tongs from: Flixborough, Ottaway, *Life and Economy*, pp. 317-8, no. 3063; Ramsbury, V. I. Evison, Objects of bronze and iron, in Haslam, *Ramsbury*, pp. 33-41 at pp. 36-7, nos. 7-8; Repton, sfno. 3721; Tattershall Thorpe, Hinton, *A Smith in Lindsey*, pp. 24-6, figs 15-16, no. 5. Note also early Anglo-Saxon pairs from: Shakenoak Farm, P. D. C. Brown, The ironwork, in A. C. C. Brodrigg, A. R. Hands and D. R. Walker, *Excavations at Shakenoak Farm near Wilcote, Oxfordshire: Part 3, Site F* (Oxford, 1972), pp. 86-117, fig. 42, no. 192 (length 190mm); Sibertswold (Kent), B. Faussett, *Inventorium Sepulchrae*, (London, 1856), grave 115 (length c.230mm).

47. Small hammers from: Tattershall Thorpe, Hinton, *A Smith in Lindsey*, pp. 20-22, figs 11-13, nos 2-3; York, Ottaway, *Ironwork from Coppergate*, pp. 514-15, nos. 2202-3.
48. Punches from: Crayke, T. Sheppard, Viking and other relics at Crayke, Yorkshire, *Yorkshire Archaeol. J.* **34** (1939), pp. 273-81, at p. 280, nos 20-5; Hamwic, SOU169.1876; Tattershall Thorpe, Hinton, *A Smith in Lindsey*, 31-4, figs 20-2, nos 9-13; York, Ottaway, *Ironwork from Coppergate*, pp. 516-17, nos. 2205-23 and 2225-6.
49. Coin dies from York, see above, note 29; Lincoln, M. Blackburn and J. Mann, A Late Saxon coin die from Flaxengate, *Lincoln Archaeology 1994-5: 7th Annual Report of the City of Lincoln Archaeological Unit*, ed. M. J. Jones (Lincoln, 1995), pp. 27-9; London, Thames Exchange site, M. D. O'Hara, An iron reverse die of the reign of Cnut, *The Reign of Cnut*, ed. A. R. Rumble (Leicester, 1994), pp. 231-71.
50. McDonnell in Ottaway, *Ironwork from Coppergate*, pp. 525-7 and microfiche p. 3:C11-13
51. Chisels from: Crayke, N. Yorks., Sheppard, Viking and other relics, p. 280, no. 26; Thetford, Goodall, *Excavations in Thetford*, pp. 76-7, nos. 5-7; Goodall and Ottaway, *Excavations in Thetford*, pp. 99-100, no. 5; York (Anglian), Rogers, *Fishergate*, p. 1242, nos. 4938-9; (Anglo-Scandinavian), Ottaway, *Ironwork from Coppergate*, pp. 521-2, no. 2245.
52. Goodall, *Excavations in Thetford*, p. 77, no. 10.
53. I. H. Goodall, The ironwork, in P. Armstrong, D. Tomlinson and D. H. Evans, *Excavations at Lurk Lane Beverley, 1979-82*, Sheffield Excavation Reports **1** (Sheffield, 1991), pp. 132-46 at p. 135, no. 298.
54. Files from York, Ottaway, *Ironwork from Coppergate*, pp. 521-3, nos. 2246-7; and Tattershall Thorpe, Hinton, *A Smith in Lindsey*, p. 34, figs 22-4, nos 14-16.
55. McDonnell in Ottaway, *Ironwork from Coppergate*, p. 523 and microfiche p. 2:B7-10.
56. Tattershall Thorpe, Hinton, *A Smith in Lindsey*, p. 26, figs 18 and 20, no. 7; Ottaway, *Ironwork from Coppergate*, pp. 523-4, no. 2249.
57. Hinton, *A Smith in Lindsey*: draw-plate, pp. 26 -31, figs 19-20, no. 8; soldering lamp, pp. 37-41, figs 25 and 27, no. 24.
58. Ottaway, *Ironwork from Coppergate*, pp. 523-5, nos. 2251-2.
59. Ottaway, *Ironwork from Coppergate*, pp. 523-4, no. 2250.
60. Swanton, *Anglo-Saxon Prose*, pp. 25-7.
61. For a general survey of woodworking techniques and tools in Anglo-Saxon England, D. M. Wilson, Anglo-Saxon carpenter's tools, *Studien zur Europäischen Vor und Frühgeschichte*, ed. M. Claus, W. Haarnagel and K. Raddatz (Neumünster, 1968), pp. 143-50; Wilson, Craft and industry, pp. 253-9. For the use of carpenter's tools, see also W. L. Goodman, *The History of Woodworking Tools* (London, 1964);

R. A. Salaman, *Dictionary of Tools used in the Woodworking and Allied Trades, c.1700-1970* (London, 1975); G. Milne, *Timber Building Techniques c.900-1400*, London and Middlesex Archaeol. Soc., Special Pap. **15** (1992).

62. K. Leahy, The Flixborough Hoard, *Current Archaeol.* **141** (1995), 352; Ottaway, *Life and Economy*, pp. 256-67.

63. Stratified axes from: Flixborough, Ottaway, *Life and Economy*, p. 253, fig. 7.1, no. 2423; Repton, sfno. 3296; York, Ottaway, *Ironwork from Coppergate*, p. 527, no. 2253. Unstratified axes from Britain are to be found in: A. Bjørn and H. Shetelig, *Viking Antiquities in England*, *Viking Antiquities in Great Britain and Ireland* **4**, ed. H. Shetelig (Oslo, 1940). Waterman, Late Saxon, Viking and early medieval finds, fig. 10, nos 5-6 and 8; Wheeler, *London and the Vikings*, pp. 22-6.

64. Wheeler, *London and the Vikings*, see also Goodman, *History of Woodworking Tools*, pp. 27-31; and B. Ward-Perkins, *London Museum Medieval Catalogue* (London, 1940), pp. 55-65.

65. Wheeler, *London and the Vikings*, pp. 22-4 (types III and V).

66. Wilson, *Craft and industry*, p. 257.

67. See an early eleventh century hymnal: London, British Library, Cotton Julius A. VI, fol. 5v (June; chopping down trees); E. Temple, *Anglo-Saxon Manuscripts 900-1066*, A Survey of Manuscripts Illuminated in the British Isles **2** (London, 1976), p. 80 and illustration 199. *The Bayeux Tapestry*, ed. F. Stenton (London, 1957), fig. 38 (boatmaking) and fig. 65 (fighting).

68. Wheeler, *London and the Vikings*, pp. 18-19; D. C. Devenish and W. M. Elliott, A decorated axe head of Viking type from Coventry, *Medieval Archaeol.* **11** (1967), pp. 251-2.

69. Stratified T-shaped axes from: Hamwic, SOU24.22; London, Pritchard, Small finds, p. 135, no. 26; St Neots, P. V. Addyman, Late Saxon settlements in the St Neots Area 3: The village or township at St Neots, *Proc. Cambridgeshire Ant. Soc.* **64** (1973), pp. 45-99, at p. 94, no. 29; Winchester, Goodall, *Object and Economy*, pp. 273-4, no. 391. T-shaped axes from hoards at: Crayke, Sheppard, Viking and other relics, p. 280, no. 17; Flixborough, Ottaway, *Life and Economy*, pp. 257, figs 7.6-7, nos 2453-6; Hurbuck, C. C. Hodges, Anglo-Saxon remains, *Victoria County History of Durham*, ed. W. Page, 2 vols. (London, 1905) **1**, pp. 211-40, at pp. 213-15. Unstratified T-shaped axes from: London, Wheeler, *London and the Vikings*, pp. 25-6, fig. 8, nos 4-6; York, Waterman, Late Saxon, Viking and early medieval finds, fig. 5, no. 7.

70. Abraham building an altar, Oxford, Bodleian Library, Junius 11, p.87; Ohlgren, *Textual Illustration*, pl. 16.49; *Bayeux Tapestry*, ed. Stenton, fig. 38; Goodman, *History of Woodworking Tools*, pp. 29-31.

71. J. Ypey, Wapen of Werktuig?, *Rijksdienst Voor Het Oudheidkundig Bodermonderzoek, Overdrukken* **166** (Amersfoort, 1981).

72. C. Fox, *The Archaeology of the Cambridge Region* (Cambridge, 1923), pl. 36; Wilson, *Craft and industry*, pp. 256-7.

73. Adzes from: Flixborough (excavation), Ottaway, *Life and Economy*, p. 253, fig. 7.1, no. 2425, (hoard), fig. 7.7, nos 2458-9 (2459 T-shaped); Hurbuck, Hodges, Anglo-Saxon remains (two, of which one T-shaped); Thetford, Goodall, *Excavations in Thetford*, pp. 78-9, nos 11-2; Skerne, East Riding of Yorkshire, C. Loveluck, Finds, in J. Dent, C. Loveluck and W. Fletcher, The early medieval site at Skerne, in eds R. Van de Noort and S. Ellis, *Wetland Heritage of the Hull Valley*, pp. 227-36 at pp. 230-1, fig. 11.8.

74. Socketed chisels from: Flixborough, Ottaway, *Life and Economy*, p. 254, no. 2426; Skerne, Loveluck, Finds, p. 231, fig. 11.8; York, Ottaway, *Ironwork from Coppergate*, pp. 529-30, no. 2258. For mode of use and form of handle, Goodman, *History of Woodworking Tools*, pp. 31-2; S. McGrail, Axe, adze, hoe or slice, *Nautical Archaeol.* **6** (1977), pp. 62-4.

75. Wedges from Thwing, nos 16-8, and York, Ottaway, *Ironwork from Coppergate*, pp. 529-30, no. 2257.

76. Pritchard, Small finds, p. 135, no. 26.

77. McDonnell in Ottaway, *Ironwork from Coppergate*, p. 530, microfiche p. 3:C14.

78. Goodall, *Goltho*, pp. 177-8, nos 5-6.

79. *Bayeux Tapestry*, ed. Stenton, fig. 38; the 'breast auger' is discussed by Goodman, *History of Woodworking Tools*, pp. 172-3.

80. Flixborough hoard: Ottaway, *Life and Economy*, p. 258, fig. 7.9, nos 2462-4; Mästermyr: Arwidsson and Berg, *The Mästermyr Find*, p. 13, nos 46-51. Stratified spoon augers from: Skerne, Loveluck, Finds, pp. 231-2, fig. 11.8; Thetford, Goodall, *Excavations in Thetford*, pp. 77-8, nos 14-7; York (Anglian), Rogers, *Fishergate*, pp. 1243-5, nos 4942 and 4944; (Anglo-Scandinavian), Ottaway, *Ironwork from Coppergate*, pp. 532-6, nos 2260-8. Spoon augers in hoards at: Hurbuck, Hodges, Anglo-Saxon remains; Westley Waterless, Wilson, Anglo-Saxon carpenter's tools, pp. 146-7; and Wilson, *Craft and industry*, p. 258.

81. Shaves from: Flixborough (hoard), Ottaway, *Life and Economy*, p. 258, fig. 7.8, 2460-1; York, Ottaway, *Ironwork from Coppergate*, pp. 531-2, no. 2259.

82. Ramsbury, Evison, *Ramsbury*, p. 37, no. 17; Sandtun, Wilson, Anglo-Saxon carpenter's tools, p. 148.

83. Early Anglo-Saxon example from Sutton Courtenay, E. T. Leeds, A Saxon village at Sutton Courtenay, Berkshire, *Archaeologia* **73** (1923), pp. 147-92, pl. 27, L. Middle Anglo-Saxon examples from: Butley, V. Fenwick, Insula de Burgh, excavations at Burrow Hill, Butley, Suffolk, 1978-81, *Anglo-Saxon Stud. Archaeol. Hist.* **3** (1984), pp. 35-54, at p. 40, fig. 4; Riby, P. Ottaway, Ironwork, in K. Steedman, Excavation of a Saxon site at Riby Crossroads, Lincolnshire, *Archaeol. J.* **151** (1994), pp. 212-306, at pp. 249-63, no. 22; and Thwing, nos 173-5. Late Anglo-Saxon examples from: Repton, sfnos 3331 and 5708, and York, Ottaway, *Ironwork from Coppergate*, p. 589, no. 2982.

84. See Part 1, p. 6.

85. Brandon, unpublished, excavated by Suffolk Archaeological Unit, sfno. 9904; Hamwic, Addyman and Hill, Saxon Southampton, pp. 64-5, no. 12 (length 160mm).

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For use, C. Morris, Aspects of Anglo-Saxon and Anglo-Scandinavian lathe-turning, *Woodworking Techniques before A.D.1500*, ed. S. McGrail, Brit. Archaeol. Rep. Int. Ser. **129** (Oxford, 1982), pp. 245-62, at pp. 254-6.

86. Crayke, Sheppard, Viking and other relics, p. 280; York, Ottaway, *Ironwork from Coppergate*, pp. 536-7, nos 2269-70.

87. Rasps from Flixborough, Ottaway, *Life and Economy*, p. 255, fig. 7.1, nos 2427-9; York, Ottaway, *Ironwork from Coppergate*, p. 522, no. 2248.

88. G. C. Dunning, The Anglo-Saxon plane from Sarre, *Archaeologia Cantiana* **63** (1959), pp. 196-7. For a discussion, including reference to other European examples, see Goodman, *History of Woodworking Tools*, pp. 54-6.

89. Goodall, *Excavations in Thetford*, p. 79, no. 18.

90. Goodall, *Object and Economy*, pp. 299-300, no. 412.

91. Salaman, *Dictionary of Tools*, p. 273. Probable millpicks from Goltho, Goodall, *Goltho*, p. 181, no. 33; Winchester, Goodall, *Object and Economy*, pp. 299-302, nos 416-7; York, Ottaway, *Ironwork from Coppergate*, nos 2232 and 2237 (described as 'tanged punches').

92. Slickers from: Beverley, Goodall, *Lurk Lane*, p. 135, no. 319; Hamwic, SOU169.2572; Winchester, Goodall, *Object and Economy*, pp. 248-9, nos 324-5 and Rees et al. *Artefacts and Society*, pp. 308-9, fig. 174, no. 2216.

93. Ottaway, *Life and Economy*, p. 278, fig. 8.1, no. 2475.

94. For Thetford, Goodall, *Excavations in Thetford*, p. 81, nos 41-2 (single armed); and York, Ottaway, *Ironwork from Coppergate*, pp. 554-5, nos 2744-7 (double-armed).

95. For use of the creaser, see W. A. Attwater, *Leathercraft* (London, 1961), p. 25; R. A. Salaman, *Dictionary of Leatherworking Tools c.1700-1950 and the Tools of Allied Trades* (London, 1986).

96. For the use of the leatherworker's awl, see Attwater, *Leathercraft*, p. 28. Awls with arms of diamond-shaped cross-section include a Middle Anglo-Saxon example from Cottam, East Riding of Yorkshire, P. Ottaway, Iron objects, in J. D. Richards, Cottam: an Anglian and Anglo-Scandinavian settlement on the Yorkshire Wolds, *Archaeol. J.* **156**, pp. 72-8 at p. 75, illus. 49, no. 18. Late Anglo-Saxon examples from: Thetford, Goodall and Ottaway, *Excavations in Thetford*, pp. 102-3, nos. 47-9; Winchester, Goodall, *Object and Economy*, pp. 248-9, no. 326; York, MacGregor, *Anglo-Scandinavian Finds*, pp. 80-1, nos 424-6, and Ottaway, *Ironwork from Coppergate*, pp. 552-4. Awls with arms of other cross-section forms are numerous, but see, for example, those from Thetford, Goodall, *Excavations in Thetford*, p. 81, nos. 34-40b.

97. Middle Anglo-Saxon shears from: Hamwic, Andrews, Iron objects, p. 109, no. 12, and SOU31.335; Maxey, P. V. Addyman, A Dark Age settlement at Maxey, Northants., *Medieval Archaeol.* **8** (1964), pp. 20-73, at pp. 60-1, no. 11; Thwing, I20; York, Rogers, *Fishergate*, pp. 1272-3, no. 4980. Late Anglo-Saxon shears from: Cheddar, I. H. Goodall, Iron objects, in P. Rahtz, *The Saxon and Medieval Palaces*

at Cheddar: *Excavations 1960-2*, Brit. Archaeol. Rep. Brit. Ser. **65** (Oxford, 1979), pp. 263-74, at p. 266, no. 198 (angle-back blades); Goltho, Goodall, *Goltho*, p. 181, nos 68-70; Thetford, Goodall, *Excavations in Thetford*, p. 87, nos 105-13, and Goodall and Ottaway, *Excavations in Thetford*, pp. 102-3, nos 37-9; York, Ottaway, *Ironwork from Coppergate*, pp. 548-50, nos 2688-2700.

98. Goodall, *Excavations in Thetford*, p. 87, no. 106, and Goodall and Ottaway, *Excavations in Thetford*, pp. 102-3, no. 42.

99. See Part 2, p. 1.

100. For the preparation of wool fibres: M. Hoffmann, *The Warp-weighted Loom* (Oslo, 1964); P. Walton, *Textiles, Cordage and Raw Fibre from 16-22 Coppergate*, Archaeol. York, **17/5** (London, 1989), p. 315.

101. Brown, *Excavations at Shakenoak Farm*, p. 106, fig. 51.

102. From grave 14 (excavated by Oxford Archaeological Unit), D. Miles and S. Palmer, *Invested in Mother Earth* (Oxford, 1986), p. 17.

103. Middle Anglo-Saxon examples from: Canterbury, Cakebread Robey site, sfno. 790 (unpublished, excavated by Canterbury Archaeological Trust); Cottam, Ottaway, Iron objects, pp. 74-5, illus. 49, no. 10; Hamwic, SOU169.1975; Wicken Bonhunt, Essex (excavated A. Rogerson and K. Wade), unpublished report by P. Ottaway, sfnos 379a-b. Late Anglo-Saxon examples from: Harrold, Beds., B. N. Eagles and V. I. Evison, *Excavations at Harrold, Bedfordshire, 1951-3*, *Bedfordshire Archaeol. J.* **5** (1970), pp. 17-55, at pp. 39-42; London, Pritchard, Small finds, p. 135, fig. 3.15; York, Ottaway, *Ironwork from Coppergate*, pp. 538-40, no. 2273.

104. P. Walton Rogers, *Textile Production at 16-22 Coppergate, York*, Archaeol. York **17/11** (York, 1997).

105. For the use of grease, G. de Poerck, *La Draperie Médiévale en Flandre et en Artois* (Ghent, 1951), pp. 45-6.

106. Wicken Bonhunt, sfno. 60.

107. See Part 2, p. 6.

108. Examples from: Finglesham, Kent, S. C. Hawkes, Anglo-Saxon cemetery at Finglesham: a reconsideration, *Medieval Archaeol.* **2** (1958), pp. 1-71, at pp. 30-35 (includes discussion of comparanda); Spong Hill, Norfolk, C. Hills, *Spong Hill Part 3, Catalogue of Inhumations*, East Anglian Archaeol. **21** (Gressenhall, 1984), p. 73, fig. 82, no. 3.

109. Weaving swords from: Barking, excavated 1985 by Passmore Edwards Museum, sf290; from York, D. Tweddle, *The Anglian Helmet from Coppergate*, Archaeol. York **17/8** (London, 1993), pp. 882-7.

110. Harbicks from: Goltho, Goodall, *Goltho*, pp. 177-8, no. 25; Thetford, Goodall, *Excavations in Thetford*, pp. 79-80, no. 31; York, Ottaway, *Ironwork from Coppergate*, p. 551, no. 3410.

111. Tweezers from Thwing, nos I21-2, and York, Ottaway, *Ironwork from Coppergate*, pp. 550-1, nos 2701-4.

112. Ottaway, *Ironwork from Coppergate*, pp. 542-7.

113. Ploughshares from: Flixborough, Ottaway, *Life and Economy*, p. 245, fig. 6.1, no. 2360; St Neots, Addyman, Late Saxon settlements in the St Neots area, p. 94, no. 30; Thetford, Goodall, *Excavations in Thetford*, pp. 81-2, no. 43; Westley Waterless, Fox, *Archaeology of the Cambridge Region*, pl. 35.

114. Hurbuck: Hodges, Anglo-Saxon remains. Scythe blade tip from Thetford, Goodall, *Excavations in Thetford*, pp. 81-2, no. 46.

115. Heskett and Ormside, J. D. Cowen, A Catalogue of objects of the Viking Period in the Tullie House Museum, Carlisle, *Trans Cumberland Westmorland Archaeol. Soc. new ser.* **34** (1934), pp. 166-87, pl. 1, no. 9, pl. 3, no. 5, and B. J. N. Edwards, The Vikings in North-west England: the archaeological evidence, in *Viking Treasure from the North-west: The Cuerdale Hoard in its Context*, ed. J. Graham-Campbell, National Museums and Galleries on Merseyside Occas. Pap., Liverpool Museum **5** (Liverpool, 1992), pp. 43-62, at pp. 45-6, fig. 5.2.

116. BL, Cotton Tiberius B. V, fol. 3v (February); Temple, *Anglo-Saxon Manuscripts*, p. 104. Bill hooks or pruning hooks from Flixborough, Ottaway, *Life and Economy*, (excavation) p. 245, no. 2361 (hoard), p. 258, fig. 7.9, no. 2465.

117. Weedhook(?) from Hamwic, Andrews, Iron objects, pp. 109-10, no. 7 (length 44mm). Pruning hook from Portchester, D. A. Hinton and M. Welch, Iron and bronze, in B. Cunliffe, *Excavations at Portchester Castle 2, Saxon*, Rep. Res. Comm. Soc. Antiq. London, **33** (London, 1975), pp. 195-218, at p. 197, no. 11 (length 120mm). Reaping or pruning hook from St Neots, Addyman, Late Saxon settlements in the St Neots area, pp. 92-3, no. 26 (length 73mm). Weed hook from Thetford, Goodall, *Excavations in Thetford*, pp. 81-2, no. 47 (length 60mm).

118. Adam and Cain digging, Oxford Bodleian Library, Junius 11, p. 49; Ohlgren, *Textual Illustration*, pl. 16.25. Spade shoes from: Southampton, P. V. Addyman and D. Hill, *Saxon Southampton*, p. 65, no. 13; Thetford, Goodall, *Excavations in Thetford*, pp. 81-2, nos 44-5; York, Ottaway, *Ironwork from Coppergate*, pp. 555-6, no. 2748.

119. Ottaway, *Ironwork from Coppergate*, pp. 556-7, no. 2750.

120. Fish hooks from: Flixborough, Ottaway, *Life and Economy*, p. 252, fig. 6.4, nos 2405-22; Thetford, Goodall and Ottaway, *Excavations in Thetford*, p. 102, no. 52; Winchester, Goodall, *Object and Economy*, p. 818, nos. 2537-9; York (Anglian) Rogers, *Fishergate*, pp. 1317-9, nos 5038-9, (Anglo-Scandinavian) Ottaway, *Ironwork from Coppergate*, pp. 600-1, nos 2991-5.

121. For an extended discussion of the classification of knives, Ottaway, *Ironwork from Coppergate*, pp. 558-85; and P. Ottaway, *Anglo-Scandinavian Ironwork from 16-22 Coppergate, c. 850-1100* (unpubl. DPhil dissertation, York Univ., 1990), pp. 160-86 and 399-428.

122. Size as the principal criterion for distinguishing between a knife and a scramasax is employed by V. I. Evison, A decorated seax from the Thames at Keen

Edge Ferry, *Berkshire Archaeol. J.* **61** (1963-4), pp. 28-36, at p. 29. Decoration is also admitted as a criterion in D. Gale, *The seax, Weapons and Warfare in Anglo-Saxon England*, ed. S. Chadwick Hawkes, Oxford Univ. Comm. Archaeol. Monogr. **21** (Oxford, 1989), 71-83.

123. For York, Ottaway, *Ironwork from Coppergate*, pp. 576-7.

124. These features are described in full in Ottaway, *Ironwork from Coppergate*, pp. 579-82.

125. Inlaid knives from stratified contexts include Middle Anglo-Saxon examples from: Easton Down, Hants, S. M. Davies, The finds, *Archaeology and the M3*, P. J. Fasham and R. J. B. Whinney, Hampshire Field Club Archaeol. Soc., Monogr. **7** (1991), pp. 40-6 at pp. 42-3, fig. 33, no. 10; Flixborough, Ottaway, *Life and Economy*, pp. 204-5, figs 5.28 and 5.30, nos 2046 and 2060; Hamwic, SOU24.1889, SOU99.153, SOU169.266. Late Anglo-Saxon examples from: Canterbury, A. D. Saunders, Excavations in the abbey church of St Augustine's Abbey, Canterbury, *Medieval Archaeol.* **22** (1978), pp. 25-63, fig. 11, no. 13; Cheddar, Goodall, *Cheddar*, p. 264, no. 31; London, Pritchard, Small finds, pp. 124-7, no. 1; Oxford, B. Durham, Archaeological investigations in St Aldate's, *Oxoniensia* **42** (1977), fig. 25, no. 5; Wicken Bonhunt, J. Musty, K. Wade and A. Rogerson, A Viking pin and inlaid knife from Bonhunt Farm, Wicken Bonhunt, Essex, *Antiq. J.*, **53** (1973), p. 287 (sfno. 286); Winchester, Goodall, *Object and Economy*, p. 841, no. 2654; Rees et al., *Artefacts and Society*, pp. 314, 317, fig. 175, plate 4, no. 2238; York, Ottaway, *Ironwork from Coppergate*, pp. 579-81, no. 2809.

126. D. M. Wilson, *Anglo-Saxon Ornamental Metalwork, 700-1100*, Brit. Museum Catalogue of the Antiquities of the Later Saxon Period **1** (London, 1964), p. 60, pl. 22, no. 36.

127. For the metallography of knives and other objects from Hamwic, Winchester, York and other sites, with further references: J. G. McDonnell, Iron and its alloys in the 5th - 11th centuries in England, *World Archaeol.* **20.3** (1989), pp. 373-82; McDonnell, *Ironwork from Coppergate*, pp. 591-9; R. F. Tylecote, Scientific examination and analysis of iron objects, in Biddle, *Object and Economy*, pp. 140-59; Tylecote and Gilmour, *Metallography of Early Ferrous Edge Tools*; K. Wiemer, Metallography of the knives, in Rogers, *Fishergate*, pp. 1277-1308 (see especially section entitled Comparative data by P. Ottaway and K. Wiemer, pp. 1304-8); K. Wiemer, Early British iron edged tools: a metallurgical study, (unpubl. DPhil dissertation, Cambridge Univ., 1993).

128. For a description of the principal macrostructure types, Tylecote and Gilmour, *Metallography of Early Ferrous Edged Tools*, pp. 2-3.

129. Pattern-welded knives from: Hamwic, SOU31.670; London, Pritchard, Small finds, p. 127, no. 9; Thetford, Goodall, *Excavations in Thetford*, p. 83, no. 103a; York, Ottaway, *Ironwork from Coppergate*, p. 598, nos 2756 and 2892; McDonnell, *ibid.*, microfiche p. 3:D3.

130. See Part 3, pp. 7-8.

131. For a comprehensive list of references and further discussion, Goodall, *Object and Economy*, pp. 836-8; additional examples from Hamwic, SOU24.13, 278;

Ottaway: Products of the blacksmith in Mid-Late Anglo-Saxon England, 4

SOU31.1557, and York, Ottaway, *Ironwork from Coppergate*, pp. 586-8, nos 2975-8.

132. Goodall, *Object and Economy*, p. 838, nos 2644, 2648.

133. J. Graham-Campbell, An Anglo-Scandinavian ornamented knife from Canterbury, Kent, *Medieval Archaeol.* **22** (1978), pp. 130-3.

134. M. Biddle, Knives used by scribes, in Biddle, *Object and Economy*, pp. 738-41.

135. S. Margeson, Objects from Burial 451, in A. Rogerson, *A Late Neolithic, Saxon and Medieval Site at Middle Harling, Norfolk*, *East Anglian Archaeol.* **74** (Gressenhall, 1995), pp. 79-80, fig. 76, nos 4-5.

136. M. Biddle and B. Kjølbye-Biddle, Repton and the Vikings, *Antiquity* **66** (1992), pp. 36-51, fig. 6, no. 10.

137. Middle Anglo-Saxon example from Thwing, I77. Late Anglo-Saxon examples from Carlisle Cathedral, sfno. 218 (unpublished, excavated by Carlisle Archaeological Unit), and York, Ottaway, *Ironwork from Coppergate*, p. 588, nos 2979-81.

138. Ottaway, *Ironwork from Coppergate*, p. 589, no. 2983.

139. Goodall, *Excavations in Thetford*, pp. 78-9, no. 13.

140. Thwing, I81; others from Flixborough, Ottaway, *Life and Economy*, p. 218, fig. 5.31, nos 2311-12.

141. For Thetford, Goodall, *Excavations in Thetford*, pp. 94-5, nos 193-5, and Winchester, Goodall, *Object and Economy*, p. 819, nos 2546-7.

142. For Thetford, Goodall, *Excavations in Thetford*, pp. 94-5, no. 196, and York, Ottaway, *Ironwork from Coppergate*, pp. 599-600, no. 2989, and Waterman, Late Saxon, Viking and early medieval finds, fig. 5, no. 10.

143. Ottaway, *Life and Economy*, no. 2309.

144. Ottaway, *Ironwork from Coppergate*, pp. 601-4, nos 2998-3003.

145. For single-bowled spoons in bone, J. Collis and B. Kjølbye-Biddle, Early medieval bone spoons from Winchester, *Antiq. J.* **59** (1979), pp. 375-91. For spoons in non-ferrous metal: Addyman and Hill, Saxon Southampton, pl. 8, e4; C. Peers and C. A. R. Radford, The Saxon monastery of Whitby, *Archaeologia* **89**, pp. 27-88, at p. 62, fig. 12, no. 7; A. Goodall, Non-ferrous metal objects, in Rogerson and Dallas, *Excavations in Thetford*, pp. 68-75, at p. 69, fig. 112, no. 48; Waterman, Late Saxon, Viking and early medieval finds, fig. 15, no. 3.

146. Examples from: Thetford, Goodall, *Excavations in Thetford*, pp. 94-5; Thwing, I80, I83; York, Ottaway, *Ironwork from Coppergate*, p. 680, nos 3681-2.

147. Middle Anglo-Saxon examples from: Hamwic, Addyman and Hill, Saxon Southampton, p. 66, no. 7; Polhill, Kent, S. C. Hawkes, Dating and significance of the burials in the Polhill cemetery, in B. Philp, *Excavations in West Kent, 1960-1970*

(Dover, 1973), pp. 186-201, nos 550-1, 555-6 (referred to as 'purse mounts'); Riby, Ottaway, Riby cross-Roads, no. 24; Yeaverling, B. Hope-Taylor, *An Anglo-British Centre of Early Northumbria* (London, 1977), fig. 89, no. 8.

148. Winchester: M. Biddle and R. N. Quirk, Excavations near Winchester Cathedral, 1961, *Archaeol. J.* **119** (1962), pp. 150-94, at pp. 184-6; M. Biddle, The iron pan, in Biddle, *Object and Economy*, p. 163; Goodall, *Object and Economy*, pp. 820-1, no. 2544. York, Ottaway, *Ironwork from Coppergate*, pp. 604-5, no. 3005.

149. See, for example, J. R. Mortimer, *Forty Years Researches in the British and Saxon Burial-Mounds of East Yorkshire* (London, 1905), pl. 28, fig. 225.

150. See Part 1, p. 12.

151. Small bells from York, Ottaway, *Ironwork from Coppergate*, pp. 557-8, nos 2752-3 and Ribblehead, N.Yorks, A. King, Gauber High Pasture, Ribblehead: an interim report, *Viking Age York and the North*, ed. R. A. Hall, Counc. Brit. Archaeol. Res. Rep. **27** (London, 1978), pp. 21-5. Large bells from: Flixborough (hoard), Ottaway, *Life and Economy*, p. 256, fig. 7.5, nos 2450-1; Repton, sfno. 3812; Tattershall Thorpe, Hinton, *A Smith in Lindsey*, pp. 44-7, figs 30-1. For a survey of Irish bells with notes on manufacture, C. Bourke, Early Irish hand bells, *J. Royal Soc. Antiq. Ireland* **110** (1980), 52-66.

152. Iron styluses from: Barking Abbey in *The Making of England, Anglo-Saxon Art and Culture AD 600-900*, ed. L. Webster and J. Backhouse (London, 1991), p. 90, no. 67k; Flixborough, T. Pestell, The styli, in Loveluck and Evans, *Life and Economy*, pp. 127-8; York, Ottaway, *Ironwork from Coppergate*, pp. 606-7, no. 3010.

153. For nails from 16-22 Coppergate and a discussion of their use, Ottaway, *Ironwork from Coppergate*, pp. 607-15.

154. Ottaway, *Ironwork from Coppergate*, pp. 611-3.

155. Oseberg, S. Grieg, *Kongsgaarden*, eds A. W. Brøgger and H. Shetelig, *Osebergfundet* **2** (Oslo, 1928), figs 17, 34 and 134, and E. E. Astrup and A. E. Christensen, Decoration nails from the Oseberg find, chemical analyses and production techniques, *Universitetets Oldsaksamling* (Oslo, 1991-2), pp. 137-52. Fyrkat, E. Roesdahl, *Fyrkat, en Jysk Vikingeborg 2: Oldsagerne og Gravpladsen* (Copenhagen, 1977), p. 96, figs 125-6 and 129.

156. For clench bolts from 16-22 Coppergate and discussion of their use, Ottaway, *Ironwork from Coppergate*, pp. 615-8.

157. For example at Fyrkat, Roesdahl, *Fyrkat*, pp. 84-90, figs 109-10, and Thumbby-Bienebek, Schleswig-Holstein, M. Müller-Wille, *Das wikingerzeitliche Gräberfeld von Thumbby-Bienebek 2*, Offa-Bücher **62** (Neumünster, 1987), Tafn 20-1.

158. W. Rodwell and K. Rodwell, St Peter's church, Barton-on-Humber, excavation and structural study, 1978-81, *Antiq. J.* **62** (1982), pp. 283-315, at pp. 290-2.

159. J. Geddes, The construction of medieval doors, *Woodworking Techniques*, ed. McGrail, pp. 313-26, at p. 313; C. A. Hewett, Anglo-Saxon carpentry, *Anglo-Saxon England* **7** (1978), pp. 204-29 at pp. 211-14; C. A. Hewett, *English Historic*

Carpentry (London, 1980), pp. 21-2. There is an excavated example from Goltho, Goodall, *Goltho*, pp. 180-2, no. 88.

160. For staples from 16-22 Coppergate and a discussion of their use, Ottaway, *Ironwork from Coppergate*, pp. 619-23.

161. In recent times large staples have been known as 'timber dogs' or 'dog joiners', see Salaman, *Dictionary of Tools*, p. 173.

162. Hinge pivots from: Thetford, Goodall, *Excavations in Thetford*, pp. 89-90, nos 138-45; Winchester, Goodall, *Object and Economy*, p. 330, nos 564-77; York, Ottaway, *Ironwork from Coppergate*, pp. 635-7.

163. For example: London, British Library, Cotton Caligula A. xiv fol. 22; Temple, *Anglo-Saxon Manuscripts*, pp. 113-5, illus. 293; Oxford, Bodleian Library, Junius II, p. 66 (illustration of *Genesis* showing Noah's Ark); Ohlgren, *Textual Illustration*, pl. 16.38.

164. See note 159.

165. Pritchard, Small finds, pp. 140-1, nos 59-60; V. Horsman, C. Milne and G. Milne, *Aspects of Saxo-Norman London: 1, Building and Street Development*, London and Middlesex Archaeol. Soc. Special Pap. **11** (1988), pp. 89-91. Other U-eyed hinges from York, Ottaway, *Ironwork from Coppergate*, pp. 637-9, nos. 3460-72; Ottaway and Rogers, *Finds from Medieval York*, p. 3010, figs 1556-7, nos 15341-2.

166. For example on chests from Mästermyr, Arwidsson and Berg, *Mästermyr Find*, fig. 1, and Oseberg, Grieg, *Kongsgaarden*, figs 66-7, pl. 10.

167. Hinge straps from: Dacre, Cumbria (excavated R. Newman), unpublished report by P. Ottaway; Flixborough, P. Ottaway, The coffin fittings, in C. Loveluck and D. Atkinson, *The Early Medieval Settlement Remains from Flixborough, Lincolnshire: The Occupation Sequence, c. AD 600 – 1000*, Excavations at Flixborough, **1** (Oxford), pp. 122-4; Ripon (Ailcy Hill), P. Ottaway, The ironwork, in R. A. Hall and M. Whyman, Settlement and monasticism at Ripon, North Yorkshire, from the 7th - 11th centuries AD, *Medieval Archaeol.* **40** (1996), pp. 99-113, fig. 24; Thwing, Anon., Thwing: excavation and field archaeology in East Yorkshire, 1986, Yorkshire Archaeol. Soc., Prehistory Res. Section (1986); York Minster, B.Kjølbye-Biddle, Iron bound coffins and coffin fittings from the pre-Norman cemetery, in D. Phillips and B. Heywood, *Excavations at York Minster 1* (London, 1995), pp. 489-520.

168. See Part 2, pp. 15-16.

169. Figure 8-shaped hasps from Thetford, Goodall, *Excavations in Thetford*, p. 89, nos 162-7 (164 with decorated attachment link), and Winchester, Goodall, *Object and Economy*, p. 973, nos 3473-7.

170. Early Anglo-Saxon examples from Dover, V. I. Evison, *Dover, the Buckland Anglo-Saxon Cemetery*, Historic Buildings and Monuments Commission for England, Archaeol. Rep. **3** (London, 1987), pp. 101-2, and Shudy Camps, T. C. Lethbridge, A cemetery at Shudy Camps, Cambridgeshire, *Proc. Cambridgeshire Antiq. Soc.*, Quarto Public. new ser. **5** (1936), fig. 9, no. 2. Late Anglo-Saxon

example from Hereford, R. Shoesmith, *Excavations at Castle Green, Hereford City Excavations 1*, Counc. Brit. Archaeol., Res. Rep. **36** (London, 1980), p. 36, fig. 32, no. 2. There are also numerous examples from Repton.

171. See below, Part 2, p. 12.

172. Evison, *Dover*, fig. 21, no. 8c.

173. Thwing, I251-6.

174. Ripon, Ottaway, The ironwork, pp. 103-6, fig. 23, nos 409 and 575 and Thwing, I257-62. Late Anglo-Saxon examples from North Elmham, I. H. Goodall, The iron objects, in P. Wade-Martins, *Excavations in North Elmham Park 1967-72*, East Anglian Archaeol. **9** (Gressenhall, 1980), p. 510, no. 12, and York, Ottaway, *Ironwork from Coppergate*, pp. 645-6, nos 3495-8.

175. From 16-22 Coppergate, Ottaway and Rogers, *Finds from Medieval York*, pp. 2842-3, fig. 1421, no. 12367. For Birka, H. Arbman, *Birka 1: Die Gräber* (Uppsala, 1940), Tafn 260, 263-4, 272 and G. Arwidsson and H. Thorberg, Kästen und Schachteln, *Birka 2, 3, Systematische Analysen der Gräberfunde*, ed. G. Arwidsson (Stockholm, 1989), pp. 113-21.

176. Corner brackets of various forms from: Thwing, I169-99; Hereford, Shoesmith, *Castle Green*, pp. 36-8, fig. 32; Thetford, Goodall, *Excavations in Thetford*, p. 89, nos. 154-5; York, Ottaway, *Ironwork from Coppergate*, pp. 642-3, nos 3487-8.

177. Drop handles from Thwing, I263, and York, MacGregor, *Lloyds Bank*, pp. 84-5, no. 606, and Ottaway, *Ironwork from Coppergate*, pp. 646-7, nos 3504 and 3507. Ring handle from Winchester, Goodall, *Object and Economy*, p. 974, no. 3517.

178. Small fittings from Thetford, Goodall, *Excavations in Thetford*, p. 89, nos 160-1, and York, Ottaway, *Ironwork from Coppergate*, p. 629, nos 3365 and 3367, and (discs) pp. 623-4, nos 3408-9.

179. Ottaway, *Ironwork from Coppergate*, pp. 631 and 641, nos 3322-3, 3475 and 3478.

180. Vessel suspension fittings from York: Ottaway, *Ironwork from Coppergate*, pp. 650-1, nos 3544-5 (U-eyed form), nos 3547-52 (flat plate form).

181. Vessel handles from: North Elmham, Goodall, *North Elmham Park*, p. 514, no. 90; Portchester Castle, Hinton and Welch, *Portchester 2*, pp. 200-1, nos 16-7; York, Ottaway, *Ironwork from Coppergate*, pp. 646-7, nos 3501-2 and 3505.

182. For Butley, Fenwick, *Insula de Burgh*, pp. 42-4; Flixborough, Ottaway, *Life and Economy*, pp. 173-4, fig. 5.5, no. 1777; Sutton Hoo, V. H. Fenwick, The chainwork, in R. Bruce-Mitford, *The Sutton Hoo Ship Burial*, 3 vols, ed. A. C. Evans (London, 1983), **3**, pp. 511-53.

183. Pot hooks from Flixborough, Ottaway, *Life and Economy*, p. 173, fig. 5.4, nos 1763-76; North Elmham, Goodall, *North Elmham Park*, p. 514, nos 89 and 91; Ramsbury, Evison, *Ramsbury*, pp. 36-7, no. 21; Thetford, Goodall, *Excavations in Thetford*, pp. 94-5, nos 198-201; Winchester, Goodall, *Object and Economy*, p.

823, no. 2579; York, Ottaway, *Ironwork from Coppergate*, pp. 652-3, nos 3561-2 and 3565.

184. Wall hooks from: Thetford, Goodall, *Excavations in Thetford*, pp. 88-9, nos 134-5; Winchester, Goodall, pp. 328, 476-81; York, Ottaway, *Ironwork from Coppergate*, p. 651, nos 3553-4 and 3557-9.

185. Lamps from Sutton Hoo and Broomfield, R. Bruce-Mitford, *The Iron Lamp*, in Bruce-Mitford, *Sutton Hoo*, pp. 844-52, and York, Ottaway, *Ironwork from Coppergate*, p. 679 (referred to as candleholder), no. 3676.

186. Socketed candleholders from North Elmham, Goodall, *North Elmham Park*, p. 514, nos 92-3, and York, Ottaway, *Ironwork from Coppergate*, pp. 679-80. Prickets: *ibid.*, nos 3675 3677-8 and 3680.

187. W. H. Manning, *Catalogue of the Romano-British Iron Tools, Fittings and Weapons in the British Museum* (London, 1985), p. 95, pl. 42, O66.

188. Examples from Dover, Evison, *Dover*, pp. 100-1, figs 17, 21, 30, 33-4, 39 and 51, and Chamberlain's Barn, Beds., M. Hyslop, *Two Anglo-Saxon Cemeteries at Chamberlain's Barn*, Leighton Buzzard, *Bedfordshire Archaeol. J.* **120** (1963), pp. 161-200, at p. 196. Thwing has produced nineteen bolts (I283-302) and eight keys (I304-11) and Ripon two complete locks, Ottaway, *The ironwork*, pp. 106-9, fig. 22, nos 233 and 367. Keys are numerous and include examples from York (Anglian), Rogers, *Fishergate*, p. 1423, nos 5234-5, and as part of chatelaine, pp. 1425-8, nos 5243-5, and (Anglo-Scandinavian), Ottaway, *Ironwork from Coppergate*, pp. 674-5, nos 3655-60.

189. Goodall, *Object and Economy*, pp. 1016-17, no. 3686. For mode of operation, see also Ottaway, *Ironwork from Coppergate*, fig. 288.

190. Examples with pear-shaped bows from: Cheddar, Goodall, *Cheddar*, pp. 263-4, nos 4, 15 and 96; Portchester Castle, Hinton and Welch, *Portchester 2*, p. 197, no. 12; Winchester, Goodall, *Object and Economy*, pp. 1006-7, nos 3731-2; see also Ward-Perkins, *London Museum Medieval Catalogue*, pp. 134-6 (type 1). Examples with stem widening to a looped terminal from Hamwic, SOU169.984, and York, Ottaway, *Ironwork from Coppergate*, p. 673, no. 3654.

191. Pontefract, T. Wilmott, *The Anglo-Saxon church and cemetery on The Booths*, in I. Roberts and T. Wilmott, *Pontefract, 1: the Growth and Topography of the Medieval Town*, Yorkshire Archaeol. Monogr. (Wakefield, in prep.), in grave 588; Ripon, Ottaway, *The ironwork*, pp. 109-10, fig. 25, nos 267 and 567. Late Anglo-Saxon example from Beverley, Goodall, *Lurk Lane*, p. 134, no. 503. See also wooden lock case with bolt, tumbler and spindle from York, MacGregor, *Lloyds Bank*, pp. 80-1, no. 430.

192. Middle Anglo-Saxon examples from Hamwic, Addyman and Hill, *Saxon Southampton*, pp. 65-6, nos 14-5, and SOU169.2809, SOU99.15, SOU99.43. Late Anglo-Saxon examples from Thetford, Goodall, *Excavations in Thetford*, p. 95, nos 184-91, and York, Ottaway, *Ironwork from Coppergate*, pp. 668-71.

193. Examples from York, Ottaway, *Ironwork from Coppergate*, nos 3637, 3641 and 3653.

194. Three examples from pagan graves in Kent, Faussett, *Inventorium Sepulchrae*, pl. 10, nos 8-10. Another from the cemetery at Castledykes, N. Lincs. (excavated by Humberside Archaeological Unit), grave 1, find no. 1. Late Anglo-Saxon examples from: York, Ottaway, *Ironwork from Coppergate*, pp. 665-7, no. 3610; Northampton, I. H. Goodall, B. Ellis and G.E. Oakley, The iron objects, in J. H. Williams, *St Peter's Street, Northampton, Excavations 1973-6* (Northampton, 1979), pp. 268-77, at pp. 268-9, no. 3; Lincoln, R. White, An iron barrel padlock, *Lincoln Archaeological Trust 8th Annual Report 1979-80*, ed. M. Jones, pp. 23-5.

195. Padlock keys from Winchester, Goodall, *Object and Economy*, pp. 1005-7, nos 3693-7, and York, Ottaway, *Ironwork from Coppergate*, pp. 675-6, nos 3662-5 and 3668-70.

196. Probable pre-Conquest examples from Goltho, Goodall, *Goltho*, p. 183, nos 101-2. Keys from: *Goltho*, *ibid.*, no. 111, and York, Ottaway, *Ironwork from Coppergate*, no. 3666.

197. Examples from: Northampton, Goodall, *St Peter's Street*, pp. 268-9, no. 1; Thetford, Goodall, *Excavations in Thetford*, p. 89, no. 169; York, K. M. Richardson, Excavations in Hungate, York, *Archaeol. J.* **116** (1959), pp. 51-114, at pp. 81-3, fig. 18, no. 4 (scale should be 1:1). Keys from York (Anglian), Rogers, *Fishergate* pp. 1423-5, no. 5240, and (Anglo-Scandinavian), Ottaway, *Ironwork from Coppergate*, p. 677, nos 3671-3.

198. Examples from York, MacGregor, Industry and commerce in Anglo-Scandinavian York, pp. 44-5, fig. 27, no. 2, and Beverley, I. H. Goodall, Padlock, in P. Armstrong and D. Tomlinson, *Excavations at the Dominican Priory, Beverley, 1960-83*, Humberside Heritage Publication **13** (Hull, 1987), pp. 37-8.

199. e.g. from: Thwing, I314-20; Goltho, Goodall, *Goltho*, p. 184, nos 132-3; Thetford, Goodall, *Excavations in Thetford*, p. 98, nos 235-45; York, Ottaway, *Ironwork from Coppergate*, pp. 681-6; Rogers, *Fishergate*, pp. 1346-8, nos 5044-5.

200. Examples of buckles in graves from Süderbrarup (Schleswig-Holstein), E. Aner, Die wikingerzeitliche Kammergräber am Thorsberger Moor, *Offa* **11** (1952), pp. 60-77, at pp. 65 and 70-1, and Thumbby-Bienebek, M. Müller-Wille, *Das wikingerzeitliche Gräberfeld von Thumbby-Bienebek (Kreis Rendsberg-Eckenförde)*, **1** (Neumünster, 1976), p. 31 (for discussion), Taf. 29, nos 2 and 5.

201. Ottaway, *Ironwork from Coppergate*, pp. 687-8, nos 3746 and 3759.

202. Ottaway, *Ironwork from Coppergate*, pp. 691-2, nos 3795-6.

203. S. Grieg, *Viking Antiquities in Scotland, Viking Antiquities in Great Britain and Ireland* **2**, ed. H. Shetelig (Oslo, 1940), p. 61, fig. 34.

204. For Birka, B. Arrhenius, Bügelfibeln, *Birka II, 1: Systematische Analysen der Gräberfunde*, ed. G. Arwidsson, (Stockholm, 1984), pp. 39-44; see also, for example, H. Simonsson, En senvikingatida gravfält från Västmanland, *Fornvännen* **64** (1969), pp. 69-89 at p. 73, fig. 5.

205. See Part 2, p. 9.

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206. For Northampton, Goodall, *St Peter's Street*, p. 273, no. 121, and York, Ottaway, *Ironwork from Coppergate*, pp. 688-90, nos 3776-3784.

207. For Northampton, see note 203 above; Lincoln, Flaxengate, sfno. Fe75, 2552, and Repton, sfnos 4809 and 5257.

208. Examples from Hamwic, e.g. SOU15.8, SOU31.150; Ramsbury, Evison, *Ramsbury*, p. 35, no. 6; York, Ottaway, *Ironwork from Coppergate*, pp. 690-1, nos 3789-93.

209. Non-ferrous strap-ends from Hamwic, Addyman and Hill, Saxon Southampton, pp. 68-70, nos 1-4, and York, D. M. Wilson, Two ninth century strap-ends from York, *Medieval Archaeol.* **8** (1964), pp. 214-6.

210. Müller-Wille, *Thumbby-Bienebek* **2** (Chamber grave 37A, bridle 1), p. 38, Abbildung 6, Taf. 81, nos 16-7.

211. Examples from: Cottam, Ottaway, Iron objects, p. 77, illus. 50, nos 37-43; Flixborough (over 100), Ottaway, *Life and Economy*, pp. 38-9, nos 683-797; York (Anglian), Rogers, *Fishergate*, pp. 1367, nos 5054-67; and (Anglo-Scandinavian), Ottaway, *Ironwork from Coppergate*, pp. 690-1, nos 3798-3801.

212. Ringed pins also from North Elmham, Goodall, *North Elmham Park*, p. 516, no. 118; York, Ottaway, *Ironwork from Coppergate*, pp. 693-5, no. 3802, and D. Tweddle, *Finds from Parliament Street and Other Sites in the City Centre*, Archaeol. York **17/4** (London, 1986), p. 229, no. 1233. For iron ringed pins from Ireland see, for example, S. P. O'Riordain, Lough Gur Excavations: Carraig Aille and the Spectacles, *Proc. Royal Irish Academy* **52C** (1949), pp. 39-111, at p. 74, fig. 21, nos 111-2. For non-ferrous ringed pins from York, Waterman, Late Saxon, Viking, and Early Medieval Finds, fig. 11, nos 13-4, and *The Vikings in England*, ed. E. Roesdahl, J. Graham-Campbell, P. Connor and K. Pearson (London, 1981), YTC 10 and 12.

213. Ottaway, *Ironwork from Coppergate*, p. 696, no. 3810.

214. Examples from: Flixborough, G. Thomas, The hooked tags in *Life and Economy*, p. 19, fig. 1.8, nos 105-14; Lincoln, Flaxengate, sfnos F75, Fe1969, F75, Fe1699; Repton, sfno. 3175; York, Ottaway, *Ironwork from Coppergate*, p. 697, nos 3820-2.

215. D. M. Wilson, Late Saxon metalwork from the Old Minster 1964, in M. Biddle, Excavations at Winchester 1964, 3rd Interim Report, *Antiq. J.* **45** (1965), pp. 262-4, and D. A. Hinton, Hooked tags, in Biddle, *Object and Economy*, pp. 548-52.

216. Bracelets: Ottaway, *Ironwork from Coppergate*, pp. 696-7, nos 3817-9; brooches: Ottaway, *Life and Economy*, nos 28-49.

217. Goodall, *Object and Economy*, p. 1042, no. 3878.

218. W. A. Seaby and P. Woodfield, Viking stirrups from England and their background, *Medieval Archaeol.* **24** (1980), pp. 87-122.

219. Middle Anglo-Saxon spurs from Harling, Margeson in Rogerson, *Harling*, fig.76, no. 9, and Hamwic, SOU169.2184. Probable ninth century spurs from York,

Ottaway, *Ironwork from Coppergate*, nos 3836 and 3838. For a survey of spur development in Europe, R. Koch, *Stachelsporen des frühen und hohen Mittelalters*, *Zeitschrift für Archäologie des Mittelalters* **10** (1982), pp. 63-84.

220. Late Anglo-Saxon spurs from: Northampton, Goodall, *St Peter's Street*, p. 273, no. 120; Thetford, B. Ellis, Spurs, in Rogerson and Dallas, *Excavations in Thetford*, pp. 266-76; York, Ottaway, *Ironwork from Coppergate*, pp. 698-704, and Waterman, Late Saxon, Viking and early medieval finds, fig. 8, nos 5-7, fig. 25, no. 8.

221. As originally noted in E. M. Jope, The tinning of iron spurs a continuous practice from the tenth to the seventeenth century, *Oxoniensia* **21** (1956), pp. 35-42. For a spur with brass plating, Wheeler, *London and the Vikings*, fig. 19.

222. Ottaway, *Ironwork from Coppergate*, pp. 702-3, fig. 305.

223. For the role and status of the mounted warrior in Late Anglo-Saxon England, and a summary of artefactual evidence, J. Graham-Campbell, Anglo-Scandinavian equestrian equipment in eleventh century England, *Anglo-Norman Studies XIV, Proceedings of the Battle Conference 1991* (Woodbridge, 1992), pp. 77-89.

224. Complete or near complete examples include one from Hamwic, SOU169.974, two from Thwing, I331-2, and one from Wicken Bonhunt, sfno. 381.

225. An example of a snaffle bit with bronze plating from Hesketh (Cumbria), J. D. Cowen, *A Catalogue of Objects of the Viking Period in the Tullie House Museum*, p. 178, pl. I, no. 6. Snaffle link with punched dots from York, Ottaway, *Ironwork from Coppergate*, no. 3842.

226. For Sutton Hoo, see illustration in Anon., The Sutton Hoo research project, Mound 17, update, *British Museum Magazine* **14** (1993), p. 26, and York, Ottaway, *Ironwork from Coppergate*, p. 706, no. 3848. See also Ward-Perkins, *London Museum Medieval Catalogue*, p. 80 (type B, dated to the ninth century).

227. Wheeler, *London and the Vikings*, p. 42, fig. 20, nos 1-2.

228. Examples with round and rectangular eyes from Thetford, Goodall, *Excavations in Thetford*, pp. 99-100, no. 258, York, Ottaway, *Ironwork from Coppergate*, p. 706, no. 3849, and Waterman, Late Saxon, Viking and early medieval finds, fig. 8, nos 1-2. Examples with two round eyes from: London, Wheeler, *London and the Vikings*, p. 42, fig. 20, nos 1-2.; Goltho, Goodall, *Goltho*, pp. 184-5, no. 161; Thetford, Goodall, *Excavations in Thetford*, pp. 99-100, nos 259-61; Winchester, Goodall, *Object and Economy*, pp. 1043-4, nos 3881-3.

229. Example from Aspatria, H. Rooke, Druidical and other British remains in Cumberland, *Archaeologia* **10** (1792), pp. 105-13, republished in B. J. N. Edwards, *The Vikings in North-west England: the Archaeological Evidence*, fig. 5.1.

230. Incomplete bits with bar made separately from the strap-joiner from Beverley, Goodall, *Lurk Lane*, p. 134, no. 564, and Winchester, Waterman, Late Saxon, Viking and early medieval finds, pp. 74-5, fig. 8, no. 2. Single bars from: Beverley, I. H. Goodall, in D. H. Evans and D. G. Tomlinson, *Excavations at 33-5 Eastgate, Beverley, 1983-86*, Sheffield Excavation Reports **3**, pp. 151-61, at pp. 160-1, no. 467; Thetford, Goodall and Ottaway, *Excavations in Thetford*, pp. 110-1, nos 133-4; Winchester (Sussex Street), Rees et al. *Artefacts and Society*, p. 289, fig. 162, no.

1999. Complete example of bit with strap-joiner made in one piece with the bar from York, Waterman, Late Saxon, Viking and early medieval finds, pp. 74-5, fig. 8, no. 1, and single component of a bit of similar form from Thetford, Goodall, *Excavations in Thetford*, pp. 99-100, no. 249.

231. Examples from Beverley, Goodall, *Lurk Lane*, p. 134, no. 566 (boss); Thetford, Goodall, *Excavations in Thetford*, p. 100, nos 262-3 (bosses); Winchester, Goodall, *Object and Economy*, pp. 1043-5, nos 3885A (boss) and 3886 (pierced).

232. Ottaway, *Ironwork from Coppergate*, fig. 268, no. 3480; Müller-Wille, *Thumbby-Bienebek 2*, Taf. 81, nos 16-7.

233. For terminology and a summary of research to 1986, J. Clark, Medieval horseshoes, *Finds Research Group 700-1700, Datasheet 4* (1986).

234. W. H. Manning, *Catalogue of Romano-British Ironwork in the Museum of Antiquities, Newcastle-upon-Tyne* (Newcastle, 1976), pp. 31-2.

235. Wicken Bonhunt, sfno. 225.

236. Winchester, Goodall, *Object and Economy*, pp. 1054-6, nos 3939-43; and (Sussex Street) Rees et al., *Artefacts and Society*, pp. 292-5, fig. 166, nos 2030-2, 2037; York, MacGregor, *Anglo-Scandinavian Finds*, p. 83, no. 437; and Ottaway, *Ironwork from Coppergate*, pp. 707-9. Other Late Anglo-Saxon horseshoes from: Cheddar, Goodall, *Cheddar*, p. 267, no. 7; London (Ironmonger Lane), sfno. 153 (unpublished); Portchester Castle, Hinton and Welch, *Portchester 2*, p. 197, no. 9; Thetford, Goodall, *Excavations in Thetford*, nos 277-95 (not all necessarily pre-Conquest), and Goodall and Ottaway, *Excavations in Thetford*, pp. 110-11, no. 138.

237. For a survey of archaeological and other evidence for archery, J. Manley, The archer and the army in the Late Saxon period, *Anglo-Saxon Stud. Archaeol. Hist. 4* (1985), pp. 223-35.

238. Early - Middle Anglo-Saxon examples from: Hamwic, SOU169.895 (socketed); Morning Thorpe, B. Green, A. Rogerson and S. G. White, *The Anglo-Saxon Cemetery at Morning Thorpe, Norfolk*, East Anglian Archaeol. **36**, Vol. 2 (Gressenhall, 1981), fig. 404, D and G; West Stow, S. E. West, *West Stow, The Anglo-Saxon Village*, East Anglian Archaeol. **24**, Vol. 2 (Gressenhall, 1985), fig. 241, no. 4. Late Anglo-Saxon examples from: Carlisle Cathedral (unpublished, excavated by Carlisle Archaeological Unit), sfno. 270; Flixborough, Ottaway, *Life and Economy*, p. 123, no. 991; Norwich, V. Williams, Iron objects, in B. Ayers, *Excavations at St Martin-at-Palace-Plain*, East Anglian Archaeol. **37** (Gressenhall, 1988), fig. 59, no. 21; Sonning, V. I. Evison, A Viking grave at Sonning, Berks, *Antiq. J.* **49** (1969), pp. 330-45, fig. 1, g-k; Thetford, Goodall, *Excavations in Thetford*, p. 105, no. 298; Walton, M. Farley, Saxon and medieval Walton, Aylesbury: excavations 1973-4, *Records of Bucks.* **20** (1976), pp. 153-290, at p. 248, fig. 39, no. 6; York, Ottaway, *Ironwork from Coppergate*, pp. 710-5, Waterman, Late Saxon, Viking and early medieval finds, fig. 5, no. 9.

239. Ottaway, *Ironwork from Coppergate*, no. 3922.

240. E. Wegraeus, Pilspetsar under Vikingatid, *Tor 15* (1972), pp. 191-208; E. Wegraeus, Die Pfeilspitzen von Birka, *Birka 2, II, Systematische Analysen der Gräberfunde*, ed. G. Arwidsson (Stockholm, 1986), pp. 21-34.

241. Middle Anglo-Saxon examples from Thwing, 1350-1. Late Anglo-Saxon examples from York, Ottaway, *Ironwork from Coppergate*, nos 3919 and 3921 (small), and nos 3918 and 3926 (large). Other small examples from St Neots, Addyman, Late Saxon settlements, pp. 92-3, no. 9, and Thetford, Goodall, *Excavations in Thetford*, p. 105, nos 299-301, and Goodall and Ottaway, *Excavations in Thetford*, pp. 111-12, no. 142.

242. G. R. Owen-Crocker, *Dress in Anglo-Saxon England* (Manchester, 1986), pp. 171-2.

243. M. Brisbane, Hamwic (Saxon Southampton): an eighth century port and production centre, *The Rebirth of Towns in the West*, eds R. Hodges and B. Hobley, Counc. Brit. Archaeol. Res. Rep. **68** (London, 1988), pp. 101-8; S. Pay, *Hamwic*.

244. K. Wade, Ipswich, *The Rebirth of Towns in the West*, eds R. Hodges and B. Hobley, pp. 93-100.

245. R. Cowie and R. Whytehead, Lundenwic: the archaeological evidence for Middle Saxon London, *Antiquity*, **63** (1989), pp. 706-18.

246. R. Hall, York 700-1050, *The Rebirth of Towns in the West*, eds R. Hodges and B. Hobley, pp. 125-32; Rogers, *Fishergate*.

247. See note 29.

248. Evans and Loveluck, *Life and Economy*.

249. See note 32.

250. J. Bayley, *Anglo-Scandinavian Non-ferrous Metalworking from 16-22 Coppergate*, Archaeol. York **17/7** (London, 1992).