

## A METAL-WORKING COMPLEX IN THE MEDIEVAL CITY OF TRONDHEIM, NORWAY (Figs. 5 and 6; Pl. x)

In April 1987 a large block of buildings, the Mellager area, was demolished to make way for Trondheim's new concert house, and a programme of archaeological sampling trenches was initiated here. The unexpected discovery, in the first trench (Trench B; Fig. 6), of a c. 1 to 1.5 m thick body of stratified deposits comprising waste debris clearly deriving from medieval metal working prompted a three-month rescue excavation on an area of some 370 m<sup>2</sup> (F-site; Fig. 6).

The excavation lay to the south-west of the Mellager area, itself situated to the north-east of the Nidarnes peninsula (Fig. 5) on which the medieval town (Nidaros) grew from roots established in the late 10th century.<sup>1</sup> Ørene, the area north of the medieval town's perimeter (Fig. 5), seems to have served as an assembly point, for armies and the Øre-Thing, and as a site for ship-building. Sverre's saga (written c. 1200) mentions the presence of smithies here, while a 16th-century copy of the *Nightwatchmen's Itinerary* preserves the 13th-century route by which the watchmen were to meet 'at Ørene by the smithies'. Ørene was a large expanse of sand-banks and previous observations suggested that the Mellager locality was prone to flooding for most of the medieval period.

In fact, evidence from the 1987 season demonstrates that while this locality was indeed a flood-prone sand-bank, occasionally visited in the late Viking period (two camp fires were found within the alluvial sands and gravels, the lowest of which produced a Stuiver-Pearson calibrated radiocarbon date of A.D. 900–1027), the excavated area was occupied much earlier than expected. Evidence derived from radiocarbon samples, land rise estimations, pottery, coinage and documentary sources places the inception of metal working on this virgin stretch of river bank to within the second half of the 12th century. The site was devoted to metal working from the start, continuing possibly until the mid 14th century when the Black Death may have ended activities.

The archaeological deposits were much disturbed and highly complex stratigraphically. It was thought originally that the area comprised simply dumped detritus from workshops sited elsewhere, but it soon became apparent that the slag-, clay- and charcoal-ridden layers incorporated traces of buildings and various hearth or furnace features, pits and stake-holes. The fragmentary remains of two parallel structural ranges were found, aligned north-east/south-west. These comprised either two elongated partitioned buildings or two rows of conjoined structures, separated by an intervening open space or yard used for dumping, a lay-out repeated through at least six phases of constructions (Fig. 6). The structural remains consisted of fragmented burnt or unburnt timbers often resting on clean gravel spreads, rows of pad stones, or large post-holes, all conforming to the characteristic orientation. Clearly, metal-working activities were conducted within a regulated structural environment from the outset: in effect an ordered complex of workshops and associated industrial features. On the basis of the surviving evidence it is possible to suggest that these workshops were relatively insubstantial, perhaps similar to those mentioned in connection with goldsmiths in the Bergen Town Laws of 1276, i.e. single-storeyed vertical plank-built huts with earthen floors. Floors here consisted simply of strewn debris and while occasional patches of compacted clay may be remnant laid flooring they might equally derive from activities within the workshops, processes represented by the remains of a large number of hearth/furnace constructions, often occurring in superimposed sequences in specific localities within the workshops (Fig. 6; Pl. x, A). These were mainly bowl-like subcircular pits c. 0.5 m to 1 m in diam. by c. 0.3 m deep, usually back-filled with waste debris; some examples contained the remains of internal arrangements such as stone slabs set on edge and/or laid flat to form an internal chamber (K3, Fig. 6; Pl. x, B and C) or, alternatively, successions of burnt clay linings. In the lowest levels, at least one rectangular construction incorporating (?) pegged and nailed wooden panels and clay survived (K22, Fig. 6); it may be pertinent to note that the 12th-century craftsman Theophilus described the construction of a metal-working furnace using such materials.<sup>2</sup> Later features superimposed here consist of collapsed stones with clay, possibly

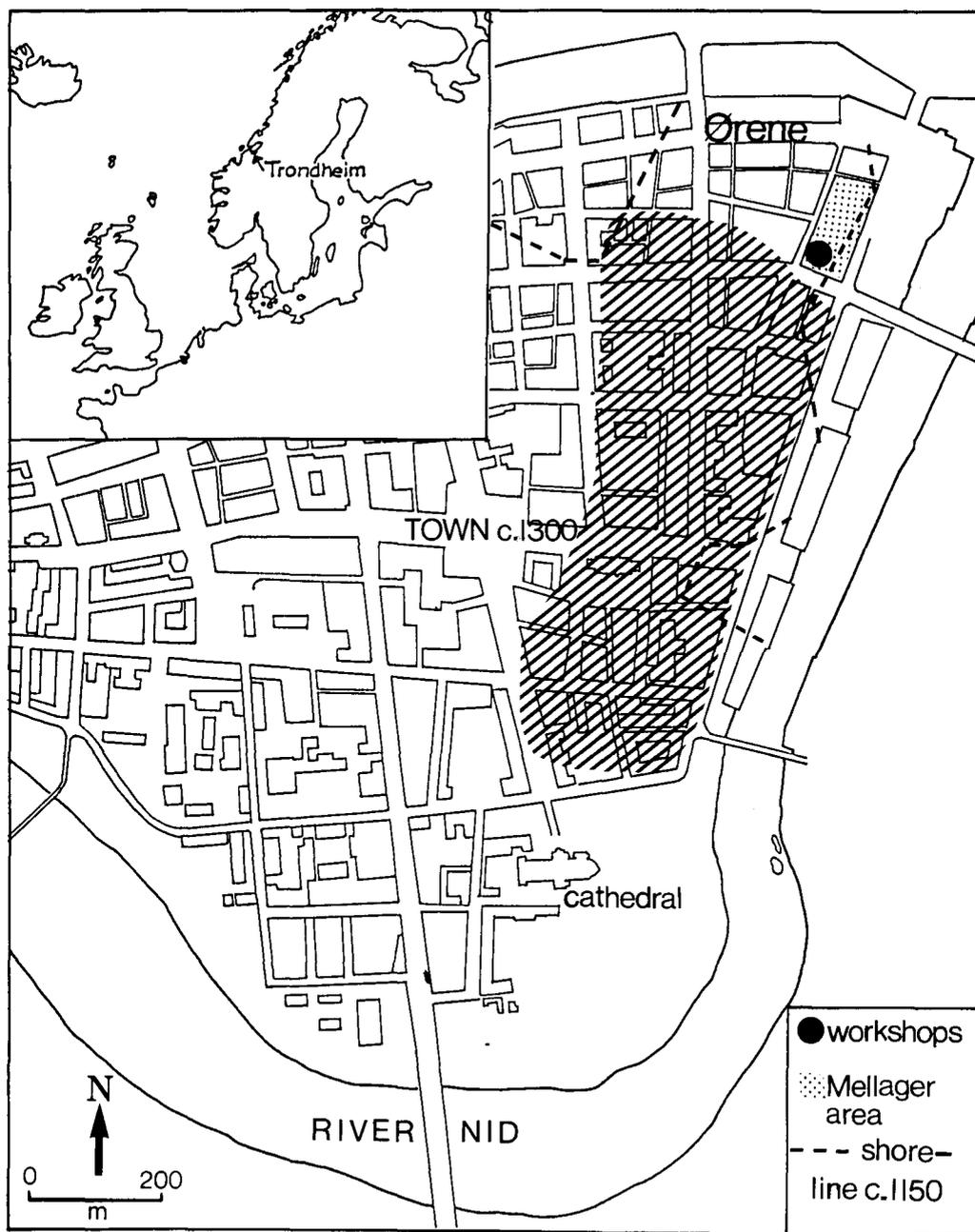


FIG. 5

Trondheim. The present town plan with, superimposed, the site of the medieval workshops shown in relation to the shoreline at about the time of the site's establishment, and the estimated maximum extent of the medieval town at c. 1300

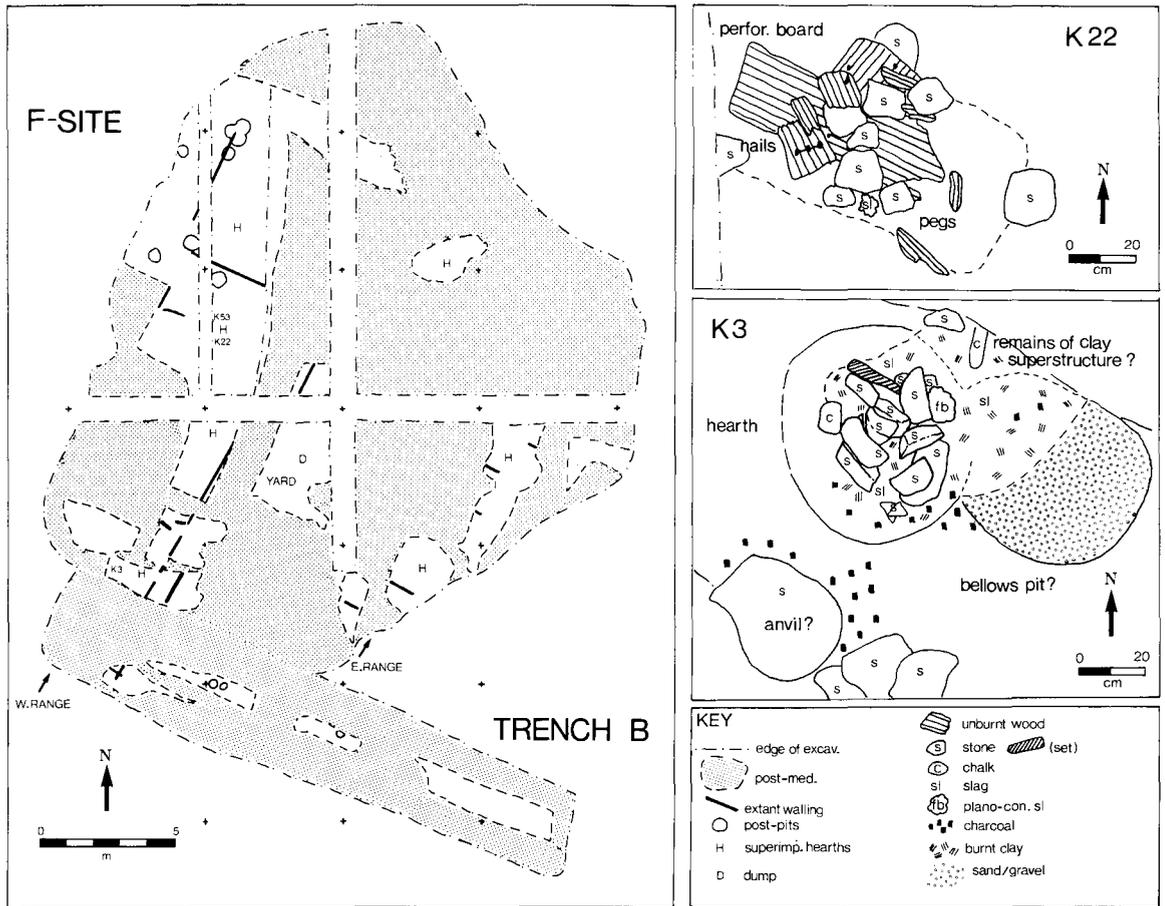


FIG. 6

Mellager excavations. Simplified plan of the main excavated area (left) showing the major structural arrangements occurring throughout the metal-working period (remnant wall-lines, superimposed hearths, yard), and (right) two examples of hearth/furnaces: K22, the collapsed remains of a wood-built structure, possibly a furnace; K3, a bowl-like pit with collapsed internal chamber and associated ancillary features

the remains of (?) low stone-built hearths (Pl. x, D). Some larger pits occurred, subsquare and wood-lined, filled with debris and material typical of the site: stone fragments (variously worked and/or singed), flints, hones, pieces of chalk, quartz and sandstone, slags (including many plano-convex 'furnace bottoms'), much charcoal, burnt clay fragments (furnace lining, moulds), unburnt clay, sand, various metal off-cuts and ferrous and non-ferrous objects, crucible sherds, and organic materials such as bone, textile, leather, straw and worked and unworked wood. Pits filled exclusively with charcoal or sand (Fig. 6; Pl. x, B) may have had some function ancillary to related hearths, e.g. for fuel storage, support of bellows or crucibles? Scatters and occasional arcs of stake-holes were common.

Despite considerable time pressure a methodical sampling strategy was adopted which will hopefully provide some insight into, for example, the character and volume of production here and any temporal and spatial differentiation in the body of data. As yet, only a few

metallurgical samples have been analysed (by Mr A. Espelund, Senior Lecturer, The Metallurgical Division, The Norwegian Institute of Technology, University of Trondheim): notably a number of plano-convex slags, soil samples, metal fragments, a piece of possible furnace lining and geological samples. The results are published in the excavation report<sup>3</sup> and in a recent conference paper.<sup>4</sup> Briefly, these analyses suggest the presence of a number of metallurgical activities, though no smelting processes occur. All metals appear to have been brought to the site in metallic form, or at least in a condition which allowed further working in small furnaces, smithing hearths and crucibles. The plano-convex slags contain very little copper (0.1–0.5%) and probably derive from the forging of bloomery iron possibly obtained from one of the surrounding district's bloomeries. Also indicative of the hand smithing of iron is magnetic hammer scale found in the soil samples. Evidence for non-ferrous metal working exists in the form of unalloyed copper, an off-cut of which was found to have a relatively high silver content and a low proportion of zinc (possibly indicative of an ore source outside the Trøndelag district). As yet, no significant traces of metallic tin or other alloying metals have been found, though future analyses might provide evidence for the alloying of copper. Meanwhile, Espelund suggests that pure copper was perhaps being hammered into sheets for craftsmen (comb-makers, sheet metal-workers? etc.) situated elsewhere.<sup>5</sup> A fragment of possible furnace lining may have been associated with the melting of copper, perhaps during casting, a process indicated by, for example, a stone ingot mould, burnt clay mould fragments, crucible sherds and a pair of cast conjoined rings of (?)copper. A worm-shaped piece of lead yielded a very low silver content. An interesting speculation, as yet unsupported, is that the extraction of silver from lead by means of cupellation might have formed part of the local metal-working repertoire.

In conclusion it must be stated that much archaeological and metallurgical research remains to be done, though the great potential of this hitherto unique medieval urban industrial complex is evident. Supplementary archaeological evidence from neighbouring trenches and profiles suggests that the area devoted to metal working extended somewhat west, east and south and covered some 1250 m<sup>2</sup> at least. This extensive site must have constituted a significant element in the townscape, and its peripheral siting is clearly a response (as specified, for example, in the Town Laws of 1276) to the dangers and nuisance associated with such a fire-dependent enterprise.

The establishment of this workshop complex during the second half of the 12th century corresponds to the beginning of an era of political and economic dynamism centred on Nidaros, inspired by the newly-founded Archbishopric and the consolidation of royal power under Sverre. Cultural and commercial horizons expanded throughout the late 12th and the 13th centuries, the town emerging as one of Europe's major pilgrimage centres. Iron production was long-established in the district, and while there is little evidence for copper working in the region prior to the 17th century there are local sources of ore. Lead occurs locally as well. Nidaros lay strategically in this regard, though its extensive international trading network may have facilitated imports of raw materials from further afield and secured a wider market for metal products.

The siting of such an extensive complex of regulated structures, its maintenance and stability in lay-out on lines established from the start, the apparent continuity, variety and intensity of production through perhaps 150 or more years, all seem to be suggestive of some inspirational and regulatory authority instrumental in its operation. The Archbishopric, administered from Nidaros, with its rich resources and requirements for metal products, might well have been associated with this major component in the town's industrial and commercial infrastructure.

## NOTES

<sup>1</sup> C. D. Long, 'Excavations in the medieval city of Trondheim, Norway', *Medieval Archaeol.*, 19 (1975), 1-32 and A. Christophersen, E. Jondell, O. Marstein, S. W. Nordeide og I. W. Reed, *Utgraving, kronologi og Bebyggelsesutvikling, Meddelelser Nr. 13 Del 1, Riksantikvaren, Utgravningskontoret for Trondheim* (Trondheim, 1988). These provide historical, topographical and archaeological information about the medieval town.

<sup>2</sup> Theophilus, *De Diversis Artibus*, ed. C. R. Dodwell (London, 1961), 65-66.

<sup>3</sup> A. Espelund, C. J. M<sup>c</sup>Lees, M. Pagoldh og P. Sandvik, *Smedene på Ørene. Metallverksteder i middelalder Trondheim. Rapport fra utgravningene i Mellagerkvartalet, 1987. Arkeologiske undersøkelser i Trondheim Nr. 2* (Trondheim, 1989). Forthcoming site report including archaeological, metallurgical and palynological data. Norwegian and Swedish chapters, though the greater part of the archaeological text and the main conclusions are in English.

<sup>4</sup> A. Espelund, 'Mellagertomta i Trondheim — et metallverksted fra middelalderen', *Jernkontorets Bergshistoriska utskott, H-serien* (Stockholm, 1989). Forthcoming publication of a paper given in Stockholm in November 1988. Article published in Norwegian.

<sup>5</sup> Trondheim's Library Site excavations have produced evidence for metal working in the town centre from c. 1025 to 1275. Five or six workshops occur on various properties, used by itinerant craftsmen for small-scale production, mainly casting, though some smithing may also have taken place. Finds include crucible sherds, soapstone ingot moulds, metal ingots and off-cuts, and clay mould fragments for brooches, small crosses and needles. Qualitative analyses indicate the presence of copper and zinc (as brass?), silver, gold and lead: U. Bergquist, *Gjutning och smide: Metallhantverkets utveckling i Trondheim ca. 1000-ca. 1350. Meddelelser Nr 16* (Trondheim, Riksantikvaren, 1989).

## THE LEEDS CONFERENCE 1989

The 31st Annual conference of the Society was held in Leeds on Saturday 20 May, 1989 on the theme of 'Regionality versus Uniformity in Medieval Britain'. After an introduction by David Hinton the following lectures were given: Peter Hayes, 'The Fens'; Peter Rose and Ann Preston-Jones, 'Cornwall'; Nick Higham, 'Medieval Cheshire: A Distinctive Culture or Just Downright Impoverished?'; Dennis Turner, 'From the Home Counties to the Hebrides'; and Chris Dyer, 'A Historical perspective on regional differences'. The lectures took place in Leeds City Art Gallery and the help and generosity of the Director and staff there is gratefully acknowledged.

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