

# Economic Aspects of Anglo-Danish York

By the late JEFFREY RADLEY

*Investigator, Royal Commission on Historical Monuments (England)*

*IN 1959 Mr. Dudley Waterman published the first modern summary of Anglo-Danish artifacts found in York<sup>1</sup> and it says much for his work that very little needs adding or modifying. This paper examines some aspects of Danish York which were not discussed by Waterman and records information which throws more light on the nature of everyday life in the Anglo-Danish city. This has been made possible by the considerable advance in knowledge on a national scale of 10th- and 11th-century pottery, and by recent developments in York. Intensive study of the history, architecture and archaeology of York by investigators of the Royal Commission on Historical Monuments has developed the first tentative ideas of the nature of the city defences, and of the street plan, and has thus led to greater knowledge of its economic life.<sup>2</sup>*

## THE DANISH TOWN

**T**HERE are two aspects of the Danish town at York which merit separate attention, namely its defences and its urban development.<sup>3</sup> The defences of the Roman fortress are now known to have survived sufficiently to permit the city to withstand attacks and sieges at the beginning of the 9th century. Although breached in several places, much of the fortress wall stood more than 10 ft. high. Excavations by S. N. Miller in 1925 revealed in his section C-D (FIG. 6) as many as three phases of defensive earthworks covering the Roman defences and preceding the 13th-century stone wall which can still be seen today.<sup>4</sup> Miller did not identify the builders of these three ramparts, and not until 1969 was there a little evidence to suggest that the first rampart, which barely covered the Roman wall, was the Danish defence which must date a little before 900 A.D.<sup>5</sup> This Danish

<sup>1</sup> D. M. Waterman, 'Late Saxon, Viking and early medieval finds from York', *Archaeologia*, xcvi (1959), 59-105. Virtually all the material he described is deposited in the Yorkshire Museum.

<sup>2</sup> The newly-excavated material which I discuss comes partly from my investigation of trenches for drains, gas pipes, and road improvements, and partly from watching the rebuilding of the strong rooms in the York branches of Lloyds and Barclays Banks. For permission to work on these last two sites, I am indebted to Lloyds Bank Ltd. and Barclays Bank Ltd., and to the contractors, William Birch & Sons Ltd.

I would like to thank in particular Mr. H. G. Ramm, Dr. E. A. Gee and Mr. J. H. Harvey for their unstinted advice, and for permitting me to see their manuscripts in advance of publication. The term Anglo-Danish is used for the period from the Viking conquest in 876 to the Norman conquest, but obviously the archaeological remains continue at least into the 12th century.

[This paper was very kindly prepared for press by Dr. R. M. Butler, a colleague of the late Jeffrey Radley in the York office of the R.C.H.M. (England). Ed.]

<sup>3</sup> The Royal Commission on Historical Monuments will soon publish a detailed survey of the evolution of the defences of the city, and a manuscript on the evolution of the city centre by H. G. Ramm has been consulted. The specific aspect of the development of the economic centre of Danish York described in this paper is in no way intended to transgress the copyright of the Commission or to anticipate Mr. Ramm's conclusions.

<sup>4</sup> S. N. Miller, *J. Rom. Studies*, xv (1925), 176-8, pl. xxvi.

<sup>5</sup> In 1969 I excavated what is probably a 7th-century defensive tower in the city rampart at the rear of the Public Library. The excavation also established the relationship of the various ramparts to this tower. A full report will appear elsewhere.

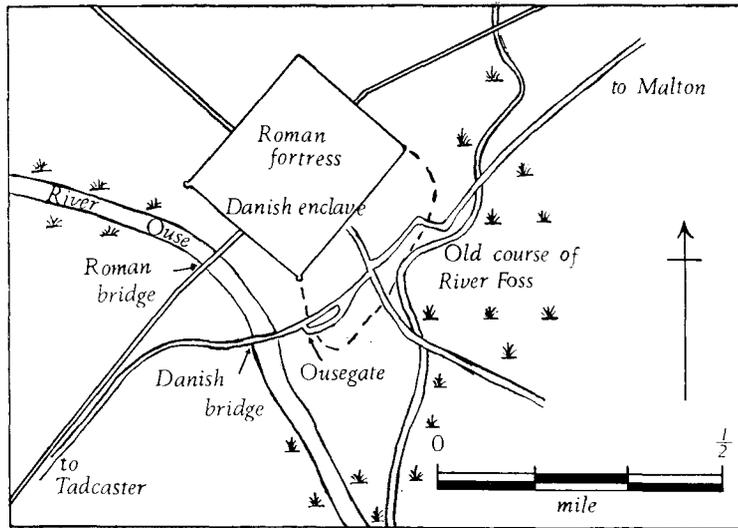


FIG. 5  
 SKETCH-PLAN OF ANGLO-DANISH YORK  
 showing the position of the main Danish thoroughfare focused on Ousegate (p. 39)

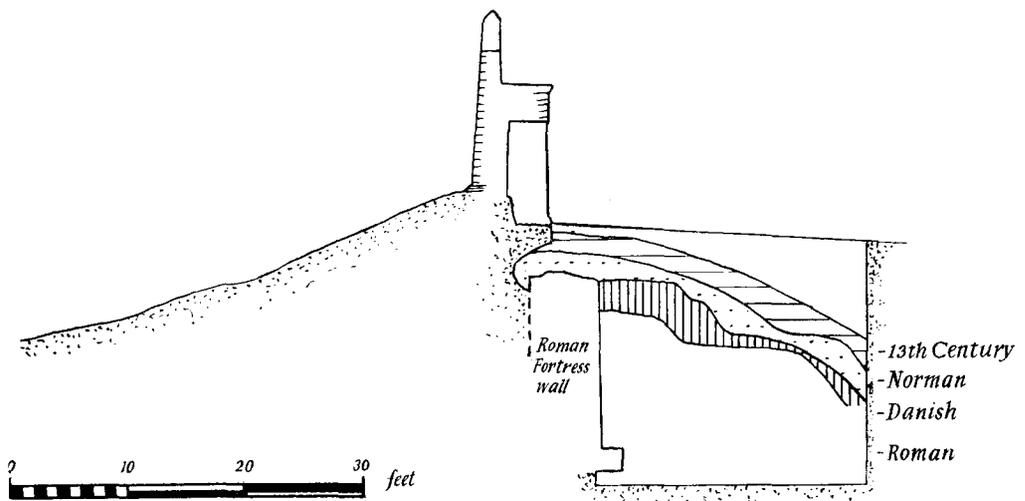


FIG. 6  
 THE ROMAN FORTRESS AT YORK  
 Section C-D through the rampart near the E. angle-tower (p. 37)  
 After S. N. Miller, 1925

bank, with a palisade on its top, is known by excavation to have existed on the NW. and NE. sides of the Roman fortress, but not on the other two sides.<sup>6</sup> It is probable that the Danish bank extended from the River Foss to the River Ouse, encompassing the Roman fortress and the area between it and the rivers. Miss Richardson has shown that a timber- and brushwood-revetted embankment bordered the Foss,<sup>7</sup> and it is here that the anchorage for Danish commercial shipping is likely to have been, rather than at any place on the main River Ouse (FIG. 5). The defensive rampart and open river fronts, similar to the arrangements at Hedeby and Birka, make sense when we remember that the Roman civil settlement on the SW. side of the Ouse was probably defended in Roman times and almost certainly defended in Danish times, creating twin settlements, linked probably by a bridge.

York's connexion with the outside Viking world was by water and the centre of economic life was drawn to the area outside the Roman fortress on the south-east. It may be that the growth of ecclesiastical power, in what by 1066 had become the Minster and Liberty of St. Peter, and other clerical and monastic organizations, precluded commercial development on a large scale within the confines of the old fortress. Associated with this is the change in the bridging point of the River Ouse. After the Roman period the first bridge over the Ouse fell into disuse, and, perhaps after a considerable lapse of time, was replaced in the energetic commercial climate of Danish York at more or less the present position of Ouse Bridge. The main road from the W. along the glacial moraine formerly ran straight into the Roman fortress, but during the early medieval period the main road was diverted inside Micklegate Bar south-east, to the new bridge (FIG. 5). This move may suggest that the area of the former *colonia* was not so densely populated as to impede this change. The bridge carrying the main road into the Danish central business area passes into Ousegate, and then into Pavement. This Micklegate-Ousegate-Pavement axis, with its numerous pre-conquest churches, was the main commercial thoroughfare in Danish times, and even in later medieval times there were markets on Ouse Bridge and Pavement; All Saints', Pavement, was the chief burial-place for the city's mayors, and near by the Merchant Adventurers built their hall. Probably the focus of the town's commercial activity was a small open area or green at the junction of Pavement, Ousegate and Coppergate, and perhaps including the site of All Saints', Pavement. Here was the market. Before the 14th century the name for Pavement was 'Marketshire'.

### THE DANISH OCCUPATION-LAYERS

For the Anglian period, 400-850 A.D., no useful domestic site—a floor, a structure, or a refuse layer—has yet been found. In Davygate, for example, L. P. Wenham encountered no more than an arrangement of reused Roman stones,

<sup>6</sup> H. G. Ramm has suggested in unpublished notes that a post-Roman deposit covering part of the fortress wall in Coney Street might be the vestiges of a Danish rampart. Since three other excavations down the outer face of the fortress wall have failed to locate any upcast bank on this SW. side, it is unlikely that the post-Roman deposit is Danish.

<sup>7</sup> K. M. Richardson, 'Excavations in Hungate, York', *Archaeol. J.*, cxvi (1959), 51-114.

which may have been part of a building.<sup>8</sup> At King's Square and the S. corner of the Roman fortress I. M. Stead found unhelpful layers of earth, manure, and clay daub.<sup>9</sup> With the advent of the Danes there is an apparent change. Where datable artifacts have been found they have been associated with the elaborate use of wood, either as timber or brushwood, for building platforms and fences, and for lining refuse-pits. Hurdling as a technique appears to have been introduced on a large scale at this time. The low-lying ground facilitates the survival of wood and other perishable materials in the waterlogged soil, particularly in the Ousegate-Pavement area. The types of trees can be identified from their bark, which is so fresh that the waterlogged conditions must have existed throughout subsequent periods, and the absence of remains in Anglian levels is all the more remarkable.<sup>10</sup> Major rafts and piles were made from oak or birch trees; lesser fencing and brushwood flooring used alder, beech, hazel and birch branches.

The city of York has risen on its refuse-deposits, a feature which has helped to keep much of the city above flood levels in later medieval and modern times. In the Ousegate-Pavement area the Danish layers are usually some 10–15 ft. below present street level, but may lie as much as 18 ft. deep.

### BUILDING REMAINS

It would appear that there were two methods of preparing house-foundations and two methods of making floors. A timber-framed house could be built either on oak piles or on a stone-filled sleeper-trench. The floor could be either a timber raft or a sandy, stony level finished with mortar. It is likely that the merchants' houses were those with the mortar floors, and that the brushwood-strewn rafts were associated with industrial premises.

At Lloyds Bank (FIG. 7, no. 8) the excavation took place in the basement adjacent to the S. side of Pavement. Here the Danish occupation was 10–12 ft. below street level, at 30–32 ft. O.D. This level has clearly been at or near the water-table ever since the Danish period, for all the wood preserves its texture and colour. The main floor was a raft or platform of birch trunks, 3–8 in. thick, laid horizontally and parallel to Pavement. Over 240 sq. ft. of raft was examined, but no building-line fronting the street was found; only a line of wall at right angles to the street and close to the present property-line was partially extant. This was represented by several upright stumps, 4½–7 in. thick, set in the raft. The tops of the stumps were charred and indicate the fate of this building. To the E. of the line of wall was part of a cobbled track, 6 in. thick.

On the raft there was a deposit, up to 18 in. thick, of black, smelly, slimy silt seamed with layers of brushwood and containing fragments of leather. Two layers of grey clay 1–2 in. thick may represent flood deposits. Beneath this slime

<sup>8</sup> L. P. Wenham, 'Excavations and discoveries within the legionary fortress in Davygate, York, 1955–8', *Yorks. Archaeol. J.*, XL (1962), 531–3, 540–1, 547.

<sup>9</sup> I. M. Stead, 'An excavation at King's Square, York', *Yorks. Archaeol. J.*, XLII (1968), 151–64.

<sup>10</sup> The survival of timber strapping and piles from Roman levels shows that Anglian timberwork should survive. It may be that, when more sophisticated techniques of identification are developed, some of the lower Danish deposits may prove to be Anglian. For evidence of post-Roman flooding in York see H. G. Ramm in R. M. Butler (ed.), *Soldier and Civilian in Roman Yorkshire* (Leicester, 1971), pp. 179–99.

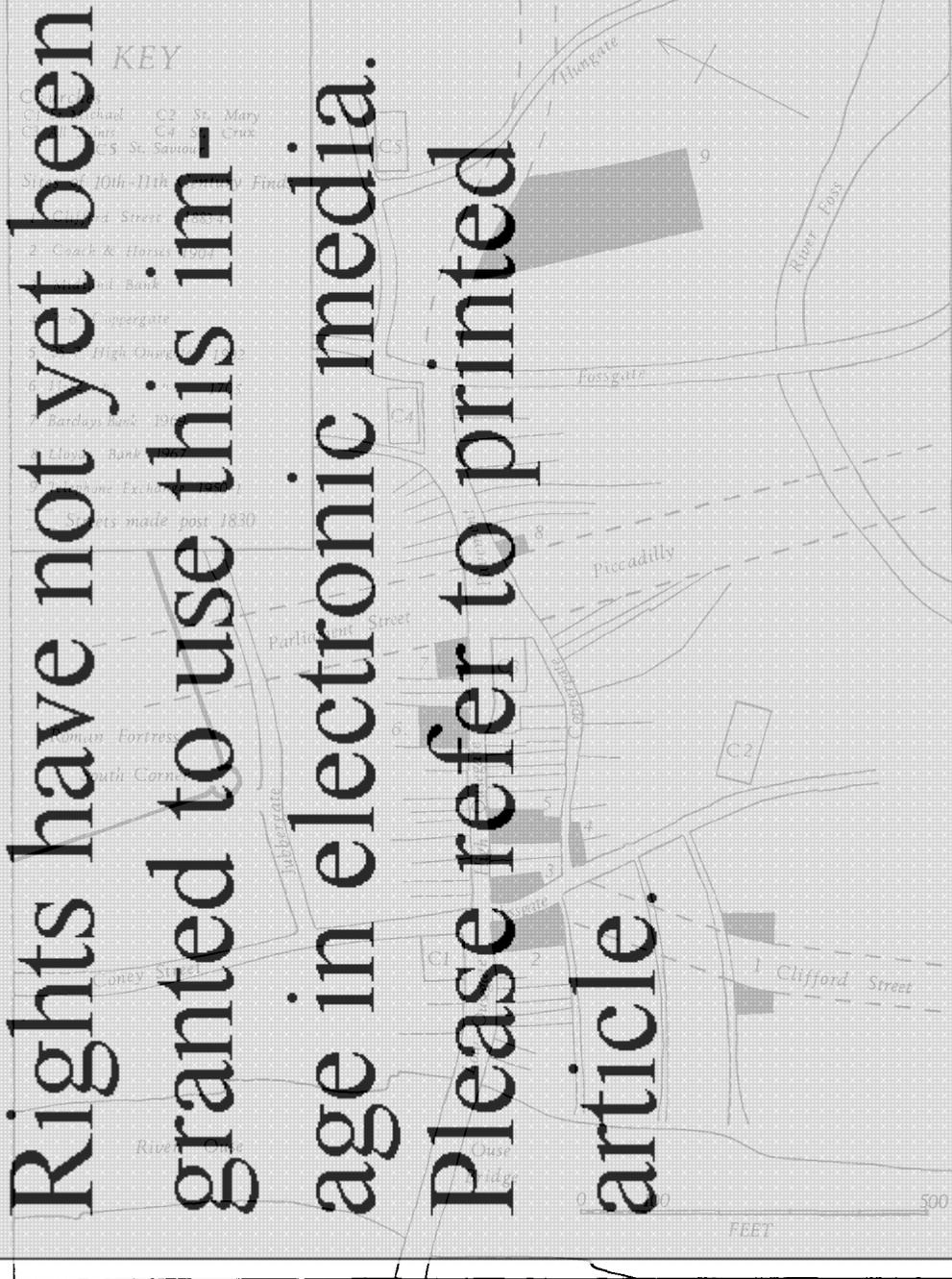


FIG. 7

ANGLO-DANISH YORK

Map of the Ousegate and Pavement area showing excavated sites which have yielded remains belonging to the 10th and 11th centuries (pp. 40, 42f., 45)

*Based on the O.S. map with the sanction of the Controller of H.M. Stationery Office. Crown copyright reserved*

the tops of birch stakes had been driven between the timbers of the raft to stabilize or bind the raft and the periodically-renewed brushwood floors. In 1916, in digging below near-by premises, three tree trunks, about 6 ft. long, were found embedded vertically in the clay, one of which was forked at the top.<sup>11</sup> These were presumably piles and appear to have been related to this Danish level. Behind these premises, on Piccadilly, rough piles were discovered at a depth of 10 ft. in 1941.<sup>12</sup>

The 1969 excavations in Barclays Bank (FIG. 7, no. 7) were only 200 ft. away from Lloyds Bank on the N. side of Ousegate. Normally commercial excavations in York expose only small areas of the Danish occupation-levels, but at Barclays Bank an area of some 2,000 sq. ft. was exposed. Parts of two building-plots were uncovered, both aligned on the present property-boundaries (FIG. 8).

The most important feature revealed was the sill-beam for a timber-framed house—the oldest yet found in York, excluding the Roman barrack blocks—at 14 ft. below High Ousegate, and at 36 ft. O.D. The oak beam was 1 ft. 2 in. wide and 2½ in. thick, resting on a trench filled with cobbles and pottery. The building was traced for 17 ft. and a length of about 5 ft. of an end wall was found. A doorway 9 ft. from the end wall is indicated by a gap in the sill-beam, 4 ft. 2 in. wide, with sawn, squared edges. The foundation-trench continued under the hard compact floor, which still preserved the traces of wood shavings. No evidence of uprights was found. Beside the door a 6-in.-high board, 1¼ in. thick, with adze and saw marks on it, was in position, held by the edge of a clay backing which thinned out into a floor-level above the original floor (FIG. 9). Behind the building the line of its long side was continued by a stake-and-wattle fence. On its W. side was a shallow ditch and, on its E. side, part of the back yard was excavated, revealing layers of birch twigs and domestic rubbish which included sherds, part of a wooden bowl, oyster-shells, hazel nuts, and meat-bones.

Only a fragment of the plan of the second building was recovered. A sill-beam, at 37 ft. O.D., was traced for 14 ft. and four floor-levels of clay or mortar separated by dark rubbish were recovered (FIG. 9). Between two of these floor-levels a circular sandstone grindstone was discovered, 15 in. in diameter and 4 in. thick, with a central shaft-hole, 3½ in. across. Both these buildings rested on accumulations of foul black debris which yielded no diagnostic remains.

These excavations suggest that industrial quarters, when they were established on wet ground, used the simple raft technique, the raft being stabilized and underpinned by oak or birch piles and the structural uprights set into the raft. The more sophisticated type of timber-framed building found under Barclays Bank was also found by Stead at King's Square.<sup>13</sup> Here there was a rectangular corner of a building, constructed with a row of posts, 5–7 in. square, set in a stony foundation-trench 18 in. wide and 2 ft. deep. This building, with its posts standing up to 5 ft. 10 in. high, still had clapboards in place. The associated floor was 9½ ft. below street level and at 31–35 ft. O.D. Artifacts showed that this building belonged to the 10th to 11th century.

<sup>11</sup> G. Benson, *Later Medieval York from 1100 to 1603* (York, 1919), p. 162.

<sup>12</sup> *Yorks. Archaeol. J.*, xxxv (1943), 424.

<sup>13</sup> I. M. Stead, *loc. cit.* in note 9.

Elsewhere in York piling associated with spreads of brushwood or tree trunks has been found in contexts which suggest a late medieval date, but one or two sites have sufficient evidence for a Danish date. In 1705 Thoresby gave the following description of an excavation beneath a house on High Ousegate (FIG. 7, no. 6), which was one of thirty destroyed by fire in 1696, and lay immediately W. of Barclays Bank:<sup>14</sup>

‘ . . . they discovered at a considerable depth the foundations of an older fabric very probably unknown to the builders of the later house. These lower foundations were very well supported at several angles with good oak piles, some of which were still sound; beside these piles there were several large timber trees that lay athwart to make the stronger foundation. Between the head of two piles in this lower foundation the workmen found a small decayed oaken box, in which had been hoarded 200 or 250 Norman coins . . . The coins were almost entirely William I.’

This house on pile-supported foundations is probably to be dated before the Norman conquest or else belongs to the very beginning of William I’s reign, with the coin-hoard buried perhaps at the Harrying of the North in 1089.

Stone was probably rarely used for building before the Norman conquest and it is probable that the Minster and a few churches were the only stone buildings of any consequence in the town. However, some stone was in use in the Danish period, for both the bank sites yielded many fresh chippings of oolitic limestone, showing that this stone was then being imported from the Howardian Hills. The first reference to a stone building in the Ousegate area is in 1150–61, when a deed mentions Alan’s stone house.<sup>15</sup> Part of a stone house of c. 1170–80 can still be seen behind nos. 48–50 Stonegate.<sup>16</sup>

Finally, the only reasonable complete Danish industrial building so far discovered in York must be mentioned. This covered the tan-pits which were discovered 7–8 ft. deep under no. 27 High Ousegate in 1902 (FIG. 7, no. 5).<sup>17</sup> This building stood with its gable on High Ousegate and was timber-framed and supported on piles. The published account of the excavation leaves much to be desired, but the plan and section accompanying the report show that the sill-beam was intact for most of the ground plan. The tannery (FIG. 10) was 90 ft. long and 17 ft. wide, but there appears to have been a gallery or aisle, 3½ ft. wide, on either side, so that the complete building may have been similar to an aisled barn. Several cross-beams divided the building into rooms and each beam appears to have been rebated to take upright boards which survived in some places up to 3 ft. high. These cross-walls appeared to pass over the tan-pits, which may mean that they were part of a system of racks for drying and hanging the skins in the tannery. The symmetrical relationship of the tan-pits to the sill-beams leaves no doubt that they are part of one entity. A fragment of another building of similar construction was also discovered on the E. side of the tan-pits.

The arrangement of the Danish structural remains along Ousegate suggests

<sup>14</sup> R. Thoresby, *Phil. Trans. Ryl. Soc.*, xxiv (for 1705), no. 303, 2, 127.

<sup>15</sup> W. Farrer, *Early Yorks. Charters*, 1 (1914), 185.

<sup>16</sup> J. S. Syme in *Ann. Rep. Yorks. Archit. and York Archaeol. Soc.* (1951–2), p. 36.

<sup>17</sup> G. Benson, ‘Excavations at 25–7 High Ousegate’, *Ann. Report, Yorkshire Philos. Soc.* (1903), p. 64.

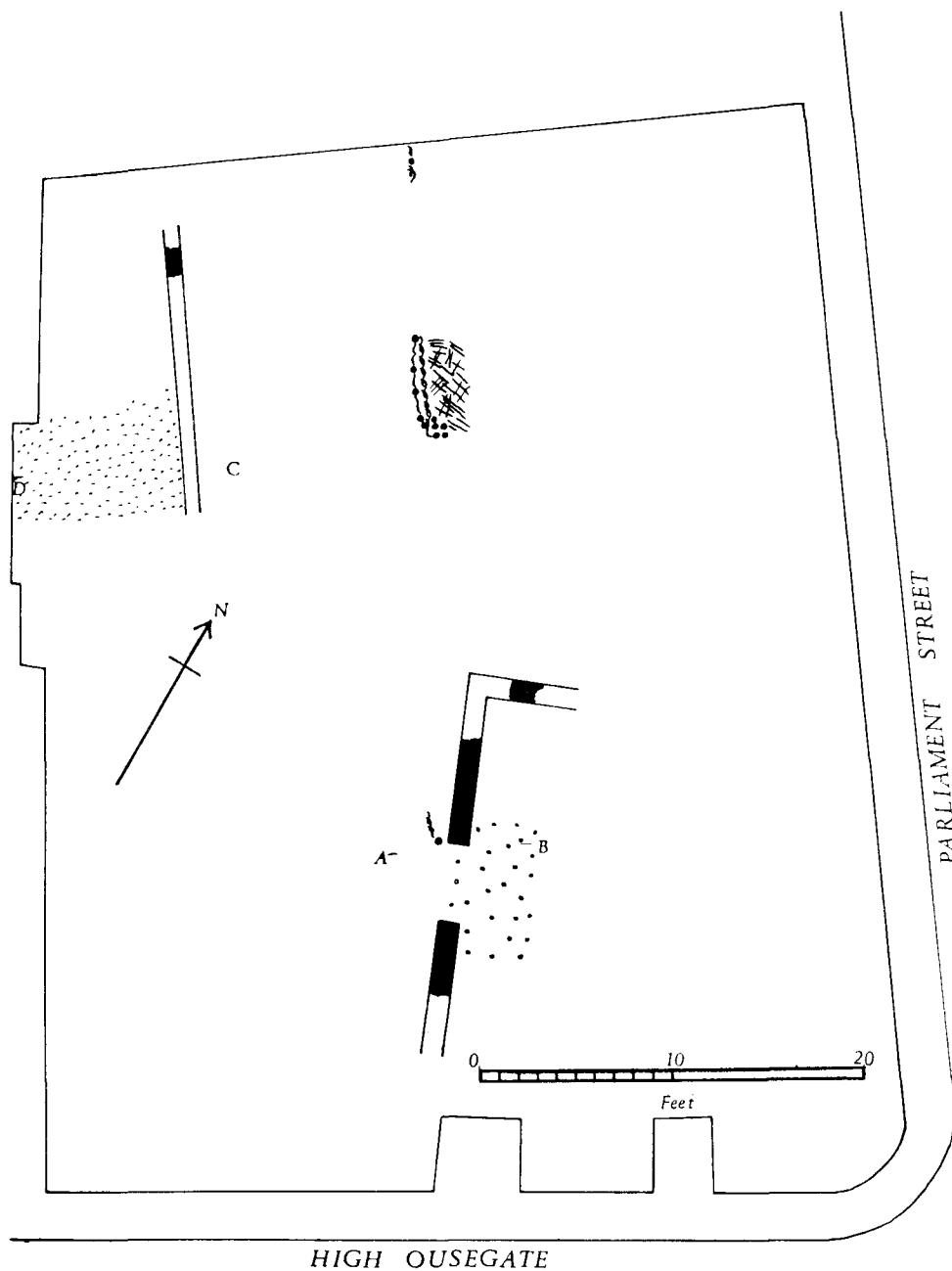


FIG. 8  
BARCLAYS BANK SITE, HIGH OUSEGATE, YORK  
Remains of buildings and other features revealed in the Danish levels in 1969 (p. 42)

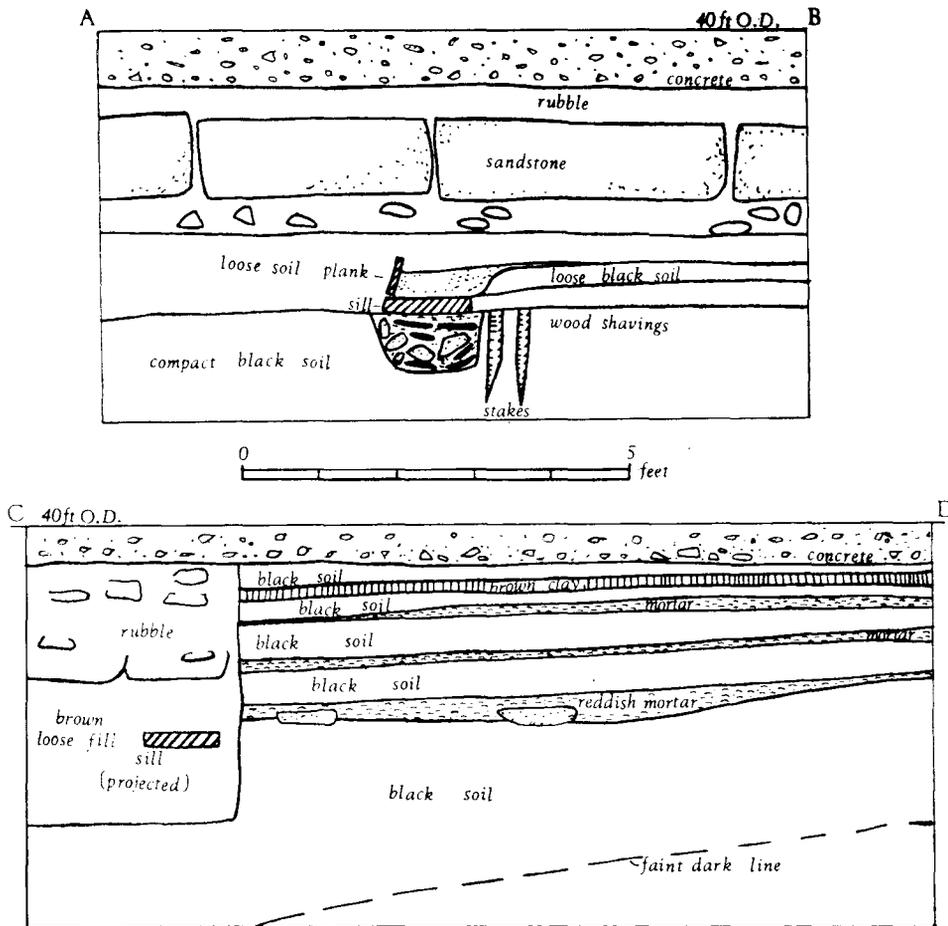


FIG. 9  
 BARCLAYS BANK SITE, HIGH OUSEGATE, YORK  
 Sections A-B and C-D through two Danish building-plots, 1969 (p. 42)

that the present subdivision of property was already in existence in Danish times. FIG. 7 shows Ousegate and its vicinity with its modern property-lines. They appear to be based upon a message which had a frontage of around 18 ft., but now varies in width from 12 to 20 ft. The messages are limited in their length, by the proximity of other features such as the Foss and other streets. It would appear that by the Norman conquest this part of York was closely built over with substantial houses and industrial premises, with the gable-ends to the street. Later, this arrangement is substantiated by a deed of 1184-91 referring to St. Peter's Hospital which held 'seven gables in Ousegate with the oven'.<sup>18</sup>

<sup>18</sup> W. Farrer, *op. cit.* in note 15, pp. 183-4.

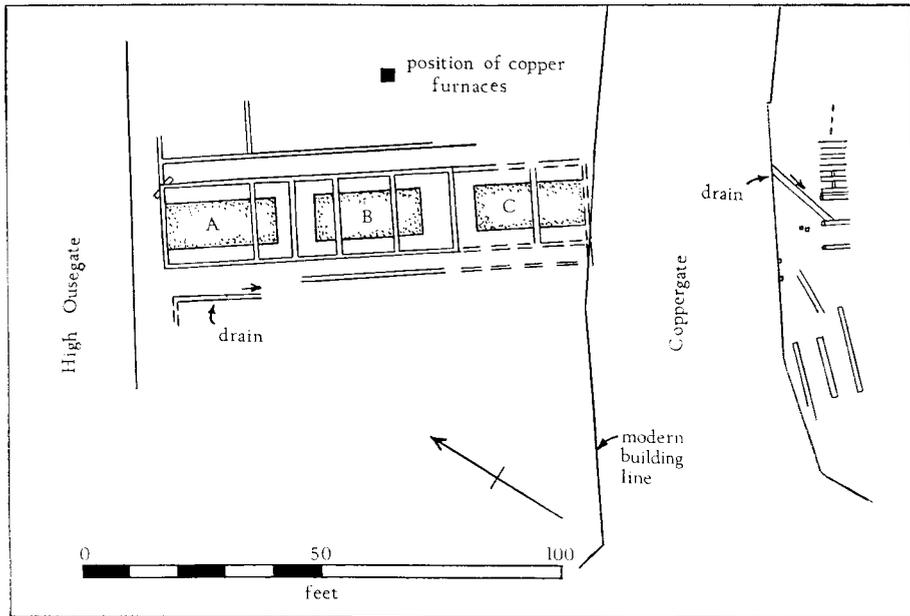


FIG. 10

## HIGH OUSEGATE AND COPPERGATE, YORK

Plan of tan-pits A, B, C and related structures of the Danish period excavated in 1902 (p. 43)  
*After G. Benson, loc. cit. in note 17*

## THE ENVIRONMENT

As I have already emphasized, the waterlogged subsoil in the lower parts of York is ideal for the preservation of organic remains. Every Danish site in York has yielded birch and oak branches, and the analysis of macroscopic and pollen remains from Hungate<sup>19</sup> gives a reasonable picture of the sorts of plants found in the vicinity. Hazel nuts were abundant, blackthorn fruit and cultivated plums were collected, and tentative identifications were made of flax, hops, cabbage, spinach and rape. Many weeds of cultivation were present:

Goosefoot	Knot grass	Flix weed
Corn marigold	Pale persicaria	Spurry
Corn cockle	Creeping buttercup	Chickweed
(very common)	Sheep sorrel	Common nettle

Two pollen samples taken from the backyard of the house below Barclays Bank have given similar results:<sup>20</sup>

<sup>19</sup> K. M. Richardson, *op. cit.* in note 7, Appendix 3, pp. 109-13.

<sup>20</sup> I am indebted to Mr. P. Cundill of the Dept. of Geography, University of Durham, for undertaking the pollen analysis.

## TREE TYPES

*Betula*—Birch  
*Quercus*—Oak  
*Alnus*—Alder 4·4% of  
 total pollen  
*Fraxinus*—Ash  
*Salix*—Willow  
*Coryloid*—Hazel 3·3%  
*Hedera*—Ivy  
*Prunus*/*Sorbus* type—?culti-  
 vated plum

## NON-TREE TYPES

*Calluna*—Heather 3·9%  
*Gramineae*—Grasses  
 29·4%  
*Cerealia* type—Cereals  
 11·1%  
*Cyperaceae*—Cotton grass,  
 rushes, etc.  
*Plantago lanceolata*—Plan-  
 tain  
*Plantago major/media*—  
 Plantain  
*Rumex*—Sorrel  
*Artemisia*—Mugwort  
*Lugiliflorae*— 13·3%  
*Tubuliflorae*/*Cirsium* type—  
 Thistle  
*Chenopodiaceae*—e.g. Fat  
 Hen  
*Cruciferae*—e.g. Groundsel  
*Spergularia*—e.g. Sand  
 Spurry  
*Vicia* type—Vetch  
*Ranunculus*—Buttercup  
*Caryophyllaceae*/*Dianthus*  
 type—wild pinks  
*Umbelliferae*—  
*Rosaceae*—Rose family  
 6·1%  
*Filipendula*—e.g. Meadow  
 Sweet  
*Mercurialis*—Dog's Mer-  
 cury  
*Papilionaceae*—Poppy  
*Successa*—Devil's Bit  
 Scabious

This assortment of pollen remains suggests that cereals were being cultivated quite close to the town. There were a few trees, probably near the river, and heather on open areas, heather being found *in situ* beneath the Danish deposits in Nessgate.<sup>21</sup> The open areas between and behind the houses had typical urban weeds—groundsel, thistle and grasses—with many of the other plants which today favour waste places or damp environments (e.g. Dog's Mercury, Meadow Sweet, Devil's Bit Scabious). There was no evidence for garden cultivation, for example, of herbs.

The site of nos. 25–27 High Ousegate yielded flood silts. These were also noted under Lloyds Bank, and it seems probable that the 9th, 10th and 11th centuries saw repeated flooding of the York area. The climate may also have been somewhat cooler than at present with more severe winters. The abundance of well-used bone skates would seem to testify to this (*see* Appendix, p. 56f.).

## SUBSISTENCE ACTIVITY

Danish York was a thriving town with a colony of Frisian merchants and an abundance of all kinds of goods.<sup>22</sup> Unfortunately no record has survived of the nature of this commerce other than that provided by archaeology. The Danes settled the land around York and most of the food needed by the town probably came from the outlying villages. The pollen record indicates that cereals were grown, and animal bones are so prolific that livestock must have formed a major

<sup>21</sup> J. Raine, *Yorkshire Philos. Soc. Museum: Handbook to the Antiquities* (1891), pp. 216 ff.

<sup>22</sup> D. Whitelock (ed.), *English Historical Documents*, I (1955), 725; J. Raine (ed.), *The Historians of the Church of York and its Archbishops*, II (Rolls Series, LXXI, 1879), 495.

part of the farming economy. Up to 280 lb. (127 kg.) of bones were recovered each day over a period of five months from the excavation under nos. 25-27 High Ousegate, and every other excavation in Ousegate has yielded large quantities of bones. An analysis of the Lloyds and Barclays Bank bones<sup>23</sup> gives a good idea of the food available in York. In the 22 lb. (10 kg.) of bones examined from these two sites, 65 per cent were chiefly leg and rib bones of cattle (*Bos*), 24 per cent were of red deer (*Cervus elephas*), and the remainder included sheep or goat,<sup>24</sup> young pig, and hen. Other sites have yielded remains of horse, dog, goose and duck, and layers of pig manure were found in Coppergate, Clifford Street, and elsewhere. Horn-cores, skulls, and complete leg bones of oxen belong to a small breed similar to those of prehistoric short-horn breeds. One stout horn-core has a close resemblance to that of a Soay ram, and other bones are very similar to those of the British feral goat.

Of special interest is the high percentage of red-deer bones. These animals were undoubtedly larger than the present red deer and were in great demand for their enormous antlers (see next paragraph), but so many of the antlers bear evidence of having been sawn off or wrenched off the skull that it is certain that that the whole carcass was brought to York.

A curious feature of the goat bones is the presence under Lloyds Bank of a pair of distinctive, long, curved horns attached to a sawn-off portion of skull with serrated leading edges. These probably belong to *Capra corneri*, a breed of goat which is now extinct in Britain and may already have been extinct here in Danish times.<sup>25</sup> Another horn was found at Barclays Bank, and the Yorkshire Museum has a pair attached to a sawn-off portion of skull, which came from no. 17 Pavement; another from 15 ft. below Goodramgate; a pair from the Hungate excavation; and a single horn from Coppergate. It is improbable, on present evidence, that these goats were native to Britain, and they may well have been imported from the continent, either for their meat or their skins.

Other remains of food found on the Ousegate sites include oyster- and mussel-shells probably from the Humber estuary; hazel nuts; and plum-stones.

## COMMERCIAL ACTIVITY

### METAL PRODUCTION

I. M. Stead found evidence for iron smelting outside the S. corner tower of the Roman fortress in levels which may be earlier than Danish.<sup>26</sup> Analysis of slag from the site revealed that the iron was probably wrought and never fully molten—material from the refractory hearth was only just adequate for the purpose. Associated with the Danish buildings below Barclays Bank was a piece of vitrified

<sup>23</sup> I am grateful to Mr. D. Bramwell of Bakewell for reporting on these bones.

<sup>24</sup> Cf. the results of I. M. Stead's excavation under Hart's Store (*Yorks. Archaeol. J.*, xxxix (1958), 515-37). The Saxo-Norman (i.e. Danish) give: Ox 67 per cent, Sheep 22 per cent, Pig 10 per cent, and virtually no red deer.

<sup>25</sup> I am grateful to Mr. C. Simms of the Yorkshire Museum and to Mr. D. Bramwell for advice on these horns.

<sup>26</sup> I. M. Stead, *op. cit.* in note 24, p. 537.

furnace lining,<sup>27</sup> which suggests that by Danish times the inhabitants of Ousegate were capable of making better iron. A by-product of the pollen analysis at Barclays Bank was the discovery of numerous flecks of a red, iron-rich mineral in the back yard which was probably haematite. Slag has been recorded from Pavement and from Goodramgate. The ironworkers were probably responsible for some of the knives (FIG. 11, no. 16), axes, buckles, shears, hooks (FIG. 11, no. 15) and nails found in York, and the large grindstone found in 1969 may have been used in the production of edged tools.

Bronze was in common use for coins, pins, brooches, and buckles, and there is some evidence for its manufacture in York. A tantalizingly brief note records the remains of two Danish furnaces off Coppergate, adjacent to the tannery, which yielded two barrow-loads of thin copper pieces measuring 6 in. by 1 in., and may explain the street name, which is first recorded c. 1120–35.<sup>28</sup> The Clifford Street and Coppergate sites both yielded numerous bronze pins, and a stone mould for bronze or pewter rings was found in Hungate.<sup>29</sup> A small crucible from Goodramgate, coated in glassy slag, is similar to a 12th- or 13th-century crucible for non-ferrous metal from Feasegate.<sup>30</sup> There are later records of goldsmiths, silver-smiths and armourers in York, but, although gold and silver objects have been found, there is at present no evidence for the working of these metals in Danish York. One of the Coppergate bronze pins has the remains of a green glass bead set on the head of the pin. The green colour of the glass appears to be identical with one of the shades found in the glass from Clifford Street (see next section).

#### GLASS PRODUCTION

The only glass objects made in Danish York, so far as we know, were beads. As far as can be determined the Clifford Street site was in the vicinity of a Danish glass bead workshop, and the site in Pavement was almost certainly near one also. The beads from Clifford Street have been described by Waterman;<sup>31</sup> apart from two melon beads and one segmented, they are all annular, in a variety of sizes. Those of translucent glass are mostly green, with some pale and dark blue examples. The beads made from opaque glass provide a range of colour from white to grey, brown, blue, yellow, and black. One of blue glass has olive-coloured swirls, and a melon bead of buff glass has pale blue trails marvered flush. At least 40 waste fragments and droplets have survived, over 30 broken beads, several misshapen examples, and three unperforated ones. Many of the beads appear to have been shaped around a piece of thin wire and the withdrawal of the wire has distorted some of the beads.

The 230 beads from Pavement are made from translucent green or yellow glass and opaque dark glass, appearing black.<sup>31a</sup> There are also five frag-

<sup>27</sup> Identified by Dr. R. F. Tylecote, Newcastle University.

<sup>28</sup> G. Benson, *loc. cit.* in note 17; A. H. Smith, *The Place-Names of the East Riding of Yorkshire and York* (English Place-Name Society, xiv, 1937), p. 285, where the name is explained as 'the joiners' street'.

<sup>29</sup> K. M. Richardson, *op. cit.* in note 7, pp. 100–1, fig. 28, no. 10.

<sup>30</sup> L. P. Wenham in *Yorks. Archaeol. J.*, xxxix (1958), 423.

<sup>31</sup> D. M. Waterman, *op. cit.* in note 1, p. 96. <sup>31a</sup> D. M. Waterman, *Ibid.*, p. 104.

ments of narrow yellow glass rings which have a diameter of *c.* 25 mm. Most of the beads are 7–8 mm. long but sizes range from 4·5 mm. to 16 mm.

No evidence for crucibles has survived. An attempt to obtain more information from petrographic and spectrographic analyses proved inconclusive. Samples of slag were examined and it may be that they have nothing to do with the accepted processes of glassmaking.<sup>32</sup> One sample suggested iron smelting on the site. The blue and yellow beads may owe their colours to the presence of iron; alternatively copper may have been used.

Glass linen-smoothers have been found in Danish levels and are so well made of dark glass that they were probably imported. Half of one was found at the Barclays Bank site (FIG. 11, no. 17).

The present distribution of the evidence for working glass and metal shows a concentration around Ousegate and along the banks of the River Ouse under the present Clifford Street. It is probable that some of this industrial activity took place very near the timber-framed houses along Ousegate.

#### OTHER LUXURY ITEMS

Both the Clifford Street and Pavement sites yielded numerous fragments of amber, and a few pieces were found in Coppergate. All stages in the manufacture of amber beads, pendants and rings have been found, ranging from lumps of raw amber to rough-outs, half-finished, and broken examples. The main evidence comes from Clifford Street, where several pieces show that some of the beads were cut and turned on a lathe. One fragment of a lathe-turned ring of jet was found at the Pavement site. A coiled-serpent pendant, a spindle-whorl, and a chessman illustrate a limited use of this material.<sup>33</sup>

#### THE LEATHER INDUSTRY

This industry is the best documented in York, with tan-pits in Ousegate, an extension of these across Coppergate (FIG. 10) and numerous remains of shoes, laces, belts, garments, bags, sheaths, and gloves. Medieval tanning utilized oil, alum or oak bark. The leather from the workshop under Lloyds Bank has been identified as the product of oak tannage.<sup>34</sup> Skins have to be softened and their slaking in lime pits and putrefaction help to loosen the hair and epidermis. The

<sup>32</sup> I am grateful to Dr. R. G. Newton of the British Glass Industry Research Association, Sheffield, for undertaking this analysis.

[Dr. Newton has seen, and made a few amendments to, this section of the late Mr. Radley's text. He also comments: 'D. M. Waterman (*op. cit.* in note 1, pp. 96 and 104) has adopted the term "frit" to describe the material of the opaque beads from Clifford Street and Pavement, while calling the translucent beads "glass". This use of the term "frit" is potentially misleading because the term is also used to describe an intermediate stage in old glass manufacture whereby an inhomogeneous melt can be made more homogeneous by pouring it into water and grinding the fragments to form frit; the dry powdered frit is then well mixed by hand before remelting. The term "frit" is also used, in an analogous manner, to describe powdered glassy materials made into pastes and used for enamelling porcelain. Non-transparent glass beads can be opaque because they (i) are densely coloured. (ii) contain an opacifier or (iii) are incompletely fused and contain air, sand, etc. It seems better to use one of these three descriptions, as appropriate, and some of the Pavement beads were certainly incompletely fused.' Ed.]

<sup>33</sup> D. M. Waterman, *op. cit.* in note 1, p. 94, fig. 21.

<sup>34</sup> The analyses were kindly performed by Mr. P. Stanley Briggs of the Food and Leather Dept., University of Leeds.

hair is scraped off over a tree-trunk and then the skins are soaked for up to 15 months in the tan-pits. It is improbable that the Danes used the alum method in York, but the presence of jet ornaments may suggest trade connexions with the Whitby area, a major source of alum. Analysis of quantities of leather from Lloyds Bank showed that all were bovine, thin pieces (1·7–2·0 mm.) being from calves, and thicker pieces from adult animals. Many pieces of leather were split down the middle, but not at the grain-corium junction. This indicates incomplete tanning, leaving a 'pelty' streak in the middle which rots more readily than the tanned parts. This was also found at the Market Street and Feasegate sites,<sup>35</sup> and is a defect found in tannages of modern primitive societies.

There were numerous pieces of limestone on the Barclays Bank and Lloyds Bank sites which proved to be Carboniferous Limestone and these may represent residual pieces from the lime used in the near-by tan-pit. The tanners' quarter, which appears to have moved at an early date to Tanners' Row across the Ouse, was situated near the river to facilitate the soaking of skins by attaching them to poles in the river, presumably downstream from the places where drinking-water was collected. When Benson excavated the tan-pit in 1902 he noted that the bottoms of the three pits were covered with lime, sand, and clay respectively. The lime clearly derives from the slaking process, and the clay and sand may be derived from the inflowing water or from dirty hides. The pits were big enough to stack cattle hides without folding them, and shallow enough to facilitate emptying. The pits sloped slightly from north-west to south-east. Part of a wooden drain was noted by Benson leading on to the site from the north-west, but its relationship to the pits is not clear. A water-supply was required and similarly an outlet drain would be needed. Across Coppergate part of a drain leading under a pile-supported platform may in fact be the outlet.

Amongst the leather fragments recovered in 1968 and 1969 were many strips with knife marks and others with part of the outline of a shoe sole. Many fragments of shoes and leather from Feasegate show that the shoes were of turnshoe construction. Several pieces have long slits in them, the result of being pegged to a frame. Dozens of antler tines have been found on the Ousegate sites, and one of their uses may have been to peg out the hides.

No literary evidence exists for this period, but the earliest freemen's rolls (1272–78) show that the leather trades continued to be important in the city. The following are represented: tanner (*tannatour*, *tannour*); skinner (*pelliparius*); dresser (*alutarius*); glover (*cirotecarius*); girdler (*zonarius*); harness-maker (*lorimer*); parchment-maker (*parcheminer*); and cobbler (*sutor*).

#### ANTLER AND BONE UTENSILS

Burrs and tines of red-deer antler are frequently found, all with saw marks where they have been detached from the beam of the antler. Antler beam is rarely found in its natural state, presumably because of its value. Antler, and to a lesser extent bone, was used for combs, knife-handles, game-pieces, pins, needles,

<sup>35</sup> I. M. Stead, *op. cit.* in note 24, p. 530; L. P. Wenham, *op. cit.* in note 30, pp. 155–6, 422–3.

and bodkins. More antler remains were found at Clifford Street in 1883 than anywhere else in York. Here at least 22 antler combs, an antler comb-case, and several sawn strips for making combs were found. A trial-piece on a flat bone, showing part of a frieze of animals, was obviously executed in the town. A fragment of green-stained elephant ivory, clearly a waster, was recovered from the Danish level around the Anglian tower excavated at the back of the Central Library in 1969, and a green-stained bone buckle is displayed in the Yorkshire Museum. These pieces suggest a fashion for staining bone in imitation of bronze.

#### CLOTH MAKING

Coarse clay loom-weights, probably from the Danish period, are known, but are rare, in York. There are four from Castle Yard, one from Clifford Street, and possibly one from Hungate. Spindle-whorls are more abundant—from King's Square (3), Goodramgate (several), Castle Yard (1), Hungate (1), and Clifford Street (19). These are made from limestone, pebbles, chalk, lead, and coal. It is interesting to note that they are absent from the Ousegate excavations, but occur both in the wet riverside sites at Hungate and Clifford Street, and also nearer to the Minster in King's Square and Goodramgate. The only piece of cloth so far recovered was found in Market Street and is firmly woven wool spun in the Z and S system.<sup>36</sup>

#### WOODEN UTENSILS

It is difficult in the slimy mud of the Danish sites to isolate fragments of wooden vessels and other utensils and in some cases it is fortuitous if they are retained. Lathe-turned wooden bowls have been found at Hungate, King's Square, and Barclays Bank (FIG. 11, no. 14). Two decorated wooden spoons were found at Clifford Street and wooden combs also have been found in York.

#### POTTERY

A thorough survey covering all known Anglo-Danish pottery from York would require a separate report, but some aspects can be noted here. Perhaps the most significant point is the apparent absence of a local ceramic industry. Although one fabric is called 'York' ware there is no evidence for its manufacture either in the industrial complex around Ousegate or in the suburbs. Most of the known pottery sherds belong to the traditions which include St. Neots, Thetford, Stamford and Torksey wares, and there remains the difficult problem of establishing a detailed chronology within the city for the major pottery types. At present some of the forms and fabrics could be as late as the 12th century but still in the Anglo-Danish style, and there is not even a broad, stratigraphically-established sequence for the city. Analysis of the numerous finds of pottery from the present excavations under the Minster should clarify the problem.

Over twenty locations in the city have yielded Anglo-Danish pottery. Barclays Bank produced a useful group of sherds (cf. FIG. 11, nos. 3-13) which are

<sup>36</sup> I. M. Stead, *op. cit.* in note 24, p. 525.

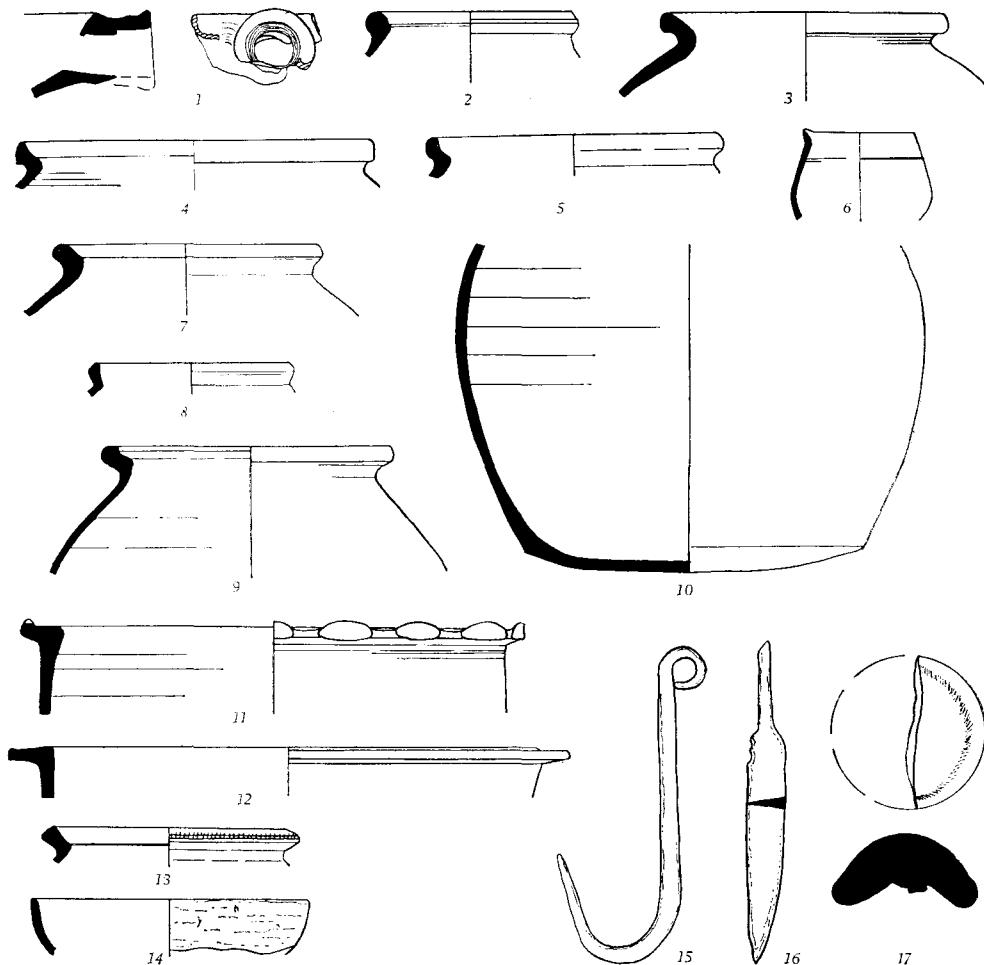


FIG. 11

FINDS OF THE DANISH PERIOD FROM LLOYDS BANK (1-2) AND BARCLAYS BANK (3-17), YORK, 1969

1-13, pottery (pp. 52ff.); 14, wooden bowl (p. 52); 15-16, iron hook and knife (p. 49); 17, glass linen-smoother (p. 50). Sc.  $\frac{1}{4}$

similar to the finds from the city's best pottery assemblages from King's Square and Hungate. It is worth noting that the prolific Coppergate site, probably of 10th-century date, yielded very few sherds, and it may be that pottery did not become a common commodity until the 11th century, when the Danelaw as a whole became a more settled political entity.

The most frequent vessels encountered are cooking-pots and bowls. Vessels with the typical inturned rim, pie-crust rim (FIG. 11, no. 11), spout or skillet handle (FIG. 11, no. 1), and rouletting (FIG. 11, no. 13) occur in Thetford-type fabrics. The harder rougher 'York' ware forms a small fraction of the total finds.

Among the less-frequent vessel forms, perhaps the most interesting is the small vessel of cream-jug size with thin walls and delicate spout. One was found at Barclays Bank (FIG. 11, no. 6). The skillet-socket occurs frequently—some are attached by being applied to the outside of the vessel, after which a finger is pushed through from the inside; others are formed by a tube of clay being inserted into and spread around a ready-made hole. Whether this is a significant difference remains to be determined.

#### STONE

A good illustration of the movement of commodities is provided by the analysis of hones.<sup>37</sup> Many have been found and some are certainly Danish in date: other identical hones are later. Most of the hones in the Yorkshire Museum and single examples found under Lloyds and Barclays Banks are small personal hones which are perforated at one end for suspension from a belt. Many are made from very fine-grained grey-bluish stone, but they have diverse origins. Seven examples are of quartz mica granulite, two are of metamorphosed siltstone, both kinds being found in Aberdeenshire. Others are made from siltstone, phyllite, and gritstone. These rock types may have been collected on the Yorkshire or Northumberland coasts, where Scottish glacial erratics are quite common. The gritstone could be from the Pennines.

#### CONCLUSIONS

Other aspects of Danish York which were not encountered during my own researches, for example the minting of coins, have been omitted from this paper. The assembling of evidence from recent excavations and from little-known excavations of the past, together with the considerable contributions from specialists in numerous fields, gives a reasonable picture of pre-conquest York, which is, however, obviously far from complete.

The core of the Danish settlement appears to have been quite densely built over with long, narrow, timber-framed buildings. The main impression is of a somewhat damp and dirty town with thriving industries. There were furnaces here, tan-pits there; functional and luxury goods were being produced in quantity; commodities were arriving from several parts of Yorkshire and probably from beyond; and merchants' houses stood in close proximity to industrial premises. More important still, the Danish remains prove conclusively that the present street-plan and the general pattern of the arrangement of messuages were already in existence before the Norman conquest.

Two large areas remain in which the pattern of Danish development is relatively unknown: the area within the former Roman fortress, where no large area of domestic remains has yet been excavated; and the area of the Roman *colonia*, where Wenham has recently shown that Danish remains can be expected whenever large-scale excavations are made.

At the Norman conquest the town held some 30,000 adults and it was ready

<sup>37</sup> D. M. Waterman, *op. cit.* in note 1, pp. 97–8.

to take on the role of military capital of northern England in a reorganization of the town which involved the devastation and levelling of part of the Danish industrial area to make way for William the Conqueror's new castle.

## APPENDIX

## BONE SKATES (FIG. 12)

The low-lying flood-prone nature of the centre of Danish York described above may have promoted the use of skates in the city. I list here in TABLE I all those known

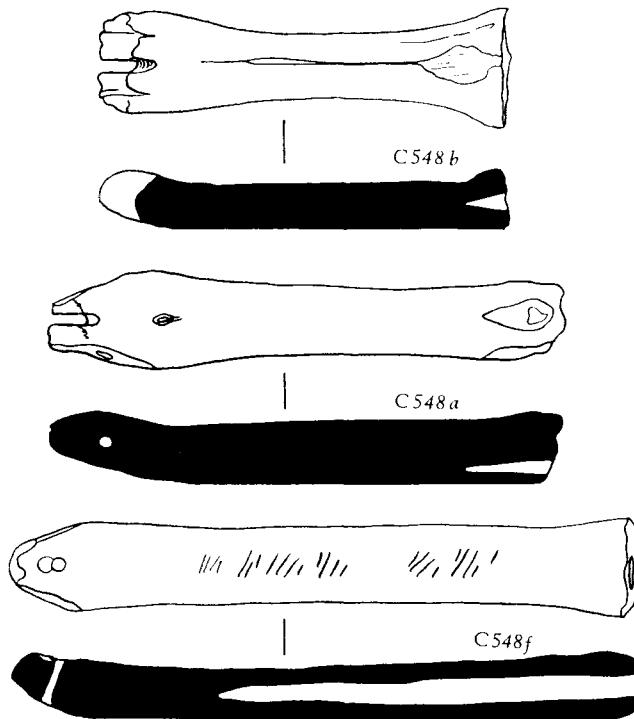


FIG. 12

BONE SKATES OF THE DANISH PERIOD FROM COPPERGATE, YORK  
(pp. 55ff.). Sc.  $\frac{1}{2}$

to me and this total of 41 (or 44) complete examples is probably the largest group in England. Although bone skates were in use throughout medieval times and the find-spots of many of the isolated York examples are not known, the bulk were found during excavations in Coppergate and Jubbergate at levels thought to be 10th to 11th century in date.

The British Museum *Guide*<sup>38</sup> records that bone skates were 'fastened to the instep and ankle with cords passing through holes at the end of the bone in much the same manner as metal skates (and were) generally made from the tibia of a horse'. The skater pushed himself along with an iron-shod pole. The York collection can be divided into four types. The basic tibia with its smooth base, and often a roughened upper surface,

<sup>38</sup> British Museum, *A Guide to the Mediaeval Antiquities* . . . (London, 1924), p. 27.

TABLE I  
BONE SKATES FOUND IN YORK

NO.	MUS. REF. NO.	LENGTH (CM.)	HEEL PEG-HOLE	VERT. OR HORIZ. TOE-HOLE	FIND-SPOT
YORKSHIRE MUSEUM					
1	2 Cop.	26.6	x	H	Coppergate
2	Cop. 3,21	16.0	x		"
3	C.39	15.5	x	H	"
4	C.548.a (FIG. 12, no. 2)	20.3		H	"
5	C.548.b (FIG. 12, no. 1)	16.4	x		"
6	C.548.c	21.0	x	H	"
7	C.548.d	28.0	x		"
8	C.548.e	19.5	x		"
9	C.548.f (FIG. 12, no. 3)	25.0	x	V	"
10	C.548.g	20.0	x	V	"
11	C.548.h	17.5	x	H	"
12	C.548.i	16.5	x		"
13	C.549.a	21.2			"
14	C.549.b	25.0	x		"
15	—	25.3	x		"
16	—	17.0	x	V	"
17	—	24.4	x		"
18	—	25.1	x	H	"
19	—	25.3			"
20	—	25.3	x		"
21	C.745.47	21.5	x		"
22	—	22.8	x		High Ousegate
23	—	26.6	x[+peg]	H	Hungate
24	—	—	x	H	"
25	—	25.1	x[+peg]	3 incomplete holes	King's Square
26	1951.50	—	x		Aldwark
27	*633.1.48	26.8	x	H	St. Andrewgate
28	*633.2.48				"
29	*633.3.48				"
30	555.4.48	21.4	x	H	Goodramgate
31	555.5.48	21.8	x	H	"
32	555.6.48	21.5	x	V	"
33	—	28.0			York
34	—	22.3			"
SHEFFIELD MUSEUM					
35	J.93.1208		x		Jubbergate
36	"		x	V	"
37	"		x	V	"
38	"		x	V	"
39	"		x		"
40	"		x		"
41	"		x		"
42	"		x		"
43	J.93.1209		x		Micklegate
44	"		x		"

\*These three have not been located, but may be nos. 19-21, which are unlabelled but are probably from Coppergate.

may have: 1, a pointed or tapered front end with a vertical hole through the thickest part; 2, a tapered front end with a horizontal hole; 3, an untrimmed front end with a horizontal hole; 4, a pointed or untrimmed front end with no hole. Nearly all have a hole in the rear end for the insertion of a deer tine or a wooden peg to which the heel strap was attached—in two instances wooden pegs have been found still in position.

There are three sizes of skate varying according to the size and type of bone selected for use. The shortest skates (16-17 cm.; FIG. 12, no. 1) are made from the slender tibia of red deer, the medium-sized (20-22 cm.; FIG. 12, no. 2) from the short thick metatarsals of some type of cattle, and the longest (25-28 cm.; FIG. 12, no. 3) from the long slender metatarsals of cattle or from the tibia of horse. Only four lack a heel peg-hole, but the largest group is that with no toe-hole. Of 18 toe-holes, 11 are pierced horizontally and 7 are vertical.

This collection of skates is extraordinary in its quantity, and it may be a pointer to contemporary conditions. Presumably the skates had no use other than for amusement or for occasional excursions across the frozen rivers. The skates are usually very worn and still retain a high polish, which must imply at least fairly frequent long, hard winters during which the river was frozen for long periods. A few skates have broken toe-holes, but otherwise most are complete and show no reason for being abandoned.