

ART. VI.—*Excavations in Carlisle, 1953*. By ROBERT HOGG, B.Sc., A.M.A., with a contribution by J. P. GILLAM, M.A., F.S.A., and a report on the medieval pottery by E. M. JOPE, M.A., F.S.A., and H. W. M. HODGES.

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I. THE EXCAVATIONS. By ROBERT HOGG.

THIS report deals with two small excavations carried out by the writer in Carlisle in 1953, the first during January on the site of 63, Scotch Street, and the second in July on the site of 51-53, Castle Street. Both excavations were emergency projects, the opportunity being taken, when it occurred unexpectedly, of making a general examination of sites within the historic city area which are normally part of the built-up area of modern Carlisle. Although neither excavation yielded much evidence for the topography of the lost pre-Norman town plans, each did produce archaeological remains of the greatest interest and rarity. In Scotch Street there was found a wooden well of Roman date, in which not only the shaft but also much of the timber of the well-head had survived; and in the Castle Street excavation, although structural remains were completely absent in the pre-Conquest levels, there was recovered from the later levels a stratified sequence of medieval structures with associated pottery, something of the greatest rarity in our area.

(a) *Excavations in Scotch Street* (fig. 1).

The excavation on the site cleared by the demolition of 67, Scotch Street, was done during January 1953. In the early part of the month a quantity of oaken timber, much of it having structural features such as nail-holes

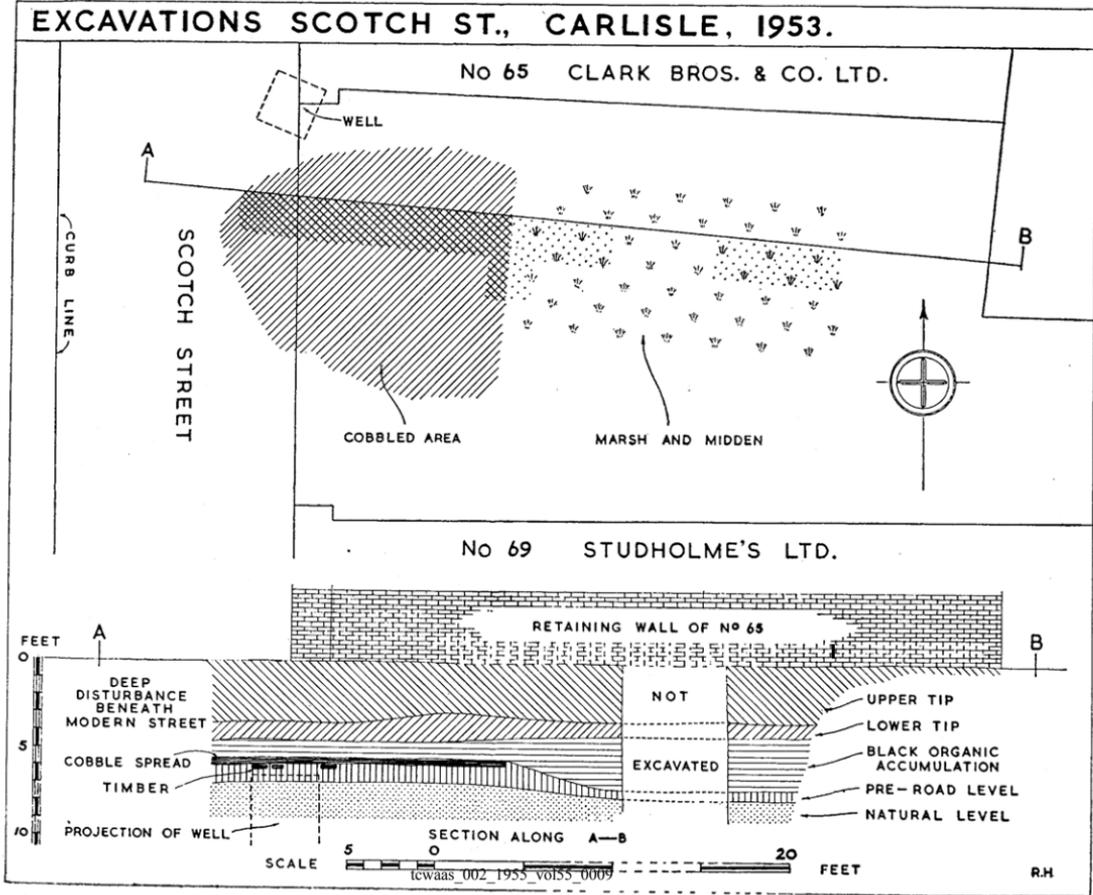


FIG. I.

and joints, and the shaft of a wooden well, were found on the site by the contractor, when excavating a foundation-trench for a retaining wall; this wall was built on the north side of the site, between nos. 65 and 67; and both the timber and the well were found at a low level in a superficial cover of some 7 ft. of made earth. As the work of constructing the retaining wall had to be carried out expeditiously, because of the precarious condition of the standing property, no opportunity was available for a systematic study of discoveries. Towards the end of the month, however, permission was kindly given by the owner, Mr W. N. Moffit, for an excavation to be made on the cleared site, for the purpose first of recovering any remaining timber, and secondly of determining the date of the well and its relationship to the timber.

67, Scotch Street. The title-deeds of the property begin early in the 17th century with a conveyance of a burgage in Rickergate (*now Scotch Street*), on 16 May 1614, for a consideration of £20. A century later, on 1 December 1713, the property had greatly appreciated in value, being sold for £235; about this time, the premises were converted into an inn, the "King's Arms", which was the headquarters of Sir John Pennington and other militia officers in 1745. The inn came latterly into the ownership of the Carlisle New Brewery Co., which at one time owned a good many licensed premises; on 11 August 1916 it was compulsorily acquired by the Central Control Board (Liquor Traffic), and in accordance with that Board's policy of rationalization its licence was declared redundant, and the premises were let for commercial purposes. The Board disposed of the property to its present owners, Messrs Moffit Brothers, in 1950, and they continued to use it as their business premises until the demolition of the building in 1952.

The excavation. The contractor's foundation-trench, in which the wood was discovered, reached a laminated clay subsoil at a depth of 7 ft. 6 in. The oaken timber was found just above subsoil level, and concentrated at the western end of the trench. Beneath the timber, and in a position almost on the glass line of the modern street

frontage, there was found the shaft of a wooden well, completely filled with heavy black earth; this was excavated to a depth of 8 ft. The shaft measured 3 ft. square and was faced with oak cradling, jointed at the corners with simple overlaps, and held in position by its backing of earth. In the upper part of the shaft, where it had cut through the compact, impervious stratum of laminated clay, the cradling was still secure, but beneath the clay level a less compact, gravelly water-bearing stratum had failed to hold it in position, and the well had in consequence collapsed at this point. Of the pottery fragments from the upper filling of the well, one piece is of special interest: it is the greater part of a buff-coloured carinated bowl, in its shape imitating the samian form 29.

The greater part of the oaken timber from the contractor's trench was found in a level above that of the well, and the explanation why it had survived became clear during the subsequent systematic excavation of the site, 21-28 January. For this work a trench 2 ft. 6 in. wide was cut, some 7 ft. to the south of and parallel to the retaining-wall of no. 65. Details of the section revealed by it were as follows (fig. 1):

The upper 3 ft. consisted of building rubble, at the base of which was the flagged surface of an older floor. Beneath the flagging was another stratum, 1 ft. 6 in. thick, of similar make-up material, but of rather lighter colour. These two upper levels gave a total superficial cover of some 4 ft. of tipped material. Beneath them was a deposit of completely different character, namely an accumulation of dense black, foul-smelling occupation-earth, 1 ft. thick at the western end of the trench (where it rested upon a cobbled surface) and some 3 ft. thick at the eastern end (beyond the limits of the cobbled spread). This stratum was of organic origin and contained mixed refuse, including fragments of Romano-British pottery, bones, wood, leather and the shells of oysters and mussels. The cobbled spread, the only structural feature found in the trench, was of very slight construction; the cobbles were laid to a thickness of only two or three inches, water-worn river gravel set in clay. A length of 5 ft. of the eastern limits of this material was exposed in a trench cut at right-angles to the main one, and was seen to

be a well-defined straight edge, the alignment of which was roughly parallel to that of Scotch Street; but the excavation was too limited in extent to permit a reliable determination of the alignment, and moreover the deep disturbance of the stratification beneath Scotch Street had destroyed the western limits of this feature. The cobbling was lifted in part at the western end of the trench, and immediately beneath it were found pieces of timber, resembling that found in the contractor's trench (fig. 2). This had been carefully laid at one level, and the separate lengths were lying roughly parallel to one another, crossing our trench (as it happened) approximately at right-angles to it and thus parallel to the general alignment of the cobbled spread.

The reason why the timber had survived was now clear, and the complete sequence of events, in the history of the well, can now be recapitulated. It had been made, rather roughly, in the early years of the Roman occupation, and within a few years had fallen into disuse because its shaft had collapsed; the wooden well-head had then been dismantled, and the well completely filled with earth. The timber provided by this demolition was not destroyed, but was used as bottoming for the cobbling now spread over the site. This is not the first record of a Roman well of this type in Carlisle (cf. CWI iii 135), but it is the only instance in which parts of the well-head have survived, and the rarity and the great interest of these wooden remains thus place them amongst the most important discoveries yet made on the site of the Roman town.

Beneath the placed timber there was a spread of fairly clean make-up, about 1 ft. in thickness (pl. I), in which Romano-British pottery of pre-Hadrianic date occurred (see Mr Gillam's report, below). This basal level rested on a subsoil of pale grey laminated clay, overlying a rather stony boulder-clay. An upper spread of laminated clay overlying boulder-clay has been reported from other subsoil sections within the area of the historic city, but both the situation and the colour of the present deposit deserve note.

The structural remains of Roman date from the lowest level of this excavation, though unspectacular in appearance, are full of interest, giving us our first glimpse of

ROMANO-BRITISH WELL-HEAD
SCOTCH STREET, CARLISLE, 1953

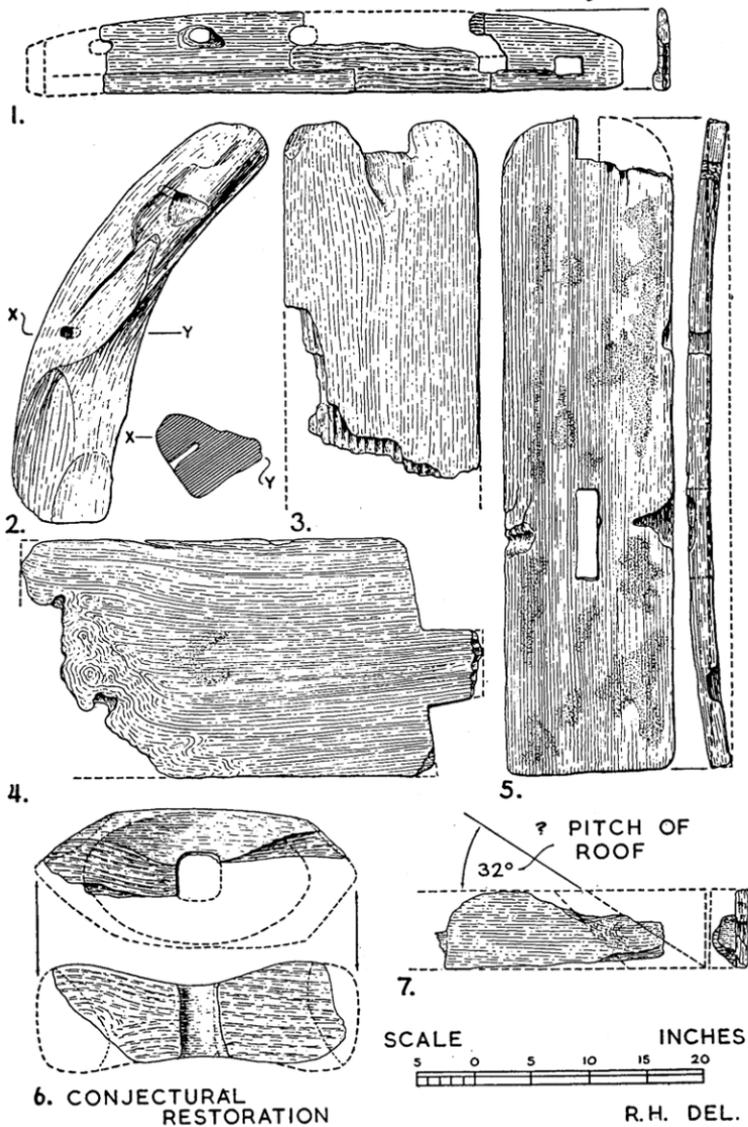


FIG. 2.

civilian life in Roman Carlisle. The site apparently lies outside the main built-up area of the town, in a marshy tract which had been used in part as a midden. It is not certain whether it was within the stockaded area or outside it, but the presence of this well, and the occurrence of another (built in stone, found in 1804, cf. Jefferson, *Carlisle*, 1838, p. 326) in Sewell's Lane, a little to the north, suggest that it was within. But the site was never heavily occupied; the gravelled area laid down early in the 2nd century was never repaired, and it had fallen into disuse relatively quickly, the whole area becoming derelict.

The northern boundary of the stockaded area has not yet been determined, but there is information on its eastern and southern limits (CW1 iii 135 and iv 91). One further piece of evidence has been noted recently: in February 1949 the writer observed a cross-section of one of the ditches of the eastern defences, exposed in a branch sewer-trench to 54, Lowther Street. The ditch was V-shaped in section, 14 ft. wide across the top and 8 ft. deep, its centre-line being 15 ft. from the building frontage on the east side of Lowther Street, with which (as far as could be judged from a single trench) its alignment approximated closely.

The timber from the well-head. Altogether some twelve large and fairly complete pieces and five fragmentary ones were recovered, all of well-dressed oak. Seven pieces show interesting structural features, and are therefore described and illustrated (fig. 2):

1. This appears to be a cross-member, broken at one end, which has originally been some 52 in. long; it is 7 in. broad at the middle but tapers towards the ends, of which the surviving one is chamfered. It is 1 in. thick, but along the lower edge there is a projecting strip, 2 in. by $\frac{5}{8}$ in., which has been carved from the solid. There are a number of holes bored through the piece, those near the lower edge being square and the upper ones rounded.

2. A carved support or crutch, some 40 in. long and 9 in. broad, with one end wedge-shaped and the other rounded. There are two holes for nails or pegs; the upper of these has been broken away, possibly when the piece was torn from its position

at the time of demolition. This piece seems to indicate a roofed cover for the well.

3 and 5. These two boards are possibly uprights from the casing of the well-head. No. 3 is fragmentary; no. 5 measures 56 in. long, 15 in. broad and $2\frac{1}{4}$ in. thick, one end of it being rounded and slotted to a depth of $3\frac{1}{2}$ in. In line with this slot, at a distance of 16 in. from the opposite end, there is a mortice hole, 8 in. by 2 in.

4. Part of a rectangular board, one end broken away, original dimensions some 36 in. by 21 in. by $2\frac{1}{2}$ in. A tenon, 7 in. broad and $5\frac{1}{2}$ in. long, projects from the centre of the end, which is entire. By fitting pieces 4 and 5 together, by their mortice and tenon joint (probably the true arrangement), it is possible to visualise the well-head casing as consisting, on two opposite sides of uprights similar to no. 5, and on the remaining two sides of cross-pieces (one of which, no. 4, has been recovered). The length of piece no. 4, 36 in., is in keeping with the dimensions of the well-shaft, and its breadth, 21 in., would provide on one side a conveniently low casing for manoeuvring the bucket into and out of the well. The meaning of the slot at the top of no. 5 now becomes apparent: it was made to carry the cross-support for the winding-gear.

6. Part of a carved block, some 25 in. by 12 in. by 10 in. (restored dimensions); the ends are chamfered, and the upper and lower faces are dished; in the middle the piece is perforated with a hole of squarish cross-section, its side being 4 in. long. The piece has almost certainly formed part of the winding mechanism, and although it is not possible to determine precisely how it functioned, it seems reasonable to suggest that it was a bearing for the axle.

7. Part of the end of a board, 7 in. broad, which has been dressed for the greater part of its length, to a thickness of some 3 in. The piece expands to its maximum thickness at the end, and the block so left has been cut across at an angle of 32° , to form a half-lap joint. This piece may have functioned as a tie-beam of the superstructure, the end joint carrying one of the rafters of the roof.

Sufficient structural evidence of the well and well-head survives, therefore, for a reconstruction of the general appearance of the unit to be attempted. We may visualise it in its complete form as a rather imperfectly constructed utility feature, bearing the stamp of native workmanship. That is emphasized when one contrasts it with the

superb water-supply systems provided for the larger Roman towns and military bases—for example, the public fountain at Corbridge (AA4 xxviii 158 ff.), with its aqueduct supplying the aeration-basin of the ornamental fountain-house; or, for that matter, the public fountain which later supplied the needs of Roman Carlisle, and which was still an object of wonder when St Cuthbert visited the city in A.D. 685.

It is not too much to say of the Scotch Street discoveries, therefore, that they give an indication of the pioneer conditions of the earlier days of the Roman occupation of Carlisle.

(b) *Excavations in Castle Street* (fig. 3).

I am indebted to Mr Peter Strong, of Messrs Wright, Brown and Strong, solicitors, Carlisle, for extracting from the title-deeds of nos. 51-53, Castle Street the information upon which the following account of the recent history of that property is based:

The earliest date on the title-deeds is 23 June 1792, when Isaac Milner, dean of Carlisle, granted a lease of 40 years to Margaret Hutchinson, spinster, at a rent of 18s. The property was assigned by her in two parts to George Hewith, gentleman, and Thomas Forster, esq., both of Carlisle, respectively for the remainder of the term of the lease, for the sum of £138. 14s. apiece. George Hewith and Jane Forster, widow of Thomas, sold their plots to John Mitchinson of Rickergate, in 1799 and 1800, for £202 and £250 respectively, subject to the lease. John Mitchinson died in 1810, and the property passed to his youngest daughter. In 1847 it was described as "a shop, dwelling room, warehouse, offices, yard and premises in Castle street", adjoining Jane Forster's house on the west.

A new lease was granted to Jonathan Dodgson Carr, baker, of Stanwix, who in 1856 bought the reversion for £480. He sold the property in 1882, and the plan attached to the deeds at that time shows the property as it was when demolished in 1953. A later owner mortgaged it to the Cumberland Benefit building society, which sold it to Robert Creighton for £3,700, and from his personal representatives it was acquired by the

EXCAVATIONS CASTLE ST., CARLISLE, 1953.

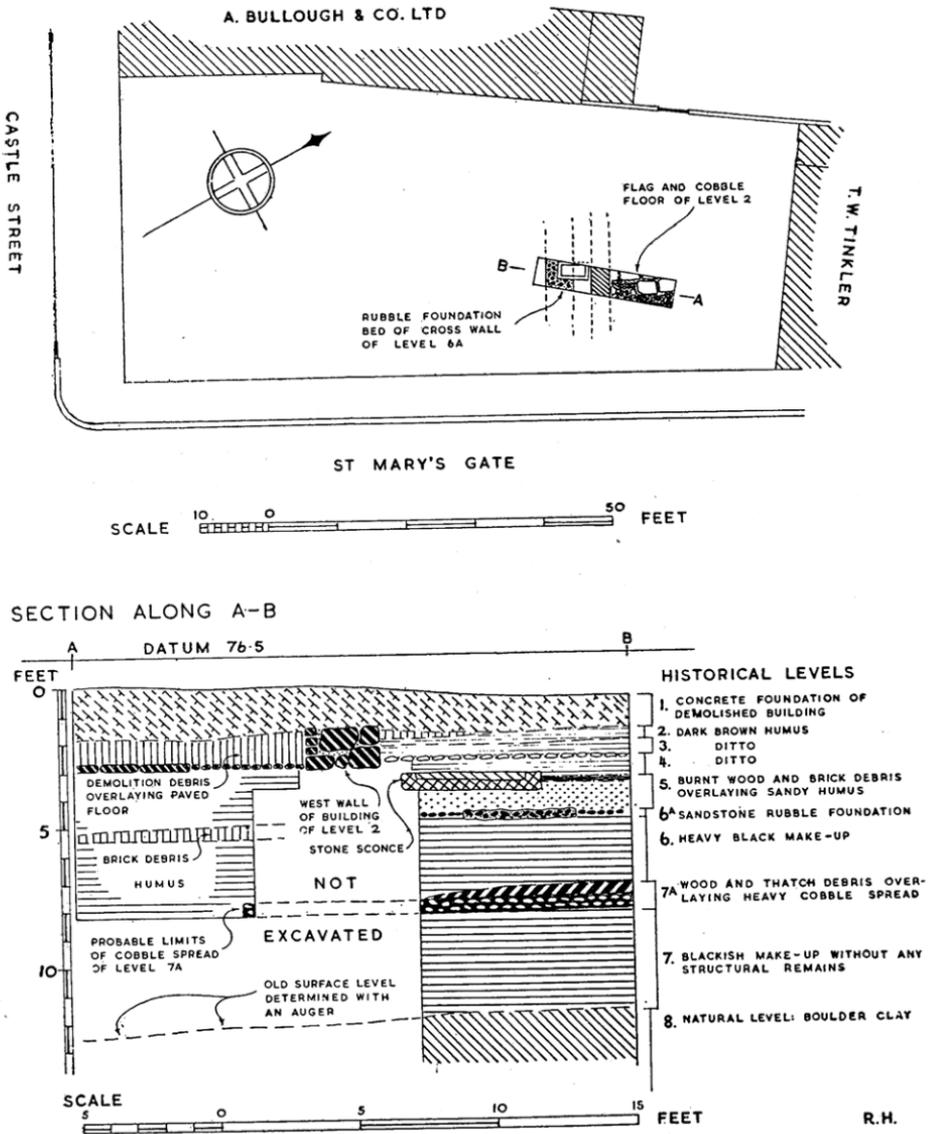


FIG. 3.

present owners. The building demolished in 1953 was apparently built by J. D. Carr shortly after 1856, in place of that described in the title-deeds of 1847, traces of which were found beneath the upper spread of concrete in the excavations described below.

The excavation. Work began on 13 July and was completed on 30 July; there was interference from rain on eight days, on two days very considerable. The work was directed by the writer and carried out by two labourers supplied by Messrs John Laing and Sons. While work was in progress it was visited by a large number of interested people, including the mayor of Carlisle (Alderman A. C. R. Punnett) and members of the city council, the town clerk (Mr H. D. A. Robertson) and the city treasurer (Mr William Forsyth); and towards its close the excavation was examined by Professor I. A. Richmond, F.B.A.

A trench 20 ft. long and 4 ft. wide was marked out in a position giving the necessary safety clearance from standing property (fig. 3) and with an alignment parallel to the axial alignment, NE.-SW., of the early Roman fort, as determined from the discoveries at Tullie House in 1890 (CW1 xii 344). By good fortune this trench was intersected, at a depth of 18 in. and approximately at its middle point, by the comparatively heavy sandstone foundations of the outer wall of the building found in level 2; this cross-wall was retained as a central baulk, and its presence therefore determined the subsequent course of the excavation. First the stratification in the western half of the trench was examined, on one side of the cross-wall, then that in the remaining half, after which an attempt was made to relate the results from the corresponding levels of the two separate sections. This plan of action served admirably in practice, as it was found that the structural remains of medieval domestic buildings were so insubstantial that no purpose would have been served by attempting to work out their stratification in an area greater than half of the original trench.

Beneath the modern surface there was a spread of concrete, containing in its aggregate brick debris, later revealed as the result of demolishing an earlier building; it was 2 ft. thick at the eastern end of the trench and, owing to a slight fall in the ground, 1 ft. 2½ in. at the opposite end. This seems to represent J. D. Carr's new foundation for his bakehouse floor. The concrete completely sealed the substantial structural remains in the next level, consisting of the outer western foundation-wall of a building, the paved floor of which was found intact in the eastern half of the trench; it was 2 ft. 7 in. broad, faced in its two lower courses with roughly dressed sandstone blocks, and with a sandstone rubble core. This foundation-work apparently belonged to a brick building, two courses of brickwork remaining in position on the foundation, as well as the brick debris used in the later concrete, already referred to. Associated with this wall, as part of the same building, was the paved floor, found at a depth of 2 ft. 6 in. in the eastern half of the trench; the paving was extremely irregular, consisting in part of rectangular flags with patches of cobbling, suggesting a stable rather than part of a domestic suite. Overlying the paving and, of course, sealed by the concrete, there was a thickness of about 1 ft. building rubble which had accumulated on it during the demolition of the building. The corresponding level at the western end of the trench gave a spread of dark brown garden humus, indicating that the building did not extend in that direction. There was no precise evidence for the date of the flagged floor and the associated building, but it was clearly post-medieval, probably of the 18th or at earliest of the 17th century; for a relatively rich yield of green-glazed pottery was found beneath the flagged floor, marking the upper medieval (16th century) level. The complete sequence of pre-17th century levels occupied a total depth of about 9 ft. of made earth, the total depth of artificial make-up above the boulder-clay subsoil being 12 ft.

The medieval levels in the western half of the trench, examined first, were sealed by a spread of large cobbles, some 5 in. in diameter, which occurred at a depth of 2 ft. 6 in. and formed a paved area apparently associated with the flagged-floor building of level 3. Beneath the cobbles a thickness of some 8 in. of dark humus (level 4) overlay a rectangular stone trough, the external dimensions of which were 54 in. by 31 in. by 12 in., its depth 4½ in. It was identified by a country visitor as a stone scone, a shallow stone receptacle used in the process of salting bacon; similar receptacles are still in use for that purpose, many of them (such as that recently observed in use at Yanwath Hall, Westmorland) being made of slate.

The trough was lying on an old surface-level, identified by a thin scatter of cobbles on which lay charred wooden debris. These remains, although of the slightest structural type, were nevertheless evenly spread at this level and thus effectively sealed the underlying level 5, which was composed of some 1 ft. 4 in. of lighter coloured, sandy make-up, lying above a relatively well-constructed but shallow foundation bed of sandstone rubble and mortar, some 4 to 5 in. thick and 2 ft. 9 in. broad, which crossed the trench on an alignment parallel to that of the flagged-floor building in level 2. The parallel alignment of the superimposed medieval structures corresponded to that of Castle Street, and the angle at which this is set to the axial alignment of the early Roman fort, are features worthy of note.

The rubble cross-wall (level 6A) sealed an underlying thickness of 2 ft. 6 in. of heavy black make-up (level 6), beneath which was buried possibly the most interesting structural feature discovered in the trench, namely a heavy spread of cobbles, to a thickness of some 5 in., overlaid by a layer of compressed wood and thatch, some 7 in. thick. The small yield of pottery found mixed with this material is of the greatest importance, not only because of the unusual character of both the glaze and the form of the pieces, but also because this was the lowest level at which sherds of lead-glazed ware occurred.

Although the remains of medieval date found below level 3 were of the slightest construction, they nevertheless served to mark off clearly the successive occupation-levels, the whole accumulation of make-up material being well stratified. This is probably typical of what is to be expected in medieval levels elsewhere in the city; it is the result of the decay of buildings constructed for the most part of wood or clay, on the shallowest foundations. Such buildings, on demolition, would leave little trace of their existence, but their erection would not involve delving into the underlying levels which their floors, by contrast, sealed securely. The detailed study of such structural remains of medieval Carlisle calls for systematic work by trained archæologists; although the results of such work may never be spectacular, there is always the chance that it may yield undisturbed stratification and valuable dating-evidence, such as the stratified

sequence of lead-glazed potsherds from the present excavation.

The undisturbed condition of the upper historical levels encouraged the hope that structural features of pre-Conquest date would be found securely sealed beneath them, but the hope was not realised. Beneath the layer of wood and thatch debris there was a thickness of 3 ft. 6 in. of heavy black make-up (level 7), yielding a little mixed Romano-British pottery but not a vestige of any structure; and below it, at a depth of 12 ft. from the modern surface, the subsoil of hard, compact boulder-clay was reached.

In the eastern half of the trench the flagged floor of the building of level 2 was removed in part, and the underlying levels examined down to a depth equivalent to that of level 7A. Structural elements encountered in this part of the excavation were even less definite than those in the western half, and it was not found possible to establish any continuity between structures found at equivalent depths at opposite ends of the trench; in particular, the layer of wood and thatch was completely absent. Although the material in the lowest level was not fully excavated here, it was nevertheless sampled systematically and proved to be similar to that of level 7, with no structure whatever in it. Subsoil was at a slightly deeper level at the eastern end of the trench, as a result of a gradual fall of the basal surface-level eastwards, from the high ground near the cathedral towards the Eden. Careful search was made for a ditch-system, but none was found.

Conclusions. The absence of structural features of Roman date in the lower levels of the Castle Street excavation, considered in conjunction with the presence at a similar level of wooden foundation-work in the cathedral precincts (in the late F. G. Simpson's trial excavation of 1953) and on the site of Tullie House, seems to prove that the early Roman fort was confined to the western side of what is now Castle Street. It is now known (as a result of excavations at Tullie House in 1954 and 1955) that the early military site was re-planned for civilian use, presumably shortly after the construction of a new fort at Stanwix on the Wall; how this reorganisation

affected the area here under consideration is not yet known, and the excavation of 1953 was of necessity too limited in scale to produce conclusive evidence. Its chief interest has been in demonstrating the presence and the nature of the post-Conquest sequences which lie buried within the historic city area of Carlisle. There is no doubt that this area, if systematically studied as opportunities occur, will yield a wealth of stratified archaeological evidence, sufficient to form the secure basis for study of post-Conquest sites in the whole of our Society's territory.

Acknowledgements. As has been explained, the excavations described in this report were carried out on sites which had been cleared by the recent demolition of unsafe structures. It is a pleasant duty to record the consideration shown to the writer, in spite of the stress of circumstances at the time, by the owners of the properties, Mr W. N. Moffit of Moffit Brothers, Scotch Street, and Mr J. V. E. Bullough of Bullough & Co., Castle Street; and the helpful co-operation of the architects concerned, Mr G. W. Danson and Mr F. G. Jackson respectively. The cost of the work was borne by Carlisle Corporation, and was undertaken as part of the writer's official duties as Keeper of Archæology, Carlisle Museum. Whatever value the report may have will be in no small measure due to the specialists' contributions which have been incorporated in it. To these contributors, and to Professor Richmond (who read through the first draft of the report, and made a number of comments which have now been incorporated in it), the writer expresses his warm thanks.

(c) *Notes on the Roman pottery from the Scotch Street site* (fig. 4). By J. P. GILLAM.

(i) *Pottery from below the cobble spread.*

1. Fragment from a carinated bowl with parallel grooves on the body and a reeded rim, in slightly gritty, pinkish-grey

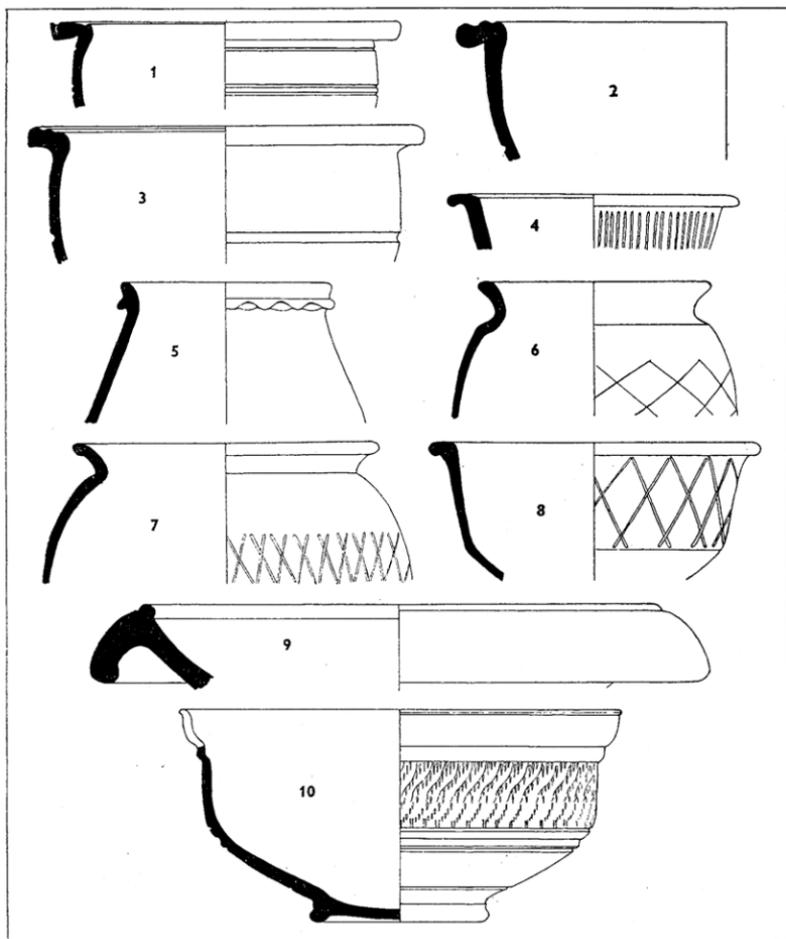


FIG. 4.—Roman pottery. (†).

fabric, smoked black in places, cf. *Corbridge 1951*, no. 27, A.D. 100-120.

26 further fragments, from at least 11 separate vessels, found at the same level include a large fragment from a samian dish of form 18/31, rouletted, with the stamp OF.CEN (a late first-century Graufesenque potter), a rim and wall fragment from a South Gaulish bowl of form 37, and fragments from two rough-cast beakers. While some of the small fragments are not closely datable, there is nothing that would be out of place in a late first- or early second-century context.

(ii) *Pottery from the level of the black organic accumulation.*

2. Three fragments from a carinated bowl with a single horizontal groove on the body and a somewhat lumpy reeded rim, in coarse brick-red fabric; cf. *Corbridge 1951*, no. 25, A.D. 100-120.

3. Large fragment from a carinated bowl with a single horizontal groove on the body and an upturned reeded rim, in slightly gritty buff fabric, of about the same date as no. 3. On each of the three Carlisle carinated bowls the wall is thickened and turns slightly inwards at the point of junction with the inner edge of the rim; this is not a feature of the otherwise similar bowls from *Corbridge*.

4. Fragment from a flat-rimmed bowl or dish in black fumed fabric; cf. *Corbridge 1951*, no. 54, c. A.D. 140.

20 further fragments, from at least 13 separate vessels, found at the same level include rim-fragments (with some decoration surviving) from two South Gaulish samian bowls of form 37, one of the late first and the other of the early second century; two fragments of rustic ware and other pieces contemporary with nos. 3 and 4, together with base fragments from two black fumed cooking-pots contemporary with no. 5. In addition, however, there are three fragments (two of them burnt and with the colour-coating vitrified) from an indented Castor beaker of third-century type, and a fragment of barbotine-decorated Castor ware.

(iii) *Pottery from the lower tip.*

5. Large fragment from an uncommon narrow-mouthed vessel, with finger-depressed decoration on a flange below the lip, in grey self-coloured fabric; there are no close parallels, but the vessel is probably of later date than c. A.D. 140.

10 further fragments from 7 separate vessels found at the same level include part of the rim of a Central Gaulish bowl of form 37, a scrap from the rim of a mid-second-century mortarium, and other contemporary pieces. In addition, however, there are two conjoined fragments from the rim of a vessel in red fabric, with a high-quality dark, purple-brown treacly glaze, of a kind characteristic of the early modern (post-medieval) period.

(iv) *Pottery from the upper tip.*

6. Three fragments from the rim and shoulder of a wheel-made cooking-pot, in smooth grey fabric; cf. *Bewcastle*, no. 2, close of the second century.

Five further fragments, from as many vessels, found at the same level include samian forms 31, 33 and 37, all somewhat large and coarse, and typical of the closing years of the second century; in addition, however, there is a tiny scrap of modern pottery, in fine white fabric with a translucent glaze in imitation of china.

(v) *Pottery found during building operations.*

7. Rim and shoulder fragment from a typical cooking-pot in black fumed fabric, caked with soot; cf. *Corbridge 1947*, no. 33, close of the second century.

8. Large fragment from a flat-rimmed, deeply chamfered bowl, in the dense black, slightly gritty fumed fabric typical of the earliest vessels in the series; cf. *Birloswald*, no. 65, A.D. 125-140, and no. 5 above.

9. Large fragment from the rim of a mortarium with small black grit, in pinkish buff fabric burnt grey on the surface; cf. *Milecastle 50*, no. 113, third century. Except for the Castor ware (in the level of the black organic accumulation), this is the latest Roman piece from the site.

Among several other unstratified pieces are a wall-fragment from a South Gaulish samian bowl of form 37, with other early pieces; a rim-fragment from a cooking-pot similar to no. 8; and a further part of the rim of the cooking-pot no. 7 above.

(vi) *Pottery from the upper filling of the well.*

10. The greater part of a copy of a samian bowl of Dragen-dorff's form 29, in fine, hard reddish-fawn fabric, without glaze but with specks of mica in the body of the clay; the zones of decoration on the prototype are represented by regular rouletting. There are no close parallels from dated northern deposits, but

the vessel is almost certainly a contemporary copy, and therefore to be assigned to the first century; from the large size and excellent condition of the piece, it would appear that it found its way into the filling soon after the vessel had been broken.

Conclusions. The presence of early modern pieces in both the tip levels indicates that they are of comparatively recent date; but the bulk of the pottery in the tips is not only Roman but of a limited range of date within the Roman period, so that the material was clearly derived from Roman occupation-levels.

The pottery found in the black organic accumulation is all Roman; it ranges in date from early in the second century until well into the third, and appears to have accumulated over the whole of this long period. The proportion of early to mid-2nd-century pieces is high; this may imply that the population in the immediate vicinity was greater in the first half of the 2nd century than later. No 4th-century pieces were found, but that does not mean that organic accumulation necessarily ceased after the 3rd century.

The pottery found in association with the timber from the dismantled well, and sealed by the cobbled spread, forms an internally consistent group, of the turn of the first and second centuries. The cobbles, therefore, were not spread before the end of the 1st century; but the distinctive pottery types of the second quarter of the 2nd century are absent, and the black accumulation began while the earlier types were still current, so that the cobbles were almost certainly laid within the first quarter of the 2nd century.

As a 1st-century vessel, newly-broken when discarded, was found in the upper filling of the well, and as the well had been dismantled before the cobbles were laid, the well is undoubtedly a 1st-century feature.

These conclusions may be summarised as follows:

Well: 1st century.

Cobbles: Early 2nd century.

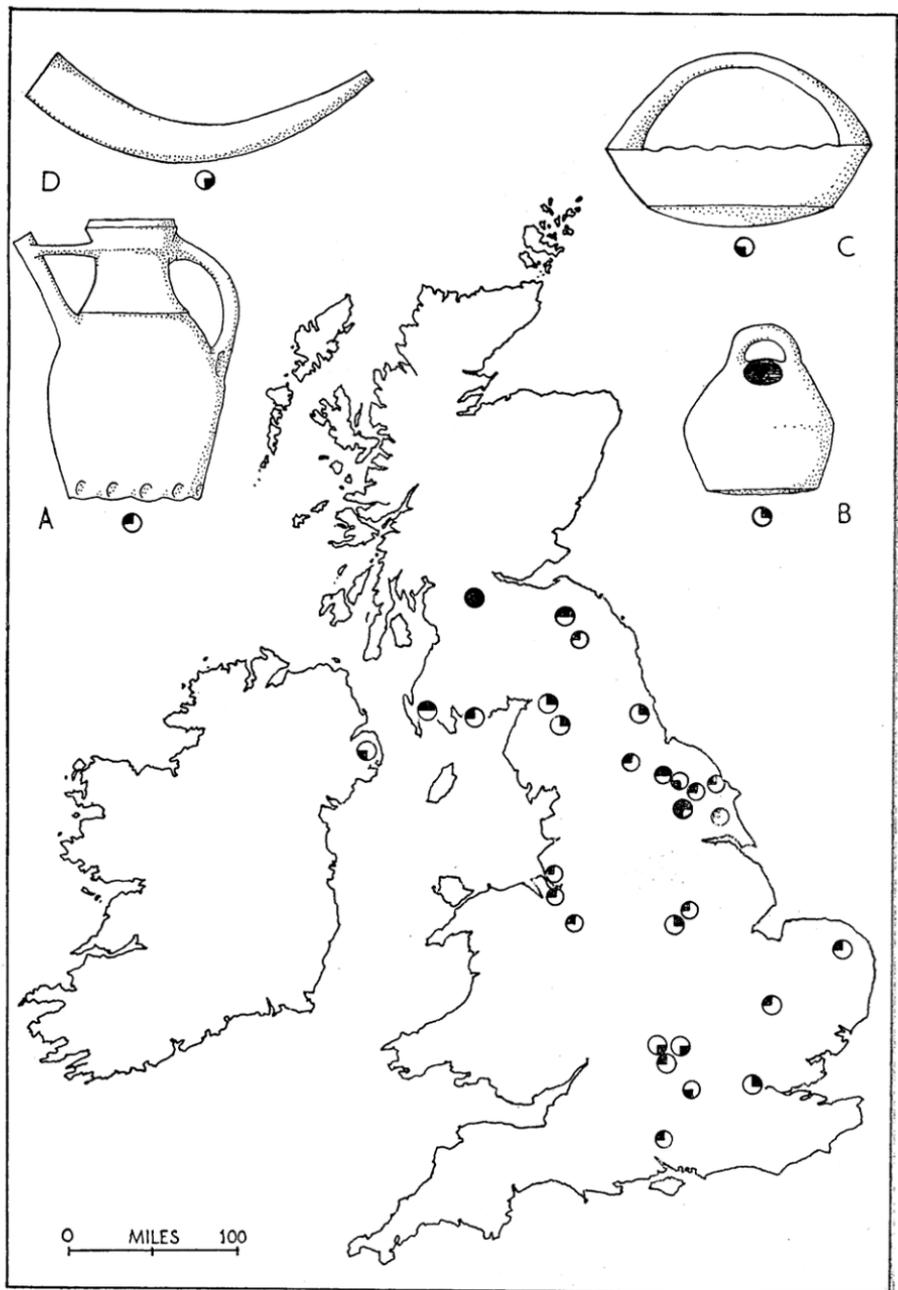


FIG. 5.—Map illustrating the connections between English and Scottish pottery types in the later 13 and 14th centuries.

Organic accumulation: Early 2nd to 3rd century
(and later?).

Tips: Early modern, but containing derived 2nd-
and 3rd-century pieces.

References used in this section are as follows:

<i>Bewcastle</i>	.	CW2 xxxviii 219 f.
<i>Birdoswald</i>	.	CW2 xxx 175 f.
<i>Corbridge 1947</i>	.	AA4 xxviii 177 f.
<i>Corbridge 1951</i>	.	AA4 xxxi 222 f.
<i>Milecastle 50</i>	.	CW2 xiii 356 f.

II. THE MEDIEVAL POTTERY FROM CASTLE STREET.

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(a) *Introduction.*

This excavation has yielded an important stratified sequence of pottery groups, extending from the 12th century through to the later Middle Ages, such as is by no means frequently found; it provides a most welcome starting-point for a study of some aspects of the medieval pottery of this north-western region, which has remained virtually unstudied up to now. The area is particularly important as one through which the influences of techniques, shapes and ornament used by the English medieval potters were passed on to those working in Scotland, the element of English background to Scottish medieval pottery being now recognised (fig. 5). Indeed, the medieval pottery of the Carlisle region is most important for studying that of the whole north Irish Sea area, which must be treated to some extent as a unity during the Middle Ages, just as in prehistoric times.¹ During the later 12th and 13th centuries, Carlisle, in the 12th century perhaps directly and then through its port

¹ *Ulster Journal of Archaeology* 14 (1951), 31-33; *Belfast in its Regional Setting* (British Association handbook, 1952), 96 and 113 ff.

of Skinburness (overwhelmed in the 14th century), was one of the important provisioning bases for campaigns in south-west Scotland² and the north of Ireland,³ and during more peaceful times the maritime trade of the area was by no means negligible.⁴ It remains to be seen from a study of material remains such as pottery, quernstones, ironwork, paving-tiles or building materials, to what extent such campaigning and maritime trading overcame the natural cleavage between the divergent peoples involved, to create a measure of unity throughout the north Irish Sea lands. French pottery of the 13th and 14th centuries is found in some quantity in south-west Scotland⁵ and north-east Ireland;⁶ 13th century and later English imports, perhaps from the Chester area, are found in the latter, and similar material occurs in Scotland and at Carlisle. By the 14th century the line-impressed paving-tiles of north-east Ireland (Mellifont, Carrickfergus) most closely resemble those of the Chester area, and Chester perhaps became more and more the focus of north Irish Sea maritime trade.⁷ Even the purely Irish medieval building technique of constructing a vault on a wicker mat, and also corbelled vaulting, are to be seen in a cellar of a later medieval tower at Lancaster castle. It is clear that a study of many aspects of the Carlisle region is most important in the general treatment of the medieval archæology of the whole north Irish Sea area.

The excavation also produced evidence, in the form

² Thus, it is clear from *Cal. Pat. R.*, 1301-7, p. 208, &c. that supplies were being sent from Ireland through Skinburness to Lochmaben, Dumfries and other castles in those parts in 1302.

³ *Pipe Roll*, 1171-2, p. 79.

⁴ For instance, Holme Cultram abbey was seeking provisions in Ireland even in 1302 (*Cal. Pat. R.*, 1301-7, p. 38, and cf. pp. 417, 428); see also R. W. Cochran-Patrick, *Medieval Scotland* (Glasgow, 1892), chapter vii, and H. J. Hewitt, *Medieval Cheshire* (Chetham Soc., 88, 1929), chapter viii.

⁵ Besides the well-known south-west French "polychrome" fragment from Castledykes, Kirkcudbright, there are in the Stewartry Museum at Kirkcudbright parts of one and probably two other imported vessels in fine white fabrics, probably of French origin. 13th century French wares are also known at Glenluce abbey (*D. & G. Trans.* xxix, 1952, 179 ff.).

⁶ *Ulster J. A.* 17 (1954), 124-127.

⁷ *Antiq. J.* 34 (1954), 212 ff.

of wasters, of pottery-kiln activity during the late 13th and 14th centuries, an important addition to our scanty knowledge of the actual centres of pottery manufacture in the north. Variations in local styles make it clear that pottery must have been made by craftsmen settled in a number of different places, but apart from a pottery kiln-site at Colstoun in East Lothian (unpublished material in the National Museum of Antiquities, Edinburgh), a paving-tile kiln on the site of the Cistercian abbey at North Berwick in the same county,⁸ evidence of another in the form of tile-wasters at Melrose, and a possible hint of pottery wasters (like this Carlisle material) at Brougham castle, north of Cheshire and Yorkshire the places of pottery production are at present not known from either documentary or archaeological sources.

(b) *Formative influences in Carlisle medieval pottery styles.*

Of the more southerly English influences traceable in the Carlisle medieval pottery, the later 12th or early 13th century spouted pitchers with strap-handles (no. 2) seem to be an idea from the South Midlands, particularly the Oxford-Bristol-Gloucester area, and the square, flat-based cooking-pots of the later 13th century (no. 8) perhaps from Nottingham, where their manufacture in the Parliament St. kilns is loosely datable to the later 13th or early 14th century.⁹ The fine jug with face-masks and beard-handles from Carlisle (CW2 liii 207 f.) has parallels from the Nottingham kilns, which yielded coins of 1272-1377.¹⁰ The face-masks from Castledykes, Kirkcudbright,¹¹ apparently occupied only during the period 1288-1308 by an English garrison (*D. & G. Trans.* xxix, 1952, 180), also extended down into beard-handles, so

⁸ PSAScot. 63 (1928-29), 281.

⁹ For no. 8 cf. *Trans. Thoroton Soc.* 36 (1933), 79-124, and bottom half of pl. XVII.

¹⁰ *Trans. Thoroton Soc. cit.*, pl. II, nos. 1 and 3, facing p. 84.

¹¹ PSAScot. 48 (1913-14), 393.

that it seems that the type was current during the late 13th and early 14th centuries. A face-mask pitcher was in use at Dunstanburgh castle, Northumberland, after 1313 (AA4 xii (1936), 285-289). The handled urinals (no. 35 from Carlisle, but not recorded from this Castle Street site), known from many sites in the north (fig. 11: PSAScot. 86 (1952) 158 f.) are also found at Nottingham (no. 34). The role of the Nottingham potters in providing ideas, and perhaps craftsmen, for the development of north English and south Scottish medieval pottery is now beginning to be clear, in addition to those of places such as York, already recognised in this role.

By contrast, the 12th century cooking-pottery from this site (nos. 2, 2A and 3) has a northern background. This type of vessel, with squared-off, sometimes angular, clubbed rim is well recognised in north-east England (see no. 2 for discussion and references), but does not seem up to now to have been published from west of the Pennines, though the more angularly moulded variant is known from Brough-under-Stainmore and Brougham in Westmorland, and it has so far remained unrecorded from north-east Ireland, where English pottery influences only begin at the end of the 12th century; its southerly limits appear to be south Yorkshire, and its influence extended into Scotland. The genesis of the type is not yet clear, but it was probably developed out of 10th or 11th century shapes in the north-east during the later 11th or early 12th century. It is in marked contrast to much of the contemporary pottery of southern England, with its out-turned rim-flanges and often inferior throwing, and is indeed of a generally higher quality. This angular clubbed rim became more common in the south during the 13th century, due perhaps as much to the indirect influence of French rim-forms as to northern influence, or even to a natural and independent development.¹² By contrast, some 12th century types of coarse pottery, such

¹² Cf. *Kirkstall Abbey Excavation, 2nd report* (Thoresby Soc., Leeds, 1952) 21.

as the handled lid discussed under no. 2, seem to have had a more general distribution over much of the country.

(c) *Dating of medieval pottery in the Carlisle area.*

So far there is no evidence to suggest that the pottery from the earliest stratum on this site (layer 7A) is any earlier than the 12th century, and it is on the whole most likely to have been made and used after the middle of the 12th century. A possible origin of the spouted pitcher type (no. 2) seems to be in the spouted globular pitcher, often set on three small feet, of the Oxford-Bristol-Gloucester area,¹³ which itself seems only to have been developed in that area about the second quarter of the 12th century, though perhaps a little earlier at Old Sarum.¹⁴ It is possible that this Carlisle type, otherwise as yet unpublished from the north, could be a sloppy devolution from the late Saxon taller spouted-pitcher style, in fine fabric, of eastern England, which is found commonly up to Leicester and occasional examples evidently reached the Nottingham area and York. This origin, however, seems very improbable. Similarly, the parallels for the cooking-pot type from layer 7A are in the north-east (Yorkshire and Durham) in the 12th century, mostly the second half of that century, the earlier pottery of Yorkshire being different. There is thus nothing to suggest a date earlier than the second half of the 12th century for either the spouted pitchers or the cooking-pottery from layer 7A, and some indications against it.

It is true, however, that virtually nothing is known of the 10th and 11th century pottery of the north-west, beyond a pot containing coins deposited c. A.D. 970 at Chester,¹⁵ and a certain amount of background material at York. Another undated pot from Chester¹⁶ suggests a

¹³ With outliers as far north as Coventry: *Antiq. J.* 20 (1940) 103 ff; *Oxoniensia* 15 (1950) 47-50.

¹⁴ *Antiq. J.* 15 (1935) 184-190, nos. 25 and 29-31.

¹⁵ *Antiq. J.* 33 (1953) 22-32.

¹⁶ *Ibid.*, 31 and fig. 36.

certain influence from the cooking-pottery styles of eastern England, and "St Neot's" wares are now well recognised from the Nottingham area¹⁷ and are recorded from York. There is a hint in a roll-rim from Carlisle (no. 9) of some ultimate East Anglian background here, but it is from the 13th century layer 6, though like no. 10 it may be derived.

The glazed pitcher types from layer 6 do not seem to extend necessarily later than the middle decades of the 13th century. There is a marked absence of plastic ornament applied after wheel-work (rosettes, animal- or human face-masks, applied strips, &c.) so characteristic of British pottery in general from the mid-13th century, extending well into the early 14th century, especially in the north. Such styles are well enough represented, though not perhaps profusely, among the material from other sites in and around Carlisle.¹⁸ The entire absence from the Castle Street site of bridge-spouted pitchers may also be noted; they are known from other sites in Carlisle: they are typical of the second half of the 13th century further south, and a few were still in use at Dunstanburgh castle after 1313, though most of the jugs found there had simple pinched lips.¹⁹ A single sherd of orange-glazed pinkish-buff ware (also represented in layers in 6A and 5) is closely comparable with some wares from Castledykes, Kirkcudbright (1288-1308). On the other hand, in layer 6 occur the hard-fired, almost stoneware, squat flat-based cooking-pots, like some being made at Nottingham in the late 13th and early 14th centuries, which one would normally consider as at any rate of the second half of the 13th century. Hence the upper limit of the deposit in layer 6 is probably well into the later part of the 13th century, though the main bulk of the material seems to be of its middle decades.

The hard grey wares with olive glaze, first appearing

¹⁷ *Trans. Thoroton Soc.* 58 (1954) 28-33.

¹⁸ CW2 liii 207 f.; AA4 xiii (1936) 287, no. 10; and at Brougham castle.

¹⁹ AA4 xiii (1936) 286 ff.

in layer 5, and whose manufacture is demonstrated in layer 4, suggest a date well into the earlier part of the 14th century for the beginning of layer 5. The earlier stages in the development of this ware, itself so characteristic in the north, may be seen in the pottery from Castledykes, Kirkcudbright. Two pieces of this ware have been found with a bag containing 11 English and Scottish coins buried, soon after 1350, at Closeburn, Dumfriesshire (National Museum of Antiquities, Edinburgh). The occurrence of this ware, and the absence from the Castle Street site of plastic ornament and of bridge-spouts, noted above, combine to suggest a break in the pottery sequence of this stratified deposit for some 50 years during the late 13th and early 14th centuries.

It is difficult at present to argue in detail an upper limiting date for this Carlisle sequence of medieval pottery, but there seems little even from layer 3 which need be later than the 14th century. Most significant is the entire absence from this site of the large three-handled glazed pitchers with bung-holes near the base, and sometimes a cordon of pie-crust ornament below the rim,²⁰ features typical of the 15th century, and numerous on later sites in the north.²¹

The suggested dating of the pottery from the medieval layers in this stratified deposit may thus be summarised as follows:

Layer 3	.	Second half of 14th century.
„ 4	.	Middle decades of 14th century.
„ 5	.	Second quarter of 14th century.
„ 6A	.	Most pieces could have been derived from layer 6, but four were more appropriate to layer 5 and above, suggesting that these footings were of the early 14th century.
„ 6	.	Main bulk early 13th century to <i>c.</i> 1260, with some pieces later 13th century.
„ 7A	.	Second half of 12th to early years of 13th century.

²⁰ PSAScot. 52 (1917-18) 69.

²¹ Cf. AA4 xxv (1947) 191 ff.

Each layer above level 5 contains many sherds appropriate to lower levels, and in many instances it is not possible to decide whether these are derived from those levels, or are a reflection of longevity of pottery types in current manufacture and use.²²

(d) *Description of the pottery.*

(i) *Layer 7.*

There was no medieval pottery in this level.

(ii) *Layer 7A* (figs. 6 and 7).

This layer contained fragments of one spouted globular pitcher and two, or possibly three, cooking-pots; also a bone comb.

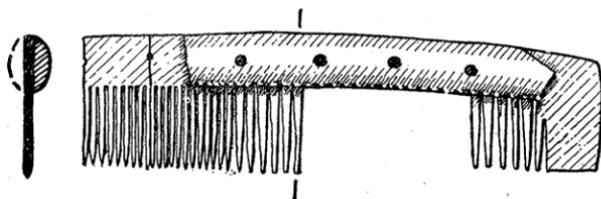


FIG. 6.—The bone comb. (1).

1. A single-sided bone comb, with closely spaced teeth at one end and more widely spaced at the other. Cutting between the teeth has been done after the plates and back have been assembled with their iron rivets, and the cut-marks can be seen on the bottom edges of the back-plates, as often on this type of comb. The type is widely distributed in the northern world; parallels from Scandinavia are datable to the 12th and 13th centuries, but such an object cannot be used to provide close dating (cf. R. Blomquist, *Kulturen* (Lund, 1942), 149 f. and 146, nos. 39-42).

2. Large part of rim and shoulder, and fragment of base, of a cooking-pot in clayey ware with coarse grits (0.5—2 mm. and a few larger), giving a pimply surface; fracture light brown to grey, inner surface light buff, outer surface reddish-brown with blackened patches. This pot was evidently formed by

²² Cf. K. M. Kenyon, *Jewry Wall Site, Leicester* (Soc. Ant. Research Report xv, 1948, 72 f.).

throwing on a continuously rotating wheel. The small rim sherd, 2A, comes from a similar pot with less squared rim, and bears a spot of brown glaze.

This type of cooking-pot with squared-off clubbed rim is recognised in north-east England as current during the 12th century: Knaresborough, York and other Yorkshire sites (*Antiq. J.* 33 (1953) 212); Kirkstall abbey, near Leeds, a pot datable to the second half of the 12th century (*Thoresby Soc.*, 1952, 20 and fig. 6 no. 1 and 1954, 64 and fig. 18); Durham (*Antiq. J.* 33, 1953, 60 and fig. 3, nos. 2-5). From the north-west, this general rim-form is also known at Brough-under-Stainmore (vicarage garden, 2C), and the more angular variant (*Antiq. J.* 33, 212, nos. 10-13) occurs at Brougham castle (2B). The southerly limits of the type appear to be in south Yorkshire. There are really three variant rim-forms of this northern type of cooking-pot: (a) the small flange (nos. 2, 2A and 10); (b) the rounded clubbed moulding (nos. 2B and 3); and (c) the sharp angular moulding (nos. 2C and 2D). A rim of the rounded form (b) but in a fine creamy fabric (2E), and a fragment of a large pan-rim with angular moulding (cf. *Antiq. J.* 33, 212, nos. 17 and 18) but in hard, fine pink ware, are among the material from the section cut in the motte ditch at Hawick, Roxburghshire (PSAScot. 48, 1913-14, 18-24, where the rim-forms are figured at the wrong sitting-angles). This suggests that the influence of this northern form of 12th century cooking-pot penetrated into Scotland; but the often-quoted association of the Hawick group of pottery with a coin of Henry II is of little value for dating, as no stratigraphy was recorded, and the pottery from the excavation now preserved in the Wilton Park Museum at Hawick includes not only other cooking-pot rim-forms (cf. *Antiq. J.* 33, 212, no. 9) but also fragments of glazed jugs, some of them very comparable in both form and fabric with examples from Castledykes, Kirkcudbright (1288-1308): this suggests that the Hawick group of pottery extends from the late 12th century at least through much of the 13th.

At Brough-under-Stainmore there is part of a 12th or early 13th century type of strap-handled lid, recognisable by the holes at the handle-junctions. The type is known elsewhere in the north, at Flixton near Scarborough in the East Riding (T. C. M. Brewster, *Two Medieval Habitation Sites in the Vale of Pickering*, York 1952, 46, no. 27), and is perhaps a 12th century type general over much of the country, being known in the south of England at Oxford, Enstone (Oxon), Newbury (Berks) and Avebury and Wootton Bassett (Wilts): cf. *Oxoniensia* 11-12, (1946-47), 169 f., nos. 3 and 4.

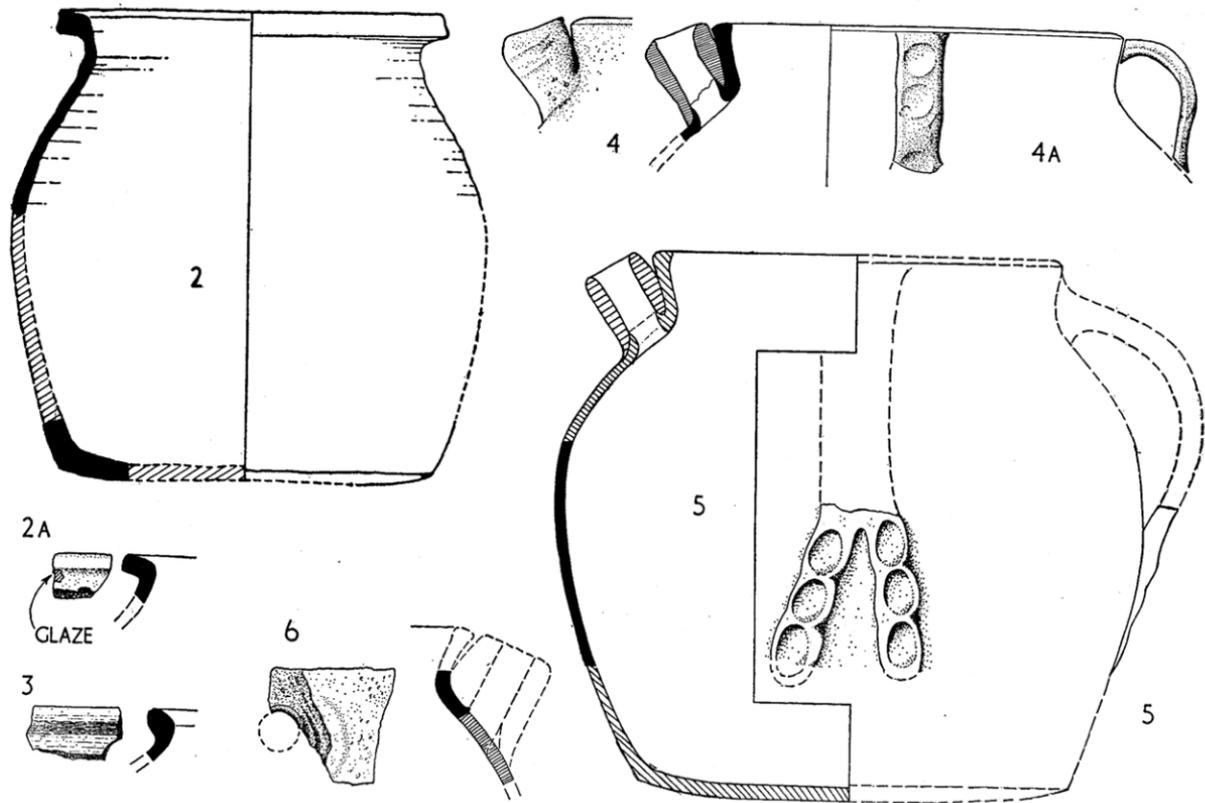


FIG. 7. (†).

3. Rim rather more rounded, from a cooking-pot of similar type; similar fabric, grey core with red-brown surface layer 2 mm. thick.

4. Top part of a wide-necked spouted pitcher; fairly hard-fired clayey fabric, sparsely gritted, grey in fracture with light red-brown inner surface layer about 2 mm. thick; the exterior bears an irregular olive to brown lead glaze, under which the red surface layer has not developed on cooling, presumably because the fabric was protected by the glaze from atmospheric oxygen.

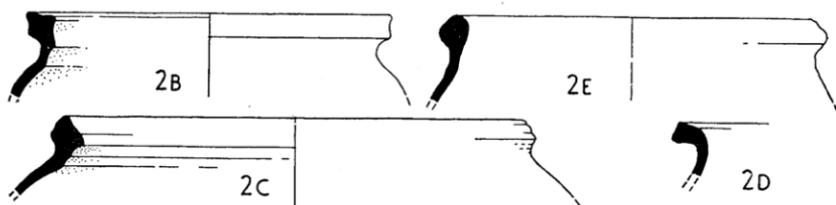


FIG. 8.—Cooking-pots of northern 12th century types: 2B, Brougham Castle; 2C, Brough under Stainmore; 2D, Bowes; 2E, Hawick. (†).

This is a typical wheel-thrown shape, the irregularity being due to the fixing of the spout; this was a tube of clay formed on the potter's finger and then placed on the shoulder of the pot, the finger was pushed through the pot-wall from the inside and the spout smoothed into the outer surface: all these details are inferable from the fracture down the spout (pl. IV). This is one way of making a tubular spout, and stands in contrast to the long tubular spout current later in the north (fig. 5), which was built up on a stick.

4A. A small strap-handle of similar fabric and glaze to no. 4, with three finger-impressions on the outer face. It is almost certainly part of the same pitcher as no. 4, probably a side-handle, the main strap-handle opposite the spout presumably being larger (see no. 5 below).

(iii) Layer 6 (figs. 7 and 9).

This layer contained pitcher and cooking-pot fragments, in keeping with those of layer 7A, which may be derived from vessels continuing in current use during at least part of the period represented by layer 6. It also contained cooking-pots of harder fabrics, some almost stoneware, with flat bases, and jug fragments of hard but somewhat coarse whitish fabric, with pale orange-yellow glaze.

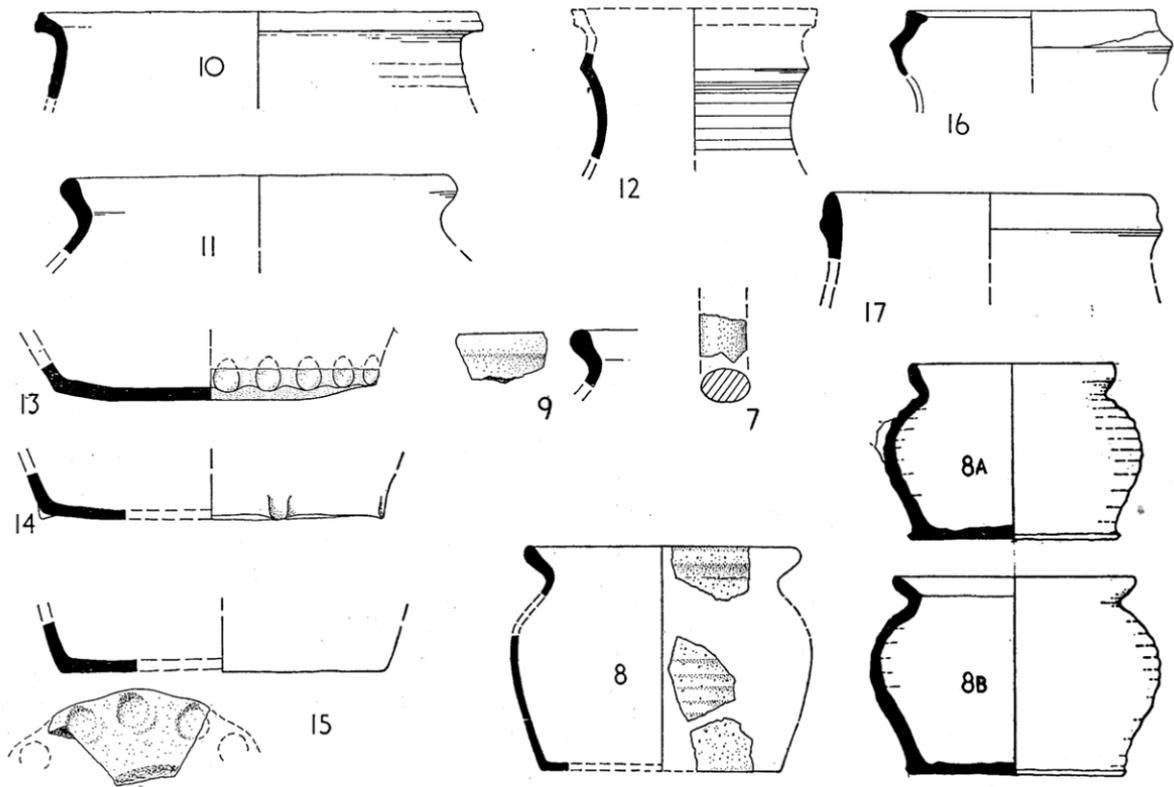


FIG. 9. (±).
 tewaa_002_1955_vol55_0009

a) Glazed pitchers of coarser wares.

5. Junction of strap-handle with the body of a large baggy pitcher; clayey ware with a high proportion of added grit, consisting of about equal proportions of water-rounded and jagged quartzite pebbles, mostly 1-2 mm.; grey fracture with 1-2 mm. reddish surface layer, except where protected by glaze (as in no. 4), irregular olive to brown lead glaze all over the outside, except behind the handle; slight finger-rilling on the outside at full girth. The strap-handle is pulled down the body in two tails with rows of thumb-impressions, the strap having presumably been cut into a swallow-tail at the base before being applied. This general type of vessel is discussed under no. 4 above; the main bulk of this pitcher came from 6A, some pieces from 6 and 6E. There is another example, in harder, closer textured fabric, from layer 6E.

6. Shoulder sherd and other pieces (also from 6E) of a spouted pitcher of the same class as nos. 4 and 5; coarse clayey ware with some large grits, mostly 2-5 mm.; buff surfaces and fracture, but grey where the fabric is protected by the irregular pitted olive to orange glaze: for the technical significance of this pitting, seen on much of this pottery, in relation to the glazing process see below.

7. Small piece of oval-sectioned rod-handle in harsh, fairly fine sandy fabric, grey core and surface, except under the olive glaze, where there is a pale grey layer.

b) Cooking-pottery.

8. Three sherds of a very hard-fired squat cooking-pot with flat base, which seems to have been made of a fine clay which has vitrified considerably almost to a stoneware, having a metallic ring; the matrix holds particles of a regular added grit, mostly of particle size, 0.5-1 mm. Though this pot has evidently been fired to above about 1,100° c., it is nevertheless not over-fired (in the sense that no firing-faults, such as cracks, blisters or twisting can be seen in the surviving pieces), and it looks as though such excellent fabric, impervious without a glaze, was being made intentionally. The fracture is red and the surface brown to black, glossy brown at the rim but matt elsewhere; the vessel shows some finger-rilling round the outside of the body.

There are four other sherds of paler colour and reddish surfaces, one bearing streaks of glaze down the inside over what seems a zone of very thinly applied painted slip, giving a slightly darker surface colour: see also no. 32, from layers 3/4. Another

sherd, of slightly less hard-fired ware, has a thick, even brownish glaze on the inner surface.

This form of squat vessel with perfectly flat base, made so by cutting with a sharp tool, is of considerable interest at Carlisle. Closely similar vessels were being made in the Parliament St. kilns at Nottingham (8A), the working period of which is loosely datable to the second half of the 13th or the 14th century (8A and 8B, *Trans. Thoroton Soc.* 33, 1932, pl. XVII bottom left, facing p. 122). Such vessels are versions of the small medieval cooking-pot, but these unusual features of squat shape and deliberately cut, perfectly flat base do seem to connect Carlisle with Nottingham. Flat-bottomed vessels, a little taller and with skillet-handles, were being made for instance in the kilns at Brill (Bucks) in the late 13th or early 14th century (*Records of Bucks* 16, 1953-54, 39-42). It is interesting, moreover, to find these pots at Carlisle in a level otherwise datable to the first three quarters of the 13th century.

8A and 8B. Complete vessels of this type, in hard, sandy grey ware, from the Parliament St. kilns, Nottingham (Nottingham Castle Museum). The bases here have been removed from the wheel with a knife, but have not then been so sharply trimmed as the Carlisle specimens.

9. Roll-rim of a cooking-pot in a fine, slightly sandy clay with very little added coarse grit; fairly hard-fired, buff fracture and buff surfaces with blackened patches. This rim, with slight hollowing of the inner surfaces, is suspiciously reminiscent of the late Saxon "St Neot's" ware cooking-pots of eastern England, and though not of their shelly fabric, even the surface texture is so reminiscent. These "St Neot's" wares are so far known as far north as the Nottingham area, Lincoln and York: see the map in *Proc. Cambridge Antiq. Soc.*, forthcoming; but the nature of the apparent relationship with the Carlisle pot is not yet clear.

10. Sherd of rim-flange and shoulder of a cooking-pot of northern 12th century type, in fabric as no. 5 but without grey core: compare *Antiq. J.* 33, 212, fig. 1, no. 15, from Knaresborough, Yorks.

11. Cooking-pot rim of rounded form, with markedly hollow inner surface, in a rather friable buff ware, containing much grit in the 0.5 mm. range, but with some as large as 2 mm. Another sherd is very similar.

c) *Fine whitish glazed wares.*

12. Fragment of a jug-neck in hard white ware, with sparse small grits set in a fine white, partially vitrified matrix; over

the exterior surface a thin orange slip has been painted, thereby obscuring the fine white quality of the clay (a whiteness which Islamic potters had striven to achieve in imitation of imported Chinese wares since the 9th century). Over this slip a patchy brownish-yellow lead-glaze has been applied, and it may be that the slip was intended to prepare a surface to bind the glaze: on this ware the glaze is sometimes applied to the fabric with no slip between, and sometimes it has cracked away badly from such areas. The fine grooving on the surface indicates that the jug was thrown on a speedily rotating wheel.

Not illustrated, also of similar ware though slightly more sandy, is one body fragment of a jug, with thumb-impression, from the base of a handle junction; it has a similar orange slip, applied patchily, with the yellow glaze (also somewhat irregular) applied directly to the white clay as well as over the slip. One other body sherd of this white ware has a similar thick yellow glaze (pitted, as on no. 6) but with no reddish under-glaze slip.

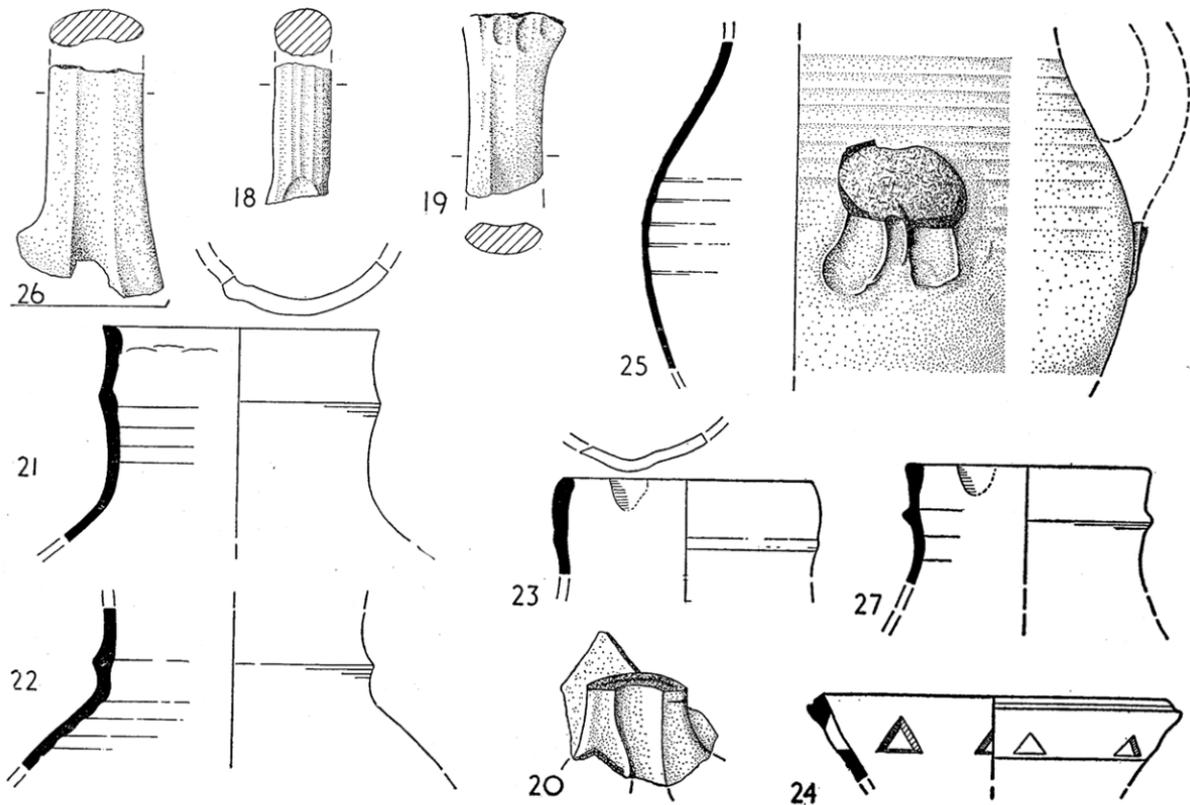
This ware is thus not common in this deposit at Carlisle, and it occurs in no other level on the site. Fragments of jugs of very similar fabric, slip and glaze have been found at Clough castle, Co. Down, in levels datable to the first half of the 13th century, and had been considered by the excavator as English imports (D. M. Waterman, *Ulster J. A.* 17, 1954-55, 126 and fig. 6, no. 5). The not dissimilar whitish wares found at Castledykes, Kirkcudbright, have a good green glaze (Stewartry Museum, Kirkcudbright, PSAScot. 48, 1913-14, 390-394). The ware occurs at Chester, and though not in datable contexts, at least some of the sherds are from vessels of early type, probably early 13th century. There is also one sherd of hard pinkish ware, with good orange glaze (as in layers 6A and 5) closely comparable with pottery from Castledykes, Kirkcudbright.

(iv) *Layer 6A.*

The material from this layer (sandstone rubble foundations) seemed to be made up of pottery appropriate to layer 6, some joins with sherds from that layer being noted, and this has been described under that layer (no. 5). The rest seems appropriate to layer 5.

(v) *Layer 6E.*

This layer, from its pottery content, is evidently much disturbed.



(vi) *Layer 5* (figs. 9 and 10).

There is a sharp distinction between the styles of the main bulk of pottery from this layer and that from the underlying layer 6. It is not possible to be sure whether there was an interval of several decades between those layers, but it does seem probable. There is a little evidence of kiln activity (see below) from layer 5, and it would appear possible that the burnt wood and brick debris included in the top of this layer was in fact kiln debris, from which the wasters of this layer might well have come.

a) *Glazed pitchers.*

13. Part of the base of a fairly large pitcher, of slightly sandy fabric with dark grey core and 1-3 mm. buff surface layer inside and out. The base is slightly convex, the rotational marking towards the centre of the interior surface having been obscured by the pummelling process by which the convexity has been produced out of the flat base formed on the wheel. The base angle has been pinched at fairly close intervals with the pitcher upside down after the formation of the convex base, the forefinger having actually made the elongated impressions showing in the vertical side of the vessel. This is often erroneously called a "thumbed" base, but it is best described as a "pinched" base: for a real "thumbed" base see no. 15, below. The pinching of the base angle is a common feature of medieval pottery in Britain, from the 13th century onwards, though it does not seem to have been used earlier, and it is perhaps less common again, at any rate in the north, in the 15th century.

14. Parts of a base of hard-fired ware of medium fine texture, dark grey fracture with a buff to reddish surface layer 1-2 mm. thick, except where covered with patches of olive glaze; these patches have a brown fringe, due to oxidation of the iron at the spreading edges of the flowing glaze. Both olive and brown colours are due to iron in the ferrous and ferric states respectively, as is clearly shown by re-firing an olive glazed sherd under oxidising conditions. The glaze on the under surface of the base stops short at the outer edge of the *stacking-ring* (the ring left by the impression of the rim of the pot stacked on top of it, pots being stacked in the kiln upside down).

15. Part of a pitcher of hard, slightly sandy ware, as no. 14; dark grey fracture with 0.5-2 mm. surface layer, reddish-buff except under the olive to brown glaze, where it is whitish grey; thumb impressions at fairly frequent intervals round the *under*

edge of the base angle, apparently produced by pushing the thumb outwards against the thumb and forefinger of the other hand. Such pinching seems quite purposeless, except to give a mildly frilled effect to the base angle as seen from the side. It also occurs on bases from Burgh-by-Sands (the pottery from which will be published in a later volume of these *Transactions*), at Brough-under-Stainmore and Brougham castle, and on a large three-handled pitcher from Bothwell castle, Lanarkshire (PSAScot. 86, 1951-52, 144, no. 10). There is a stacking-ring on the under surface of the base.

16. Sherd of jug-rim, of slightly over-fired, close-textured fabric, containing a certain amount of medium sand; grey fracture and inner surface, buff on exterior, with small thin spots of glaze. Perhaps somewhat mis-shapen. The clubbed rim has a flattened top.

17. Sherd of jug-rim in hard, sandy buff ware with grey surface layer under the glaze, which is on the outside, spreading a little over the rim to the inner lip; it is deep green, probably produced by copper, and has some brown mottling. This rim form is common on 13th and early 14th century pitchers in England and Scotland (e.g., Bothwell castle, PSAScot. 86, 1952, 150 and fig. 23).

18. Part of rod-handle in somewhat powdery, clayey ware with some added sand, consisting of water-rounded quartzite particles up to 1 mm.; grey fracture, reddish surface layer except under the dirty olive glaze. The outer face of the handle is grooved down its length, and the beginning of the thumb impression for fixing it to the body can be seen.

19. Part of a thick strap-handle in hard, sandy ware, the sand grains being partially water-rounded, mostly about 0.5 mm.; grey in fracture and under glaze, with a thick buff surface layer otherwise. That the dark green of the glaze is due to ferrous iron is shown by the pale orange glaze colour at the oxidised fringes. The piece includes part of the neck of the pot, which bears a thumb-impression on the inside, and the upper end of the handle has three shallow finger-impressions; this shows how the handle was attached to the neck.

20. Lower junction of handle with body of a large pitcher, in hard-fired close-textured grey ware, with a reddish-brown surface layer about 2 mm. thick where not glazed. The even olive glaze over a grey body, the hard fabric and the sharp ridging of the handle section are all characteristic of much of the pottery from layer 4, and these features are described under nos. 17 and 23; this is the only piece of such ware from layer 5, though there is a similarly formed handle-junction in a slightly

coarser, less hard fabric with blotches of olive and brown glaze.

Among a considerable number of other jug fragments from this layer should be mentioned: (1) three pieces of pale buff, clayey ware with orange-yellow, fairly even glaze (cf. sherds, perhaps from the same vessel, in layers 6 and 6A); (2) a piece of jug-neck with rouletting as a series of 3 mm. square holes along the upper edge of a rounded horizontal ridge, and olive glaze over hard, clayey grey fabric with pale buff interior: fragments with similar rouletted ribs occur in layers 6A, 4 and 3/4; (3) parts of a jug in hard-fired, metallic-sounding grey ware with a mottled olive-brown to purplish exterior glaze; (4) parts of similar ware but with whitish 2 mm. layer in fabric under glaze, less purple and with marked interior body-rilling; (5) a sherd with cut horizontal girth-grooves in pairs 1 in. apart; (6) one piece glazed brown on interior; (7) a rod-handle of oval section in rather coarse sandy ware, with grey and buff surface layer 5 mm. thick, carrying a thin orange-yellow glaze with some green speckling, due to sprinkling copper or bronze filings on the surface before the firing of the glaze; (8) two pieces showing evidence of kiln activity, one with badly bubbled glaze, and the other with parts of another vessel sticking to the glaze, of dark grey fabric with a whitish layer under the glaze: both these, however, are very like a considerable group from the overlying layer 4, clearly denoting kiln activity near by.

(vii) *Layer 4* (fig. 10).

This layer, and layers 3 and 3/4 above it, contain mainly later medieval pottery, with comparatively few sherds derived from earlier deposits. Little distinction can be drawn between the pottery from these layers; its period of manufacture and use probably extended over much of the 14th and part of the 15th century: it is not possible to define the upper limit precisely, but the absence of later features such as bung-holes, and of any suggestion of 16th century fashions, may be noted.

The evidence of kiln activity is concentrated in the material from layer 4, and there can be little doubt that the burnt brick and wood on which the layer rested was in fact the debris of medieval destruction of a near-by kiln; the stone sconce might even have been associated with pottery manufacture, such as a settling-tank for slips or slurries, though on excavation it contained only black soil.

21. Part of the rim and neck of a large jug in hard, somewhat over-fired grey ware of fairly sandy texture, with pale grey, thin surface layer where protected by the glaze, which is

applied only to the exterior. The olive glaze is smooth and has thicker darker vertical streaks; on the upper zone it has flaked away badly from the body surface. The top of the rim has a few small firing-cracks and bubbled glaze round the lip, and it is one of the few rims showing evidence of sticking to the base of the pot on which it stood in the kiln, leaving a stacking-ring thereon; this neck may of course have been smashed in removing it from the base. The sharply moulded ridge below the rim is a feature of several jugs from layers 3, 4 and 5, and is frequent enough on Scottish medieval pottery, for example at Bothwell (PSAScot. 86, 1952, 140 ff., especially 143, fig. 8 and 154, no. 30).

22. Part of the neck of a jug in hard, close-textured grey ware, less sandy than no. 21, with characteristic pale grey surface-layer under the olive to brown glaze, which is on the outside only.

23. Jug-rim of hard, dark grey close-textured fabric with little added grit, having a pale grey surface-layer under the exterior glaze. This glaze has weathered badly to a fine whitish powder, but a few patches remain intact, a rich brown.

24. Rim sherd of a wide-necked vessel in hard, fine sandy grey ware, with badly weathered and flaked iridescent brownish-yellow glaze. This widely flared rim has had a series of triangles cut out of it before firing, and is evidently intended for some ornamental purpose.

25. Part of the body of a large pitcher (with handle-junction), in grey, hard-fired clayey fabric with a very little added grit (up to 0.5 mm.), carrying an olive, fairly even glaze. Rilling is visible at full girth on the inside and on the shoulder outside; such marks of finger-pressure are implicit in throwing this shape of pot.

The strap-handle was first fixed at the neck, as in no. 26 below, then drawn over to the necessary curvature, a channel down the back being pushed by the thumb and finished by pressing the thumb on to the body; this gives the section so characteristic of these strap-handles. The lower junction was finished by pressing the outer ends of the handle into two broad thumb-impressions down below the girth of the body. This type of handle-junction, common in the north of England and in Scotland during the 14th and 15 centuries, appears also among the wasters from this site.

26. Lower half of a strap-handle in a fabric sandier than no. 25; grey fracture and light reddish surface layer, except where protected by the olive to orange glaze. This handle has been made as described under no. 25 above.

27. Jug-rim of hard-fired ware with metallic ring, grey core and light red inner surface-layer 2 mm. thick, covered outside with mottled olive glaze; it has a rib 2 cm. below the rim, and a small thumbed-out lip. A lip-fragment of similar type (but in a finer sandy ware) comes from layer 3/4.

Also from layer 4, but not illustrated, are (1) two bases, one of hard-fired, fine grey ware with olive glaze on the outside, showing a stacking-ring on the under surface, inside which the glaze has not penetrated; (2) body fragment of an olive-glazed pot, ornamented by rows of impressions made by the thumb pressed on the outside against two fingers pressed on the inside.

Kiln activity. A group of some sherds from layer 4 is clearly waste material from kiln activity, where handled pitchers, of the type seen in nos. 21, 22 and 25, were being made. The technical details of firing deducible from them are discussed below.

(viii) *Layers 3 and 3/4* (fig. II).

28. Part of a very thick convex base from a large, wide vessel, perhaps a storage-jar; hard-fired, fine-textured dark grey gritty ware, with 1-3 mm. paler surface layers, and dirty olive glaze on the outside. A rib has been added, apparently with a tool, to the outside of the base angle; it did not function as a foot-ring, but only served to check the vessel from toppling over. (From layer 3/4.) Such vessels are found in later medieval deposits on Scottish sites.

29. Another thick convex base, of similar fabric and exterior glaze, but without an applied rib, comes from layer 3.

30. Part of a jug-neck in hard sandy ware, grey in fracture, with grey interior and reddish exterior surface layer about 2 mm. thick, which has gone to a whitish grey under the olive exterior glaze-patches; the latter have yellowish-brown edges, due presumably to the air penetrating a little through the fabric under the glaze-patch and oxidising the iron. The moulded ridges at the top and bottom of the neck are nicked into a toothed effect. A similar sherd is from layer 6E (cf. also sherds from layers 5 and 4).

31. Base of a rod-handle round in section, in very pale grey ware, very pale buff on the surface, moderately hard and with some grit up to 1 mm., carrying an olive glaze with brown mottling. Thumb-impression in centre of handle-base, the result of the fixing process. Almost certainly derived from an earlier deposit; it would be most appropriate in layer 6.

32. Rim of small cooking-pot in hard reddish ware, as no. 7, probably derived from a deposit of the same period as layer 6; there is also a rim of this type from layer 6A.

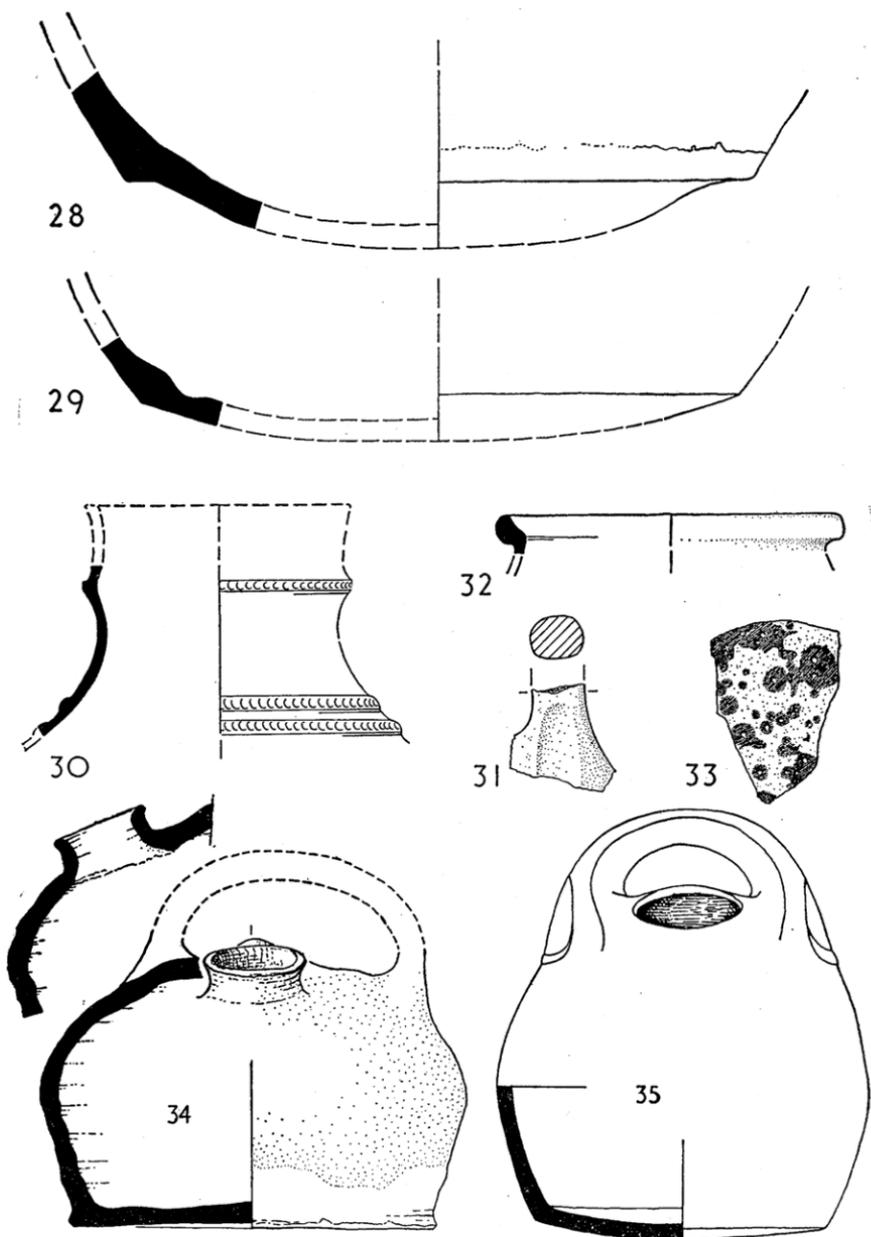


FIG. II. ($\frac{1}{2}$ except No. 33, which is $\frac{1}{4}$).

(e) *Pottery kiln activity on the site.*

Period of kiln activity. From layer 4 came a considerable number of waster sherds from pottery kiln activity, among them many which fit together; there are also a few waster sherds of the same character from layer 5 (see above). Kiln wasters do not occur in the earlier layers 7A, 6 or 6A, nor in the later layers 3 and 3/4, though sherds of vessels of the type made in the kiln do occur in the upper layers. It seems most probable, as we have said above, that the burnt brick and wood included in the upper part of layer 5, and on which rests layer 4 which contains most of the wasters, is in fact debris from the destruction of part of a kiln, such as litters the area of any substantial medieval pottery manufactory, where the kiln-domes were usually temporary structures of clay and wattle, dismantled after each firing so that the products could be removed. The kiln activity here may most reasonably be considered as going on during the 14th century, as has been noted above.

Types of vessel made. On the basis of the waster sherds, the making of only two types of vessel can be demonstrated, namely the wide pitcher with thumbled handle-junction, as no. 25, and the large wide vessels with thick bases, as nos. 28 and 29. It may well be that we have here the debris raked back after one particular firing.

Firing-faults demonstrable on the wasters. Firing-faults include the following:

(1) *Blistering* of the lead-glaze, which may be due to a number of causes—under-firing, over-reduction, or sulphur compounds in the clay, but *not* (as might be thought at first sight) *over-firing*: cf. J. B. Kenny, *The Complete Book of Pottery Making* (London, 1949), 212 ff., which lists glazing defects. This effect has been reproduced (see experiment 4, below).

(2) *Face-blowing* or *dunting*, in which flakes are blown away from the face of the vessel during firing, by the building up of gas pressures, usually in layers of steam generated in the body of the fabric, due to poor wedging of the clay or inadequate drying of the thrown vessel; it can also be due to too rapid cooling.

(3) Sharp angular *cracking* on too rapid heating or cooling, especially past the transition temperatures between the different forms of silica (573°C.); glaze may sometimes be seen running over these sharp cracks, if they occur on heating rather than cooling.

(4) *Warping* (pl. IV shows a warped base) can be due to faulty stacking, or to disturbances in the kiln, as when a pot blows out.

(5) Stacking-rings (pl. IV): when glaze is allowed to run between the base of one upturned pot and the rim of that stacked upon it, these two will be fused fast together on cooking; they could only be separated by breaking one of them, and it was naturally easier to preserve the base intact and trim the stuck rim from it, than the reverse process. Many bases from this site show this stacking-ring, but only one rim-portion seems to have left part of its substance behind, and this may be a discarded waster, broken in the very process of removal from the base. Stacking-rings may also be seen among the material from Burgh-by-Sands, and it seems that many pots survived in usable form after having adhering rims removed from their bases; nevertheless, this particular fault must have caused a heavy wastage at kilns on the products from which stacking-rings may frequently be seen.

(f) *The technique of pottery-making, as seen on the Carlisle pottery.*

Much can be deduced about the processes used by medieval potters in the north-west through a detailed examination of the pottery, wasters and otherwise, from this site, supplemented by a number of firing experiments.

The Carlisle pottery from the 12th to the 15th century, as seen from this excavation, has all been thrown on fast wheels with some skill. On the pitchers the handle-junctions, with emphasized thumb and finger impressions at the top and bottom, are particularly characteristic of the north. One noticeable feature about the pottery from this site is the lack of applied plastic ornament as a secondary process after the wheel-work; as this is otherwise frequent in the north, its absence may have chronological significance on this site.

The pummelling-out of the centre of the pot-bottom, to form a convex base, is a common medieval feature, almost universal on the cooking-pots but found also on pitchers; the flat-based cooking-pots (nos. 8, 8A and 8B) are unusual. We would suggest that the convex base was most usually produced by a combination of pressing (perhaps with a pad on the end of a stick) in the centre of the base, and easing its outer edge away from the wheel-head with a wooden blade or a knife, perhaps with some rotation, while the pot was in the green-hard state. Unless pots were produced on a bat (a detachable plate or tile on the wheel-head), the wheel would be immobilised while the pot dried sufficiently to remove it safely: hence it was in the interests of economic potting to remove the pots as quickly as possible, and

the evolution of such a method for the removal of wide-based pots while still green-hard may be partly the reason for the almost universal convex base on medieval coarse pottery. But some of the earlier convex-based pots (the late Saxon wares of East Anglia, for instance) are narrow, and the advantages of the convex base in minimising the risk of cracking when heated must be remembered: compare the use of round-bottomed, rather than flat-bottomed, flasks for heating liquids in the laboratory. The procedure for producing convex bases by carving them out of the solid, suggested by T. C. M. Brewster (*op. cit.*, 44) does not seem applicable to this Carlisle pottery, nor indeed to much other British or continental medieval pottery, on which pummelling marks on the inside of the bases are often visible; it does not seem to us an economic or indeed a particularly feasible procedure for producing such a base-form, and the knife-marks sometimes traceable underneath and on the sides of the base-angles of such pots seem to us to be merely the result of trimming. Nevertheless, convex bases are so produced on pottery in parts of the Near East even today, the cutting-marks there being completely obliterated by hand-working.

The clays used by the Carlisle potters were on the whole good and fine, firing easily to a partially vitrified matrix. Some contain a very fine sand, probably in the clay itself; other fabrics, however, have added grit of particle size (usually up to about 1 mm.), mainly angular quartz, water-rounded particles being comparatively rare. The whitish fabric of a few yellow-glazed sherds from layer 6, and the pale buff of a few orange-glazed pieces from layers 6 and 5, are particularly noteworthy; the origin of this material is uncertain, but its rarity at Carlisle and its occurrence elsewhere (Chester, Kirkcudbright and in Ulster) suggest that it is not local.

The whitish surface layers, about 1-3 mm. thick, over a dark grey or blackish core, seen on much of the pottery from layer 5 upwards, and commonly seen in Scotland, is due to loss of iron specifically from the outer layers of the fabric; this can come about on firing clays containing salt, the whole process of formation of the pale layer probably being as follows. On drying the vessel, the salt water diffusing through the clay to the surface carries salt with it, which is thus concentrated near the surface as the water evaporates; on firing, the sodium chloride begins to volatilise significantly above 813°C., and immediately attacks the iron compounds in the clay which it reaches, forming ferric chloride, which is quite volatile above 450°C., and hence comes off (see experiment 1). The whitish layers thinner on the inside than on the outer surfaces of our pots are simply the result of

the greater rate of evaporation of water from the outside than from the inside of the pot, presumably dried upside down, thereby concentrating the salt more near the outer surface; such pale layers on the inner surface can be so thin as to look like a slip: cf. F. R. Matson in N. Toll, *Excavations at Dura Europos*, Final Report IV i, part 1: *The Green Glazed Pottery* (New Haven, 1943), 85-88. It must be emphasized that much of the actual blackness of the core is due to carbon not burnt out, but that this loss of iron has contributed to the effect, and given the whiteness of the outer layers, is shown on re-firing and cooling the sherds with free access to air, when the distinct layers are still maintained in shades of pale and deeper pink or buff (see experiment 1, below).

The olive-green glaze frequently seen over the exterior white layers is discussed below. The appearance of this white layering at Carlisle suggests the digging of clay along the shores of the Solway estuary, at any rate during the 14th and 15th centuries, as might be expected in this area; there are, for instance, medieval claims to the right of digging clay from any area covered by the water of the river Hull at its highest (which included tidal reaches).

The 12th century wares are well-fired, having been baked to about 1,000°-1,050°C. From the 13th century onwards, the fabric firing seems often to have been higher, 1,050°-1,100°C. or, in some cases, more. The plastic clay used for the matrix in some cases (no. 8) easily vitrifies, and the metallic ring may be misleading in suggesting high firing-temperature.

The lead-glazes cover the exterior surfaces of the pottery somewhat erratically, and are rarely used on the inner surfaces; in many cases the surface of the fabric, beneath the glaze, is pitted (e.g., on no. 33), and often as the glaze thins out, or on otherwise unglazed areas, small spots of glaze can be seen, each emanating from one of these surface pittings. By taking unglazed areas of this pottery and placing thereon individual small fragments of galena (natural lead sulphide), and firing to about 940°C., we have been able to reproduce this pitting effect exactly (see experiment 2). It is thus clear that the pitted appearance can be the result of sprinkling coarsely powered galena over the already biscuit-fired ware, probably covered with a paste of size or flour to make it stick. The spots of glaze, each spreading from a pit-mark, are a common feature of northern medieval wares, particularly at Nottingham, and of the medieval glazed wares of Scandinavia; they appear particularly on surfaces not intended to be glazed, such as inside. Thicker and more even glazes, with no observable pitting, are also found all through the sequence of

this Carlisle pottery; these can be produced by applying finely-powdered galena, sometimes perhaps made into a slip with fine clay, to the biscuit-fired vessel and then re-firing (experiment 2, below), but these glazes begin to run off the fabric, leaving bare unglazed patches, if heated above 1,000°C. for any appreciable time.

It is difficult to be certain here, but our experiments seem to indicate that from the 12th to the 15th centuries the Carlisle potters were giving their wares two separate firings, one for the fabric ("biscuit") and another for the lead-glaze. We have reproduced the pitting effect by dusting galena particles on to fired unglazed surfaces, but we have not so far reproduced it by firing green-hard clay with galena similarly on the surface. On the whole, the fabrics have been carried up to temperatures well above that at which the lead-glaze begins to run off, leaving bare patches, which are not often to be seen on the pottery in places where the glaze could have run off; such patches can be produced quite quickly by heating glazed sherds up to 1,050°, however (see experiment 3). The development of the whitish layer is presumably also a pre-glaze phenomenon, which would hardly occur once the surface was protected by a glaze impermeable to vapours, though it might already have occurred before the temperature of formation of the lead silicate was reached.

The green colours so frequently seen on these Carlisle wares are entirely due to the presence of iron in the reduced (ferrous) condition; this is easily demonstrable, as these green glazes fire to a pale red-brown on heating under oxidising conditions (see experiment 1). Copper greens, on the other hand, are developed under oxidising conditions, and the striking green speckles on an orange background glaze and fabric, produced by spattering the surface with copper or bronze filings before the glaze-firing which (or the subsequent cooling) was then done under oxidising conditions, are absent from the Carlisle material, and rare in the north though in the south extremely common from the 13th century onwards.

(g) *Firing experiments on sherds.*

1. Firing to 940°C. of a sherd (broken in two parts, one retained for reference) of very dark grey ware with whitish-grey exterior surface layer 2 mm. thick under poor blotchy olive glaze, and 1 mm. pale buff interior layer. Fairly rapid cooling under oxidising conditions. This treatment yielded a bright brick-red fabric where it had been very dark grey before, and the whitish and buff layers were traceable in the clean fracture as buff layers paler than the brick-red of the core; the glaze

changed from a blotchy olive to a fairly even transparent orange-brown. This demonstrates the striking contrast between oxidising and reducing conditions for exactly the same material.

2. A sherd of the pitcher no. 6, with pitted exterior glaze, was divided on the interior unglazed surface into two zones; on one was applied finely powdered galena, and on the other three individual fragments of galena (2-3 mm.), one over a small angular quartz fragment protruding through the surface. This was heated to 940°C. and cooled under oxidising conditions. The finely powdered galena gave an even dark brick-red surface with an orange-brown vitreous glaze obvious only in patches, the rest looking almost like a slip. Of the three individual lumps, that placed over the quartz fragment left it entirely unchanged; those placed on the smooth biscuit surface reproduced exactly the pitted effect of the original exterior glaze, as seen in no. 33, each fragment of galena producing a single pit. It is thus clear that this widely-seen pitted effect can be produced by firing coarsely produced galena sprinkled over wares already biscuit-fired to about 1,050°.

3. A fragment of dark grey sandy ware with dark olive even surface glaze was broken in two, and one piece heated to 1,050°C. and cooled fairly rapidly under oxidising conditions by simply removing it from the oven; the fabric came out brick-red with transparent brown glaze, which had run away considerably from the dome of the convex sherd, leaving a bare patch. The inference is that the glaze on these pots cannot have been fired so high as the necessary biscuit-firing temperature of about 1,050°C. (in a kiln the ware would have stayed at the higher temperatures much longer), and that therefore there must have been biscuit- and glaze-firings as two separate processes for any one pot. It also emphasizes once again the striking colour differences between examples of the same material cooled under reducing or under oxidising conditions.

4. A sherd of hard sandy ware with dark grey core and white exterior surface layer, 3 mm., under a thick even olive glaze, was broken in two parts. One part was fired to 940°C. in a lidded crucible (a "sagger") containing carbon; the "sagger" was then removed from the oven, placed in an airtight container and cooled rapidly. The resulting sherd retained the colouring of the original but the green glaze came out badly blistered; this shows that such blistering can be due to too rapid cooling under reducing conditions. But it did not happen after rapid cooling under oxidising conditions.

5. A fragment of pale whitish-grey ware with a pale olive even glaze was broken in two, and one piece heated to 940°C.,

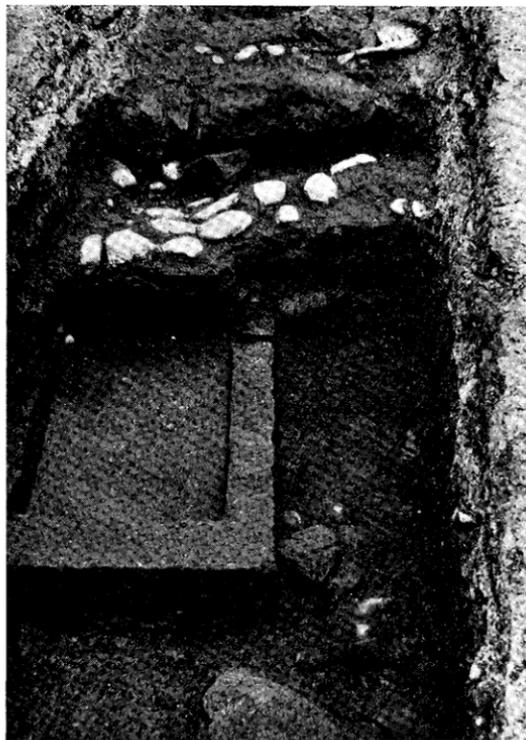


PL. I.—Scotch Street excavation from the W., showing cobbles in part removed to expose well-head timber re-used as a foundation for the cobble spread; beneath the timber is an occupation layer of dark brown soil resting on a subsoil of pale grey laminated clay.

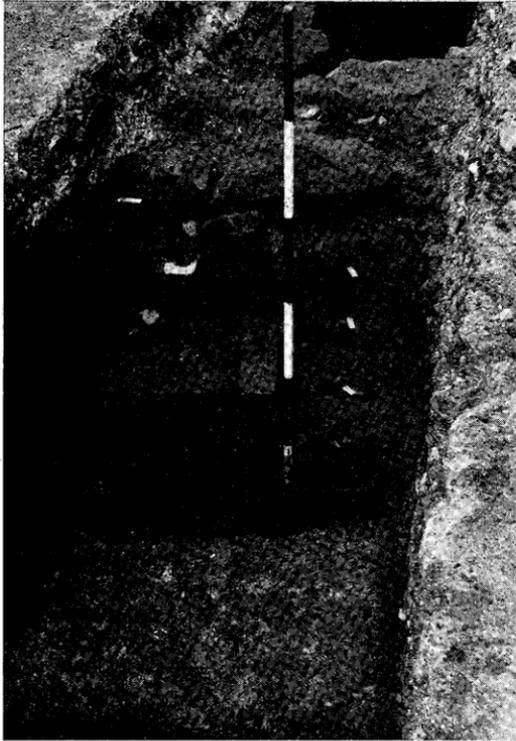
facing p. 106.



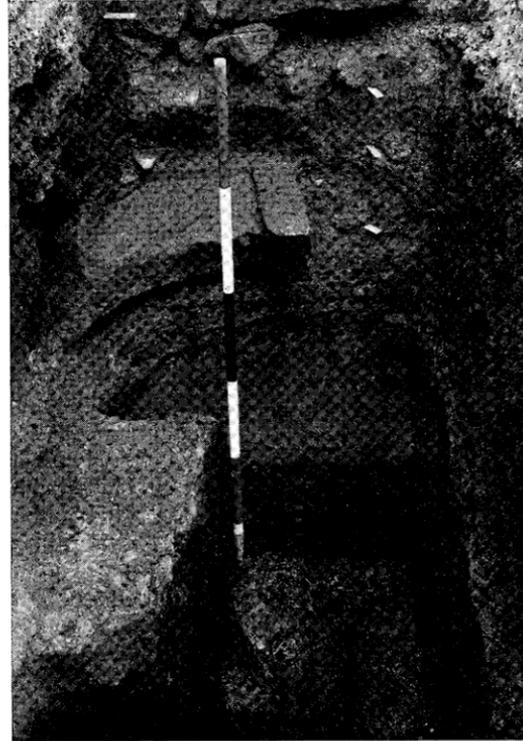
PL. II., FIG. 1.—Castle Street excavation from the E.: paved floor and cross-wall of 18th century building beneath 19th century concrete spread.



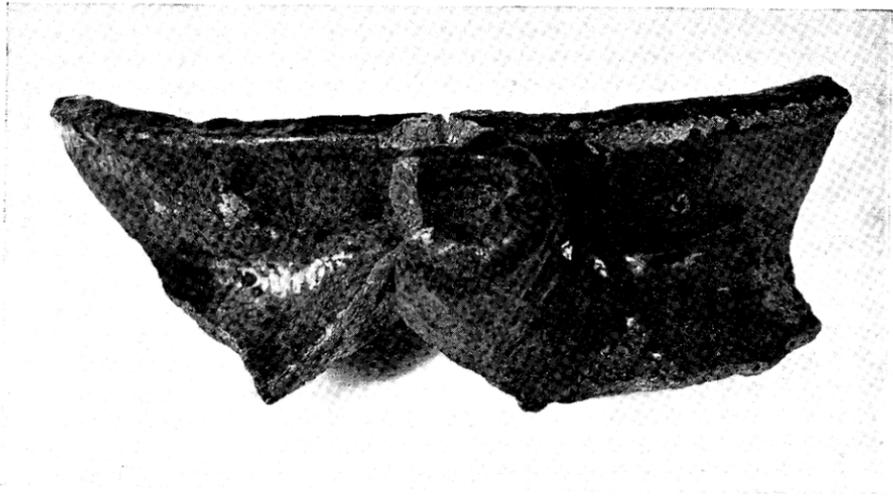
PL. II, FIG. 2.—Castle Street excavation from the W.: stone trough below heavy post-medieval cobbling.



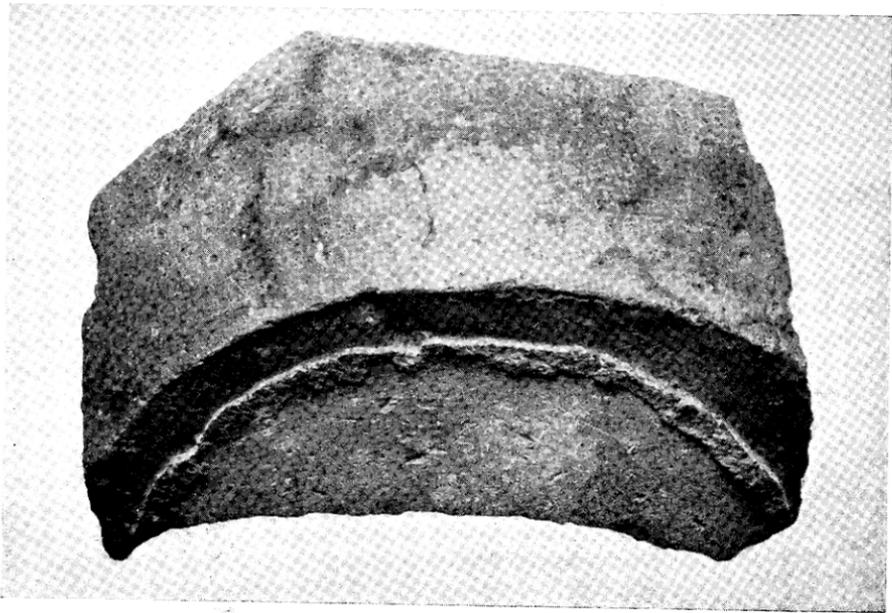
PL. III, FIG. 1.—Castle Street: stone trough partly removed, revealing foundation of sandstone rubble in lime, crossing the trench on the same alignment as the 18th century building above it.



PL. III, FIG. 2.—Castle Street: sandstone rubble foundation removed, revealing a deposit of thatch and wood lying on a cobble spread beneath it.



PL. IV, FIG. 1.—Rim and spout of glazed pitcher, no. 4 (later 12th century).



PL. IV, FIG. 2.—Underside of base of glazed pitcher (14th century), showing the "stacking-ring".

and then cooled under oxidising conditions with a little powdered galena placed on the unglazed interior surface; the fabric came out a creamy buff, and the original glaze a pale transparent orange, the newly-applied galena yielding a glaze indistinguishable from this. Thus it is clear that such an orange glaze can be produced by applying galena alone to such fabric, which yields sufficient iron for the orange colour. This fabric had tiny speckles of reddish bricky material in it; lemon-yellow glazes could only have been achieved on clays containing even less iron.

Acknowledgements. We wish to express our thanks first to the excavator, Mr Robert Hogg, for the invitation to report upon this interesting series of medieval pottery, and for his patience while the report was under preparation; secondly, to all those who have with great kindness made available, often at awkward hours, the collections of pottery in their charge or their possession: Mr James Bonser and Mr Chisholm at the Wilton Park Museum, Hawick; Mr G. E. Paterson and Mr Thompson at the Stewartry Museum, Kirkcudbright; Mr R. B. K. Stevenson and Mr S. H. Cruden at Edinburgh; the custodians of Brough and Brougham castles and the vicar of Brough, Mr Daunt; Mr W. A. Smallcombe and Mr G. C. Boon at Reading Museum; Mr Pitman at Nottingham; Mr G. C. Dunning of the Inspectorate of Ancient Monuments; and at the Ashmolean Museum, Oxford, Dr D. B. Harden and Mr J. D. A. Thompson. We are also most grateful to our colleagues, Mr D. M. Waterman for a number of points concerning medieval pottery in the North, and Dr Cecil Wilson and the technical staff of the Chemistry Department, Queen's University, Belfast, who gave us every help in using their gas furnace for the pottery-firing experiments.