

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

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### Part 2

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### Knives

One of the commonest iron objects encountered on Anglo-Saxon sites is the tanged knife. Since knives are so numerous it has been possible to undertake detailed research into their form, dimensions and metallographic structure, and thereby reveal a complex pattern of development.<sup>121</sup> A comparable pattern can, to a great extent, be seen in the large single-edged weapons usually known as scramasaxes or seaxes, although they are not the subject of this paper. It may be noted at this point, however, that it is difficult to arrive at an entirely satisfactory distinction between a knife and a scramasax.<sup>122</sup> For present purposes knives are assumed to have lengths of up to 250mm, although a tanged blade shorter than this could, of course, have been used as a weapon.

The classification of knives is problematic because wear on the blades may have substantially altered their original shape. A useful preliminary grouping of knives may, nonetheless, be made on the basis of the form of the blade back, a feature which was largely unaffected by wear except at the blade tip. In the form which is most common throughout the Anglo-Saxon period the back is straight for about two thirds of its length before becoming convex and curving down to the tip (Fig. 8c-d, g). Common also are blades with backs which are slightly convex for their whole length (Fig. 8e-f). In a third well-known form the blade back is straight and either horizontal or upward sloping before coming to an angle and sloping down to the tip (Fig. 8a-b). The angle through which the back passes between the rear and front parts is usually c.10°-40°. The so-called 'angle-back' blade appears to be scarce in Early Anglo-Saxon contexts, but is common in those of the eighth - tenth centuries, occurring, for example, on c.19% of Anglo-Scandinavian knives from 16-22 Coppergate, York. A few other blade back forms are known, but are much less common than the three just described.

Blade cutting edges, as originally made, were probably slightly convex, straight or straight for most of their length before curving up at the tip. The effect of wear and sharpening was usually to create either a concave or a slight S-shape (e.g. Fig. 8b-g). Wear might also alter the overall shape of the blade reducing its length and causing it to appear to taper markedly towards the tip.

The formal classification of knives may be supplemented by an analysis of their dimensions and the ratios between them. There is insufficient space to discuss this in detail here, but in most respects, including length, length of blade and width of blade, the data exhibit clustering within fairly narrow ranges with a few exceptional specimens with values beyond them. The data for the lengths of seventy-nine unbroken knives from 16-22 Coppergate, for example, show that 63% lie within the range 80-120mm, although a few are considerably longer (Fig. 9a).

It is also worthy of comment that dimensional analysis has revealed a distinctive group of Late Anglo-Saxon knives with tangs longer, in some cases up to three times longer, than their blades (Figs 8e; 9b). No certain examples are known from Middle Anglo-Saxon contexts, but they are common at Thetford, York and other Late Anglo-Saxon sites.<sup>123</sup> It is likely that these knives, often accompanied by relatively narrow blades, represent deliberate product diversification by smiths in the Late Anglo-Saxon period and were, perhaps, intended for specialised use in certain crafts.

As the Anglo-Saxon period progressed, both knives and scramasaxes exhibited an increasing number of blade surface features.<sup>124</sup> They include narrow incised grooves which run along the top of blade faces (Fig. 8a) and notches cut into the blade back (Fig. 8g). On occasions these features were inlaid with non-ferrous metal (Fig. 8b) and herring bone patterns based on twisted wires of different metal types are most common.<sup>125</sup> A few blades have very elaborate inlaid panels using a variety of geometrical motifs. The peak of the inlayer's art is, however, to be seen on tenth century scramasaxes such as that from the Thames at Battersea which bears the runic alphabet and the name of the manufacturer, Biorthelm.<sup>126</sup> While not absent from blades of other forms, it may be noted that grooves and notches, inlaid or otherwise, are most common on angle-back blades.

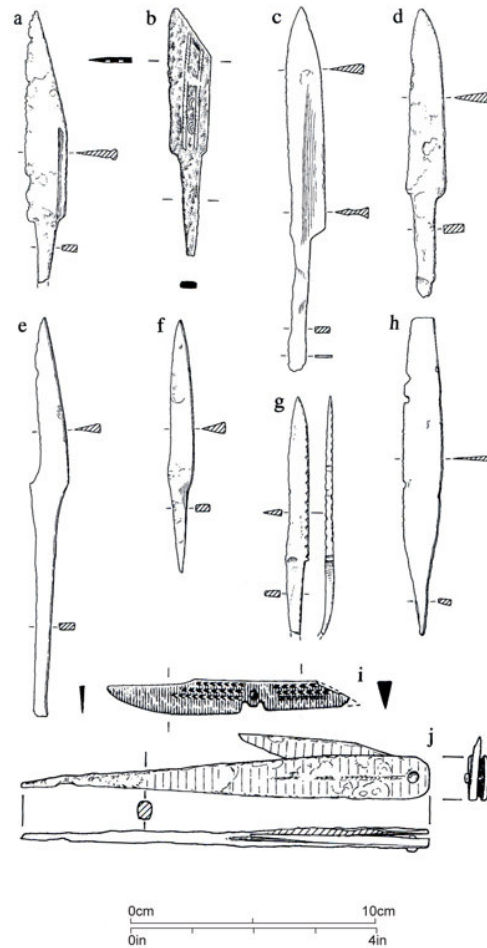
A relatively common Late Anglo-Saxon surface feature, which does not occur on angle-back knives, is the shallow concave channel which usually runs diagonally across the blade faces (Fig. 8c).

These surface features, including a number not discussed here, were probably decorative in intent, but it is possible that they also served as signatures of individual smiths and are therefore comparable to the cutler's marks of the thirteenth - sixteenth centuries.

A substantial body of data on the metallographic structure of Anglo-Saxon knives and scramasaxes is now available, a most important component of which has come from the examination of seventh - eleventh century knives from York.<sup>127</sup> The evidence from both knives and other edged tools shows that in both the Middle and Late Anglo-Saxon periods smiths were very skilled in manufacturing hard steel edges. Quenching and tempering were consistently undertaken to a high standard. Whether the Middle Anglo-Saxon period saw a distinct step up in standards can not, however, be determined since few Early Anglo-Saxon objects have yet been examined.

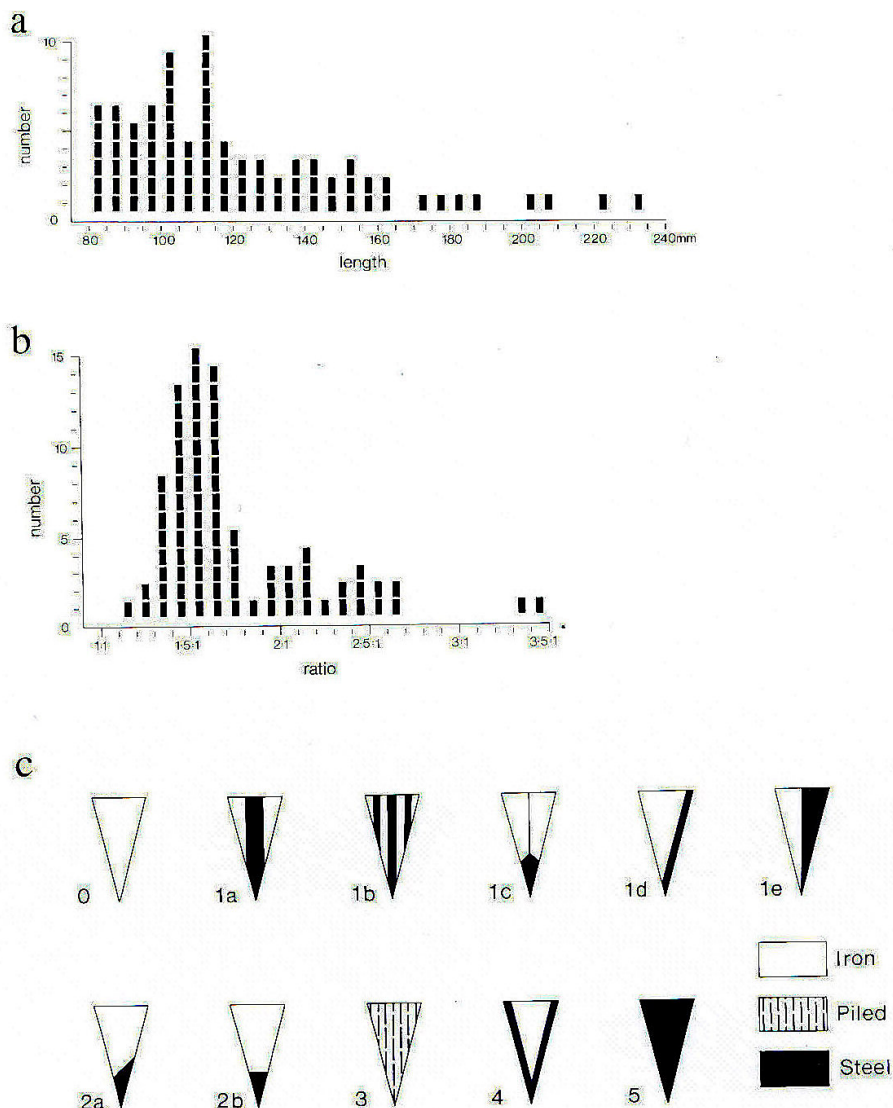
Metallography has also traced a number of developments in blade macrostructure, that is in the way iron and steel were combined to make a blade (Fig. 9c).<sup>128</sup> A few all-iron, all-piled, or all-steel blades are known, but in the vast majority of cases iron and steel were welded together in variants of two basic methods. In the first there was a butt or scarf weld between an iron back and a steel cutting edge (Type 1), and in the second the steel was welded between two iron elements creating a sandwich when seen in cross-section (Type 2). The steel would either pass through the entire width of the blade or only part way. In the eighth - early tenth centuries it appears that knives were almost exclusively manufactured with the butt/scarf weld technique, but by the mid-tenth century variants of the sandwich weld became common and by the eleventh century they had become dominant. Pattern-welding appears for the first time on knives, as opposed to swords and other weapons, in the eighth century.<sup>129</sup> It is usually seen as a band between a ferritic iron back and a steeled cutting edge, and occurs exclusively on angle-back knives.

This brief summary of the development of tanged knives may be concluded by suggesting that the Anglo-Saxon period is characterised by a continual diversification and innovation in respect of form, decoration and metallographic structure which may stand as one of the best examples of processes which characterise Anglo-Saxon blacksmithing as a whole.<sup>130</sup>



**Fig.8** a-g knives (all York except b London); h knife with serrated edge (York); i pivoting knife (Winchester); j folding knife (Thwing)

In addition to the diversification of the tanged knife, the Middle Anglo-Saxon period also saw the emergence of some new types of knife. They include the pivoting knife, consisting of two blades of different lengths which were used alternately <sup>131</sup>; an inlaid example from Winchester <sup>132</sup> is illustrated as Fig. 8i. The blade not in use was housed in a case which, on occasions, was elaborately decorated as can be seen on an example from Canterbury.<sup>133</sup> The function of pivoting knives is not known, although Biddle has argued that they were part of a scribe's equipment.<sup>134</sup> In view of the considerable variation in their sizes, however, with lengths ranging from c.100mm to c.180mm, pivoting knives may have had a number of functions. While the majority come from settlement contexts, it may also be noted that a pair were found in a Middle Anglo-Saxon grave at Harling (Norfolk).<sup>135</sup>

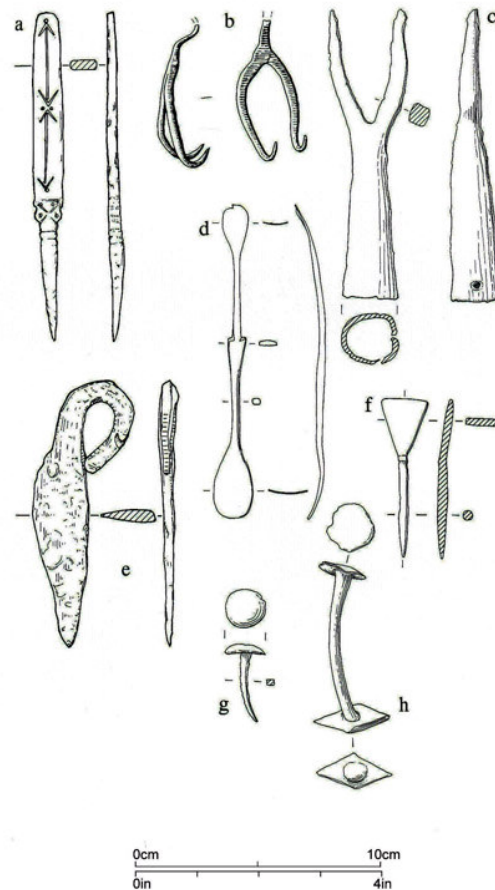


**Fig.9** a-b knives from Anglo-Scandinavian contexts at 16-22 Coppergate, York: histograms showing length (a) and ratio of length to length of blade (b); c schematic knife blade cross-sections showing principal metallographic macrostructure types

Another innovation was the knife blade which folded into an iron case. There is a simple example from the grave of a Viking warrior at Repton,<sup>136</sup> but another form, which probably had a specialist craft use, has a case which develops into a short prong (Fig. 8j).<sup>137</sup> Finally, York has produced a small knife with a serrated cutting edge and straight end which may have been used in bone working (Fig. 8h).<sup>138</sup> This may also have been the function of a small saw from Thetford.<sup>139</sup>

## Other tools and implements

Knives were usually sharpened with a honesstone, but there are a number of curious tanged bars from Early and Middle Anglo-Saxon contexts which may be sharpening steels. A study of their position in pagan graves by Helen Geake of York University shows that these objects are usually found near knives. An example from Thwing has incised lines on the bar and a moulding at the head of the tang (Fig. 10a).<sup>140</sup>



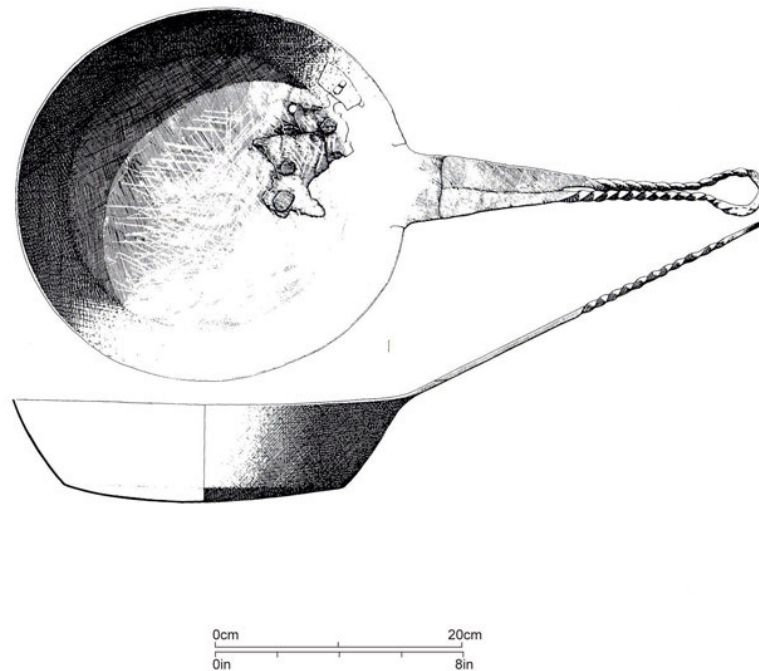
**Fig.10** a steel? (Thwing); b meat hook (Winchester); c socketed fork (York); d spoon (York); e strike-a-light (Thwing); f stylus (York); g tinned nail (York); h clench bolt (York)

Forks were not used by diners in the Anglo-Saxon period, but they had a role in cooking and meat forks (sometimes known as flesh hooks) with characteristic curved-over prong tips come from Thetford and Winchester (Fig. 10b).<sup>141</sup> Socketed forks with straight prong tips come from Thetford and York (Fig. 10c).<sup>142</sup> The iron skewer was probably a common item, but the only certain example from England, measuring 340mm, comes from Flixborough.<sup>143</sup>

Spoons from Anglo-Saxon contexts are uncommon, but York has produced six examples of small, tinned, iron spoons (Fig. 10d).<sup>144</sup> At each end of the stem they have, or had, a flat bowl one of which was slightly larger than the other. These spoons are similar to a

number of contemporary bone and non-ferrous metal spoons.<sup>145</sup> The function of the objects is unknown, although they may have been used for measuring or dispensing such materials as cosmetics and spices.

The flame for both cooking and lighting in Anglo-Saxon England was provided by striking a flint on a strike-a-light, or firesteel, of which there are a number of forms. One of the more common has a plate which tapers to a greater or lesser extent away from a C-shaped terminal by which the object could be suspended from a belt <sup>146</sup> (fig. 10e). Other strike-a-lights have a curved terminal at each end of the plate, the plate itself often assuming a pronounced triangular shape. Examples are known from Early and Middle Anglo-Saxon contexts.<sup>147</sup>



**Fig. 11** Pan (Winchester)

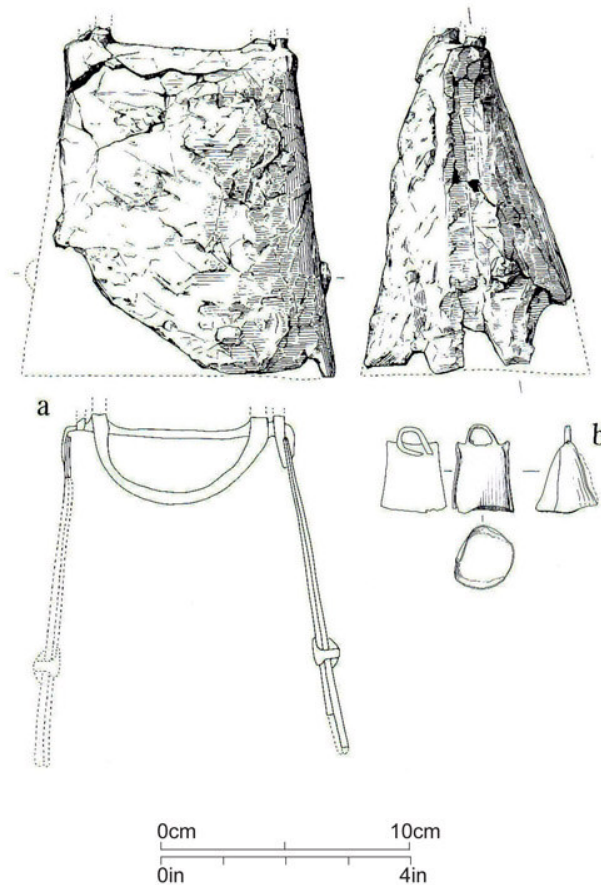
Vessels made of iron, rather than pottery, were, on occasion, used for cooking and large pans which have, or had, a long handle come from Winchester (Fig. 11) and York.<sup>148</sup> These objects illustrate skill in a very important part of the smithing process, namely the working of large pieces of sheet iron without allowing them to split. Iron cauldrons may also have been used in Anglo-Saxon England, but there are no surviving examples. Ladles are occasionally known in pagan graves,<sup>149</sup> but apart from the elongated specimen referred to above <sup>150</sup> none is known from Middle or Late Anglo-Saxon contexts.

Another object to employ sheet iron was the bell of which there are examples from contexts of all Anglo-Saxon periods (Fig. 12).<sup>151</sup> It was usually made from a single piece of iron which was folded in two leaving the seams to be riveted or joined with the copper alloy brazing metal which also covers the body of all known examples. A ring was set in the top of the bell which served both as a handle and for suspension of the clapper. Small iron bells (Fig. 12b) were probably hung around the necks of beasts, but large bells, such as that from Repton (Fig. 12a), were probably used, like a number known from early Christian contexts in Ireland, for summoning the faithful to prayer.

While dealing with types of object which might be found in a monastic environment, it may also be noted that styluses were, on occasions, made of iron as well as non-ferrous



metal. Examples have been found at Barking Abbey and York (Fig. 10f), but of particular interest are a remarkable group of eighteen from Flixborough.<sup>152</sup> Triangular erasers are standard and on, occasions, have decorative non-ferrous plates soldered on to them.

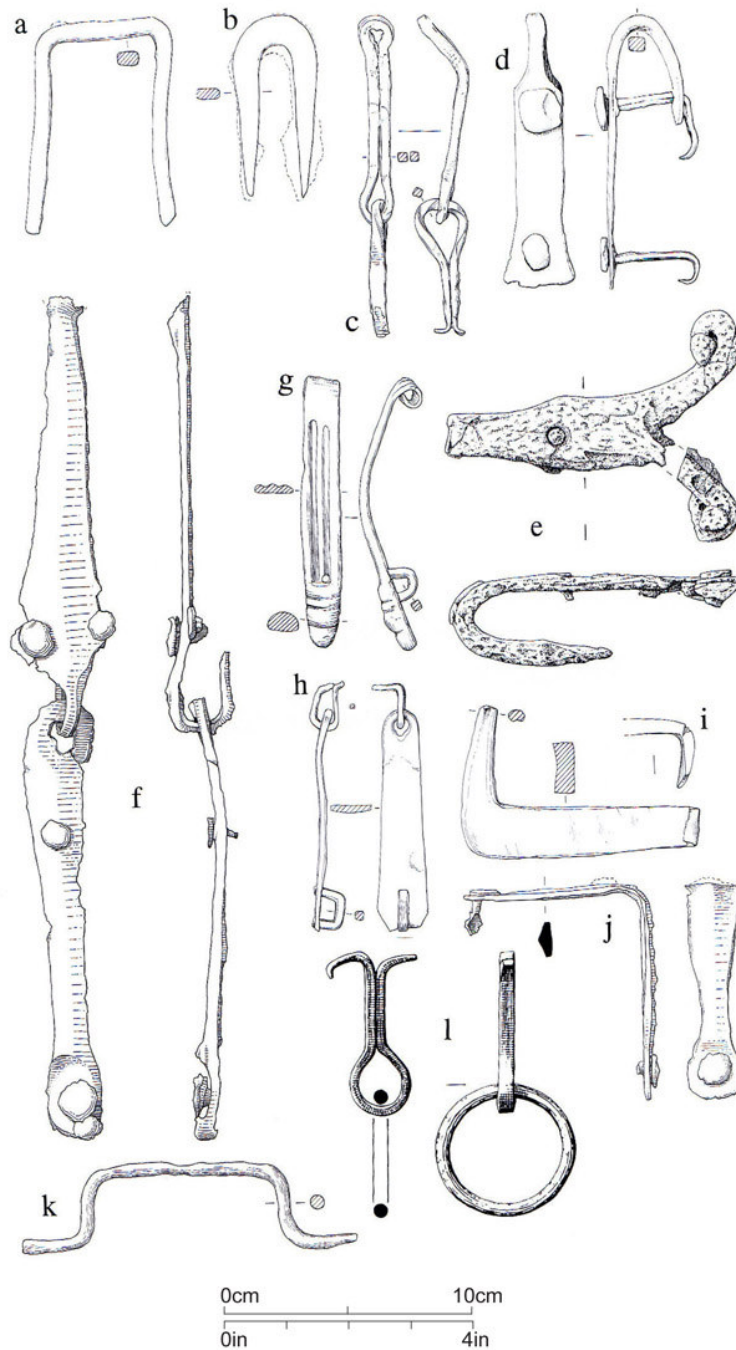


**Fig.12** a-b bells (Repton and York)

### Structural ironwork and fittings

The commonest type of iron object on most Anglo-Saxon site assemblages is the nail; Flixborough produced c.1300 and 16-22 Coppergate, York over 2000.<sup>153</sup> The vast majority of nails of the period have a roughly rounded head and a shank of rectangular cross-section with a wedge-shaped tip. The nails from 16-22 Coppergate exhibit what was probably the usual size range with unbroken lengths varying from 9mm - 145mm, although c.65% have lengths between 30mm and 65mm. Surviving or reconstructed wooden objects from England and elsewhere suggest that nails were used primarily for holding together caskets, chests and other items of furniture, and for securing iron fittings such as corner brackets and hinge straps.

As a result of regular X-radiography of ironwork, tin-plated nails have recently been discovered in some numbers. They are usually relatively small with neatly-made domed heads. (Fig. 10g).<sup>154</sup> These nails would have been used as much for decorative as utilitarian purposes as can be seen on a number of wooden objects from Scandinavia including the sledge and chests from the Oseberg ship and a casket from Fyrkat.<sup>155</sup>



**Fig.13** a rectangular staple (York); b U-shaped staple (York); c looped staple and chain link (York); d-e U-eyed hinge fittings (York and London); f chest hinge (Ripon); g-h stapled hasps (York); i hinge pivot (York); j corner bracket (Ripon); k drop handle (York); l ring handle and looped staple (Winchester)

In addition to nails, timbers were also held together with clench bolts (Fig. 10h).<sup>156</sup> A clench bolt consists of a nail which was passed through the timbers to be joined before a



rove was fitted over the tip; this was then bent over or clenched. The most familiar use of clench bolts is to join the overlapping strakes of 'clinker-built' ships, but evidence from Scandinavia shows that wagon bodies might also be clinker-built.<sup>157</sup> Clench bolts found associated with coffins at Barton-on-Humber may indicate that they were made from re-used ship's timbers.<sup>158</sup> Finally, there is a form of clench bolt with an elongated rove which held the planks of a door to its frame and fine specimens can be seen in the eleventh century north door of the church at Hadstock (Essex).<sup>159</sup>

The third type of object used for holding timbers together or for holding fittings in place was the staple.<sup>160</sup> It occurred in three basic forms: rectangular (Fig. 13a), U-shaped (Fig. 13b) and looped (Fig. 13c, l). The first two occur in a wide range of sizes (lengths c.10mm - 90mm and widths c. 15 - 50mm) which may relate to their function as either building or furniture fittings.<sup>161</sup> The looped staple is always, however, relatively small and was primarily used for holding chains, hinges, hasps or lock bolts in place on items of furniture.

A wide range of other iron fittings used on wooden objects are now known from Anglo-Saxon contexts, but space only permits a summary of the more common types.

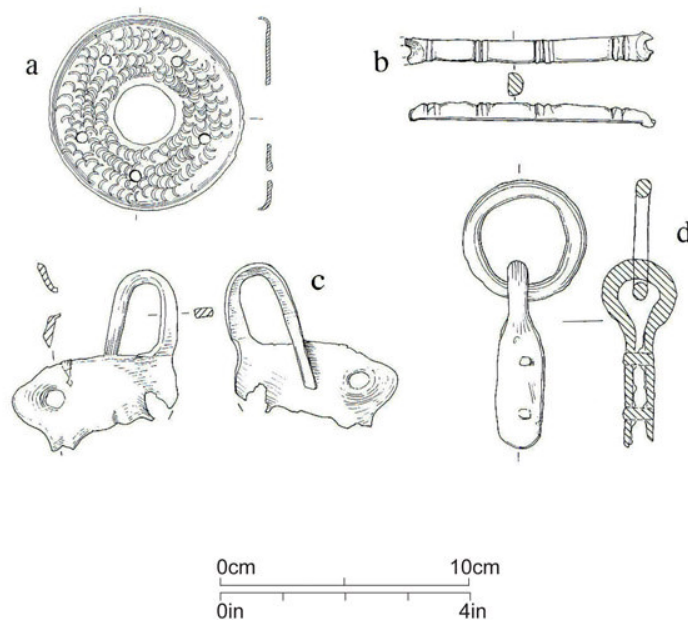
Fittings used primarily for doors or chests may be considered first. Although the evidence is sparse for the Middle Anglo-Saxon period, doors in the late period were often hinged by means of a U-shaped strap (Fig. 13d-e) the eye of which was set over one arm of an L-shaped hinge pivot or pintle (Fig. 13i).<sup>162</sup> On occasions the straps had bifurcated and scrolled terminals as can be seen in contemporary illustrations,<sup>163</sup> on the north door at Hadstock.<sup>164</sup> and on examples from excavations, including an eleventh century pair from London found in situ on a collapsed door (Fig.13e).<sup>165</sup>

Chest hinges usually consisted of two linked straps (Fig. 13f). One was attached to the chest lid and was drawn out at the head into a loop which articulated in the eye at the head of a strap attached to the chest back.<sup>166</sup> A number of strap forms are known as a result of the excavation of a group of eighth - tenth century cemeteries, including those at Dacre, Repton, Ripon (Ailcy Hill), Thwing and York Minster, in which bodies were buried in what had probably been domestic chests.<sup>167</sup> The commonest form has a body which narrows from the head to the base where it is either formed into a rounded terminal, pierced for attachment or a tapering spike which was curved over and hammered into the wood.

These burial chests are also a source of hasps of which there are two functional types. The first can be broken down into two sub-types, one incorporating a loop and the other a slot which fitted over a staple projecting from a chest or door and would have been secured by a padlock <sup>168</sup> or linch pin. The first sub-type is usually figure 8-shaped with an attachment link at one end and often made from a spirally-twisted strip.<sup>169</sup> The second sub-type, also known from the Early Anglo-Saxon period onwards, had an attachment link at one end which was joined - often by a spirally-twisted strip - to a plate with a slot in the centre.<sup>170</sup>

The second type of hasp was used exclusively on chests with mounted locks.<sup>171</sup> The earliest sub-type consisted of a strap which was attached to the chest lid at one end and at the other had a simple eye or loop which passed through a slot in the front of the chest and was then secured by the bolt. An Early Anglo-Saxon example with an eye comes from the Buckland cemetery at Dover <sup>172</sup> while six hasps from Thwing have U-shaped loops.<sup>173</sup> The more sophisticated 'stapled hasp' consists of a strap with an attachment link at the head and a staple on its inner face near the base. Straps were either curved (Fig. 13g), flat (Fig. 13h) or L-shaped according to whether the chest lid was convex or flat. The evidence from England and elsewhere in northern Europe suggests that the stapled hasp is an innovation of the eighth century and early examples occur on burial chests from Ripon and Thwing.<sup>174</sup> York has produced a stapled hasp with animal heads made of copper alloy, which recall specimens from Scandinavia, including those with elaborately-formed non-ferrous heads on chests in the Birka graves.<sup>175</sup>

L-shaped brackets were used to strengthen the corners of chests and other wooden objects (Fig. 13j).<sup>176</sup> Although the majority have arms with straight parallel sides, a variety of



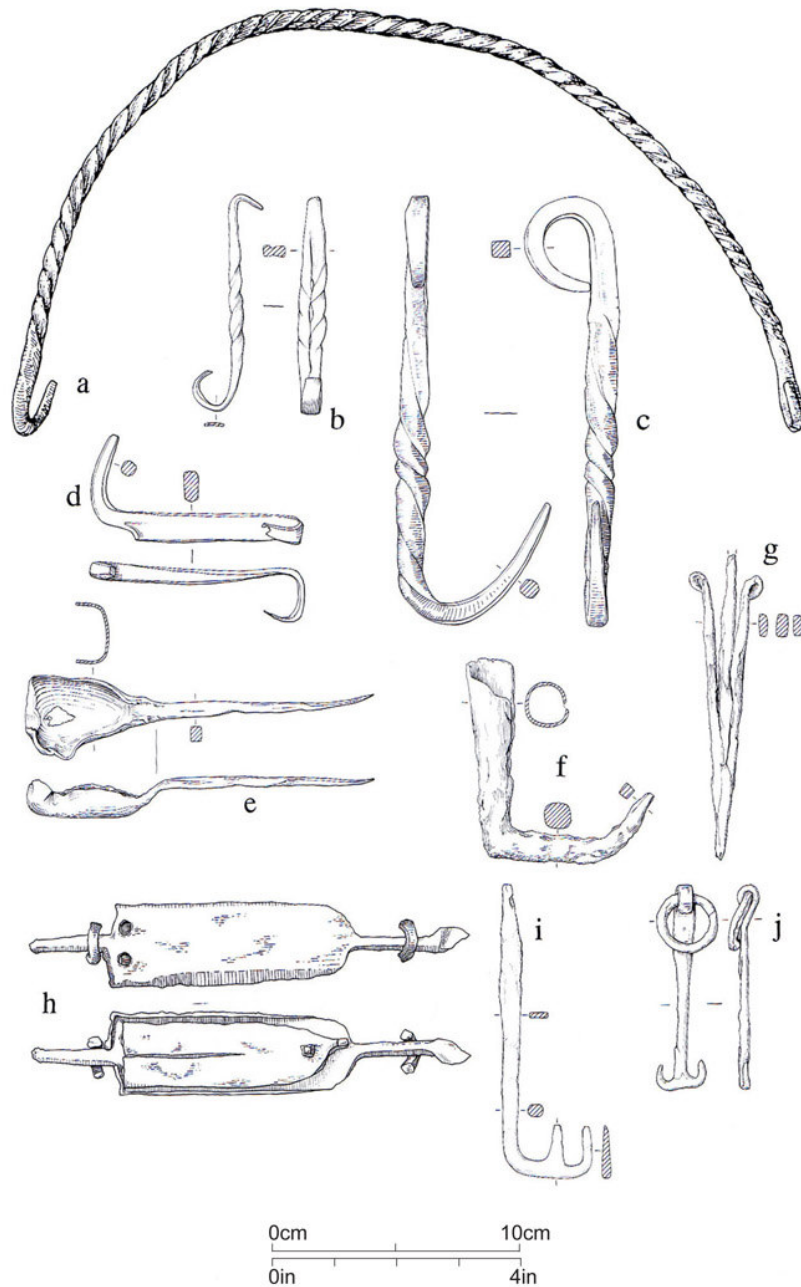
**Fig.14** a disc fitting; b casket fitting; c - d vessel suspension fittings (all York)



**Plate 6** Tinned fittings (top and third from top) and small U-eyed hinges with animal head terminals from 16-22 Coppergate, York (length of longest 130mm)

other forms are known, largely from burial chests. There are, for example, arms which taper and arms formed from spirally twisted strips; many have rounded terminals.

Caskets might have drop handles (Fig. 13k), and both doors and chests might employ ring handles (Fig. 13l); in both cases they were usually held in place by looped staples.<sup>177</sup> Large chests may have had a number of ring handles to allow them to be moved with poles.



**Fig.15** a vessel handle (Portchester Castle); b-c pot hooks (York); d wall hook (York); e lamp (York); f candleholder (York); g pricket (York); h lock bolt with springs (Ripon); i - j keys (York)

Caskets also employed smaller versions of the other chest fittings described above, but they were often decorated with simple relief work and non-ferrous plating. In addition, there is a range of small decorative fittings, usually existing as narrow strips pierced for attachment, which were not primarily utilitarian in function (Fig. 14b). More unusual objects

from Anglo-Scandinavian contexts at York are a pair of disc fittings (Fig. 14a),<sup>178</sup> and two fittings and two small U-eyed hinges which have stylised animal head terminals (Plate 6).<sup>179</sup> One hinge has leather adhering to it suggesting it may have come from a book cover.

Wooden vessels, like doors and chests, required specialised iron fittings. In addition to simple binding straps, they include handle suspension fittings which exist either as a flat plate drawn out into a loop at the top (Fig. 14c) or as a pair of straps either side of a U-shaped eye, sometimes linked to the handle by a ring (Fig. 14d).<sup>180</sup> Vessel handles are usually curved, often spirally twisted, and have looped terminals (Fig. 15a).<sup>181</sup>

Buckets, like cauldrons, might be suspended on substantial chains whilst smaller chains were used for a variety of purposes. Chain links were usually circular, oval or figure 8-shaped (Fig. 13c), but there are examples, including those on cauldron chains from Butley (Suffolk), Flixborough and Sutton Hoo, of more elaborate forms, often made from spirally twisted strips.<sup>182</sup> The vessel at the end of the chain would have been suspended from a hook, 'pot hook', of which a number of forms are known usually based on an elongated S-shape (Fig. 15b-c).<sup>183</sup> The more elaborate chains and hooks which both used a substantial quantity of iron and would have involved considerable time and skill in manufacture may be considered among the most prestigious items made by the Anglo-Saxon smith. Other hooks include those, often referred to as 'wall hooks', of a simple L-shape with tapering tangs which were set into timber (Fig. 15d).<sup>184</sup>

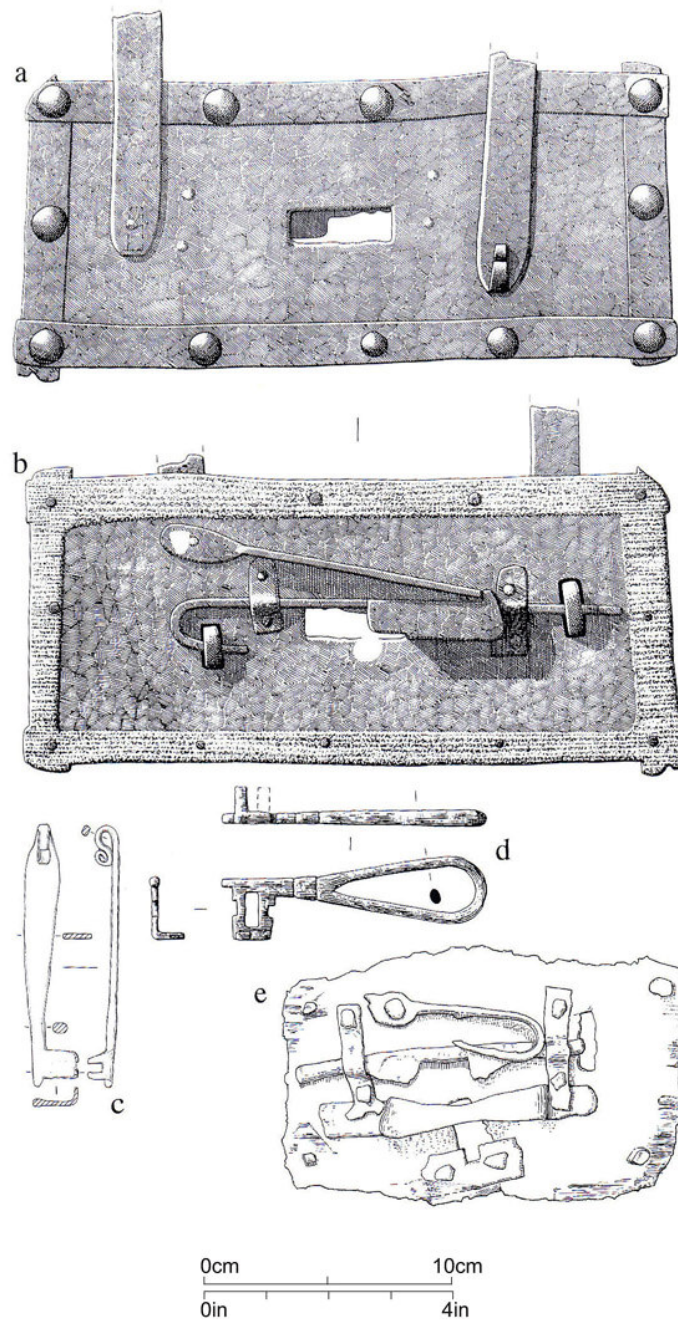
Lighting in Anglo-Saxon times was provided in part by lamps and, although they were usually made of pottery, on occasions, iron was used. The bowl-lamps on tripod stands from Sutton Hoo and Broomfield (Essex) are seventh century, but York has produced a simple tanged lamp of tenth century date which would have been set in a timber support (Fig. 15e).<sup>185</sup> Tanged iron candleholders are also known, the candle being either held in a socket (Fig. 15f) or impaled on a central spike; the latter is usually known as a pricket (Fig. 15g).<sup>186</sup>

## Locks and keys

In view of the intricacy of their moving parts, locks occupy a prominent position among the more technically advanced objects produced by the Anglo-Saxon blacksmith. They may be divided into two groups: mounted locks and padlocks.

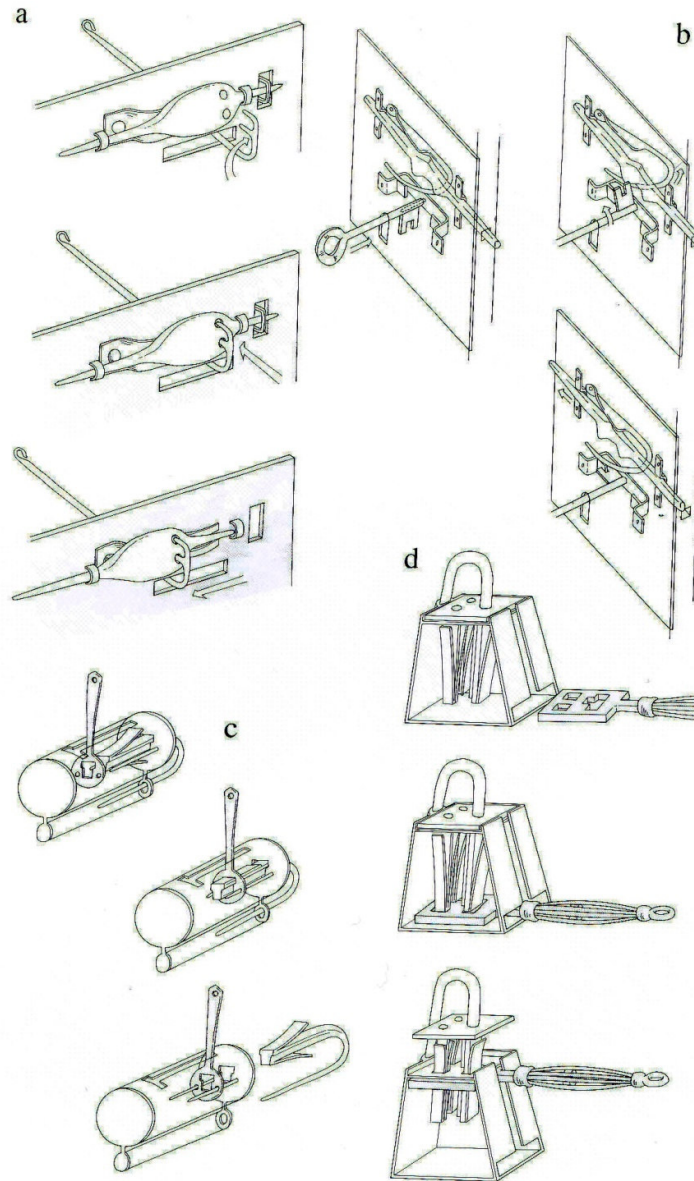
Mounted locks existed in two forms. The first occurred exclusively on chests and caskets. It had a sliding bolt which, when closed, was held in place by springs (Figs 15h; 17a). The bolt has an arm either side of a flat plate the faces of which lay in either the vertical or horizontal plane, and the springs would catch on a ridge on the inner or lower face respectively. In the former case the springs were released by a key with an L-shaped (Fig. 15i) or T-shaped bit (Fig. 15j), the latter requiring a slot in the centre of the bolt. Once the springs were released, the bolt could be moved back to release the hasp. A bolt from Lakenheath (Suffolk) suggests that this type of lock may be Roman in origin,<sup>187</sup> but otherwise its first appearance is on caskets in pagan graves of the sixth - seventh centuries. Numerous examples have also been found on the Middle Anglo-Saxon burial chests from Ripon and Thwing.<sup>188</sup>

The only example from England of a bolt with the faces of the central plate set in the horizontal plane comes from a lock found on a ninth century burial chest from The Old Minster cemetery in Winchester (Fig. 16a-b).<sup>189</sup> Suitable keys for these locks, which occur in copper alloy as well as iron, have short teeth which project at 90° from the base of the bit and often have a distinctive pear-shaped bow (Fig. 16d), although others have a stem which widens to a looped terminal (Fig. 16c).<sup>190</sup> There is no evidence to suggest that the mounted lock with bolts held by springs remained current much beyond the end of the ninth century.



**Fig.16** a-b lock with bolt governed by springs (Winchester); c - d keys (Winchester and York); e lock with bolt governed by tumbler (Ripon)

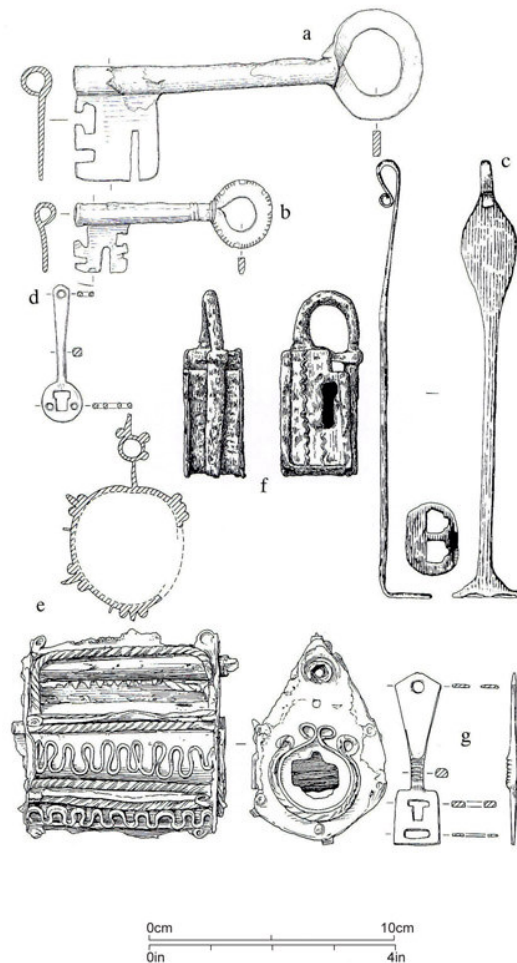




**Fig.17** Reconstructed locks: a with bolt governed by springs; b with bolt governed by tumbler; c barrel padlock; d box padlock after P. Ottaway, *Anglo-Scandinavian Ironwork from 16-22 Coppergate*, Archaeology of York 17/6 (1992)

The second type of mounted lock had a bolt held in place, when closed, by a tumbler (Figs 16e; 17b). The key usually had a hollow stem (Fig. 18a-b) which fitted over a spindle projecting from the back of the lock. The key moved the bolt by engaging on the short projections from its base. The earliest locks employing tumblers and bolts of the form described above are probably late seventh or eighth century and complete examples with an iron lock plate, pierced to admit the key and the hasp, and a bar at the back of the lock bearing the spindle come from burial chests at Pontefract and Ripon.<sup>191</sup>





**Fig.18** a-b keys; c-d padlock keys; e barrel padlock; f box padlock; g box padlock key (All York except c Winchester)

Hollow stem keys are numerous in contexts of the eighth century onwards.<sup>192</sup> They are very standardised in form being made from a single piece of iron with a rounded or oval bow, flat in cross-section, the tip of which was tucked into the top of the stem. Relief work and plating usually occur on the smaller keys which, in addition, often have complex bit designs (Fig. 18b); these keys were probably used for casket locks.<sup>193</sup>

Depending on the form of the case, padlocks may be divided into barrel padlocks which have cylindrical cases and box padlocks, cuboid cases, but the operating principle was usually the same for both. A removable bolt was secured by springs resting against the inside of the case and was released on compression by the key. The earliest Anglo-Saxon barrel padlocks had a key hole at the opposite end of the case to the bolt hole (Fig. 18e). Padlocks of this form are known in pagan graves and are found in contexts dated up to and beyond the Norman Conquest.<sup>194</sup> The keys have a bit set at an angle to the stem which usually widens towards the head where there is a looped terminal (Fig. 18c).<sup>195</sup>

Evidence from elsewhere in Europe suggests that in the eighth or ninth century a new form of barrel padlock appeared which had a T-shaped key hole in the body of the case

(Fig. 17c).<sup>196</sup> The bolt was released with a key which had its bit in line with the stem (Fig. 18d).

The box padlock is probably a contemporary innovation and there are two forms. In one the lock has the T-shaped slot in one face (Fig. 17d) and the bolt is released by a key with a rectangular bit (Fig. 18g).<sup>197</sup> In the other form the bolt (Fig. 18f) was released by keys which were rotated in the lock and had bits with projecting teeth similar to those for the mounted locks with springs as shown in Fig. 16c-d.<sup>198</sup>

Padlock cases of all forms were usually both strengthened and decorated with applied strips. They were attached with copper alloy brazing metal which covered the entire object and had both a decorative and anti-corrosion function. In many cases padlock keys, especially those for box padlocks, were also decorated with relief work and plating.