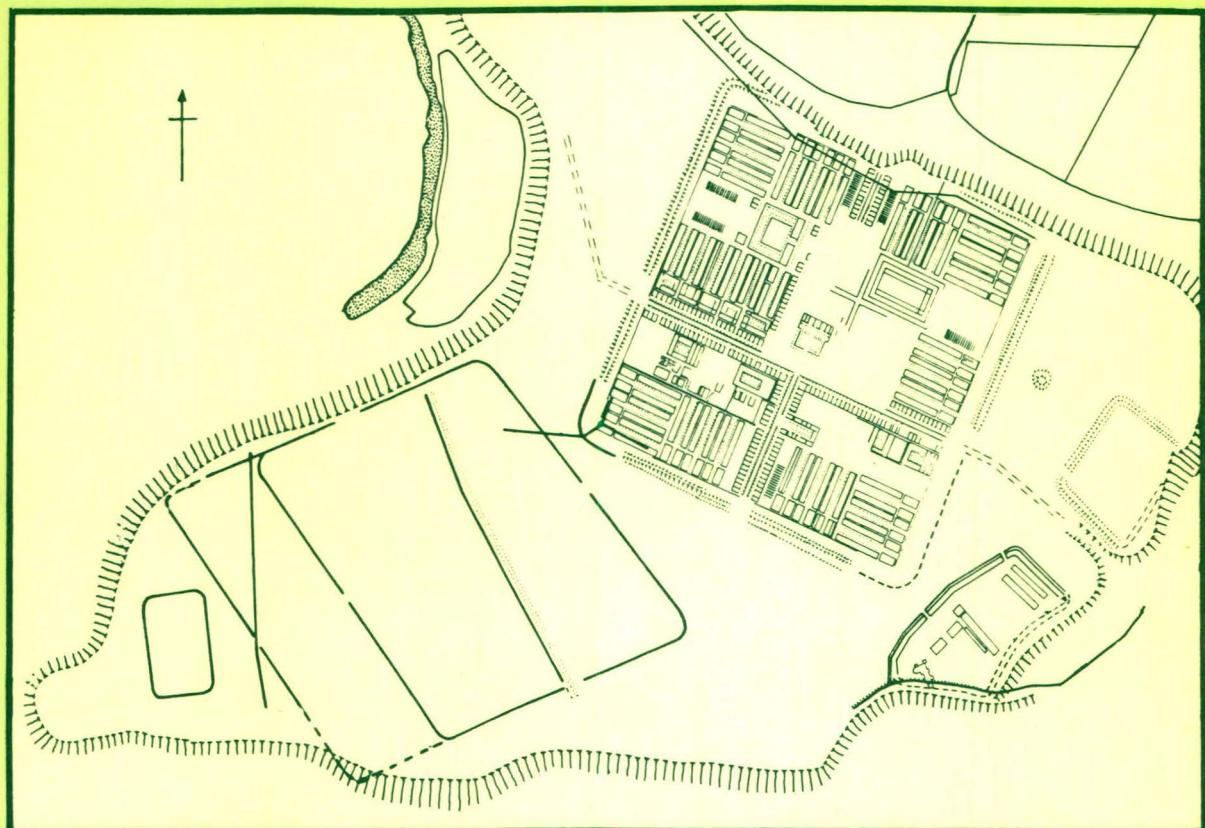


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INCHTUTHIL

THE ROMAN LEGIONARY FORTRESS

LYNN F. PITTS AND J.K. ST. JOSEPH



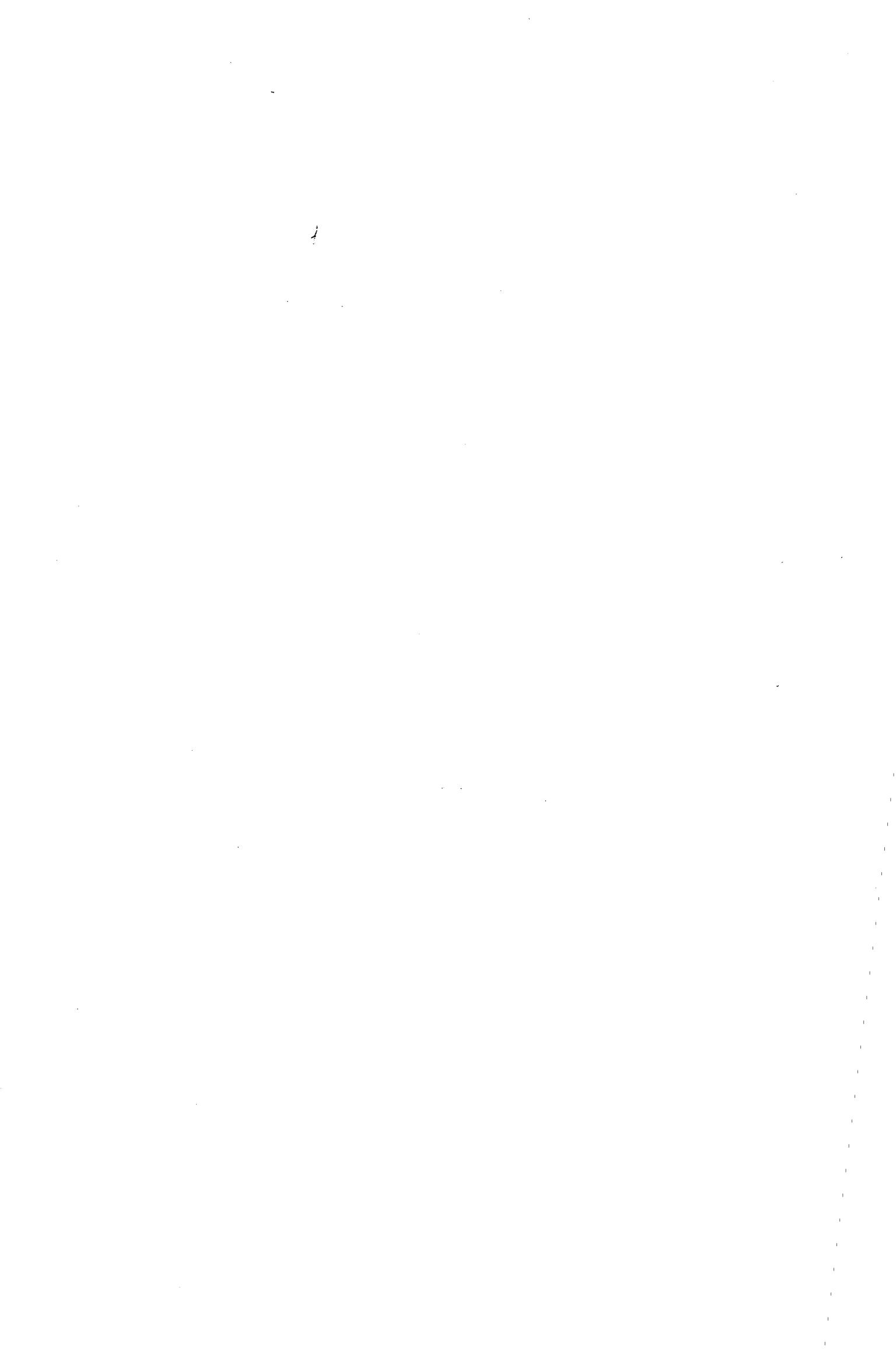
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1985

INCHTUTHIL

THE ROMAN LEGIONARY FORTRESS



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**THE ROMAN LEGIONARY FORTRESS
EXCAVATIONS 1952–65**

BY

Lynn F. Pitts and J.K. St. Joseph

with contributions by T. Cowie, H.F. Cleere, Margaret Darling, S.S. Frere, B.R. Hartley,
K.F. Hartley, A. Henshall, W.H. Manning, Anne S. Robertson, Jennifer Price,
J. Tate and D.F. Williams

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This book is affectionately dedicated to the memory of Sir Ian Richmond, former Professor of the Archaeology of the Roman Empire at Oxford and past President of the Society.

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PREFACE

The excavations by Sir Ian Richmond and Professor J.K. St. Joseph at the late first-century legionary site at Inchtuthil were undertaken annually during September, from 1952 until their conclusion in 1965. Only a few days after the end of the final season Richmond died suddenly, on 4 October. Unavoidably a long delay ensued before arrangements could be made for the writing of the report, for with Ian Richmond perished also his incomparable knowledge of the archaeology of the Roman army.

It appeared to Richmond's successor at Oxford that the task of writing the report (for which the surviving partner had inherited an inevitable responsibility, but for which he had little time in a busy life as Director of Aerial Photography at Cambridge) could best be brought towards conclusion if a pupil could be found to undertake the required research into the site-records and to reach conclusions about the various structures and their implications for Roman military archaeology, as part of work towards a higher degree. After one unsuccessful choice in 1976, therefore, Miss Lynn Pitts was persuaded in 1978 to undertake Inchtuthil as the subject of her D.Phil. thesis at Oxford under the supervision of Professor S.S. Frere. This thesis was successfully presented to the examiners in the Spring of 1982. Dr. Pitts wishes to acknowledge valuable help from Professor J.K. St. Joseph and also to thank the late Professor R.M. Ogilvie, Professor G. Rickman, Dr. B. Dobson and Miss M. Darling for other help.

In the present volume, Chapters 1–4 Section B, part of 17, Chapters 18, 22 Sections A and D, 24, and 25 Section B are from the pen of Professor St. Joseph; while Chapter 4 Section C, Chapters 5–16, part of 17, 19–21, 23 sections A and B, and part of Chapter 25 Section A are by Dr. Pitts. A heavier-than-usual task has fallen to the Monograph Editor (S.S.F.) in adapting the thesis for publication, in trying (often unsuccessfully) to ensure that contributors met dead-lines, and (as far as possible) in arranging consistency of presentation, re-phrasing to include up-to-date relevant information and references, and inserting occasional paragraphs and translations. He has contributed some discussion on p. 168, and at the request of Professor St. Joseph he has also written Chapter 22 Sections B and C, and much of Chapter 25 Section A.

The Richmond archive, bequeathed to the Ashmolean Library at Oxford, contains a large number of finished drawings and some field-drawings in pencil, all in Richmond's hand. Most of the finished drawings carry only a scale in feet, and on some there was no room to add a scale in metres; where this addition has not proved possible, it is hoped that the scale as stated in the caption will suffice. It has been thought undesirable to encumber the main plan of the fortress (FIG. 84) and the four area plans (FIGS. 79–82) with the Building-Numbers which are sometimes used for identification in the text. These are shown on FIG. 83, and readers who find it necessary will be able to annotate other plans accordingly.

The written archive on which this report is based is scanty. Richmond himself had contributed annual summaries of results to the *Journal of Roman Studies* and had also published brief accounts in the *Proceedings of the British Academy* (1955: 313–15) and in *Limes Studien* (Basle, 1959). He had also briefly discussed the site in R.M. Ogilvie and Richmond, *Cornelii Taciti: De Vita Agricolae* (Oxford, 1967). The pencilled field drawings, together with others in the possession of Professor St. Joseph, were converted into publishable form in the office of the Committee for Aerial

Photography at Cambridge. Professor St. Joseph also holds three site-notebooks, in Richmond's hand; these mainly record measurements, but they also contain notes (both descriptive and interpretative) on individual features, together with further plans and sections. A collection of 94 glass photographic half-plate negatives taken by Richmond, mainly of excavation detail, was among the archive bequeathed to the Ashmolean Library; these were transferred to the Institute of Archaeology, Oxford, during preparation of this report and are now deposited in the National Monuments Record at Edinburgh. Some other photographs were taken by the Royal Commission on Ancient and Historical Monuments for Scotland.

The comparatively few small-finds from Inchtuthil are deposited in the National Museum of Antiquities, Edinburgh, except for the coins which are in the Hunterian Museum, Glasgow.

The Editorial Committee wishes to thank Miss M. Darling, Mr. B.R. Hartley, Miss A. Henshall, Mr. T. Cowie, Dr. H.F. Cleere, Dr. D.F. Williams, Dr. J. Tate, Professor W.H. Manning, Miss J. Price and Professor A.S. Robertson for contributing their respective specialist reports, and Mr. G. Barclay, Professor J.C. Mann, Mr. G.S. Maxwell and Mrs. M. Roxan for helpful advice. The Institute of Archaeology at Oxford provided facilities for the reduction of drawings, and Mrs. L.J. Smithson kindly undertook much editorial re-typing. They also gratefully acknowledge a generous grant towards the cost of publication from the Administrators of the Haverfield Bequest.

Oxford, February 1985

S.S. FRERE

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LIST OF ABBREVIATIONS

<i>Acta Ant.</i>	<i>Acta Antiqua Academiae Scientiarum Hungaricae</i> , Budapest
<i>AE</i>	<i>L'Année Epigraphique</i>
<i>ANRW</i>	H. Temporini, W. Haase (eds.): <i>Aufstieg und Niedergang der römischen Welt</i> , Berlin
<i>Antiq. Journ.</i>	<i>The Antiquaries Journal</i> , Society of Antiquaries of London
<i>Arch. Ael.</i>	<i>Archaeologia Aeliana</i> , Society of Antiquaries of Newcastle upon Tyne
<i>Arch. Camb.</i>	<i>Archaeologia Cambrensis</i> , Cambrian Archaeological Association, Cardiff
<i>Arch. Journ.</i>	<i>The Archaeological Journal</i> , Royal Archaeological Institute, London
<i>B.A.R.</i>	<i>British Archaeological Reports</i> , Oxford
<i>BBCS</i>	<i>Bulletin of the Board of Celtic Studies</i> , Cardiff
<i>Bell. Jud.</i>	<i>Bellum Judaicum</i>
<i>BJ</i>	<i>Bonner Jahrbücher</i>
<i>BM</i>	British Museum
<i>BRGK</i>	<i>Bericht des römische-germanischen Kommission</i>
<i>Carnuntum Jb.</i>	<i>Carnuntum Jahrbuch</i>
<i>C.B.A.</i>	Council for British Archaeology.
<i>Chester Arch. J.</i>	<i>Journal of the Chester and North Wales Archaeological and Historic Society</i>
<i>CIL</i>	<i>Corpus Inscriptionum Latinarum</i>
<i>Current Arch.</i>	<i>Current Archaeology</i> , London
<i>Derbys. Arch. J.</i>	<i>Derbyshire Archaeological Journal</i>
<i>Epig. Stud.</i>	<i>Epigraphische Studien</i>
<i>Glasgow Arch. J.</i>	<i>Glasgow Archaeological Journal</i>
<i>Herts. Arch.</i>	<i>Hertfordshire Archaeology</i>
<i>IGLS vi</i>	J.P. Rey-Coquais, <i>Inscriptions grecques et latines de la Syrie vi.</i> <i>Baalbek et Beqa</i> (Paris, 1967)
<i>ILS</i>	H. Dessau, <i>Inscriptiones Latinae Selectae</i>
<i>Jber. Ges. pro Vind.</i>	<i>Jahresbericht: Gesellschaft pro Vindonissa</i>
<i>J. Chester Arch. Soc.</i>	<i>Journal of the Chester Archaeological Society</i>
<i>JRS</i>	<i>The Journal of Roman Studies</i> , London
<i>NCH</i>	<i>Northumberland County History</i>
<i>NMA</i>	National Museum of Antiquities, Edinburgh
<i>Num. Chron.</i>	<i>Numismatic Chronicle</i> , London
O	(figure-type in) F. Oswald, <i>Index of figure-types on terra sigillata (Samian Ware)</i> , Liverpool.
<i>O.R.L.</i>	<i>Der Obergermanisch – Raetische Limes des Römerriches</i>
<i>PBSR</i>	<i>Papers of the British School at Rome</i>
<i>Phil. Trans. Roy. Soc.</i>	Royal Society: <i>Philosophical Transactions</i> 1665–.

<i>PPS</i>	<i>Proceedings of the Prehistoric Society</i>
<i>PSAS</i>	<i>Proceedings of the Society of Antiquaries of Scotland</i> , Edinburgh
<i>PSI</i>	<i>Papiri della Società Italiana</i>
<i>RCAHM</i>	Royal Commission on Ancient and Historical Monuments (Scotland)
<i>RCHM</i>	Royal Commission on Historical Monuments (England)
<i>RIB</i>	R.G. Collingwood and R.P. Wright, <i>The Roman Inscriptions of Britain</i> i, Oxford 1965
<i>RIC</i>	<i>Roman Imperial Coinage</i> , London
<i>R.L.O.</i>	<i>Der römische Limes in Österreich</i> , Vienna
<i>Röm. Mitt.</i>	<i>Mitteilungen des Deutschen Archäologischen Instituts: Römische Abteilung</i>
<i>SJ</i>	<i>Saalburg Jahrbuch</i>
<i>TAPA</i>	<i>Transactions of the American Philological Association</i>
<i>Trans. Birmingham and Warwicksh. Arch. Soc.</i>	<i>Transactions of the Birmingham and Warwickshire Archaeological Society</i>
<i>Trans. Cumb. & West. Ant. & Arch. Soc.²</i>	<i>Transactions of the Cumberland and Westmorland Antiquarian and Archaeological Society</i> (second series)
<i>Trans. Dumfriess. & Galloway N.H. & Ant. Soc.</i>	<i>Transactions of the Dumfriesshire and Galloway Natural History and Antiquarian Society</i>
<i>Trans. London & Middx. Arch. Soc.</i>	<i>Transactions of the London and Middlesex Archaeological Society</i>
<i>TBGAS</i>	<i>Transactions of the Bristol and Gloucester Archaeological Society</i> .
<i>ZPE</i>	<i>Zeitschrift für Papyrologie und Epigraphik</i>

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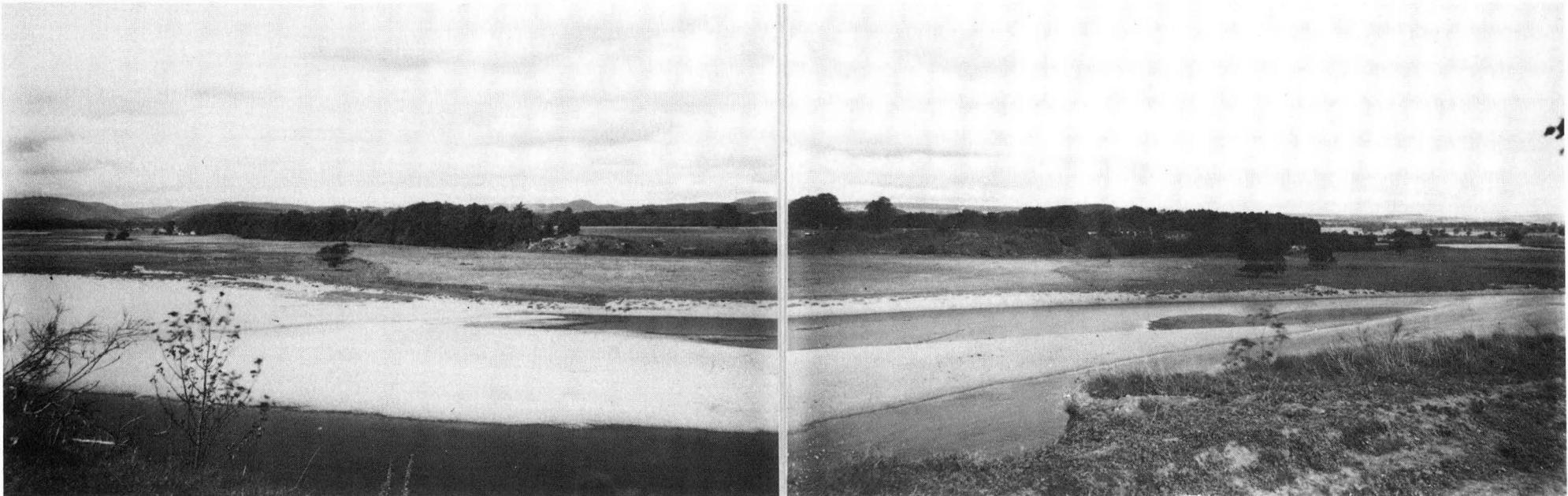
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GLOSSARY

<i>aedes</i>	Shrine of the standards in headquarters building
<i>ala</i>	A wing; term used for a unit of auxiliary cavalry either 500 or 1000 strong.
<i>angusticlavius (tribunus)</i>	Tribune entitled to narrow purple stripe denoting equestrian rank
<i>armamentarium</i>	Armoury, weapon-store
<i>as</i>	Copper coin, one sixteenth of a denarius
<i>ascensus</i>	Sloping ramp or steps giving access to the rampart-top.
<i>ballista</i>	Bolt- or shot-throwing catapult, the artillery of the Roman army
<i>balneum</i>	Bath-building
<i>basilica</i>	Hall with nave and aisle(s)
<i>beneficiarius</i>	Soldier exempt from general duties attached to the staff of an officer
<i>berm</i>	Space between wall or rampart and the ditch
<i>calo (calones)</i>	Soldier's servant(s)
<i>canabae</i>	Settlement of traders, retired soldiers, etc. outside legionary fortress
<i>capsarius</i>	Bag-carrier: in military context taken to be a dresser of wounds.
<i>carroballista</i>	Mobile <i>ballista</i> mounted on cart
<i>centuria</i>	A century: unit of 100 (in practice probably 80) infantrymen. Accommodation (barrack) for such a unit.
<i>clavícula</i>	The lunate curve inwards or outwards of a rampart at the gate of a camp.
<i>cohort</i>	Unit normally consisting of 6 <i>centuriae</i>
<i>collegium</i>	Fraternity; military guild
<i>consul suffectus</i>	Substitute consul: one elected to replace for part of the year the <i>consules ordinarii</i> entering office in January and after whom the year was named.
<i>contubernium</i>	Mess of 8 men. Accommodation for them in one unit of the barrack block
<i>cornicularius</i>	Grade of soldier on staff: head of <i>tabularium</i> and adjutant to commanding officer
<i>denarius</i>	Silver coin worth 16 <i>asses</i>
<i>deposita</i>	Soldiers' saving deposited 'with the Standards'
<i>fabrica</i>	Manufacturing workshop
<i>forum</i>	Central square and civic centre of town
<i>horreum</i>	Store-building, granary

<i>imagines</i>	Imperial busts or statues for military worship
<i>immunis</i>	Soldier on special duties, exempt from fatigues
<i>intervallum</i>	Space between the rampart and the buildings of a fort or the tents of a camp.
<i>laticlavius (tribunus)</i>	Tribune entitled to broad purple stripe indicating Senatorial rank; senior tribune of legion
<i>latus praetorii</i>	Area flanking either the general's tent in a camp or the <i>principia</i> in a fort or fortress, between this and the <i>intervallum</i> and between the <i>via principalis</i> and the <i>via quintana</i>
<i>legatus</i>	Representative of the emperor; commander of a legion
<i>librarius</i>	Clerk or book-keeper.
<i>medicus</i>	Medical officer or medical orderly
<i>milliary</i>	A thousand strong
<i>mulio (muliones)</i>	Muleteer(s)
<i>officium</i>	The staff of an officer
<i>onager</i>	Machine firing heavy stones
<i>optio</i>	Second in command of a century or soldier of equivalent standing
<i>per scanna</i>	(of barracks) Arranged with long axis parallel with the <i>via principalis</i>
<i>per strigas</i>	(of barracks) Arranged with long axis at right-angles to the <i>via principalis</i>
<i>porta decumana</i>	Rear gate, behind the <i>praetorium</i> of a camp or the <i>principia</i> in a fort or fortress
<i>porta praetoria</i>	Front gate
<i>porta principalis dextra</i>	Right-hand gate (as one leaves the <i>principia</i>), on the <i>via principalis</i>
<i>porta principalis sinistra</i>	Left-hand gate on the <i>via principalis</i>
<i>postica</i>	Term used for the area behind the <i>via principalis</i> in a camp lacking a <i>via quintana</i>
<i>praefectus castrorum</i>	Prefect of the camp, officer third in seniority in a legion
<i>praefectus fabrum</i>	Prefect of engineers
<i>praetentura</i>	Area of a camp or fort in front of the <i>via principalis</i> (a camp or fort is said to 'face' in the direction of its <i>porta praetoria</i>)
<i>praetorium</i>	General's headquarter tent in camp: residence of commander in fort or fortress
<i>primus pilus</i>	Chief centurion of a legion
<i>principalis</i>	Soldier with higher pay for extra responsibilities
<i>princeps</i>	The second centurion in the first cohort of a legion
<i>principia</i>	Headquarters building of fort or fortress
<i>quingenary</i>	Five hundred strong
<i>retentura</i>	Area behind the central range or <i>via quintana</i> in a camp or fort
<i>sacellum</i>	Shrine (term formerly used for the <i>aedes</i>)
<i>scamnum</i>	The breadth of an area: block running parallel with the <i>via principalis</i> containing tribunes' houses, etc.
<i>schola</i>	Military guild-room
<i>signa</i>	The Standards
<i>striga</i>	The length of an area as opposed to the breadth

<i>taberna</i>	(in fortress) Shop-like building used for storage and perhaps for accommodation
<i>tabularium</i>	Registry: administrative office of a military unit.
<i>territorium legionis</i>	Area around a fortress under the control of the legionary legate
<i>titulum</i>	Outlying length of bank and ditch blocking direct approach to the gate of a camp or fort.
<i>tribunal</i>	Raised platform for a commanding officer
<i>tribunus</i>	One of six senior officers of a legion or commander of a milliary cohort of auxiliaries
<i>triclinium</i>	Dining-room
<i>valetudinarium</i>	The hospital
<i>vallum</i>	A rampart
<i>vexillation</i>	A detachment of troops from a parent unit or units operating under a special standard, the <i>vexillum</i>
<i>via decumana</i>	Street running from the rear of the central range to the back gate
<i>via praetoria</i>	Street running from the front of the headquarters to the front gate
<i>via principalis</i>	Street running across the camp or fort in front of the headquarters
<i>via quintana</i>	Street running across the camp or fort behind the central range.
<i>via sagularis</i>	Perimeter street of a fort or camp.
<i>vicus</i>	A small settlement, strictly one possessing some elements of local government; a term often applied to civilian settlements outside forts.



(Photos: I.A. Richmond)

Pl. I Inchtuthil, panorama from the south. A. Looking west to the Dunkeld gap (left).
B. Looking north, with the Officers' temporary Compound towards the right-hand end of the plateau.

INTRODUCTION

The legionary fortress at Inchtuthil in Scotland, the most northerly in the Roman Empire, had a very short occupation which probably lasted only from A.D. 83 to 86. Construction is thought to have started under the governor Julius Agricola and evacuation to have been ordered by his successor. So brief was the time-span that some of the necessary buildings had not been begun; these included the legate's palace, the legionary baths and the aqueduct to supply them. But barracks for the entire legionary garrison had been built and occupied, together with a small and perhaps temporary headquarters building, four senior officers' houses out of the seven which would ultimately have been required, a hospital, workshop (*fabrica*) and six granaries. Steps had been taken to set up local manufacture of tiles and pottery; and the discovery of a hoard of a million nails buried in the *fabrica* shows the extent of supply-needs generated in establishing garrison-forts in the region.

The fortress had been defended initially with a turf rampart and timber gateways, and there had been time to re-face the rampart with a stone wall – the earliest military stone wall in Britain; but the stage of replacing the gateways in stone had not been reached. Apart from the defensive wall and some drains, all construction was in wood, the buildings (like most other contemporary military structures) being in half-timber.

This short-lived fortress accordingly has unique information to reveal, not only about the priorities observed during the building of a legionary base, but also about the layout and organisation of a first-century timber fortress. Scarcely any legionary fortresses in the Roman Empire survive as open sites where the entire plan can be revealed, or where the destruction caused by subsequent rebuildings in stone and alterations of layout are completely absent. Inchtuthil is thus of high importance, for Rome's power depended upon her legions, whose total number rarely rose over thirty; study of them is no historical triviality.

The excavations described below were conducted with masterly selection and economy of effort, but even so lasted fourteen years. They succeeded in their aim of obtaining an outline plan, and of course in gaining much all-important information on the dating, history and structural characteristics of the site. Yet Tacitus's summary of Julius Caesar's achievement in Britain could without gross exaggeration be applied to that of Richmond at Inchtuthil: *potest videri ostendisse posteris, non tradidisse* (*Agricola* 13). He established its character and significance while leaving much of less importance still to learn; and this was all that was intended, or could be expected at a site so large. It is in the nature of great pioneer work to inspire further questions and to point the way to further work. Many details at Inchtuthil are still undefined: continued preservation from damage should have a very high priority. The site remains one of the most important in Scotland's heritage, not only for what is known about it but also for what is still unknown.

Inchtuthil's archaeological significance is not confined to the fortress. On the south-eastern side two adjacent military compounds (the so-called 'Redoubt' and the Officers' temporary Compound) add to its complexity, while the south-western part of the plateau has been shown by aerial photography to contain a very large camp of 49 acres (19.9 ha), in which the troops building the fortress and those protecting the work in progress were evidently accommodated.

Rubbish-pits dug along the tent-lines afford a rare clue to the layout and numbers involved. About 2.7 km to the north lies the quarry-site at which stone for the defensive wall was obtained. These features give Inchtuthil a unique place in Roman military archaeology. The location of the fortress on the bank of the Tay near the mouth of the Dunkeld gorge and its relationship with contemporary auxiliary forts in this part of Scotland throw significant light on Roman strategy during the conquest of north Britain.

S.S.F.

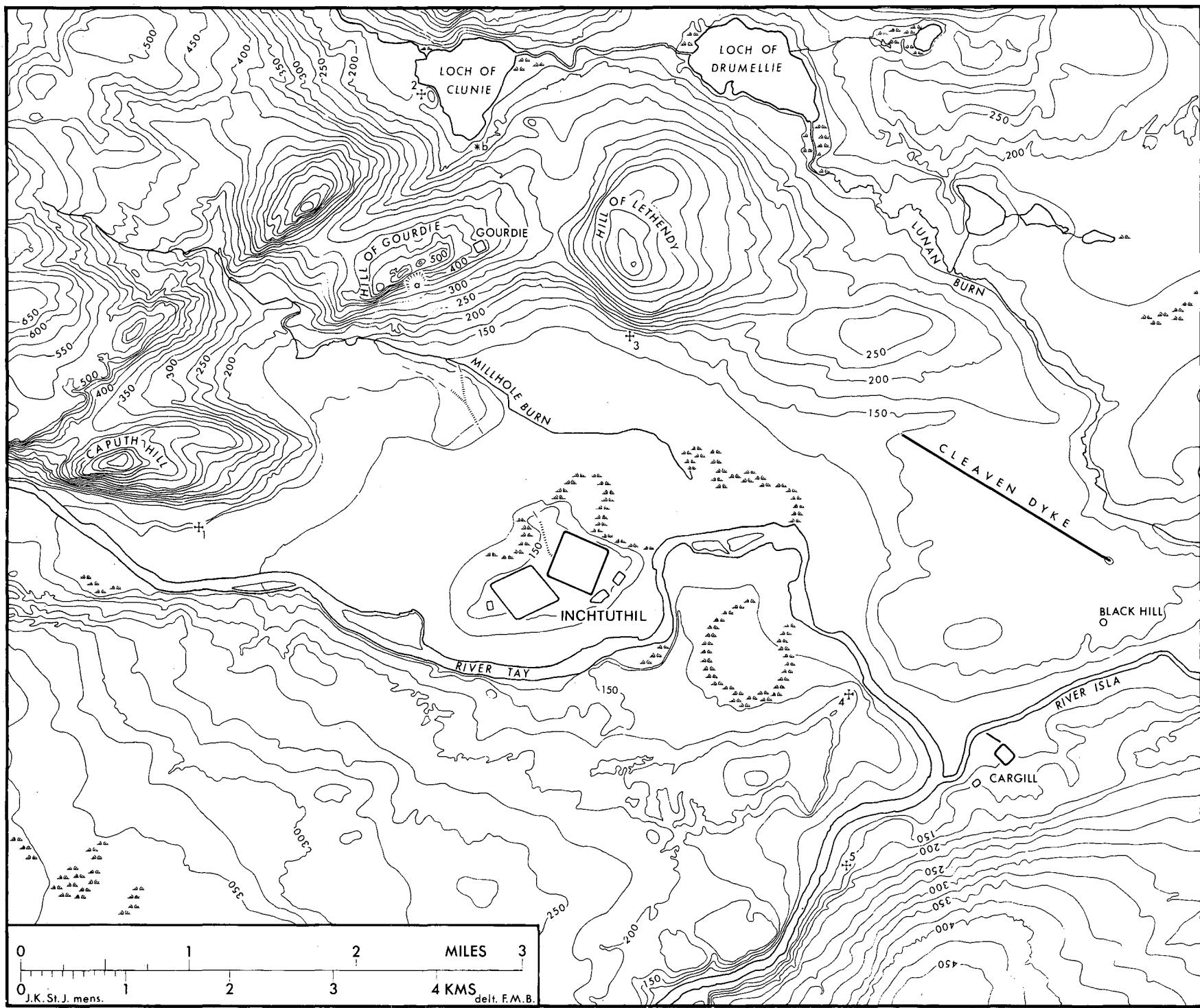


FIG. 1 Inchtuthil and its surroundings: part of the Tay valley below Dunkeld, showing the plateau of Inchtuthil, the Gourdie stone-quarry and its road, the Cleaven Dyke and the fort and fortlet at Cargill. Contours are drawn at 25-ft. (7.6 m) intervals.

Notation: (a) Roman quarry for sandstone
 (b) Recent limestone quarry.

The five crosses mark the sites of the parish churches nearest to Inchtuthil.
 1, Caputh; 2, Clunie; 3, Lethendy; 4, Kinclaven; 5, Cargill.

PART I: THE SITE

CHAPTER 1 EARLY ACCOUNTS OF INCHTUTHIL

The site of Inchtuthil was known to Hector Boece who referred to the place in his *Scotorum Historiae* (1526) as a Pictish town,¹ the same explanation that he gave of the earthwork at Camelon.

William Roy's well-known plan,² dated 1755, of the Inchtuthil plateau remained unsurpassed until the first large-scale plans of the Ordnance Survey which, for the parish of Caputh, were published in 1867.³ By that time, agricultural improvements had obscured or destroyed much of the detail recorded by Roy. His is but the first of no less than six plans and maps depicting changes in the site during these 112 years. Only three of them are accompanied by any description of the remains, and then it is the survey rather than the description that conveys most information. If these surveys are considered in the sequence in which they were made, rather than in the order of their publication, the gradual changes in the pattern of land-use on the plateau are revealed. Roy's plan of 1755 was not published till 1793, Pennant's survey of 1772 appeared in 1776; an anonymous survey of the last quarter of the eighteenth century not until 1949; while the most detailed of all, made in 1835 and of special value for the topography, remains in private possession.

Roy who, as a civilian,⁴ began and had a considerable share in the execution of the military map of Scotland,⁵ 1747–1755, brought much greater skill to the planning and interpretation of Roman military earthworks than any other author for the next hundred years. It was Robert Melville, then a captain in the Twenty-fifth Foot who, on a visit to Angus in August 1754, first recognised the large Roman camps at Kirkbuddo, Keithock, Oathlaw and Lintrose for what they were.⁶ On Melville's return to Edinburgh, Roy, who evidently had a natural inclination towards antiquarian studies, as shown by drawings of antiquities he had already made in south-west Scotland, was the first to be converted to the correctness of the new interpretation of these large earthworks. Inspired by this information, Roy devoted some time the following summer, 1755, to surveying the newly-discovered sites and to making 'more accurate drawings of such stations as formerly had been only slightly sketched.'⁷

1. *History and Chronicles of Scotland* i (1821), 145; Boece, Bk. iv, ch. 14.

2. *The Military Antiquities of the Romans in Britain* (1793), pl. xviii.

3. Ordnance Survey Maps, 25-inch scale, Perthshire, Sheet LXIII, 13, surveyed 1863–4, published 1867.

4. G. Macdonald, *Archaeologia* lxiii (1917), 174–5. Roy joined the colours on 23 Dec. 1755 and received a commission on 4 Jan. 1756. Macdonald's paper gives a detailed account of Roy's career, with special reference to his archaeological activities.

5. *Ibid.* p. 165 quoting Roy, *Phil. Trans. Roy. Soc.* lxxv (1785), 385 ff.

6. *Ibid.* p. 170.

7. *Military Antiquities*, p. vi.



(Reproduced from his *Military Antiquities* (1793), pl. XVIII)

Pl. II General W. Roy's plan of the site, 1755.

The reference is to the forts at Ardoch, Dalginross, Strageath and Inchtuthil. The first three are marked on Sheet 16 of the manuscript of the military map of Scotland.⁸ but the sketch of Inchtuthil in the initial survey was evidently so slight that this site does not appear. Thus, Roy's detailed drawing (at a scale of 500 feet to an inch) entitled 'Plan showing the situation of Inchstuthill, formerly an island in the Tay, with the old intrenchments remaining upon it', eventually published as plate XVIII of his *Military Antiquities* (1793), is the earliest plan of the earthworks, and is invaluable as showing the state of the ground in 1755 (PL. II). All four sides of the fortress are marked, though most of the north-east side had already been destroyed by erosion. The 'Redoubt', to east of the fortress, the linear earthwork that has come to be known as the 'Western Vallum' and the promontory fort on the western tip of the plateau are all in their correct positions, though the representation of the fort is somewhat schematic.

Roy was a skilled draughtsman, and his plans often convey much more information than his text. The following account of Inchtuthil in *The Military Antiquities* may have been written several years after the survey, perhaps between 1764 and 1773, in the period of his maximum archaeological activity.⁹ 'The old works remaining here consist of four parts; first a camp of about five hundred yards square; secondly, part of a square redoubt, near the east point of the island, on the top of the bank which overlooks the Tay; thirdly, a long line to the westward of the camp, extending across from the top of one bank to the top of the other; and fourthly, a strong

8. The original is in the map collection of the British Library, Ref. Maps C9.b.

9. Macdonald, *op.cit.* (note 4), 162, 176–7.

intrenched post on the extreme point of the island, towards the west. The contour of the camp (excepting part of the north side, which had suffered from the encroachment of the river, and also that angle of it near the village of Inchstuthill, which is ploughed down), can everywhere be traced, even within the inclosures of Delvin, though it is here in a great degree levelled.' Roy concluded 'from the style of the works . . . and particularly from the figure and dimensions of the large camp, there is reason to believe that all, or greatest part of them, were raised by the Romans.'¹⁰ On the grounds that the camp differed in its general form from others which he considered to have been used by Agricola, he thought that the works must have been constructed by some other general in a subsequent period, and should probably be ascribed to Lollius Urbicus.

On Roy's plan, an avenue, planted in two straight lengths at right angles, cuts off the quarter of the plateau nearest 'Delvin' house. The scattered trees on the north slopes of the plateau contrast with the regular spacing of trees both in the avenue and along the drive to Delvin: this planting dates from the mid eighteenth century when there was widespread improvement of estates in Strathmore following the devastation of the '45. Many trees of the avenue were still standing when the excavations began in 1952. Apart from the neighbourhood of the small village of 'Inchstuthill', which straddles the rampart on the south-east side near the south angle, much of the south-east and south-west defences seem to have been largely unaffected by agriculture. However, the west angle of the fortress and the whole of the north-west defences had by 1755 been so reduced, that the area within the newly planted avenue may be assumed to have been ploughed before the enclosure took place. Roy recognised the principal street of the fortress, correctly naming it as the *via principalis*. His plan shows the greater part both of the plateau and of the low-lying ground around it as a patchwork of arable land, as if a well-developed system of arable farming had been practised for some time. The interior of the 'Redoubt' is under plough, but its north-east and north-west defences are intact, as is the whole length of the 'Western Vallum'. Two mounds outside the south-east defences of the fortress, one named 'The Womens Know', remain to this day. The southern slopes of the plateau seem to have been clear of trees at the time of Roy's survey, but ploughlands spread towards the western tip over much of the area where the 'labour camps' have been found to lie.

William Maitland published an account of Inchtuthil in his *History and Antiquities of Scotland* (1757). 'That the fortress at Delvin . . . about six miles north-eastward of Perth, was a Roman town, and not a camp, is evident from the balneum or bath discovered there a few years since, which being in the plowed grounds, and covered with corn when I was there, I had not an opportunity of seeing it. At this place a number of Roman bricks have been dug up; but whether any coins or inscriptional stones, I could not learn. This station appears to have been about five hundred yards square, fortified with double rampart and a broad and deep ditch: the interior rampart was of stones, and the exterior of earth, taken out of the ditch: and as a greater security to this strong place, the entrance of the military way (which runs through the town) at the trajectus, or ferry across the Tay, was defended by a strong fort, about one hundred and fifty yards in length, and one hundred and twenty in breadth. And as an additional strength to this station, on the western extremity of the hill stands a very strong semi-circular fort, fenced on the eastern side with five very high earthen ramparts, and the like number of very deep ditches, and all the other sides are secured by the natural declivity of the hill, . . .'.¹¹

Only a short time can have separated the visits of Roy and Maitland, and it is hardly possible now to be certain who saw Inchtuthil first. However, Maitland's reference to the fortress being a Roman town, and not a camp, may suggest that the surveyors of the military map of Scotland had already made their 'preliminary sketch', identifying the site as a 'camp'. If the bath had, indeed, been discovered before Roy's visit, it is strange that it escaped his attention, seeing how assiduously in 1752 he had sought out the original drawing of a plan of a bath-house at Netherby, discovered twenty years earlier and then lost to sight.¹² Maitland's reference to a 'double

10. *Military Antiquities*, 75.

11. W. Maitland, *History and Antiquities of Scotland*, i (1757), 199.

12. *Military Antiquities*, 197, and cf. Macdonald *op.cit.* (note 4), 167.

rampart' was probably based on observation of the south-east side, where the material from the ditch can still be seen disposed as a broad upcast-mound.

Thomas Pennant, who visited Inchtuthil in 1772, is the next to describe the site together with a new plan. 'The Romans, in their course along this part of Britain, did not neglect so fine a situation for a station. Notwithstanding the great changes made by inclosures, by plantation, and by agriculture, there are still vestiges of one station five hundred yards square. The side next to Delven House is barely to be traced: and part of another borders on the margin of the bank. There is likewise a small square redoubt, near the edge, facing the *East-inch* in the *Tay*, which covered the station on that side.'

The first was once inclosed with a wall fourteen feet thick, whose foundations are remembered by two farmers . . . aged about seventy, who had received from their father and grandfather frequent accounts of ashes, cinders, brick, iron utensils, weapons, and large pieces of lead, having been frequently found on the spot, in the course of ploughing: and to the west of the station, about thirty years ago, were discovered the vestiges of a large building, the whole ground being filled with fragments of brick and mortar. A rectangular hollow made of brick is still entire: it is about ten or twelve feet long, three or four feet wide, and five or six deep.¹³

Pennant also wrote of 'Another dike (which) crosses the ground, from margin to margin, in the place where it begins to narrow', evidently a reference to the 'Western Vallum', and later, 'Monuments of this kind (i.e. tumuli) are very frequent over the face of this plain: the *Tumuli* are round, not greatly elevated, and at their basis surrounded with a foss'. This passage suggests that the two mounds marked by Roy were by no means the only ones on the plateau.

Compared with Roy's plan, Pennant's drawing, engraved by Mazel, is the merest sketch. The shape of both plateau and fortress has been distorted, and no indications are given of the use of the land. There is neither scale nor north pointer. More interesting is his reference to frequent accounts of the discoveries of objects of brick, iron and lead made during ploughing three generations before. The very quantity of objects suggests that these were the finds turned up at the first ploughing of the land in modern times. The 'vestiges of a large building to west of the station' . . . with . . . 'a rectangular hollow made of brick . . .' is surely the same as the bath-house reported by Maitland. 'About thirty years before' as Pennant wrote in 1776, and 'a few years since' (Maitland, 1757), might well refer to the same year. Unless both estimates are out by several years this would suggest a discovery before Roy's visit in 1755. According to Pennant, the building lay to west of the station, whereas the well-known bath-house, excavated in 1901, lies rather to south of the south angle of the fortress. The question whether these could indeed be the same building will be discussed later.

The next plan is an ink sketch of 'Roman Fortifications near Delvin house' preserved in the archives at the Perth Museum.¹⁴ It is unsigned and undated but clearly derives from Pennant's plan of 1776, though with slight changes, and may be assigned to the last quarter of the eighteenth century. The sketch has no scale, and the north point on the compass direction in fact aims slightly north of west. There are two matters of interest. The space to west of the 'Western Vallum' is inscribed 'Weapons and arms found in this corn field'. As to the use of the land, a patch-work of light shading suggests that much of the plateau was arable, but the ground towards Delvine house, enclosed by Roy's avenue, is described, as to its western half, 'Kitchen Garden'. The significance of this will appear when the position of Pennant's bath-house is considered.

With James Stobie's map *The Counties of Perth and Clackmannan* 1783, we reach the first of the modern-style county maps of Perthshire. The scale of one inch to one mile imposes a limit to the detail that can be shown. The Inchtuthil plateau is outlined by fine shading on the south and south-east slopes, and by a belt of trees on the north-west and north. A 'Roman camp' at the west tip of the plateau is marked by a small square, each side having a central gate with traverse. This is in fact the site of the native promontory fort. The village of 'E. Inchstuthel' is shown at about the position of the south angle of the fortress. No other earthworks appear. In a second edition of

13. T. Pennant, *A Tour in Scotland* 1772, part ii (1776), 67–70, pl. vii.

14. Published in O.G.S. Crawford 1949, pl. XIII.

this map dated 1805, the features at Inchtuthil are identical. James Knox's *Map of the Basin of the Tay*, 1831, is at a scale of half an inch to one mile, too small for detail to be shown. The surveyor may have been unfamiliar with, or did not accept, Roy's work, for the fortress is marked by a long rectangle having on its north side two gates, each with a traverse. The 'redoubt' appears as a square enclosure, a cross-dyke is shown to the west and, at the tip of the plateau, the multiple ditches of the promontory fort. The village of Inchtuthil has disappeared. Knox's companion volume *Topography of the basin of the Tay*, 1831, repeats the account of Inchtuthil in the *Military Antiquities*, virtually in Roy's wording.¹⁵

The last plan of the Inchtuthil plateau from the period before the earliest large-scale plans of the Ordnance Survey is a *Map of the Eastern Division of the Estate of Delvine*, surveyed by W. and J. Chalmers, 1835. The original drawing is still at Delvine, where I was kindly shown it by Colonel Peter Dunphie. This map, a highly professional survey, is at a scale of about 24 inches to a mile, not very different in style from the first Ordnance plans, but with even more detail. The earthworks on the plateau were not the main concern of the surveyors, and only the best-preserved lengths of the south-east and south-west defences of the fortress are marked. All the steep slopes bounding the plateau are wooded and the area of the 'Redoubt' has also been planted. A strip of trees crossing the western part of the plateau appears for the first time, while in the area of the fortress the trees of Roy's avenue are shown, together with other scattered clumps. The eastern two-thirds of the plateau including the whole of the fortress was then under grass, forming a large ornamental park in front of Delvine House. That this remained parkland for some time is clear from the early Ordnance Survey maps which mark the entire plateau in stipple; and in 1936, the occasion of my first visit to the site, the area comprising both fortress and 'Western Vallum', as far west as the plantation strip, was still in grass, a small private golf course having been laid out in the park in the 1920s. During the war of 1939–45 that part of the park immediately south-west of the fortress was turned over to arable, which meant that the 'Western Vallum' was ploughed for the first time for very many years. Since then ploughing has encroached further, extending into the southern quarter of the fortress.

The excavations at Inchtuthil in 1901 were made at the invitation of the proprietor, Sir Alexander Muir Mackenzie of Delvine, and were the seventh in a major series of excavations at Roman sites conducted under the auspices of the Society of Antiquaries of Scotland. The work, which extended from February till August, was under the immediate supervision of the clerk of works, Mr. Alexander Mackie. Surveying was in the hands of Mr. Thomas Ross, who wrote the description of the plans in the excavation report.¹⁶ Both the necessary funds and general superintendence were supplied by the Hon. John Abercromby, the Society's Foreign Secretary,¹⁷ who contributed to the report a first section headed 'History of the site and description of the excavations'. The history is a useful compilation; the only excavations there described are of three tumuli, two at Inchtuthil, and the third north of Spittalfield. The report includes a general plan of the earthworks on the plateau, with a more detailed drawing of the fortress and the area to south-east of it, on which the position of the excavators' main trenches are marked. Four sections were dug across the defences of the fortress, two across the 'Western Vallum', and three across the defences of the 'Redoubt'; sketches of all these sections were published. The laminæ of turfwork in the rampart were recognised and recorded. Three long trenches were dug across the fortress, in one of which, to south of the *via principalis*, 'small excavated trenches', 12 to 18 inches wide, were encountered at 3- or 4-yard intervals. 'These, it was conjectured, indicated the foundations of timber buildings.' Elsewhere, work was concentrated in an area to east of the south angle of the fortress, where differential growth in the grass had attracted attention. A trial cutting located a ditch, subsequently shown to surround an area within which lay a stone bath-house and timber buildings. Between this ditch and the fortress, two long narrow stone buildings were identified on a different alignment. The greater part of Ross's contribution to the report is devoted to a detailed description of the well-constructed 'Bath-house or Villa',

15. J. Knox, *Topography of the basin of the Tay*, (1831).

16. *PSAS* xxxvi (1902), 182–242.

17. Thomas Ross in *Delvine and the Romans* (1904), 121.

illustrated by a plan and photographs. Inserted into the ditch of the fortress, four ovens (now recognised as corn-drying ovens of the period of the eighteenth-century village) were explored, and a section was dug across the promontory fort on the western tip of the plateau. The small objects 'strikingly small' in quantity are described by Joseph Anderson. They consisted mainly of pottery and tiles, iron nails, bronze studs, scrap lead, glass fragments, and one bronze coin 'presumed to be an early issue of Domitian'.

In Abercromby's view, it was quite certain that Pennant's 'Roman balneum' was not the same as the bath-house unearthed in 1901, since the good condition of the plaster lining the cold bath in the latter amply disproved this;¹⁸ due weight must be attached to this contemporary opinion. Had Pennant's building indeed lain to west of the fortress, the site can scarcely have been beyond the 'Western Vallum'. A bath-house outside the fortress would not be left unprotected. A ditch and rampart, whether or not defining an annexe, would normally surround it. The question may also be asked, who was such a bath-house intended to serve? The whole of the ground to south-west of the fortress, as well as that between the west angle and the edge of the plateau, has been observed from the air, when under barley, in conditions when not only ditches but even small pits were clearly visible as crop marks.¹⁹ No sign of any building or of its enclosure was noticed. Moreover, the state of the ground west of the fortress, as recorded on the various plans already described, is significant. To judge from Roy's plan, the area enclosed by his avenue was rough grass or pasture in 1755, contrasting with the cultivated land elsewhere on the plateau. This avenue, enclosing the land around Delvine house, had been planted about 1750²⁰ and, if the bath-building had been thereabouts, Maitland is unlikely to have seen the site 'under corn'. The anonymous plan from the last quarter of the eighteenth century marks the same area as 'kitchen garden'. The intensive cultivation this implies would very likely have brought to light traces of what was evidently a large building, especially as Pennant wrote of 'the whole ground being filled with fragments of brick and mortar'. In an attempt to settle the matter, two trenches, each 30 m long, were dug in 1961 in the area about 100 m north-west of the west angle of the fortress. Such trenches could easily miss a building: however, there was no disturbance of the subsoil and no objects were found.

Macdonald's suggestion, that 'east' and 'west' in Pennant's account may have been confused by author or printer, may therefore be reconsidered. The view expressed in the excavation report may not really preclude the possibility that Pennant's bath-house was the same as that excavated in 1901. On Roy's map the area of the Officers' temporary Compound (PL. II) is shown as arable land, which would be consistent with Maitland's description of the bath-house 'in plowed grounds, covered with corn'. Pennant's measurements of the 'rectangular hollow' made of brick and mortar, 'about 10 or 12 ft long, 3 or 4 ft wide, and 5 or 6 deep', agree reasonably well with the dimensions of the cold bath, namely 12½ ft. long by 6½ ft. wide. The depth of the bath when excavated was only 4 ft., but continued ploughing may have removed a course or two of stonework since Pennant's day. The plaster lining the cold bath was in such good condition in 1901 that the excavators considered that it could not have been exposed a hundred and fifty years earlier. However, this bath was left open after the 1901 excavations and, in spite of some sixty years' weathering, the plaster, though fragile at the top, was in unexpectedly good order when examined once again in 1963. Not all the rooms of the bath-house were necessarily exposed in the mid eighteenth century, so that the quality of pointing of the masonry forming the walls of the *tepidarium*, which caught attention in 1901,²¹ does not preclude a partial exploration of the building at an earlier date.

In addition to the report published by the Society of Antiquaries of Scotland, the excavations prompted a small book *Memoirs of Delvine* (1904)²² compiled by Sir Alexander Muir Mackenzie.

18. Abercromby, *PSAS* xxxvi (1902), 192.
19. See aerial photographs K17-AS4-6, taken 20 July 1977, which show incidentally the extent of the area then cultivated (PL. XXXVI, p. 226).
20. To judge from the evidence of some estate papers kindly shown to me by Mr Hugh Hogarth in 1953.
21. *PSAS* xxxvi (1902), 207-8.
22. The two versions of this scarce book have sometimes caused confusion, so it may be helpful to distinguish

Most of the book is of no concern here, but it does contain a brief contribution by Haverfield, written shortly after the excavations, on the significance of the Roman remains at Inchtuthil. In referring to the stone and wooden buildings found to the south-east of the fortress, he conjectured that some might belong to cottages which occupied the site in Roy's time.²³ The book also contains a photograph, unpublished elsewhere, of the well-preserved length of the south-east rampart of the fortress, with the 'Womens Know' in the background.

The 1901 excavations established the importance of Inchtuthil for the study of the Roman occupation of Scotland. The results were carefully reconsidered by Sir George Macdonald in 1919.²⁴ He accepted that the troops occupying the large enclosure were housed in wooden buildings, representing the winter quarters of a small army, in all probability Agricola's. Perhaps unaware of Haverfield's cautionary remark, and misled by various features, particularly the two stone buildings, now known not to be Roman, Macdonald supposed there to have been a series of *castella* near the edge of the plateau to the east of the fortress. One of these, he conjectured, had been destroyed by erosion, leaving only its bath-house lying within an annexe.²⁵ He considered the evidence to imply that Inchtuthil was held until well after Agricola's recall. O.G.S. Crawford's account (1949) of Inchtuthil closely follows Macdonald's interpretation. Crawford, however, rightly questioned whether erosion along the south edge of the plateau had been as extensive as Macdonald supposed. He accepted 'that Inchtuthil was almost certainly Agricola's base before the battle of Mons Graupius, and . . . was also held by the Romans for a good many years afterwards'.²⁶ Amongst his plates he included the late eighteenth-century ink drawing of the plateau.

A final paragraph may conveniently refer to the form of the name Inchtuthil. The *Rentall Dunkeldense* records Inchstuthil in 1506, Instuithill in 1506–7, Inchstuthill in 1507–8, Inchtuthil in 1511–12 and Inchstuthile in 1513–14, while the Register of Sasines for Perthshire gives Inschtuithill in 1648, Inschstuthill in 1658 and Inschtuthill in 1669. Roy, in 1755, uses the form Inschstuthill. The modern pronunciation locally is Inch-tewth-ill with stress on the penultimate syllable. Watson²⁷ derives Inchtuthil from *inis* 'river meander' and the personal name *Tuathal*: *Inis Tuathail* would be 'the river meander of Tuathal'. *Tuathal* is a well-known name; Celtic *Teutoualos*, equivalent to Old Irish *Tuathal*, and Welsh *Tudwal*, meaning 'the strong one of the tribe'.²⁸

between them. The title page of the first version reads 'Memoirs of Delvine. A brief account of the Roman occupation of Delvine or Inchtuthill in the county of Perth by Sir Alexander Muir Mackenzie, Bart.' London (pp. 1–168). The book is undated but according to the B.M. Catalogue was published in 1904. The title page of the second reads 'Delvine and the Romans' the remainder of the page being the same (pp. i–viii and 1–168). This version repeats the preface (pp. v–vii) and has as well a 'Preface to second edition' (pp. 1–7) (undated, but publication was probably in 1904 or 1905). The text is almost, if not quite, identical in the two books, so the later version is in the nature of a reprint, rather than a second edition.

- 23. F. Haverfield, in Muir Mackenzie, *Delvine and the Romans* (1904), 138.
- 24. G. Macdonald, *JRS* ix (1919), 113–22.
- 25. *Ibid.*, 118. The subsidence in the wall of the bath-house remarked upon by Macdonald (116–7) need not necessarily imply an earlier Roman ditch or pit. Aerial observation of the plateau near Spittalfield has provided ample evidence of native occupation involving hollows and ditches, and the same may well be true of the Inchtuthil plateau.
- 26. Crawford 1949: 74.
- 27. W.J. Watson, *Celtic Place Names of Scotland* (1927), 238.
- 28. Compare the name O'Toole which is Ó Tuathail in Irish.



(Photo: Cambridge University Collection (APY 15), August 1966, copyright reserved)

Pl. III Inchtuthil: air-photograph looking WNW, showing (centre) the plateau with surrounding belts of trees, beyond the flood-plain of the river Tay. In the left background the tree-lined river issues from the Dunkeld gap. Back, centre, the peak of Schichallion (1076 m).

CHAPTER 2

THE GEOGRAPHICAL SETTING AND SOURCES OF RAW MATERIALS

A. GEOGRAPHICAL SETTING

The Inchtuthil plateau is part of a large deposit of fluvio-glacial sand and gravel laid down by melt waters issuing from glaciers occupying the valleys of the Tay, the Lunan Burn and the Ericht. The plateau at Spittalfield is almost certainly a fragment of the same gravel deposit, as is the spur between Kercock and Bishophall south-east of Inchtuthil. This gravel extended further east past Meikleour to cover much of the country between Blairgowrie and Coupar Angus, where it enveloped masses of ice which on melting left 'kettleholes', now represented by Stormont Loch and Monk Myre, south of Blairgowrie. In the Inchtuthil area similar depressions may well have formed in the gravel, assisting its subsequent dissection by river erosion.²⁹

Between Caputh and Kinclaven the Tay has developed a broad alluvial plain with many abandoned channels. Under the present régime of the river, little downward erosion is taking place there, as the gradient is very slight, with a consequent development of lateral erosion involving continual shifting of the river course in complicated meanders. Thus, no trace of any Roman road across the alluvial plain is likely to have survived. In Roman times, as now but for the existence of modern land-drainage, much of the alluvial plain would have been marshy, and more than one channel might be active. As the river swept across the flood-plain the unconsolidated gravel would be very easily eroded, causing development of characteristically steep slopes, now so prominent not only round the Inchtuthil plateau itself, but also to north near Spittalfield and to south at Kercock.

A number of river courses can be traced as loops of marshy ground marked on the map, FIG. 1, and many more may be distinguished on the ground or from the air. To north of the Inchtuthil plateau, Delvine Loch³⁰ (FIG. 2b) is an ox-bow lake occupying an abandoned meander. Another old river course, waterlogged at all times, runs at the very foot of the steep slope outside the north-east defences of the fortress. On Stobie's Map (1783) a stream is marked here, and in addition a small lake somewhat to the north of Delvine House. The fortress defences would not have been erected at the very edge of the plateau; an interval possibly one or two hundred feet in width may be presumed, all of which has gone, together with a large bite of the defences themselves, evidence of the extent of river erosion. Below the less steep southern slope of the plateau another channel, more ancient than that just mentioned to judge from its present state, runs past the foot of the hollow followed by the Roman road from the south-east gate of the

29. I.B. Paterson, 'The supposed Perth readvance in the Perth district', *Scottish Journal of Geology* 10 (1) (1974), 53–66 and especially fig. 2. Mr. Paterson kindly supplied information about the superficial deposits of the Inchtuthil neighbourhood.
30. Owing to an early misreading of the name, this is printed as Delinie Loch on large-scale Ordnance Maps.



(Photo: Cambridge University Collection (XB 58), July 1958. Ministry of Defence, Crown copyright reserved)
Pl. IV Inchtuthil, oblique view looking north across the fortress. The low sunlight picks out the earthworks.

fortress. Just here the early ditch and its accompanying timber breastwork reach the foot of the slope, curving inward as it does so to a butt-end short of the line of the road (FIGS. 2b, 57). It is very possible that this channel, if not the main course of the Tay, was at least one of its active channels in Roman times. Amongst the many abandoned channels visible on air photographs, one at the foot of the steep south and west slopes of the Spittalfield plateau (to west of the Millhole Burn) may be mentioned. The road from the fortress to the sandstone quarry on Gourdie Hill (FIG. 1) climbs this south slope by means of an embankment and a cutting.³¹ This particular slope, and probably the old channel at its foot, are thus older than the fortress. The frequency with which these major changes of course occur is well illustrated by one of the most recent, the consequences of which are still clear to see, namely the abandoned meander surrounding the ground known as 'Bloody Inches', a mile south-east of Inchtuthil, and south of the Tay. Roy's survey of 1755³² shows that the river then flowed round the loop: just two centuries ago the neck of the meander was cut through. The change of course is first recorded on Stobie's Map of 1783. The core of the meander was then an island, with the Tay flowing round on both sides.

On available geological evidence no certain conclusion can be reached about where the river flowed in Roman times; indeed, there may have been channels on both sides of the plateau, just as

31. The cutting and the upper part of the embankment are now much obscured by a deposit of modern rubbish.
32. W. Roy 1793, pl. xviii, dated 1755; J. Stobie *Map of the Counties of Perth and Clackmannan* (1783).



(Photo: H. Hogarth)

Pl.V Flooded landscape, looking north from near Delvine House, c. 1928.

today it temporarily becomes an island in periods of extreme flood (PL. V). The earliest large-scale map of this part of Perthshire is that of John Adair (1650–c. 1718):³³ his manuscript map is dated 1683, and the first printed version seems to be that of 1685; on both, the Inchtuthil plateau is shown. It seems to be the only feature of the natural topography to be marked on the map, apart from the coastline, rivers and hills: one may conjecture that this curious plateau, islanded in the flood plain, caught the surveyor's attention. Roy's plan (1755) shows steep slopes bounding the whole plateau, even on the south side where the gradient is least; but his outline would appear to have been sketched rather than surveyed, as if his attention were directed to making an exact record of the earthworks, while the precise shape of the plateau mattered less. Even so, his outline is more accurate than that in Pennant's sketch (1772)³⁴ where the engraver has depicted the plateau with precipitous and seemingly rocky cliffs.

The area known to geographers as the Midland Valley of Scotland is delimited northwards by the 'Highland Front', formed by a complex fault system extending in an almost straight line from the Clyde at Helensburgh to Stonehaven (FIG. 78, p. 272). The country to the south-east is for the most part low-lying and fertile, though it includes four hill ranges, the Campsie Fells, the Lomond, Ochil and Sidlaw Hills, all composed of volcanic rocks. By contrast, the country beyond the Highland Front, a complex of metamorphic and igneous rocks, is mountainous with much of the surface, if not bare rock, covered with rough grass or heather. Inchtuthil lies just half-way along the Highland Front, close to the point where the Tay breaks out of the hills.

In the siting of legionary fortresses both the need for an adequate water-supply for so large a garrison, and the convenience of river transport for carrying stores, are factors that must have been borne in mind. Water can come from many sources, but for transport a river must be large enough to be readily navigable. The early legionary fortresses in Britain, Colchester, Exeter and

33. J. Adair, *The Mapp of Straithern, Stormount and Cars of Gourie*, engraved by J. Moxon, 1685. Scale about 1 inch to 1½ miles. There are various later versions of this map.

34. T. Pennant, *A Tour in Scotland* 1772, Part ii (1776), plate facing p. 67.

Lincoln, are well placed in this regard, as is Gloucester, if the difficulties of navigating a long tidal estuary with shifting sandbanks and a tidal bore be accepted. Wroxeter, on the other hand, could not have been supplied by water, as navigation through the Ironbridge gorge is not possible. The three fortresses that came to be permanent legionary bases all lie on the edge of the 'Highland zone' of Britain, namely at Caerleon, Chester and York, at strategic points, at or near the tidal limits of rivers. Their construction took place about the end of the third quarter of the first century, following or at the same time as the attendant system of roads and forts, when the territory around them had been but recently overrun, or when a temporary frontier lay not far away. They are so sited that troops could reach quickly any part of the Highland zone where trouble might threaten.

Inchtuthil and its supporting forts appear as a response to an immediate need to garrison territory recently overrun in the most distant part of the province. In contrast to Caerleon, Chester and York, the new fortress lies on a defensive line facing the Highland Front, a natural barrier as formidable as the Rhine or Danube. Even if the momentum of northward advance had been maintained, it is difficult to see what further territory of economic value could have been added to the province. The problem was rather to ensure that the mountainous country further north did not serve as a gathering ground for Caledonian tribesmen, whether contemplating invasion or merely armed forays into territory further south. The position of Inchtuthil has less in common with the earlier British bases than with the fortresses on the Rhine or Danube frontiers. They too lie beside great natural barriers looking out over hostile territory. As to choice of site, the closest comparison is perhaps with Nijmegen, perched on the edge of a river terrace with wide views across the Waal, or with Mainz in a similar commanding position.

The skilful placing of Agricola's forts has often been a matter for comment and is particularly well exemplified in Scotland. The map (FIG. 78, p. 272) shows how the Flavian forts are closely related to the river system. The planning of a strategic line of forts, at the points where the principal rivers emerge from the Highlands, involved the valley of the Tay, which as by far the largest river invited special treatment. The choice of this valley as the site of a fortress would naturally follow. Below the narrows at Dunkeld, the Tay develops an alluvial plain which widens downstream beyond Caputh: two miles further on, the Inchtuthil plateau, rising from the middle of the marshy river flats and offering ample ground for a fortress, must have seemed to Roman military surveyors as good a site as could be found. Many Roman forts in Scotland stood on glacial gravels: others were set on river terraces. The situation of the fortress is perhaps most closely matched by that of the recently-discovered small fort at Inverquharity, 21 miles (33.8 km) to the north-east, on a flat-topped ridge, remnant of a fluvio-glacial plateau, deeply eroded by the South Esk. This plateau is bounded by steep slopes, which reach a height of 50 ft. (15.2 m) immediately north of the fort. The Flavian site at Loudoun Hill, in Ayrshire, is another example of a fort perched on a narrow ridge hardly wider than the fort itself. Level ground on a river terrace as at Dalswinton, or a flat-topped glacial ridge as at Fendoch, exemplify other favourite choices: study of known sites can help to narrow the field of search for forts of which the existence is suspected.

B. SUPPLY-ROUTES TO INCHTUTHIL

In one respect Inchtuthil differs from most of the fortresses already mentioned, in that it could not so easily be supplied by water. The wide alluvial plain of the Tay between Caputh and Cargill (FIG. 1) contrasts with the reaches of the river upstream beyond Caputh, and downstream. As FIG. 1 shows, below the confluence with the Isla the contours are bunched together defining the slopes of a small gorge, at the lower end of which the gradient increases. From Caputh, where the 125-foot contour crosses the river, to Inchtuthil – a distance of 4400 yards along the river course – the fall is 25 ft. and from Inchtuthil to the Falls of Campsie Linn, a distance of 11,800 yards, the fall is a further 25 feet. The river falls another 50 feet in the next 7600 yards to Bertha, where the bed is barely 15 feet above Ordnance Datum. At present, ships of up to 100 tons and of 13-ft. draught can reach the quays a mile south of Perth, by navigating the estuary at high

water.³⁵ In Roman times vessels of shallow draught might have been able to reach Bertha 3½ miles (5.6 km) further upstream, as it is possible that sea-level in the Tay estuary was then slightly higher than now. Navigation onwards from Bertha is impossible because of rapids below Stanley, and, in particular, of a barrier of hard rock, the cause of the Falls at Campsie Linn. From Bertha colportage would have had to be arranged to a convenient point above the Falls, some 5½ miles (8.8 km), or probably to Inchtuthil itself, 8½ miles (13.7 km) by the shortest route, or 11 miles (17.7 km) by way of the fort at Cargill.

As to connexions overland, the existence of a Roman road northwards from Camelon to Stirling, and from Strathallan by way of Ardoch and Strageath to Bertha has long been recognised and much of the course is known in detail. Following Roy, tradition takes the road beyond Bertha by Grassy Walls as far as Hillhead³⁶ and this course is marked on Stobie's Map of 1783. It presumably aimed at Cargill. Little is known of the remainder of the road-system, though roads have been recorded and are visible from the air outside the south-east gate at Dalginross, extending from the south-east and north-west gates at Inchtuthil, and from the north-east gate at Cardean. A fairly extensive search from the air over some thirty years has failed to identify roads leading to any of the forts on the 'Highland Front'. Much may have been destroyed by agriculture, but it is possible that in this military expansion programme parts of the road-system, as certainly some of the intended forts, had never been built, and that in places temporary tracks, using corduroy where necessary, were all that existed when the system was abandoned.

C. SOURCES OF RAW MATERIALS

Construction of a legionary fortress created a considerable demand for building-materials: turf, timber, gravel, sand, clay and stone. The turf needed for the rampart would involve, as mentioned in Chapter 5, stripping an area about equal to that of the fortress itself, some 53 acres (21 ha). To this requirement must be added the lesser amounts used in the base of the upcast mound; in the ballasting present in places beneath the gravel metalling of the principal streets, and in the 'make-up' needed to level the ground on which the Headquarters building was erected.

As to timber,³⁷ no doubt conifers would be available locally, and birch and scrub oak were to be found more especially in sheltered situations. However, the local oak is unlikely to have been of a size to provide the large baulks needed for bridging, for gateway-towers, and for roof-supports in main buildings: the use of unseasoned wood in considerable lengths would have brought further problems. The shapes of the post-holes, not only for large timbers at the gates and in the cross-hall of the *principia*, but also for the veranda posts in the barracks and in the stores-buildings, showed that these members had been carefully squared to standard sizes. This was true too of the intermediate posts forming the framework in the walls of the *principia*, the Hospital and the Tribunes' houses. If that part of posts to be embedded in the ground was accurately squared, the same would surely be true of the part visible above ground. Some of the uprights in the framework of the walls were so large (4 × 7 in. and 4 × 11 in. (0.10 × 0.18, 0.10 × 0.28 m) in cross-section) that they would hardly have been entirely encased in the clay matrix of the wall, so that these too were probably shaped. Since for the entire fortress an estimated total length of 15 to 20 miles (24–32 km) of timber-framed walling was in question, the amount of timber dressing and carpentry, wherever it was undertaken, must have been very considerable. Much time and skilled work on site would have been saved if a proportion of the supplies of timber could have been met from stockpiles further south. Unskilled labour for transport, perhaps captives under military discipline, might have been easier to find than skilled craftsmen to prepare timbers from trees felled locally. What material was used for making wattles to fill the spaces between the timber framing of walls has seldom been considered. Osiers would be very

35. Admiralty Pilot; North Sea (West) Pilot (1973), 42–3.

36. About NO 145343, 5 miles (8 km) beyond Bertha.

37. For the supply of timber for military buildings see W.S. Hanson, *Britannia* ix (1978), 293–306.

suitable, and even brushwood might serve: the extent to which supplies of either were available at Inchtuthil is unknown. Possibly the easier way to use such material was to prepare panels of wattle-work in standard sizes that could quickly be fitted into slots in an upright framework.

The geological resources of the neighbourhood were exploited to an extent that throws interesting light on the thoroughness of the search for raw materials. Fairly even-textured gravel of moderate coarseness was needed for road-metal. Cobbles were used in the foundation-trench for the stone wall and as road-bottoming; sand for the preparation of mortar, for which lime was also required; clay for the wattle-and-daub walls of the timber-framed buildings and, in different grades, for manufacture of tiles and pottery; freestone for building.

The superficial deposits of the Inchtuthil neighbourhood provide an abundant source of gravel and sand of various grades. The exposures in the steep slopes to north and east of the plateau, as also on Redgole Bank near Spittalfield, show very well the character of the deposit. Air photographs have revealed a number of large pits (FIG. 69) which may well have been gravel-quarries not far from the south-west side of the fortress. A section of one of them disclosed a vertical face on the side away from the fortress and a more gentle slope opposite, as if the pit had been worked from the direction of the fortress. Gravel may also have been obtained in levelling the ridges in the east *praetentura*. Ten thousand cubic yards (7645 m³) of gravel, the estimated requirement for the roads across the plateau, would no doubt call for special quarrying. Some sieving or separation of different grades of gravel might be needed to obtain material of the right grade and consistency for road-making. Local supplies of limestone are poor: the nearest source is an outcrop south of the Loch of Cluny, 2½ miles (3.6 km) away, where an impure limestone was quarried in the last century for lime burning (at NO 115435, FIG. 1); this may have been the same quarry that yielded lime for agricultural purposes a century and a half ago.³⁸ Crushed limestone is exposed in a quarry near Stenton, 3¼ miles (5.15 km) to the west, and an impure concretionary limestone, seen in outcrops by the Tay near Stanley, has in the past been quarried on a small scale at several points to the north-east as far as Gallowhill³⁹ (NO 161355). The last point is only 3½ miles (5.6 km) from Inchtuthil; but if there were need to avoid a double crossing of the Tay, the effective distance would be twice as far.

Considerable quantities of clay would be needed both for cladding the wattle-work of the timber-framed buildings, and for manufacture of tiles. The outer walls can hardly have been less than 6 inches (0.15 m) thick, that is with 3 in. of clay on either side of the wattles, if they were to provide adequate insulation: at least 8 in (0.20 m) would be necessary if most of the timber uprights were to be enclosed in the clay. A rough estimate, based on the length of exterior walls, suggests that 6000 to 9000 cubic yards (4580–6880 m³) of clay would have been required for the walls and for roof tiles.

Few samples of the tiles are now available. A gully outside the building-line at the end of Barracks 13 to 18 and 25 to 30 yielded some fragments of roof tile, 1½ to 2 inches (38–51 mm) thick. Eight pieces were found in a section at the south-east corner of Barrack 15, and the drainage-channel at the south corner of Barrack 14 yielded half an *imbrex*, 20 in. (0.50 m) wide and 10 in. (0.25 m) deep. More information exists about the hypocaust tiles from the bath-house. In the *laconicum* (FIG. 63), according to the report of the 1901 excavations,⁴⁰ there had been probably 111 pillars supporting the floor. Each pillar consisted of six tiles 8 by 8½ in., and 2¾ in. thick (203 × 216 × 70 mm), resting on a basal tile 11 in. (279 mm) square and 3 in. (76 mm) thick. The floor was carried on larger tiles 17 in. (432 mm) square, which spanned the spaces between the pillars. Several of these tiles had been preserved in Caputh church, where they were examined in 1953.⁴¹ They conformed to the two smaller sizes just mentioned. To judge from one

38. D.A. Allan, *Transactions of the Royal Society of Edinburgh* lvi (1928), 81 mentions the limestone quarry at the south-east corner of the Loch of Cluny. This paper includes a map showing the solid geology of part of the Highland Border, including the Inchtuthil district. Recent analysis of a specimen from this quarry gave a CaO percentage of 45.2.

39. Mr. I.B. Paterson of the British Geological Survey kindly supplied this information.

40. *PSAS* xxxvi (1902), 217–20.

41. The tiles had been brought up from the vaults in Caputh old church, containing the Muir Mackenzie tombs.

or two broken specimens, a clay free of stones had been used in their manufacture.⁴² Heavy-mineral analysis might provide a clue to the nature of the clay (see p. 339).

Sources of clay are difficult to find in the neighbourhood of Inchtuthil, though 'till' (boulder clay) is fairly widely available in the district, and has been used locally for the construction of buildings. However, the till contains stones which would make it unsuitable for the manufacture of tiles and pottery. The small fragments of daub recovered in the excavations contained no stones. If the clay had to be puddled to make it suitably plastic before use in the wattle and daub walls of the fortress, till would not have proved a very suitable material.

Clay of very fine texture apparently occupied a 'kettlehole' a little to the west of Bishophall (NO 125385) south of the Tay and half a mile from the fortress. A little further west, a recent trench for a gas pipe-line exposed 10 ft. (3.05 m) of clay some 50 yards (45.7 m) due south of Lily Loch. The clay from this deposit was free of stones. These seem to be the only known occurrences of fine clay in the immediate neighbourhood of Inchtuthil.⁴³ In the Blairgowrie district, clay is known in at least one of the kettleholes there, at Stormont Loch, and may well be present at others. It may also occur in some of the cut-off meanders of the Tay. Whether these local sources were exploited would largely have depended on how thorough a prospection of the Inchtuthil district was made by Roman surveyors. A local supply would have been far more convenient than the clays now most commonly worked in the neighbourhood of Perth. These fine-grained glacio-marine clays of the Errol Beds are found at a number of localities above the estuarine flats of the Carse of Gowrie and as far inland as Scone Park, 8 miles (12.8 km) from Inchtuthil.

The sandstone quarries nearest to the fortress lie near Middle Gourdie farm (at NO 116424) and by Kirkton of Lethendy (NO 132418), but these are of no great age. Outcrops of sandstone occur on Gourdie Hill, and the discovery in 1940 of a small Roman camp at Steed Stalls, at the east end of the Hill, directed attention thereabouts.⁴⁴ It was not however until 1970 that the site of a large Roman quarry was observed and photographed from the air.⁴⁵ The subsequent recognition on the Spittalfield plateau of a continuation of the road leading from the north-west gate of the fortress confirmed the discovery (FIG. 1): the road branches at the point NO 114412, the right-hand (eastern) fork aiming directly at the quarry only 1000 yards (900 m) away. The structure of this road (FIG. 77, p. 256), with its thick layer of rammed gravel overlying quite large cobbles resting on a bed of impacted earth and turf, suggests that it was built to carry heavy loads. The use of a cutting and embankment enabling it to climb in a straight course the steep, 30-foot (9 m) south scarp of the Spittalfield plateau reinforces this suggestion.

The sandstone composing the Hills of Gourdie and Lethendy is part of the Strathmore Sandstone series of Lower Devonian age. The rock, which has been quarried extensively for use as a building-stone, varies considerably in character. It is a fine- to medium-grained red or pinkish sandstone, with some horizons containing subangular or rounded pebbles in sufficient proportions to justify the term conglomeratic sandstone. The stone is well-bedded and quite easy to quarry, as it can be detached in large blocks. The intention may have been to work the stone at more than one locality, and it is possible that the left-hand fork of the road (FIG. 1) led to a second, as yet unidentified, quarry-site. The stone used for the bath-house, a fine-textured greyish sandstone unlike that from the Gourdie quarry, came, in the opinion of the excavators of 1901,⁴⁶ from Innernytie (c. NO 131358), or from Cargill, where there are outcrops beside the Tay, but no Roman quarry-working has yet been identified.

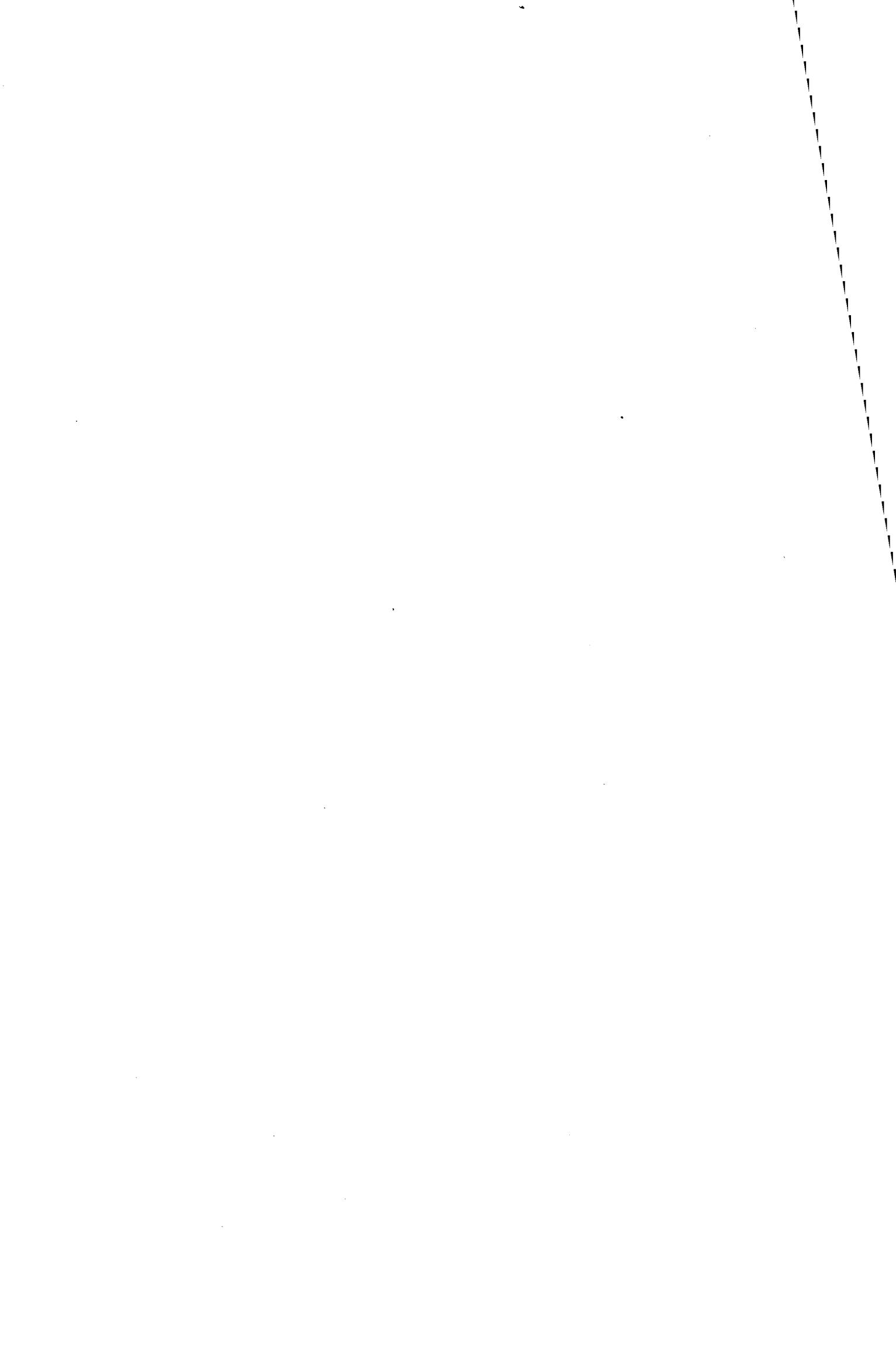
42. The larger tiles, 17 in. square, found in 1901, had been assembled to form the tiled surround of a fireplace in Delvine House, shown to us by Mr. H. Hogarth in 1953. This was destroyed when the house was demolished in 1960.

43. I am grateful to Mr. I.B. Paterson for information about sources of clay near Inchtuthil.

44. I.A. Richmond, *JRS* xxxiii (1943), 47–8, fig. 9. The camp was discovered by Mr. Eric Bradley.

45. See p. 255.

46. *PSAS* xxxvi (1902), 195.



INCHTUTHIL

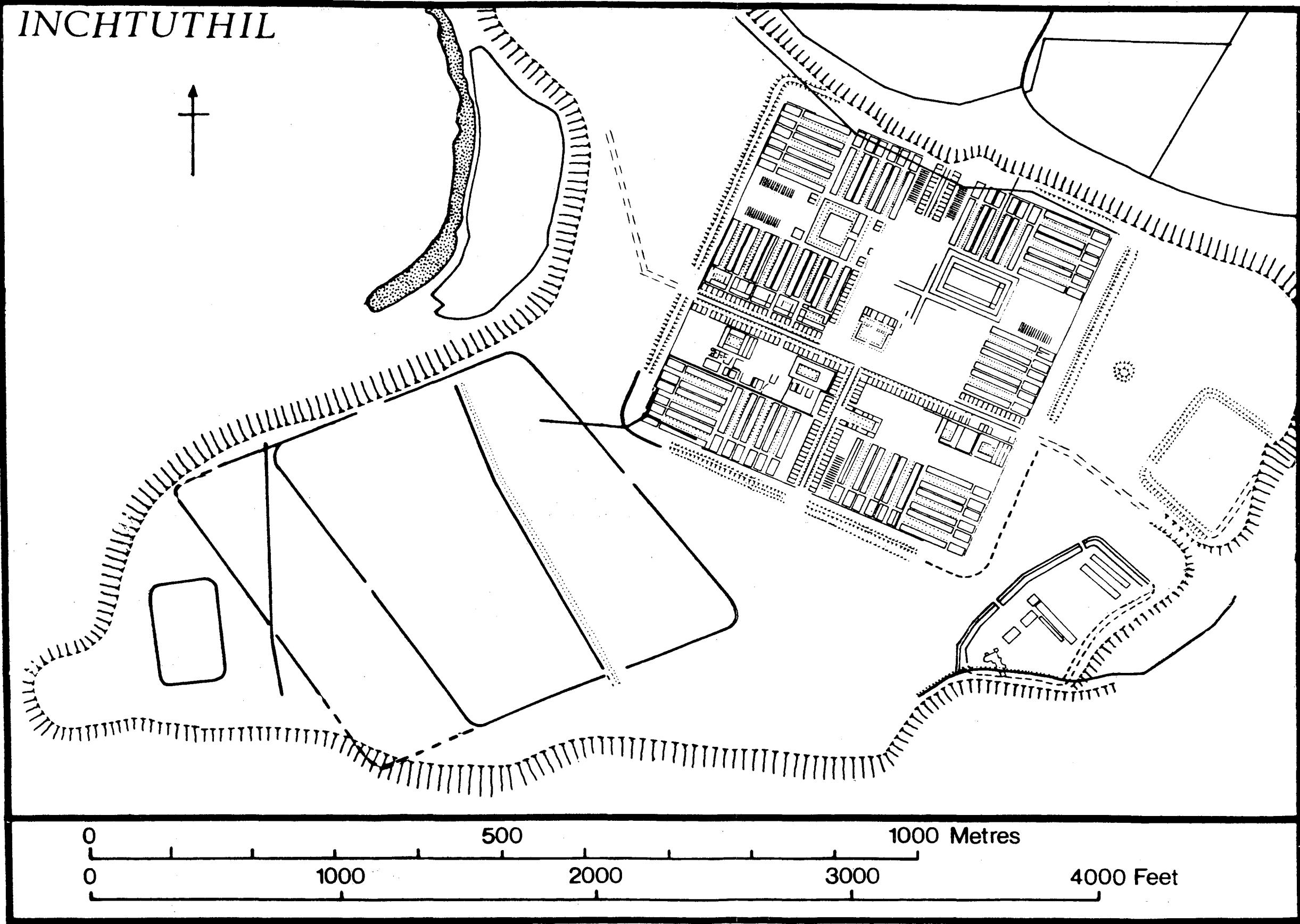


FIG. 2A Simplified plan of Roman features on the plateau.

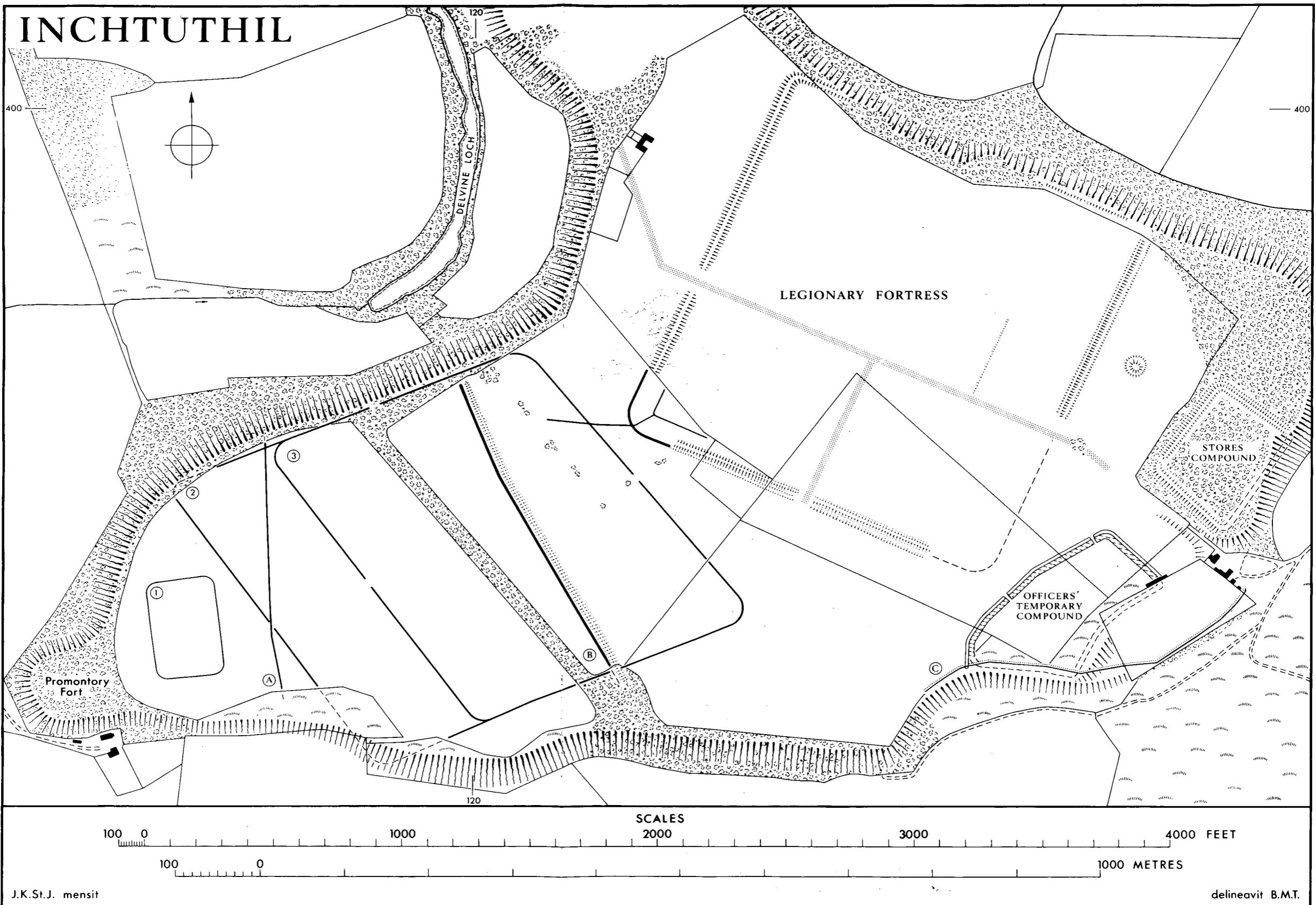


FIG. 2B Plan of the Inchtuthil plateau. Key: 1, small temporary camp. 2, first SW limit of large labour-camp. 3, later limit of reduced labour-camp. A, first boundary ditch (the Outer Masking Earthwork). B, 'Western Vallum'. C, Earth-and-timber rampart and ditch along plateau-edge. Scale, 1:5000.

CHAPTER 3

THE EXCAVATIONS OF 1952–65

Sir Ian Richmond's interest in Inchtuthil developed from a visit in 1937 when, together with James McIntyre, he made a short tour of Roman military sites between Perth and Aberdeen. He had just completed work at Fendoch, where his excavations had demonstrated that exploratory trenching, conducted with great economy of labour, was able to outline very quickly much of the plan of the essential buildings in that fort.⁴⁷ He recognised that what had been done at Fendoch, as it were in miniature, might be repeated at Inchtuthil on a far larger scale. Although plans to excavate there in 1938 were rendered abortive because of the political situation, the project remained much in his mind. He regarded Inchtuthil as a unique site: where else in Britain was there to be found a legionary fortress, having had but a brief single period of occupation, and with its entire area unencumbered and available for excavation? In a war-time review of recent discoveries, he wrote 'the fair-ways and rough grass of a private golf-course cover an entire legionary fortress (in timber), to which the air-photograph remains insensitive.'⁴⁸ However, already by 1942, when the above sentence was written, the ploughing-up campaigns of the war caused long-established park-land to be turned over to corn. The whole area from the south-west rampart of the fortress to the western tip of the plateau was then arable. After fresh ploughing in 1943, the line of the 'Western Vallum' was clearly visible from the air as a white soil-mark, suggesting that clay or turf had been used in its construction.⁴⁹ It was, however, in the dry summer of 1949 that aerial observation contributed notably to knowledge of the site. The rough grass, growing on a comparatively thin soil overlying gravel, parched brown in the drought: wherever a greater depth of soil filled trenches, pits and ditches, the grass retained its verdure. In this way a large part of the plan of the south-east quarter of the fortress was clearly visible (PL. XXV, p. 152), including twelve barracks of legionary size arranged in two groups of six, in facing pairs.⁵⁰ The centurions' quarters lay nearest the *intervallum*: the remainder of each building was divided into 12 or 14 sets of rooms, with a veranda in front. Here was conclusive evidence of the troops in garrison. The photographs established beyond cavil the possibility of recovering the plan of the fortress.

From 1945 to 1980 Inchtuthil was reconnoitered from the air almost every year with great gain in information. This work is the subject of a separate chapter: suffice it to say here that such photographs as became available during the excavations were invaluable not only for surveying, but also for enabling the labour camp to be investigated; indeed, without them this camp would have remained unknown.

The air photographs of 1949, which demonstrated that the construction-trenches of timber buildings existed and could be identified and planned, helped forward the enterprise that Richmond had in mind. His experience at Fendoch suggested that a ten-year programme would

47. I.A. Richmond and J. McIntyre, 1938.

48. I.A. Richmond, *JRS* xxxiii (1943), 47.

49. O.G.S. Crawford 1949, 71 note 1.

50. J.K. St Joseph, *JRS*, xli (1951), 63–4, pl. viii, 2.

be needed at Inchtuthil. The fortress is a scheduled site, and consent to the work was readily given by the Ancient Monuments Department in Edinburgh. The proprietor, Mr. Hugh Hogarth, kindly agreed to the excavations, approval which was renewed after Hogarth's death in 1954 by Mr. and Mrs. Stevenson, and later by Colonel and Mrs. Peter Dunphie. The excavations, which lasted in each season for four weeks (usually in September), were to be spread over fourteen years, 1952–65. Six or seven men, supplied by a contractor at Coupar Angus, were employed on the work, and we were fortunate that several of them returned year after year.

The cost of the undertaking was met for the first three years by the Christianbury Trust, for the next six years by grants from the Pilgrim Trust, and from 1961 onwards by a grant from the Leverhulme Foundation. Initially, expenditure (labour, accommodation, transport and incidentals) was at the rate of £525 a year, but it rose gradually as the cost of wages increased to a peak of £1,150 in 1964. The total cost was about £9,600, an average of £700 a year.

The work was directed throughout by Professor Richmond and the writer of this chapter (J.K. St. J.), and in the whole fourteen seasons neither of us was away from the site for more than four days. That the work was able to proceed as quickly as it did was due partly to Richmond's profound knowledge of Roman military affairs, partly to the condition of the site — a single-period fortress having its entire area free for excavation — and partly to the limits that we set ourselves, namely the recovery in reasonable detail of the essentials of the fortress plan, with a view to determining the history of the Roman works on the plateau. If the labour camps are included, these works extend over some 150 acres (60 ha), and to ensure accuracy in surveying a series of reference-points was established. In the fortress, one lay on the axis of a main street at or near each of the gates, with a fifth at the intersection of the *viae principalis* and *praetoria*. There were three more at suitable positions near the Officers' temporary Compound, and the system was later extended to provide convenient points for the measurement of the labour camps. The surveying was shared. Most of the barracks, the hospital, three of the granaries, the houses of the officers of the first cohort and the gates were surveyed by Richmond; the *principia*, the *fabrica*, the tribunes' houses, the remaining three granaries, the small buildings on the *scamnum tribunorum*, all the buildings in the Officers' temporary Compound and the construction camps were surveyed by the present writer. The recording of the *tabernae* was divided between us. The sections through the fortress defences, the defences of the stores-compound and the western vallum, sections of drains, gutters and construction trenches, the section through the road outside the north-west gate of the fortress, plans of the ovens and new drawings of the bath-house were made by Richmond. Sections across the ditch of the Officers' temporary Compound and the various ditches of the construction camps, as well as of pits within these camps, were drawn by J.K. St J.

We welcomed visits, repeated almost every year that the work was in progress, from Mr. Angus Graham and Dr. Kenneth Steer, as also from Mr. Charles Millar, who years before had been instrumental in bringing contingents of boys from Trinity College, Glenalmond to help Professor Richmond at Fendoch. Miss Anne Robertson came to see the work on several occasions. Professor Stuart Piggott was able to visit us when the prehistoric structure was excavated. Sir Walter Aitchison, who had founded the Christianbury Trust, visited us in 1952–3, when the work was spurred on by his infectious enthusiasm. Mr. Macdonald, senior, who worked part-time as a gardener at Delvine, in spite of having retired ten years before, frequently passed us on his way from the kitchen-garden to the house. He provided a link with the past, for he had clear recollections of the 1901 excavations, having been employed as a junior gardener at Delvine at that time. After our excavations were completed, Mr. P.J. Carmody, who as Reader in Surveying at Newcastle had been a colleague of Richmond's, kindly made (in 1967) a survey of the whole plateau, contoured at 2-foot intervals.⁵¹

51. We were fortunate in having help from a number of volunteers: Deryck Faulks was present for part of every season from 1959 onwards; Dr. Iain MacIvor for part of the 1953 and 1954 seasons; Alastair McLaren in 1952–5; David Wilson for the whole of the 1961 season and for part of 1962–4; Alan Wilkins in 1953 and 1955, and Alan Hall in 1954.

At the start of the excavation in 1952, the fortress was under rough grass. Besides the Roman works, the two tumuli east of the fortress remained much as they appeared in a photograph of 1901. That they had not stood alone is evident from Pennant's reference to tumuli 'being very frequent' on the plateau. Moreover, excavation was to reveal two Bronze Age cremation burials not far from the site of the *porta decumana*, and a prehistoric structure within the area of the left *praetentura*. That there had been a few other native works on the ground occupied by the labour camps is clear from air photographs.⁵² The promontory fort on the west tip of the plateau is in its present form evidently of post-Roman date, as is apparent from the presence in its rampart of loose blocks of dressed Gourdie stone matching the masonry of the fortress wall.

A fair number of trees survived from the avenue planted about 1750, and there were also a few scattered clumps of ornamental trees, chiefly oak and beech well past their prime. No useful excavation could be undertaken within the extent of matted tree roots: fortunately no vital part of the fortress plan was affected. The ditches bounding the avenue and the occasional hollows created by bunkers for the golf-course had been dug into the gravel below the depth of Roman construction-trenches. On the north-east side, about 500 ft. (150 m) of the fortress wall and rampart from the *porta decumana* north-westwards had been lost to erosion, while shrubberies and trees covered most of the remaining rampart and intervallum. However the defences, though often considerably reduced in profile, could be traced without difficulty on the other three sides, save only from the south-east gate round to the south angle, where they had been levelled in the plough-lands and paddocks of the eighteenth-century village. The cambered mound of the *via principalis* was easily followed across the fortress, with the *via praetoria* at right-angles leading to the *porta praetoria*, in front of which the ditch could be seen to be interrupted.

At the conclusion of the excavations of 1901, the bath-house, a length of the fortress wall in the shrubberies, one of the corn-drying ovens inserted within the fortress ditch, and a section across the defences and interior of the promontory fort, had been left open at the express wish of the proprietor.⁵³ This was a mistake. By 1952, the bath-house had become so overgrown with weeds and elder bushes that its plan could not be made out. Weathering and frost action had caused walls to collapse. After a fresh clearance and examination of the building in 1963, it was filled in. At the exposed length of fortress wall, dressed blocks of Gourdie stone had been shattered by frost, and the whole length had gradually become covered with a compost of leaves and beech mast. This trench was back-filled in 1953. The corn-drying oven had long been masked by weeds, but the site remained as an isolated hollow in an arable field till it was eventually obliterated by agriculture about 1969. The section across the promontory fort remains as a collapsed trench from which no useful information can now be extracted.

Since the recovery of building-plans depended on tracing the construction-trenches, some account is needed both of the subsoil in which the trenches were cut and of their filling. The subsoil was usually a fine to medium-textured brown or yellow gravel, though occasionally it became stony, including pebbles the size of small cobbles. The gravel was uncemented, but quite firm. The depth to which the construction-trenches were cut into the subsoil varied from a few inches to three feet: where lengths were cleared out the vertical sides of the trenches generally stood firm for the time the excavation was open. The filling of the trenches, which consisted of the material that had been dug out of them, usually with some admixture of topsoil, never attained the compaction and firmness of the undisturbed gravel. Difference in consistency, colour and texture made the trenches comparatively easy to trace. Even when one feature was cut by another, as happened with the superimposed barrack-buildings in the Officers' temporary Compound, or the gully cutting across Tribune's House I, the sequence was usually in no doubt. Where the exploratory trenches from the excavations in 1901 had cut into the subsoil, they could be recognised in the same way.

52. Air photographs K17-AS 6 (PL XXXVI), CDB 65-7; CDC 12-13, 24 (PL. XL), 28; CHP 1-4. See also PL. XLII (p. 242) and FIG. 69. The contrast with the Spittalfield plateau (NO 114413) is striking: there air photographs show numerous signs of native occupation.

53. As Mr. Macdonald, formerly head gardener at Delvine House, told us.

Occasionally gravel gave way to soft silver sand which would not maintain a vertical face unless it were partly cemented. In such conditions, construction-trenches and post-pits might prove very difficult to trace. Even when originally dug, the construction-trenches in sand may not have had vertical sides; and when back-filled the trenches might have a filling that appeared almost indistinguishable from the undisturbed sand. In such circumstances it might only be possible to confirm the existence of a putative trench by cutting a section across it and continuing into the subsoil on either side. Instances were also noted of the gravel infilling of a construction-trench developing a secondary cement or iron pan, which made the filling harder than the gravel in which the trench had been cut.

As with timber-framed buildings today, erection of the principal members was not without its own particular problems. Probably the largest and heaviest baulks of timber were those used in the cross-hall of the *principia*, in the hangar-like wings of the *fabrica* and at the gates. Those at the gates measured 10 to 12 in. (0.25–0.30 m) square, and can hardly have been less than 25 ft. (7.6 m) in length. They were set in pits sometimes as large as 2 ft. 4 in. by 5 ft. (0.71 by 1.54 m) and up to 4 ft. (1.22 m) deep. The erection of such posts would require appropriate tackle.⁵⁴ Individual posts would have to be held temporarily by oblique braces, while the different uprights were correctly aligned in relation to one another. Large packing-stones often found round the base of such posts would have helped to keep them steady. In the construction-trenches of the main buildings, holes for posts measuring 4 inches (102 mm) square were commonly found, with others 4 in. by 7 in. (178 mm), or 4 in. by 11 in. (279 mm). These might be held in position by smaller packers even at the level of the top of the subsoil. In one granary (No. 2) large clods of turf were similarly used as packing material at least in the construction-trench at each end of the building (PLS. XXI–XXII, FIG. 25).

Within the construction-trenches, the position of a post was occasionally revealed by a void; more often the post-hole was filled with fine-textured greyish earthy material, which might contain burnt twigs from wickerwork, and daub. Sometimes the post-hole widened towards the surface, as if the post had been rocked to and fro to loosen it before extraction. At the gates, digging round some of the largest posts had evidently proved necessary before they could be loosened. In such instances the exact position of a post might be difficult to determine, since the filling of the upper part of the post-pit was considerably disturbed. These indications all point to the demolition of buildings. The principal members would no doubt be removed for re-use elsewhere; the smaller pieces with the wattle and daub were evidently burnt, for the ash and debris were used to fill the holes as part of the tidying up of the site.

Excavation began in 1952 in an area adjoining the south-east defences, between the *viae principalis* and *quintana*, where barracks might reasonably be expected.⁵⁵ In addition, a section was cut across the defences where they are well preserved, about 400 ft. (122 m) north of the *porta principalis sinistra*. The existence of barracks was soon established: two (Nos. 17–18)⁵⁶ were chosen for particular examination of the centurion's quarters and of the soldiers' *contubernia*: the remaining four, making up the buildings of one cohort, were defined in outline. Together, the six barracks (Nos. 13–18) occupied a space 275 ft. by 278 ft. (83.80 by 84.70 m). A range of fourteen *tabernae* with wide openings and a veranda in front was found to face the north side of the *vía principalis*. To north of the barracks a building 136 ft. (41.45 m) long was identified as a granary from its distinctive plan, which conforms to a standardised pattern of first-century Roman military granaries in timber. The section of the defences revealed a 13-ft. (4 m) turf rampart, fronted by a stone wall 5 ft. (1.52 m) thick, built on a foundation of stone pitching. A berm 16 ft. (4.88 m) wide intervened between the wall and a ditch, there 20 feet (6.1 m) wide and 6½ feet (2 m) deep, cut in rather loose gravel. The material from the ditch formed a flat-topped upcast mound.

54. Cf. for example, the east gate at Oakwood where derrick-holes used for the erection of timbers estimated at 30 ft. (9 m) in length, were found. K. Steer and R.W. Feachem, *PSAS* lxxxvi (1954), 94–5, pl. XIX.

55. Annual summaries of the excavations were published in *JRS* xliii (1953) to lxvi (1966) *passim*.

56. For the numbering of the barracks, see FIG. 83 (facing p. 282).

The experience of this first season was repeated in subsequent years as the plan of the fortress was gradually recovered. Between 10 and 20 inches (0.25 and 0.50 m) of ploughsoil was found to overlie the loose gravel and sand of which the plateau is composed. That most of the area had at one time been extensively ploughed was evident: in places ploughing had begun to bite into the gravel to such an extent that shallow construction-trenches petered out into topsoil. The survival of any floor-levels within buildings is thus very unlikely and certainly none were found. As at Fendoch, only where features such as ditches, drains, construction-trenches and pits had been cut into the subsoil, or where the rampart or the tail of weathering behind it had buried the Roman surface, were any stratified levels encountered.

In buildings likely to have a more or less standardised plan, such as granaries and barracks, the essentials of the plan could be recovered with a minimum of digging. Thus, we attempted to determine the dimensions both of the centurions' and of the men's quarters in at least two barracks in each cohort. Both the number of the *contubernia*, and the spacing of the sub-divisions are important particulars, most easy to establish when the spacing is regular. Information from aerial photographs, which record in some detail the men's quarters in Barracks 1 to 12, suggest that there at least the spacing was uniform. As to the centurions' quarters, the houses of the five senior centurions attached to the first cohort were all explored in detail. The remaining fifty-four centurions' houses do not vary greatly in overall dimensions, while showing considerable differences in the details of their internal planning. Of these, six houses, a sample of eleven per cent, were chosen for particular study.

The more specialised the building, the more attention it required. Thus, the *principia*, the *fabrica*, the Hospital, the houses of the tribunes and of the centurions of the First Cohort, and the small buildings in the right *praetentura* were all examined in detail. This did not necessarily mean that a complete plan could be recovered. In the hospital, in some of the rows of *tabernae* as in the small buildings, it is likely that not every minor wall could be traced, as their construction-trenches were so shallow that in all probability some had either been destroyed by ploughing, or had not even cut into the subsoil. The care taken to recover as complete details as possible is not always apparent from the published plans. Thus, the question might be asked whether the *fabrica*, and the middle three houses for the centurions of the first cohort, did not have colonnades on all four sides of their courtyards. Sometimes the character of the subsoil made the recognition of post-holes difficult; however, at the *fabrica* search was made for four post-holes on the supposition that the colonnade continued round the south, west and north sides of the courtyard, but without success, and similarly in the centurions' houses.

In 1953, the second season, the Headquarters building and the *porta principalis sinistra* were examined in detail. The third season, 1954, saw the line of the fortress wall established on all four sides. The *porta praetoria* and *porta principalis dextra* were examined in part, and a tribune's house (No. I) was excavated in the left *praetentura*. Six more barracks (Nos. 19-24), with their centurions' quarters, were identified near the east angle. To excavate such specialised buildings as the *principia* or a tribune's house took considerably longer than to identify and plan the barracks of a cohort. Work in future seasons was designed as far as possible to include the excavation of one specialised building, and the determination of the quarters of one cohort. In 1955, a second tribune's house (No. II) was excavated, together with two granaries (Nos. 3 and 4), and the *tabernae* on either side of the *via decumana*. The legionary Hospital was identified and its outline established, and Barracks 25-30 were explored. In 1956, the Hospital was fully excavated: Barracks 31-36 were outlined and found to correspond in size and planning with the thirty examples already known. In 1957, work was concentrated on the area between the *principia* and the north-west rampart. The north side of the *via principalis* was shown to be bordered by a colonnade and row of *tabernae*. Behind these, excavation revealed the quarters of the First Cohort, comprising five courtyard-houses for the senior centurions, and ten barrack-blocks (Nos. 43-52), with an additional pair towards the Headquarters building. In the seventh season, 1958, the main work took place south of the *via principalis*, where two tribune's houses (Nos. III and IV) were excavated and planned in detail. Twenty-nine *tabernae* faced the *via principalis*, and the *via praetoria* was found to be flanked by comparable structures as far as the *scamnum tribunorum*, where a street intervened. Six more barracks (Nos. 53-58) were defined towards the

west angle of the fortress. Work continued at the centurions' houses of the First Cohort.

At about this time, half-way through the whole project as it turned out, Richmond stated the objectives and summarised the results as follows:

'The main objective is the recovery of the history of the fortress, and a complete plan of its elaborate timber-framed buildings. We have secured abundant evidence for an Agricolan occupation of the fortress, about A.D. 83, and for a systematic demolition of the whole by the Romans themselves about A.D. 90, a historical conclusion of very considerable importance. We still hope to learn which legion was in garrison. In our study of the plan, we have so far recovered the line of the defensive wall and three out of the four gates (the fourth is eroded); the headquarters building; the hospital; four out of six tribune's houses; four granaries out of a minimum of six; most of the store-rooms along the colonnaded *via principalis*, and part of those lining the *viae praetoria* and *decumana*; and fifty-four barrack-blocks out of a possible sixty-six. All this has been achieved by very careful planning of the work over seven seasons. The original estimate was that we should recover the whole plan in ten seasons. Experience now suggests that eleven will be required to complete this part of the work.'

'There is, however, a secondary objective, of real importance if the whole history of this remarkable site is to be recovered. The excavations of 1901 revealed outside the south-east quarter of the fortress a bath-house, barrack-like buildings and ditches which have been interpreted as the remains of two successive auxiliary forts. Their connexion with the legionary fortress is at present obscure, but plainly was once intimate; and information of real significance for the history of the site would be missing if this area remained unexamined. It is estimated that two seasons' work would suffice for the purpose.'

'It should be emphasised that the ultimate result obtainable at Inchtuthil is one which is to be had nowhere else in these islands. Nor is there any other site in the Roman Empire where an entire legionary fortress lies open to exploration and is susceptible of being planned as an unaltered whole. The result should be a classic text-book. The fortress belongs to the Flavian period, when the Roman Imperial army was approaching the zenith of its efficiency as an organised fighting machine. The plan, with all its implications in organisation and logistics or quantity-surveying, gives an unrivalled picture of Roman military engineering and castrametation.'

'The nature of the remains, however, with floors removed by ploughing and walls reduced to nothing but foundation-trenches, makes their recovery a specialised task, unattractive to the general public, unsuitable for display and of little service for the training of archaeological students, except of a rather specialised kind. But it is the final result on paper which will tell, and through which the remains can be made to speak vividly.'⁵⁷

Perhaps this statement was too optimistic, and yet Inchtuthil was to prove even more exceptional than Richmond then supposed: the fortress had been abandoned before construction was completed, thus providing information, hardly obtainable elsewhere, of the sequence of building.

The systematic planning of the fortress was very clear from the results of the first seven seasons, but evidence was already accumulating that the work had not been completed. As the general plan (FIG. 84) shows, there are a number of spaces empty of buildings. That this was so was established by digging exploratory diagonal trenches: they encountered no structures. The largest space is the plot to left of the headquarters, which would normally have been occupied by one of the principal buildings of the fortress. The ground there had been carefully levelled preparatory to construction, but the work had been carried no further. Behind the headquarters and beyond the *via quintana* is another large empty space. Four large officer's houses lie on the *scamnum tribunorum*, but the remaining space, enough for four more, or for structures of equivalent size, remained empty. Further ground not built upon was to be identified by later work in the *praetentura*.

In the eighth season, 1959, the planning of *tabernae* along the *via praetoria* was completed.

57. From a note on Inchtuthil by I.A.R., written about 1958 and hitherto unpublished.

Colonnaded *tabernae* were also traced to east of the junction of the *viae praetoria* and *principalis*, extending half-way along the south side of the latter. To left of the *via praetoria*, a building, provisionally identified as a 'drill hall' was located and planned: to south of this, yet another granary (No. 1) was traced. Further west, six barracks (Nos. 59-64) were defined. In 1960, the year that saw the demolition of Delvine House, work was concentrated to north of the *via quintana* where a large courtyard building was identified as a construction-shop, or *fabrica*. During the detailed planning of this building an exploratory trench revealed, in the south-east range, a pit in which a great hoard of iron, principally unused nails, had been buried before the evacuation of the fortress. To the north-west lay two granaries (Nos. 5 and 6), matching the four already known. Near the north angle of the fortress six more barracks (Nos. 37-42) of another cohort were defined. The great cambered mound of the road outside the *porta principalis dextra* was examined. The year 1961 saw further work on streets and buildings surrounding the *principia*. Excavation in the left *praetentura* identified a prehistoric structure, of which the ditch was cut by construction-trenches of Barracks 4 and 5. Work was extended for the first time to an area south-east of the fortress, where structures and ditches had been identified in 1901. The supposed stone barracks were shown to be the ruins of buildings of an eighteenth-century village. Search was made, but in vain, to west of the fortress for the bath-house recorded by Pennant. In 1962, exploration in the right *praetentura* of a strip south of the *scamnum tribunorum* revealed a miscellaneous group of eleven small buildings. The two largest were house-like structures, the remainder workshops, sheds or offices. A section was cut across the 'Western Vallum', and examination of the labour camp began. The 1963 season saw further work in the area south-east of the fortress. Both the well-known bath-house and timber buildings stood within a temporary compound near the edge of the plateau. Study of the bath-house, after clearance, enabled minor corrections and additions to be made to the plan, and established that the stoke-holes had never been fired. Within the fortress, the centurions' quarters in Barracks 13 and 15 were examined in detail. In 1964, the temporary compound was further explored. Towards its north end a timber barrack had been built: in a second phase, the barrack was rebuilt with a veranda, and a second matching barrack was added. In the centre of the compound an elaborate timber residence, presumably for senior officers, had two main rooms in masonry, which were provided with hypocausts. Three other buildings, two of them offices, were identified between the residence and the bath-house. A ditch, antedating both the compound and the baths, was traced eastwards from the edge of the plateau down to the Roman course of the river Tay (FIG. 57). The defences and interior of the stores-compound (the 'Redoubt') were examined: the north-west ditch of the labour camp was traced, and both north-west and south-east gates of the camp were identified. In the final season, 1965, excavation of the centurions' houses of the First Cohort was completed. The back of the rampart and the *intervallum* between the *porta principalis dextra* and the north angle were explored in a number of long trenches. Six ovens set high at the back of the rampart were identified: scattered stonework alone remained of some eight more. At the 'Redoubt' a gate was located near the west angle. Exploratory trenches failed to find any structures in the interior.

A week after the final season's work at Inchtuthil had been completed, Richmond died. He had had in mind to produce a report with folding plans of individual buildings at an ample scale, and he considered that four or five years would be needed for its preparation. As to publication, his practice was to make his own fair inked drawings from the excavation-records as the work proceeded. The plans were based upon surveys made each year: the sections upon detailed pencil drawings that accumulated as the digging progressed. By the end of the excavation, finished drawings of the survey of the fortress, and of the Officers' temporary Compound, and plans of all the principal buildings, together with sections of the defences of the 'Redoubt' and of the ditch of the Officers' temporary Compound, had been completed. These are published in this report. A plan of the 'Redoubt', plans of the houses of centurions of the First Cohort, and of the ovens, and a section of the stone drain, have been drawn by Mr. D.R. Wilson from Richmond's field-records. With one or two exceptions, the remaining detailed plans and sections have been prepared at Cambridge under my supervision from the original drawings by Richmond or myself. For any errors that may have crept in during this work, I take responsibility. The general

plan of all the Roman works on the Inchtuthil plateau, the detailed plan of the labour camp with sections of its ditches and pits, and the map showing Inchtuthil in its setting, have been drawn more recently.

The interval between the end of the excavation and the completion of the report has stretched to four times the span that Richmond had in mind. The delay is not without gain. In the last twenty years, excavations have taken place at other legionary fortresses; progress has been made in the study of both samian and coarse pottery of the Flavian period; not all the geological details were available twenty years ago, while discoveries from aerial reconnaissance have significantly expanded knowledge of the archaeological setting. The practical information in the many specialist contributions to this report is thus greater than would have been possible in 1965. What is most lacking is the advantage of Richmond's insight that came from his widely ranging knowledge of the Roman army, its operations and buildings, acquired during forty-five years of study and excavation.

PART II: THE FORTRESS: EXCAVATIONS AND ANALYSIS

CHAPTER 4: THE FORTRESS: PLANNING AND DEFENCES

The legionary fortress (FIG. 84) was originally defended by a turf rampart and ditch; at a later stage, although without long delay, the front of the rampart was cut back for the insertion of a stone wall. Measured from wall-front to wall-front the distance from north to south across the fortress is 1550 feet (472.4 m) and from east to west 1510 feet (460.2 m), giving an area of 53.73 acres (21.74 ha).

The line of the defences was established on all four sides of the legionary fortress in 1954. On the north-east side, however, where the edge of the plateau has been eroded, the greater part of the ditch, the gate and much of the rampart have been lost.

A. PREPARATION AND PLANNING OF THE SITE

When the decision had been reached to build a fortress on the Inchtuthil plateau, the precise ground to be occupied had to be chosen. Since the area involved within the ditch was almost a square of some 56 acres (22.7 ha), only the eastern half of the plateau provided enough space. A square placed rather more centrally might have gained maximum advantage, but the choice of ground further east, with the north-east side of the fortress lying close to the scarp of the plateau, shows appreciation of the need to leave space for a labour camp (FIG. 2) in which construction parties were to be quartered. Moreover, this position left the *porta principalis sinistra* directly opposite the easiest route from the flood-plain of the Tay to the top of the plateau.

Preparation of the site

The whole area of the plateau may be described as generally level, but in detail the surface is gently undulating, no doubt reflecting the distribution of beds of firm gravel and softer sand. The highest point is at the western tip, within the promontory fort, where the ground is 172 feet (52.4 m) above Ordnance Datum: the lowest point is on the north-east side, a little to east of the *porta decumana*, where the altitude is no more than 152 feet (46.3 m). Much of the area of the fortress lies between 156 and 165 feet (47.5–50.3 m), with no slopes so steep as to make difficult the erection of timber-framed buildings. Nevertheless a considerable amount of preparation and levelling of the ground was undertaken. The rather poor-quality soil of the plateau will have

supported bracken and heather as well as grass: the land is unlikely to have been wooded, but scattered trees may have included oak and birch. In the right *praetentura* where there are several low ridges⁵⁸ aligned north-east to south-west, their tops seem unnaturally flat as if the crests had been lowered. Part of the area occupied by Barracks 25–30 had been levelled, as is shown by the discovery there of two cremation burials (p. 252) in inverted urns, their bases sliced off in the levelling. The area of the Headquarters building, particularly part of the courtyard, had been ballasted with layers of gravel and turf to maintain an even surface. The most extensive operation of this kind was the treatment of the plot to east of the headquarters, where a space of 250 by 310 feet (76.2 by 94.5 m) had been carefully levelled, an exercise involving the removal of up to 4½ ft. (1.36 m) of soil. This levelling ended at a straight scarp, still visible on the ground, to west of Barracks 13 to 18. If only half the area had had to be lowered to this extent, the spoil to be removed would have amounted to about 6500 cubic yards (4970 m³). That material was being handled in such quantities is clear from the fact that the gravel needed for the metalling of the *viae principalis*, *praetoria* and *decumana*, together with that of the road extending across the plateau from the *portae principales*, was about 4000 cubic yards (3058 m³).

Planning (See Appendix, p. 77)

The length of the sides and the position of the gates of the fortress are determined by the use of the space within the defences (FIG. 84, p. 282). In outline, Inchtuthil is nearer to a square than are many fortresses. As usual the *portae praetoria* and *decumana* are central in their sides. Barracks occupy about 45 per cent of the area within the building-lines and their arrangement was clearly an important consideration in the allocation of space within the fortress. The barracks of all the cohorts but the first occupy a square plot of ground 280 by 282 ft. (85.34 by 85.95 m), or thereabouts. Those of the first cohort are of the same length (280 ft.), but the width of the plot is larger (at 423 ft. = 128.9 m) as ten *centuriae* are involved, while the addition of yet two more barracks increases the width to 550 ft. (167.6 m).

In the *praetentura*, the *vía praetoria* with flanking *tabernae* takes up a width of about 120 ft. (36.6 m). To the left (east) a plot about 60 ft. (18.3 m) wide allows for a granary with space at either end for the manoeuvring or parking of waggons. There is a matching space, not built upon, to west of the *vía praetoria*. The rest of the ground in this first division of the fortress is occupied by the twenty-four barracks for four cohorts. A corresponding arrangement, involving barracks for four more cohorts is found in the *retentura*. The *vía principalis* and its flanking *tabernae* similarly take up a width of about 120 ft. (36.6 m) from gate to gate across the fortress. The barracks for the two remaining cohorts, extending as far as the *vía quintana*, occupy the *latera praetorii*. This determines the depth of the plot appropriate to the *principia* as about 330 ft. (100 m). The axis of the *viae praetoria* and *decumana* bisects this plot: the distance from this axis to the street bounding the buildings in the right *latus praetorii* is about 114 ft. (34.5 m), so that the plot for the *principia* is some 230 ft. (70 m) wide. That the *principia* occupies less than a quarter of the space allotted to it, and that this building alone amongst all the major buildings in the fortress is about 2° out of alignment with the principal axes, suggests that the structure was intended to be temporary.

To the left of the *principia* a plot of equal depth (330 ft.) and 250 ft. (76 m) wide is available for another of the principal buildings. There remain two strips of ground *per scannum*, one in the *praetentura*, between the barracks of the four cohorts first mentioned and the *tabernae* facing the *vía principalis*, and the other in a corresponding position north of the *vía quintana*. Both these strips are about 200 ft. (61 m) wide. That in the *praetentura*, so far as building had proceeded, contains houses for four tribunes, and other miscellaneous structures: that in the *retentura* contains the Hospital, the *fabrica*, and three granaries, with a large central space unoccupied behind the *principia*. So neat and symmetrical an arrangement could only have been achieved in a period of active campaigning if detailed plans were ready for translation into fortifications and buildings with minimum delay as occasion required. After the lines of the defences has been laid down, the

58. The ridges are readily picked out from the air in a time of drought, for the grass parches along their crests. Photographs (e.g. DD 65, 72) suggest that there may have been a large gravel pit to west of the second tribune's house.

length of the barracks stands out as an important factor in the planning of the interior of the fortress. The position of the principal streets defining the main blocks of buildings would be pegged out very quickly, and the accuracy achieved is apparent from FIG. 84.

Not only plans would be needed but also decisions on priorities in the work of construction. Once defences were in course of erection, the need to house soldiers in permanent buildings might be thought to come first. The probability that barracks were early in the building sequence helps to explain why barrack-blocks are so determining a feature of the plan. Store rooms for the whole range of items of military equipment appropriate to a legion, and granaries to provide storage-space for the food-supply might be regarded as essential. Houses for senior officers might come later, especially as temporary quarters for certain officers were established in a separate compound, and other officers may have been seconded for the time being elsewhere. The workshop and hospital, both large and elaborate buildings requiring appropriate time for their erection, might follow. It is into some such sequence that the construction of the *principia* would have had to be fitted. This building is much larger than the headquarters in an auxiliary fort, yet strangely small in comparison with other legionary *principia*.⁵⁹ There is a strong impression that it was intended to be temporary, providing only for essential administrative functions, and that it would have been replaced by a larger building, of appropriate distinction, when the construction programme allowed.

Amongst structures that are lacking, the most evident are quarters for the legate and for two tribunes, and the Bath-building. For baths an ample water-supply was essential and there is no evidence that construction of an aqueduct had been begun. Moreover, building in timber would have been impracticable because of the risk of fire. Progress may therefore have been limited to preparation of a suitably level site. The transport and preparation of the quantities of materials required for the fortress, stone, timber, clay and turf, and the requisitioning and supply of the many special items that would have had to be brought from stock-piles further south, must have made very heavy demands on manpower. As some fifteen or more satellite forts were under construction or seem to have been planned as part of the same building-programme, there need be no surprise if the work accomplished at Inchtuthil took all the time that remained of perhaps three building seasons after each year's campaigning was finished.

It is interesting to note that a small pit was recognised about the middle of the courtyard of the *principia* when an exploratory trench exposed a burnt rim of gravel outlining a dark patch in the subsoil. The position is not far from the centre of the fortress: it lies exactly on the axis of the *viae praetoria* and *decumana*, a line that would be easy to fix. In the direction at right angles, where there is no comparable axis to serve as a guide, the pit is about 55 ft. (16.76 m) from the line midway between the north-east and south-west defences. The dark patch, 32 in. south-east to north-west by 17 in. (0.81 by 0.43 m), comprised a thin layer of loose gravel overlying the filling of a hemispherical hollow, 19 in. (0.48 m) in diameter and about 10 in. (0.25 m) deep, dug in yellow gravel. The filling was charcoal from the burning of oak with a little birch,⁶⁰ and there were minute scraps of burnt bone. Burning of the gravel surface of the bowl-shaped hollow was very evident. The pit was well below the level of the courtyard which was ballasted in places with turf and gravel to maintain a horizontal surface. Richmond's conjecture that this apparently early feature, unconnected with the building, was a ritual or sacrificial pit deserves serious consideration.

B. DEFENCES

Inchtuthil is remarkable in providing examples of a number of different types of defensive works. First (p. 207) is the small ditch, of which a length of about 2200 ft. (620 m) has been traced (FIG. 57). It began not far from an old channel of the Tay and climbed the south slope of the plateau in a curving course to a point somewhat to west of the temporary compound where it ran out into the

59. See Table I, p. 86.

60. Kindly identified by Dr. Kathleen Blackburn.

topsoil. The ditch was accompanied by a timber breastwork supported by posts which, it may be conjectured, held back the face of an earthen bank. At the labour camp (p. 225) the defences comprised a V-shaped ditch c. 9 ft. (2.74 m) wide and up to 2 ft. 6 in. (0.76 m) deep (FIG. 70) : of the rampart that accompanied it no trace now remains, but the width seems to have been about 20 ft. (6.1 m) to judge from the line of pits along its inner face (PL. XLII). The Officers' temporary Compound was enclosed within a V-shaped ditch 8½–9½ ft. (2.51–2.89 m) wide and 4½ ft. (1.4 m) deep (FIG. 59). The rampart, perhaps 15 to 20 ft. (4.57–6.1 m) wide, was retained at each of the gates by two timber uprights placed on either side of the gateway passage. The two gates are each in a position to provide most convenient access to the south-east and south-west gates of the fortress. The defences of the temporary compound delimited two sides of an irregular quadrilateral enclosure placed at a convenient corner of the plateau (FIG. 2), the other two sides being determined by the course of the scarp. Suitability of the area for defence was hardly a consideration, save that where the scarp was present, a ditch was judged unnecessary.

The defences of the 'Redoubt' were of a different order (p. 203, FIGS. 55, 56). The south, west and north sides are so sited that the slope of the ground adds to the effectiveness of the defences. The single gate, oddly placed near the west angle, enables traffic to join the road to the south-east gate of the fortress by the shortest possible route.

DEFENCES OF THE FORTRESS

The fortress defences (FIG. 3) are in strong contrast to the temporary defensive works just described. A ditch 20 ft. (6.1 m) wide and 6½ ft. (1.98 m) deep had its counterscarp heightened by an upcast mound, on which was mounted an entanglement. A wide berm separates the ditch from a stone wall almost 5 ft. (1.5 m) thick, which had been inserted into the front of a turf rampart previously in position. The Sections (FIG. 6) clearly show that the rampart had not been laid against the back of a primary wall but, instead, that the wall had been built in a secondary operation after the pre-existing rampart had been cut back.

The defences were examined on the south-east side 380 ft. (115.8 m) north of the axis of the *via principalis*, in a main section which cut across the *intervallum*, the rampart, stone wall, ditch and upcast mound. Four more sections were cut from the front of the north-west rampart across the line of the wall and the nearest part of the berm. The ends of the wall were located on either side of each of the three surviving gates. In tracing the line through the shrubberies on the north-east side, the inner face was exposed at a number of points, as also at the north and east angles, and at three positions on the south-east side. The inner half of the rampart was sectioned at several places on the north-west side in connection with a search for ovens.

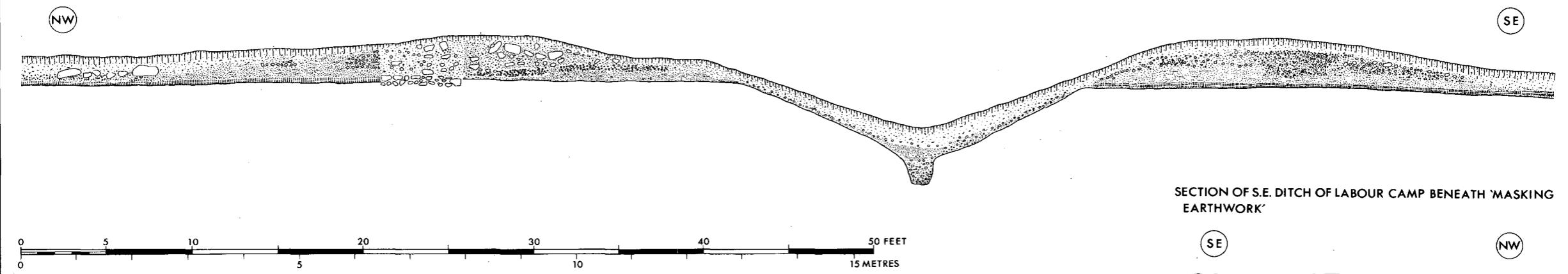
The rampart

Behind the stone wall, remains of a rampart were found, varying in surviving width from 13 to 17 ft. (3.96–5.18 m). It was constructed largely of turf with some admixture of gravel; no traces of timber strapping were detected. In two sections through the north-west rampart, about 300 ft. (91 m) from the north angle, turfwork extended for only 9 ft. (2.75 m), the back being composed of a mass of gravel, 3½ ft. (1.06 m) wide, and now reduced in height to 2 ft. (0.61 m). A similar situation existed at the *porta praetoria* (FIG. 9). The stratification of the turfwork was not always easy to see; when it was visible, the material lifted with the grass was found to be gravel rather than earth, as if the grass had been growing directly on gravel and no appreciable tilth had yet developed. The turf had presumably been close at hand, implying that parts at least of the plateau had then been little affected by cultivation. In such permeable material leaching would readily take place, so that old turf-lines might vanish.

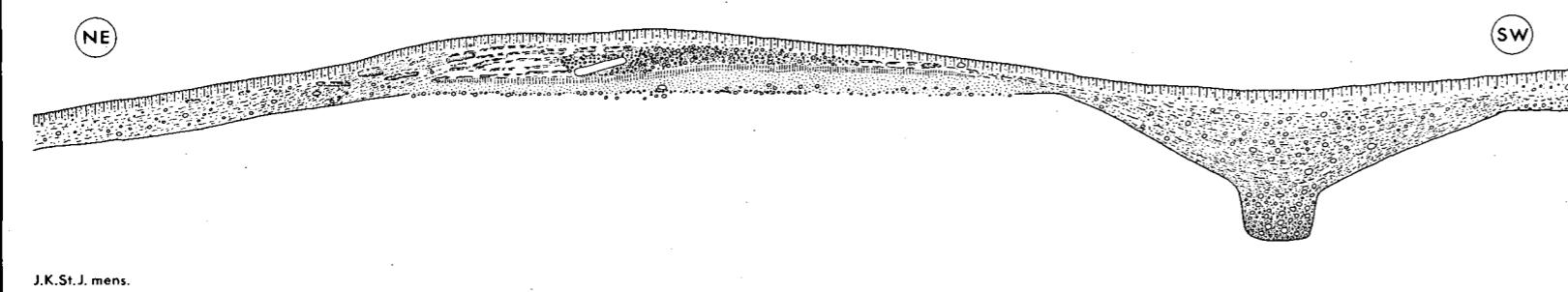
The rampart survives, as already noted, to a maximum width of 17 ft. (5.18 m) before being cut away by the wall. This width was observed at the *porta praetoria* (FIG. 10) at a place where the rear part of the rampart was of gravel. Elsewhere a width of 14–15 ft. (4.27–4.57 m) seems to have been more usual behind the wall (FIGS. 3, 8) at points where the bank was wholly of turves; and it may be that the rampart had a greater width where a vertical rear face of turves was not provided, for instance where an *ascensus* was needed.

INCHTUTHIL

SECTION OF FORTRESS DEFENCES ON SOUTH-EAST SIDE



SECTION OF 'MASKING EARTHWORK'



SECTION OF S.E. DITCH OF LABOUR CAMP BENEATH 'MASKING EARTHWORK'

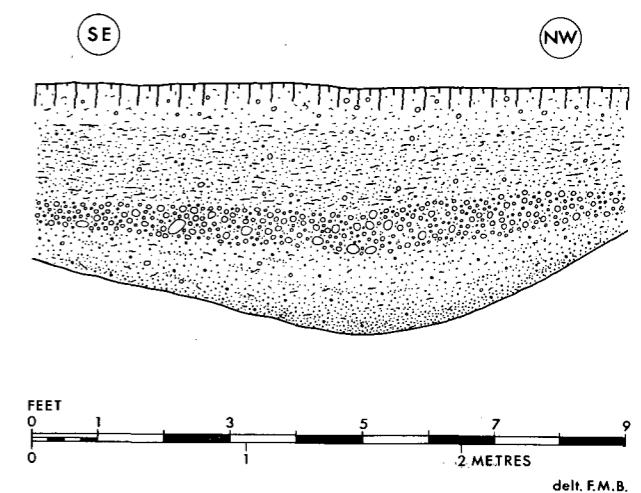


FIG. 3 Sections through the SE Defences of the fortress, and through the 'Western Vallum'. Scale, 1:90.
And through the ditch of Camp 2 below the 'Western Vallum' (p. 245). Scale, 1:36.



A reconstructed cross-section (FIG. 4A), using what has come to be regarded as the standard profile,⁶¹ assumes an original width of 19 ft. 9 in. (6.02 m); this gives a rampart-walk 7 ft. 6 in. (2.29 m) wide at a height of 11 ft. 3 in. (3.43 m). The front is restored with a slope of 66° and the back with one of 45° above a vertical base. A rough calculation can be made of the amount of turf that would be needed for a total length of rampart of about 2000 yards (1830 m). With thick turves cut so that a pile of three made up a foot, the area that had to be stripped to provide for the whole rampart would about equal that of the fortress.

Richmond's reconstruction-drawing (FIG. 5), using a different profile,⁶² yields a height of only 7 ft. 6 in. (2.29 m), which might be thought hardly sufficient unless intentionally kept low in anticipation of the wall; but as will be suggested below, the turf rampart had to serve on its own for the first winter.

The wall

A stone wall 4 ft. 7 in to 4 ft. 11 in. (1.4–1.5 m) thick stood in front of the rampart. It was perhaps intended to have a width of 5 Roman feet (4 ft. 10 in.). Several sections showed beyond doubt that the rampart had been constructed first, and that its front had been cut back in a second phase to receive the wall (FIG. 6). The foundation of the wall consisted of a mass, 12 to 18 in. (0.30–0.46 m) thick, of pitched stones, laid in a foundation-trench set about 12 in. into the gravel subsoil. The wall was built of a pink conglomeratic sandstone that outcrops quite widely on the hill of Lethendy and on Gourdie Hill to the north (FIG. 1). As described in Chapter 24, the actual Roman quarry was identified from the air in 1970, and surveyed in 1978. It lies on the south-east face of Gourdie Hill, about 2 miles (3.2 km) from the fortress. The great hollow now marking the site of the quarry measures some 200 to 210 yards (183 to 192 m) from north-east to south-west, by perhaps 50 to 70 yards (46 to 64 m). The depth of working in the centre of the hollow is 30 ft. (9 m) or more. At a rough estimate, the quantity of material that has been removed is perhaps 40,000 to 50,000 cubic yards (30,600–38,200 m³), of which a proportion, perhaps as large as half, might be waste arising from weathered rock near the surface, from poor-quality beds of stone, and from losses in the dressing of the masonry. The amount of stone needed for the fortress wall may be estimated at some 20,000 cubic yards (15,300 m³): the figures are not ill-matched.

The rock from the Gourdie outcrops varies in quality. Some beds are conglomeratic, others are a more normal medium- to coarse-textured sandstone. It is fairly soft (for some beds are rather poorly cemented) but is not an easy stone to work because of the uneven texture, particularly of the coarser beds. Notwithstanding this, the legionary craftsmen succeeded remarkably well in dressing massive facing-stones in 8 and 10-inch (0.20–0.25 m) courses, to judge from the ruins of the wall that have survived. The core consisted in places of a random mixture of large and small blocks, elsewhere of coursed masonry, and both facing-stones and core were bound together with mortar used fairly liberally. The mortar is now rather soft, and was perhaps deliberately made of a consistency to suit the hardness of the stone. The minor variations in both the stone wall and the rampart may reflect construction by different working-parties. Sand for the mortar was readily available, if not from the plateau then from alluvial deposits of the Tay. The nearest source of lime is a rather impure limestone that outcrops south of the Loch of Cluny (FIG. 1, b), two and a half miles to the north.

Inchtuthil is possibly the first Roman military establishment in Britain to have defences in stone. Caerleon, Chester and York were provided with stone walls at the beginning of the second

61. The 'standard' profile is based upon deductions made at the Turf Wall of Hadrian (*Trans. Cumb. & West. Ant. & Arch. Soc.*² xxxv (1935), 222–4; J. Collingwood Bruce, *Handbook to the Roman Wall* (ed. 13 by C.M. Daniels, 1978, 17) and at Chester (*J. Chester Arch. Soc.* 1953: 5) where near-vertical backs and (at Chester) a change of slope 3–4 ft. up have been observed. Compare also the Strageath rampart (*Britannia* v (1974), 403, fig. 3).
62. This type of profile, with a continuous batter to the rear slope, was suggested at Great Casterton (M. Todd, *The Roman Fort at Great Casterton, Rutland* (Nottingham, 1968), fig. 4), although even there the slight surviving remains suggest a vertical basis at the back (*ibid.* fig. 6). In FIG. 5 the rear face slopes up at only 32°, which does not prevent unauthorized access but would be suitable at an *ascensus* point. The form takes no advantage of the building-properties of turf which should be able to stand at a much steeper angle.

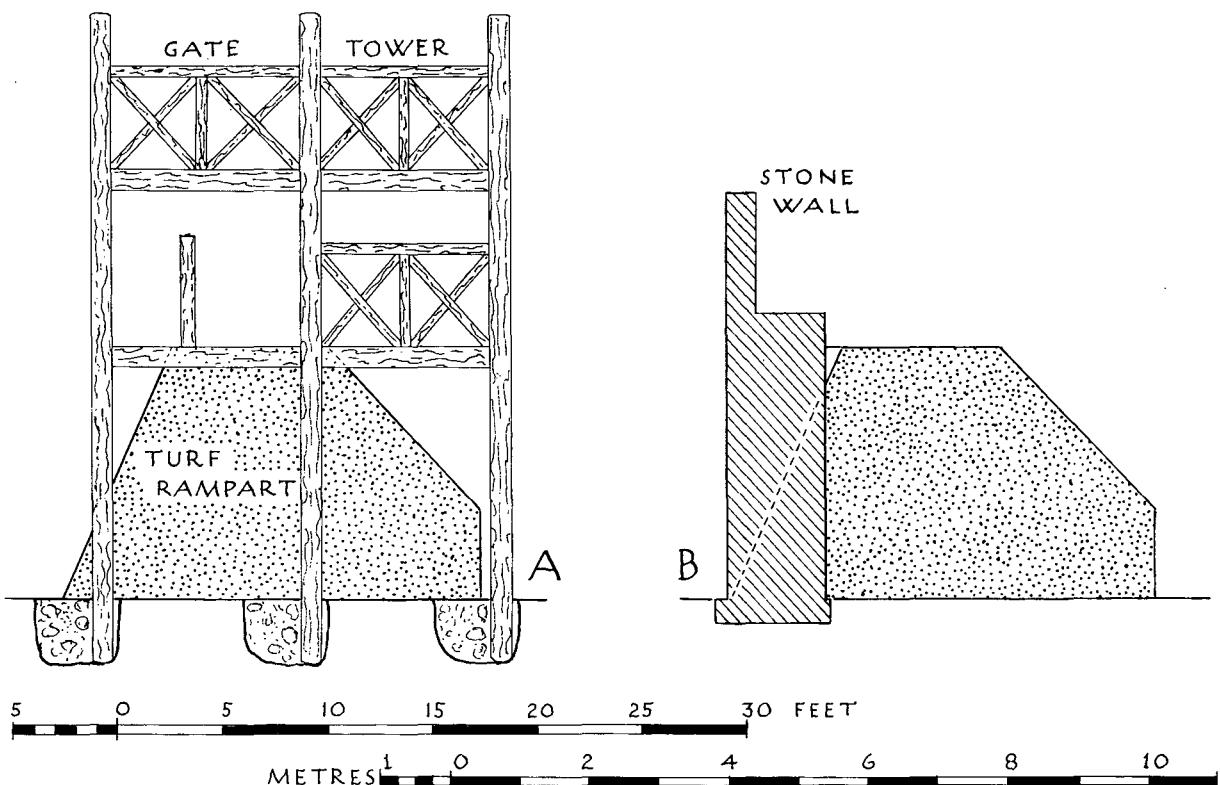


FIG. 4 (A) Reconstruction of the turf rampart and gate-towers.

(B) Reconstruction of wall and rampart.

Scale, 1:110. (Drawing by S.S. Frere)

century. Lincoln received a stone wall at about the same time, but this was associated with the change from fortress to *colonia*. On the Continent stone was used in fortresses from the mid first century, as at Vindonissa and Carnuntum, though not always for the defences; and from the Flavian period onwards the use of stone became normal at permanent bases. Amongst the Flavian forts north of the Forth-Clyde isthmus, all of which formed part of a scheme for the permanent garrisoning of the northern territory newly won by Agricola, Inchtuthil stands alone. The other forts made do with turf ramparts. The poor-quality turf at Inchtuthil was perhaps judged to be an indifferent building-material, unlikely to withstand for long the harsh weather of Scottish winters. Moreover the availability close at hand of easily-worked sandstone, and the overriding need to provide, for a legionary fortress, defences both impressive and invulnerable, may have been among the factors leading to a decision to build a stone wall. Since the rampart had been built first and the wall then added, in sequence of construction the stone wall was secondary. However, the concept must have been part of the original plan, as is clear from the design of the defences, which allowed for an unusually wide berm of 16 ft. (4.9 m). The stone wall was of considerably greater weight than the front of the rampart it replaced, making a wide berm necessary in order to ensure that increased lateral pressure did not cause the inner face of the ditch to collapse.⁶³ Moreover, the work of removing the front of the rampart, of transporting the stone and building the wall, would have had to proceed from outside the rampart, activities most easily undertaken if there were ample working space.

The height of the wall would be largely determined by the height of the rampart-walk behind, for the wall itself was only 4 ft. 7 in. to 4 ft. 11 in. (1.40–1.5 m) wide, of which 18 in. (0.46 m) would be carried up to form a parapet and merlons, leaving a wall-walk insufficiently wide for easy lateral movement; accordingly the rampart-walk behind must have continued in use for

63. The point is well seen by a comparison with the so-called 'Western Vallum' (p. 245), which consisted of a rampart 22 ft. (6.7 m) wide and a ditch 17 ft. (5.18 m) wide and 6 ft. (1.83 m) deep – a work comparable in its dimensions with the first phase of the fortress defences (FIG. 3). The rampart here, less heavy than a wall, began within c. 3 ft. (0.91 m) of the ditch.

INCHTUTHIL SECTION THROUGH EAST DEFENCES

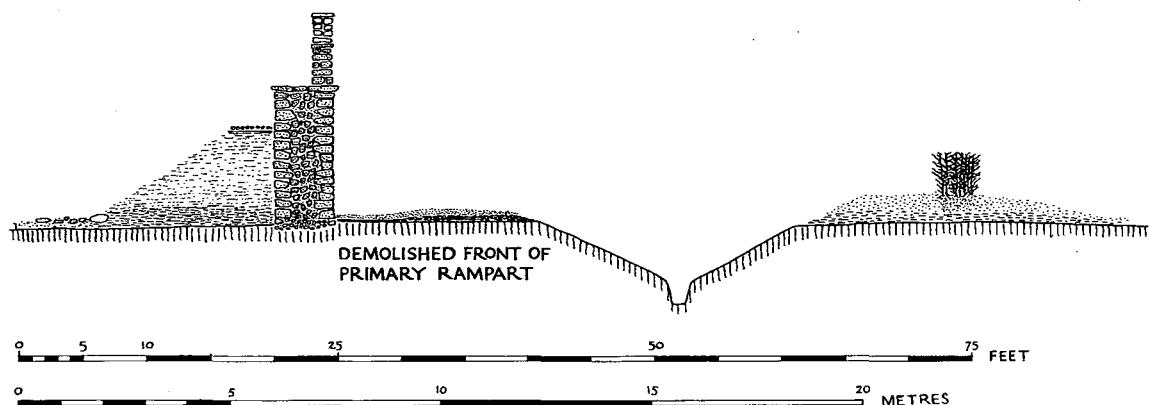


FIG. 5 Restored Section of south-east defences. Scale, 1:180.

circulation and access to the wall-walk. This consideration should limit the height at which the wall-walk ran above the rampart-walk. Some differential will have been needed for drainage and to prevent the spread of mud, but a height greater than c. 18 inches (0.46 m) would have impeded access. It is true that at York the Severan wall-walk was built 5 ft. 6 in. (1.68 m) above the contemporary rampart-walk; but at York the wall itself was 5 ft. 6 in. thick and so provided a more generous wall-walk.⁶⁴ At York steps must have been provided at intervals, but at Inchtuthil their existence would be an unjustified assumption.

In FIG. 4B the wall is given a height of 13 ft. (3.96 m) to the wall-walk which runs 1 ft. 6 in. (0.46 m) above the rampart-walk. Richmond's restoration (FIG. 5) gives the wall a height of only 10 ft. (3.05 m), a minimum figure; in this drawing the wall-walk runs 2 ft. 3 in. (0.68 m) above the rampart-walk, making access difficult. In either restoration there would be a discontinuity of circulation at the timber gates, whose first floors will have been at the level of the original rampart-walk; but a step down of only 18 in. would cause no difficulty, and the disadvantage would doubtless have been put right when stone gateways came to be installed.

Towers rising from a rampart or attached to a wall are normally part of the defences of a fortress. At Inchtuthil search was made for stone angle-towers at both the north and east angles, but none was found. Within the north angle a single large post-pit was identified (FIG. 79). In forts with a turf rampart wedge-shaped timber angle-towers, supported on three posts in front and two behind, are known.⁶⁵ As a temporary expedient in the brief, pre-stone-wall phase of the fortress, a triangular tower is not impossible, the two forward post-pits being now lost beneath the foundations of the stone wall. On the south-east side, the back of the wall was exposed in three trenches 15 ft. (4.6 m) long, at one third of the distance, and at half-way between the east angle and the *porta principalis sinistra*, and also opposite the end of the *via quintana*, but no traces of internal towers were encountered. On the north-west side the inner face of the wall was exposed at several points when ovens were being traced, again without revealing any evidence of towers. Thus the search was considerable but hardly exhaustive. The intended replacement of timber by stone at the gateways may have had a higher priority than the provision of towers, which were perhaps to have been added later.

The position of the fortress wall was usually represented by a stone-robbers' trench, at the bottom of which little more than the foundation remained in place. In the main section (FIG. 3) this consisted of a layer of flat sandstone slats, resting on stone pitching composed of broken Gourdie stone and cobbles, 4 to 6 in. (0.10–0.15 m) in size. The robber trench was full of earth,

64. RCHM, *Eburacum, Roman York* (1962), 32–5.

65. For example the Flavian forts at Pen Llystyn in North Wales (*Arch. Journ.* cxxv (1969), figs. 5, 18, 20, 22), and Künzing in Raetia (H. Schönberger 1978, Abb. 6; Beilage 5).



(Photos: I.A. Richmond)

Pl. VI A South-east defences: ditch and upcast mound (p. 71). Scale in feet.



Pl. VI B Wall footing on south-east side of the fortress (right), with tumbled stonework (left) overlying the berm (p. 67).



Pl. VII A The wall on the north-west side of the fortress, looking south-east.

VII B Wall and rampart on the south-east side of the fortress, looking south-east, with tumbled masonry beyond (p. 67). Scales: 2 and 6 feet.



(Photos: I.A. Richmond)

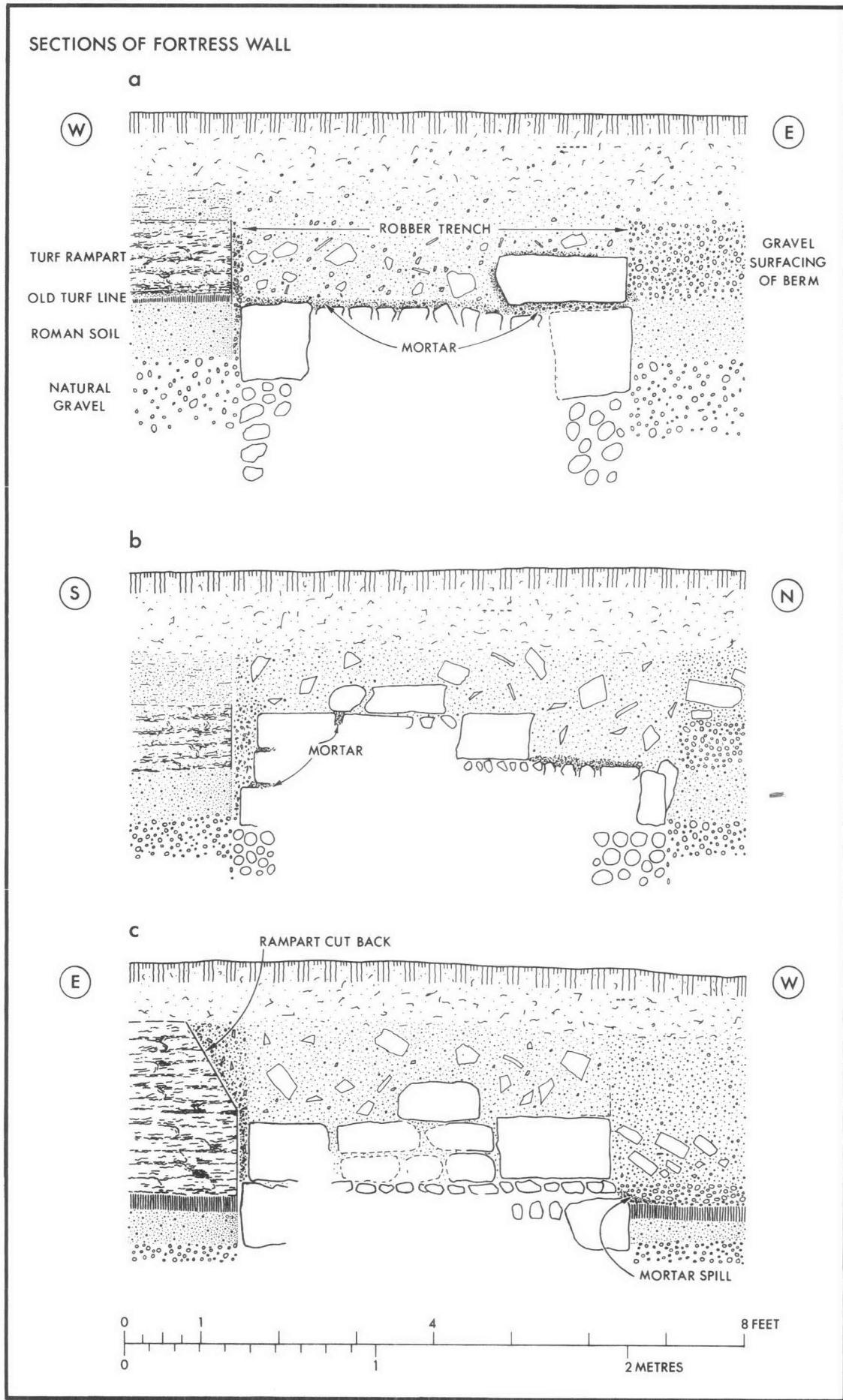


FIG. 6 Sections of the fortress wall: (a) south-east side near east angle, (b) north-east side, (c) north-west side.
Scale, 1:22.

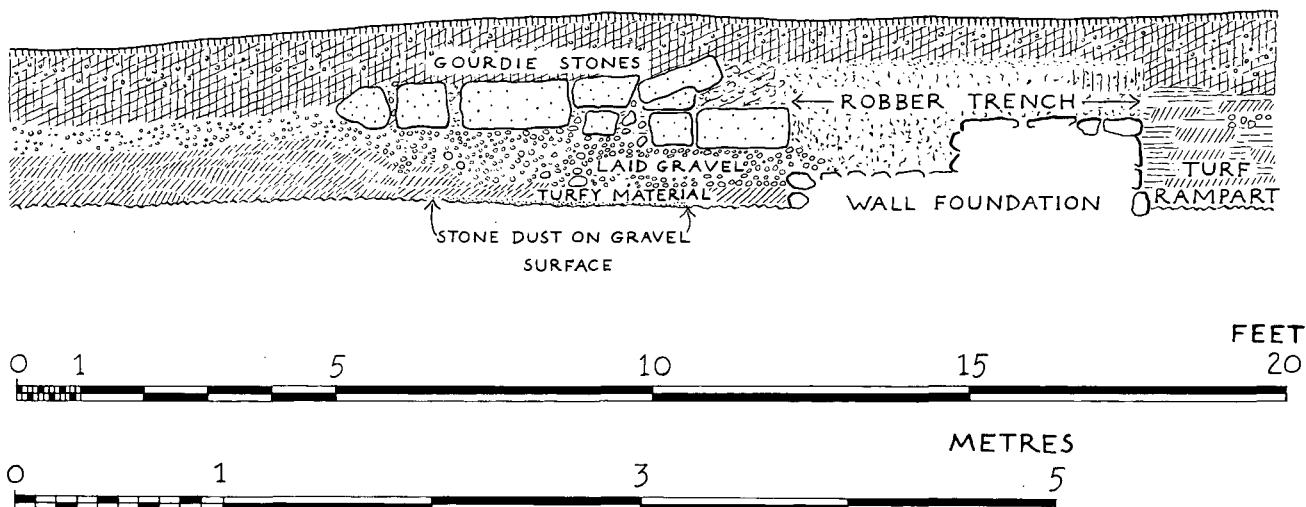


FIG. 7 The Defences. Section of north-west wall and berm. Scale, 1:36. (Drawing by M.G. Wilson)

containing broken pieces of sandstone together with a few large blocks. The inner face of the wall had stood almost against the rampart: here the first two feet were of gravel, with turf and gravelly soil behind. In front of the wall, a clean spread of gravel was overlaid by some 15 in. (0.38 m) of earth mixed with small pieces of sandstone: above this a jumble of large sandstone blocks, some of them facing-stones, having their corners and edges broken, spread some 6 ft. (1.83 m) forward from the wall. A further ill-sorted mass of sandstone blocks lay at the back of the rampart.

A second section (FIG. 6, a) across the fortress wall, on the south-east side not far from the east angle, revealed two courses of masonry in position at the outer face. The lower course, 12 in. (0.3 m) thick, rested on a foundation of cobbles and broken sandstone. The bottom of the coursed masonry was a little below the level of the natural gravel; the top reached to about the level of the Roman soil. Of the second course, a single large sandstone block, 7 in. (0.18 m) thick, remained in position. It had been laid on a bed of mortar extending right across the core of the wall, here composed of rough lumps of sandstone. There was an offset of about 1½ in. between the courses. The inner face of the wall had stood close to the turf rampart which had been cut back to a vertical face.

On the north-east side, 250 ft. (76 m) from the east angle, a section of the wall and part of the rampart showed that the cobble and sandstone foundation was laid in a trench cut 2 ft. (0.61 m) into the gravel subsoil (FIG. 6, b). At the outer face, the masonry had been removed almost to foundation-level: at the inner face, three six-inch courses (0.15 m) of dressed stone remained. There was a 3-inch offset above the lowest course. The blocks were well mortared together with the mortar used liberally to fill quite wide joints. Broken blocks of sandstone were present in the filling of the robber trench, and more, larger, blocks lay on the gravel covering the berm. In 1960, a section across the wall on the north-west side, about halfway between the *porta principalis dextra* and the north angle, showed that only the inner half of the wall remained above foundation-level (FIG. 7). There, three rather rough courses of sandstone together made up a height of 12 in. (0.3 m): the outer half of the wall had been reduced to its foundations. A very thin layer of stone dust had spread forward several feet over the natural gravel (FIG. 7). It was overlaid with trampled earth and turf material, which in turn was covered by a layer of clean gravel. A mass of large sandstone blocks, some of them dressed facing-stones, lay scattered over this layer for a distance of 7 ft. (2.13 m).

A section dug in 1965, again on the north-west side, opposite the oven for Barrack 45, showed the upper part of the pitched foundation of the wall contained between sandstone blocks (FIG. 6, c). Above this the wall began in massive masonry in 9-inch (0.23 m) courses. The outer facing-stones of the lowest course measured 9 by 22 by 24 inches (0.23 × 0.56 × 0.61 m). Instead of the rubble core encountered in previous sections, the whole wall was of sandstone blocks

mortared together. A loose block rested on the wall at the bottom of the robber trench. A spill of mortar had spread forward from the top of the foundation on to the old surface. At the back of the wall, the turf rampart had been cut to a vertical face for the first 13 in. (0.33 m), and then at a steep slope. The space between rampart and wall had subsequently been filled with gravel.

The sections of the wall have been described in some detail, as much can be learnt from them. That the wall was secondary has been demonstrated: other evidence helps to define the sequence more precisely. Where the rampart was interrupted at the gates, established practice and requirements of defence would dictate that the gaps be protected as soon as possible. The timber gate-houses and the rampart were probably constructed more or less together. The stone wall comes up to the side of the gatehouse, and at both the *porta principalis sinistra* and the *porta praetoria* excavation has shown that the face of the wall is about 2 ft. (0.6 m), or a little more, in front of the outer line of main posts. (FIGS. 8, 9). At both gates, the end of the wall rested upon the infilled pit dug to hold the corner-post. The full weight of the wall would thus be carried on the infilling, a situation that could hardly be accepted unless there had been time for the filling to become consolidated. This suggests that there was an appreciable interval, some months at least, between the erection of the rampart with its timber gates, and the construction of the wall. Another detail points the same way. In the sections where the rampart could be closely examined, its front had been trimmed back in a clean cut, vertical or oblique. Such a straight cut would be made more easily after the turf had consolidated into a homogeneous mass, a change that would take time. Moreover, the building of the stone wall could hardly be undertaken until the rampart had become thoroughly compacted, a process involving some shrinkage and settlement in the newly-built turfwork.

This view differs somewhat from Richmond's opinion expressed at the end of the second season's work. That year had seen the excavation of the South-east Gate, where a few of the post-pits were found to contain quite large blocks of Gourdie sandstone used as packers to secure the posts in an upright position. At that time Richmond argued that these packers, of the very same material of which the fortress wall was built, pointed to contemporaneity between the building of the wall and the erection of the timber gatehouse. But this conclusion does not necessarily follow, for other possible sources of the stone were at hand when the gates were being built. As the excavations proceeded, a number of Gourdie stone erratics of varying sizes were found in the natural gravel. It is thus quite likely that occasional blocks of the stone will have been turned up during the stripping of turf from the area of the fortress. Furthermore, as soon as any troops moved in to the fortress, even if quartered temporarily in tents, ovens would surely have been needed. Slabs and quite large blocks of sandstone had been used in the construction of ovens on the *intervallum*, so that such material would have been at hand from an early stage. The combined evidence suggests as the most likely sequence of construction the completion of the turf rampart, gates and ditch in one season, and the building of the stone wall the following year.

The wall was separated from the inner lip of the ditch by a berm 16 ft. (4.9 m) wide. There were only a few inches of soil above the natural gravel, but the extensive traffic along the berm in connexion with the building of the wall had often reduced this to a layer of mixed and trodden earth. In a few places the earth had been stripped off the gravel, thus providing a firmer working surface for such activities as the final dressing of sandstone blocks. In one section (FIG. 7) a layer of stone dust and chips was evidence of such work. After the wall had been completed the whole of the berm was surfaced with clean gravel, 6 to 10 in. (0.15–0.25 m) thick.

At most of the points where the wall was examined only footings were encountered, with an occasional well-mortared block in position. Exceptionally one course and sometimes a second remained in place. Some debris from the wall, including large dressed facing-stones, formed a tumbled mass actually resting on the gravel surfacing of the berm (FIG. 7). This is clear evidence of demolition at no long interval after the wall had been built, for had it been left standing, gradually to decay, a layer of humus and a fresh grass surface would have developed over the gravel before collapse took place. No doubt the lower courses of the wall remained in position beneath the ruin, and it was this material that was sought by stone robbers when the site came to be used as a quarry; but the fallen blocks tumbled on to the berm at demolition, and subsequently hidden in soil and vegetation, were often missed.



(Photo: I.A. Richmond)

Pl. VIII A Rampart (right) and wall on the north-west side of the fortress, looking north (p. 67).



(Photo: RCAHM (Scotland): Crown copyright)

Pl. VIII B Section of north-west defences of the fortress showing wall-footings (right) and fallen blocks overlying the gravelled berm (pp. 67-8).

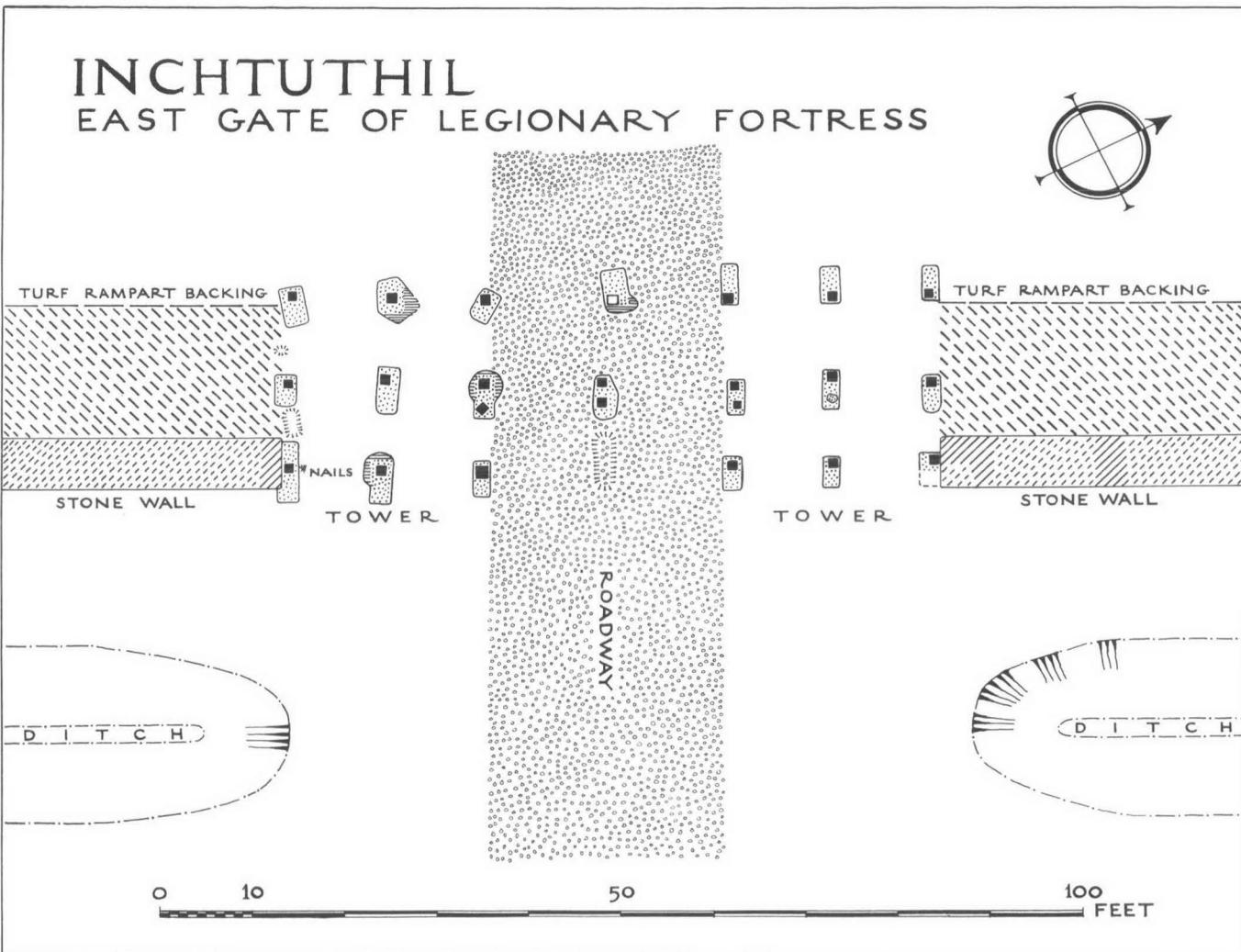


FIG. 8 The south-east Gate of the Fortress (*porta principalis sinistra*). Scale, 1:240.

The ditch and counterscarp bank

The single ditch was about 20 ft. (6.1 m) wide and 6½ ft. (1.98 m) deep, V-shaped with rather gently sloping sides and at the bottom a square-sectioned cleaning-channel (FIG. 3). The slope of the sides was probably chosen as the angle of rest of the rather loose gravel through which the ditch was cut. Certainly in the few weeks that the main section was left open, a negligible amount of material accumulated in the bottom. The ditch was also located where it is now obliterated on either side of the causeway, 70 ft. (21.3 m) wide, in front of the South-east Gate. At the time of the excavation a similar causeway was visible outside the South-west Gate.

Some gravel from the ditch may have been used in the rampart, but most of the material was disposed as a broad, flat-topped mound outside the ditch, thus effectively heightening the counterscarp. This mound, some 22 ft. (6.7 m) in width and now some 3 ft. (0.9 m) high, was bedded on a few courses of turf. Along its centre a series of holes, and in places a continuous trench about 3 ft. (0.9 m) deep, was filled with mixed earth and gravel. This was probably designed to hold some form of obstacle, such as interlocking branches. The object of such an arrangement, the ancient world's equivalent of a barbed wire entanglement, was to hinder attackers at about the killing range of missiles thrown from the rampart walk: the distance from the walk to the centre of the upcast mound is some 50 ft. (15 m). The upcast mound is visible only on the south-east side of the fortress, between the east angle and the *porta principalis sinistra*, but no doubt it originally continued round the whole circuit. No traces are likely to remain round the southern half of the fortress because of repeated ploughing. Between the *porta principalis dextra* and the north angle the lower part of the mound may still be in place below the turf.

THE GATES

The fortress had four gates, one on each side, as was usual in all fortresses of regular plan. The North-east Gate has been destroyed by erosion. The South-east Gate (*porta principalis sinistra*) was fully excavated in 1953; the North-west Gate was assumed to be similar and it occupied a similar-sized gap in the rampart. The South-west Gate (*porta praetoria*) was excavated and shown to be an almost exact replica of the South-east. All four gates can thus be assumed to have been more or less identical.

South-east Gate (FIG. 8)

The ditch is interrupted by a causeway of approximately 70 ft. (21.3 m) which carried the road. (The road was examined outside the North-west Gate where it was found to be about 25 ft. (7.62 m) wide with a cambered surface of rammed gravel (FIG. 44); only one surface was discovered.) The wall ended square at the gateway (PL. IX A) leaving a gap of approximately 70 ft. (21.3 m). There were two carriageways each c. 13½ ft. (4.12 m) wide, divided from each other by a central *spina*. Each roadway probably had a double door. The gates were flanked by two timber towers measuring c. 20 ft. (6.1 m) square, each carried on nine posts. The front posts were set some 2 ft. (0.61 m) behind the front face of the wall and the rear posts stood about 1 ft. (0.305 m) behind the rear edge of the rampart. The gates themselves were recessed, being hung on the second row of tower supports; the extra post-holes in the centre were probably used to hang the doors. The gates were thus well protected since they were only reached via a forecourt overlooked by the towers and by the walkway carried across the road on the central piers.

The main posts were set in large pits (PL. X) and the majority of the actual post-positions were located during excavation. The three central pits each held two posts, an indication not of rebuilding but of the door position. Each upright was approximately 1 ft. (0.305 m) square and would have been at least 25 ft. (7.62 m) high. Nails of varying sizes were found in the area including the 10-in. (25 cm) and 15-in. (37.5 cm) spikes necessary for pinning such timbers.

South-west Gate (FIGS. 9, 10)

The South-west Gate was not so fully explored as the South-east, but sufficient was done to show its close similarity with the latter. The wall was found to seal part of one of the post-pits of the gate (FIG. 10). The rampart-ends were vertical, and associated with them were fragments of



Pl. IX A The South-east Gate (*porta principalis sinistra*), showing wall-terminal on the north side and a post-hole of the gate (p. 71).
Scales: 12 inches (one foot) and 6 feet.

IX B. The South-west Gate (*Porta praetoria*), looking north (p. 71). Wall-terminal on west side (see FIG. 9). Scales in feet.



(Photos: I.A. Richmond)

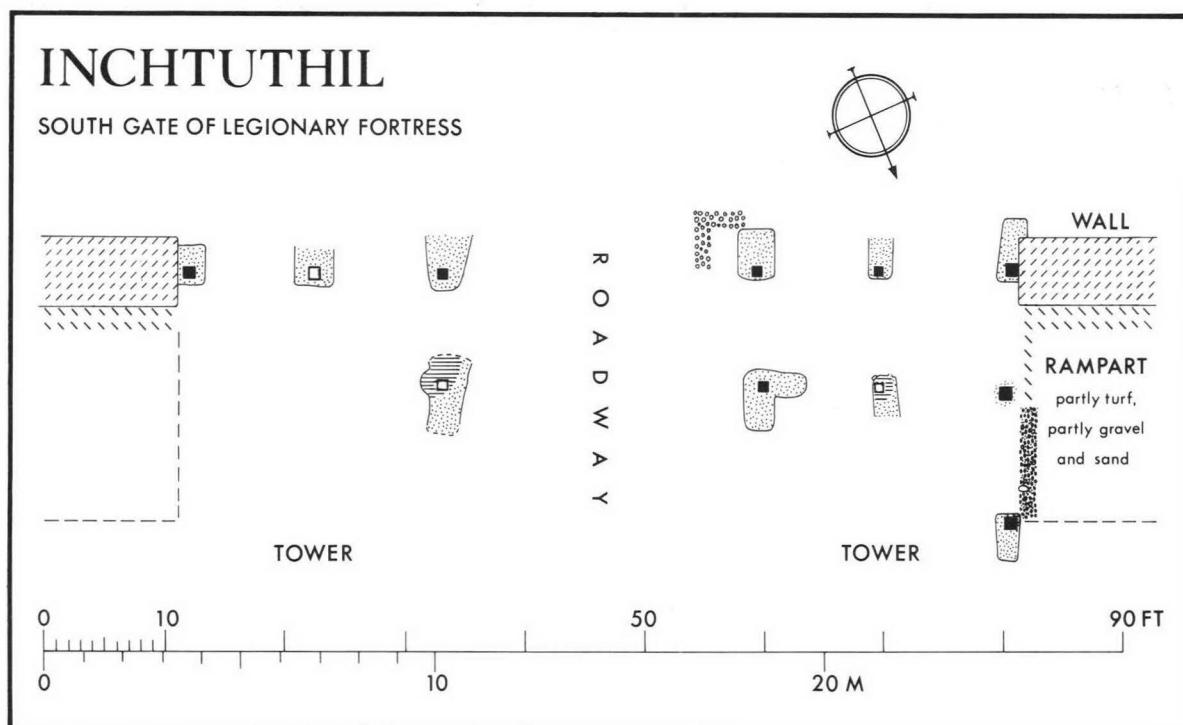


FIG. 9 South-west Gate of the Fortress (*porta praetoria*), plan. Scale, 1:192.

planks from the revetment, some still *in situ* and burnt at the abandonment (FIG. 10). There would have been little point in merely boarding the rampart-end beneath an open tower, for it could have been supported more simply by a ramp of turf-work. The remains were taken to indicate that the ground floor of the towers had been boarded in to form guard-chambers. The upper storeys of the towers, however, may well have been open, as depicted on Trajan's Column. Use as a guard-chamber was also suggested by the presence in the western tower of a heap of yellow sand (PL. IX B), possibly placed there for damping down a fire.

The main uprights would have required a pulley system to raise them such as that used at the Lunt (Hobley 1971a: 18). At Oakwood a large oval pit with sloping runway on one side and a thick plank at the bottom was discovered in front of each tower at the east and west gates (PSAS 1951–2: 94). These were interpreted as derrick-holes used during the construction of the towers; similar pits have been found at Fendoch and at Old Church Brampton. The posts were evenly spaced and the Lunt reconstruction illustrated the accuracy of Roman levelling equipment. The recently excavated south gate at Carlisle (Charlesworth 1980: 201) has shown the accuracy of Roman carpentry and use of timbers of a precise size; this supports Richmond's views on standardization of timber sizes in Roman military construction, the timbers being cut to an optimum size. The evidence adduced by Hanson (*Britannia* 1978: 298–302) does not militate against this. A post size of c. 1 ft. (0.3 m) seems to have been standard, and seasoned wood must surely have been used rather than green wood for such tall posts where warping would have a more serious effect than elsewhere.

The gates at Inchtuthil are considerably larger than most of the timber gates known in Britain, for instance at Fendoch, Hod Hill, or Longthorpe, but are comparable in size with legionary gates on the continent such as at Vetera, where the gate-house was 68 ft. 11 in. (21 m) across. Our knowledge of legionary timber gates in Britain is very slight; only the east gate at Lincoln is known in any detail and only four posts of the north tower have been located there. The Lincoln gate may have had a plan similar to those of Inchtuthil but this is not certain. The recession of the gates to create a protected forecourt is familiar at most first- and second- century forts and fortresses. Schönberger (BJ 1964: 39 f.) has shown its origin in Republican times (Renieblas) and use at early German sites, as at Rödgen. The deep flanking towers on the continent were usually

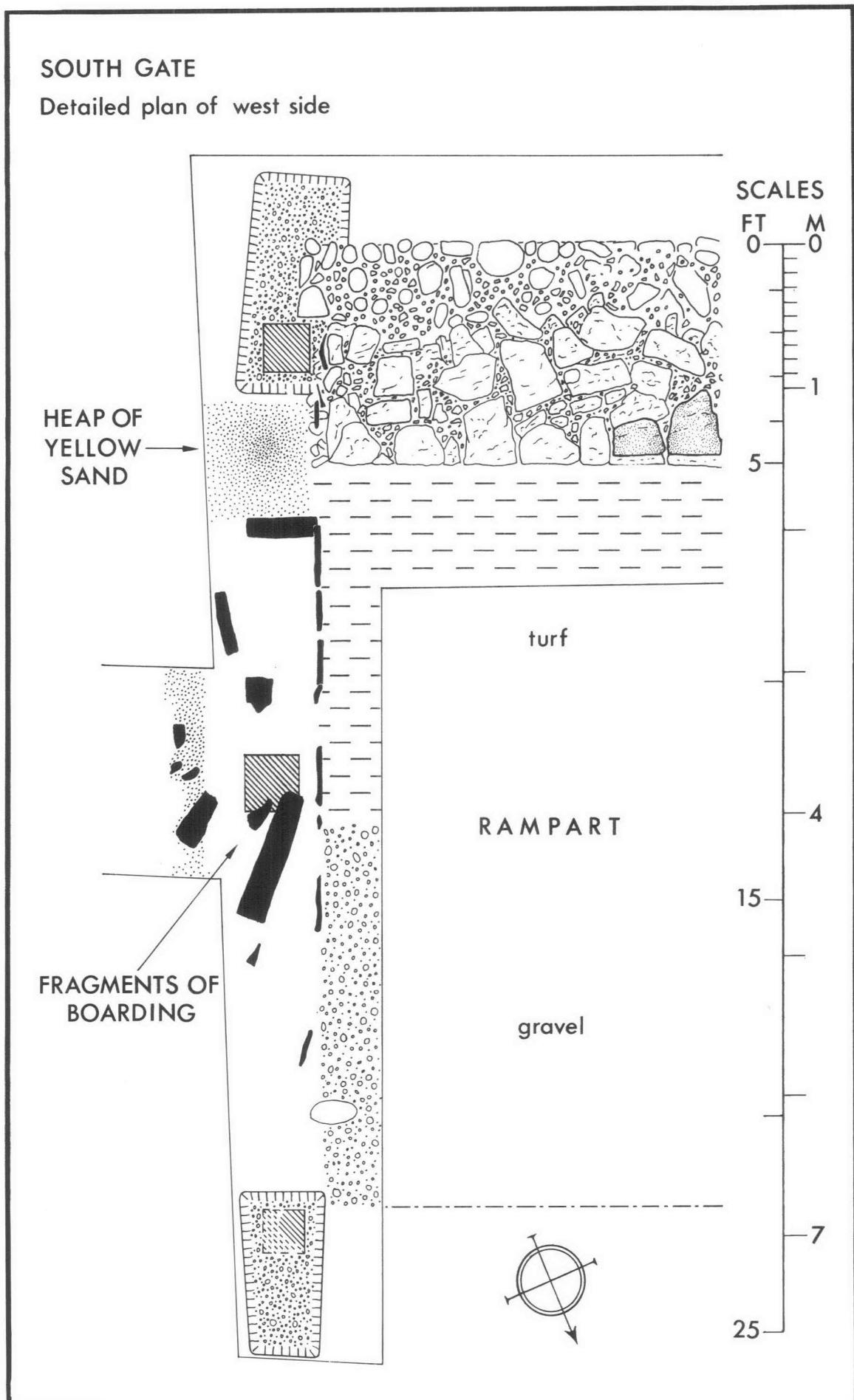
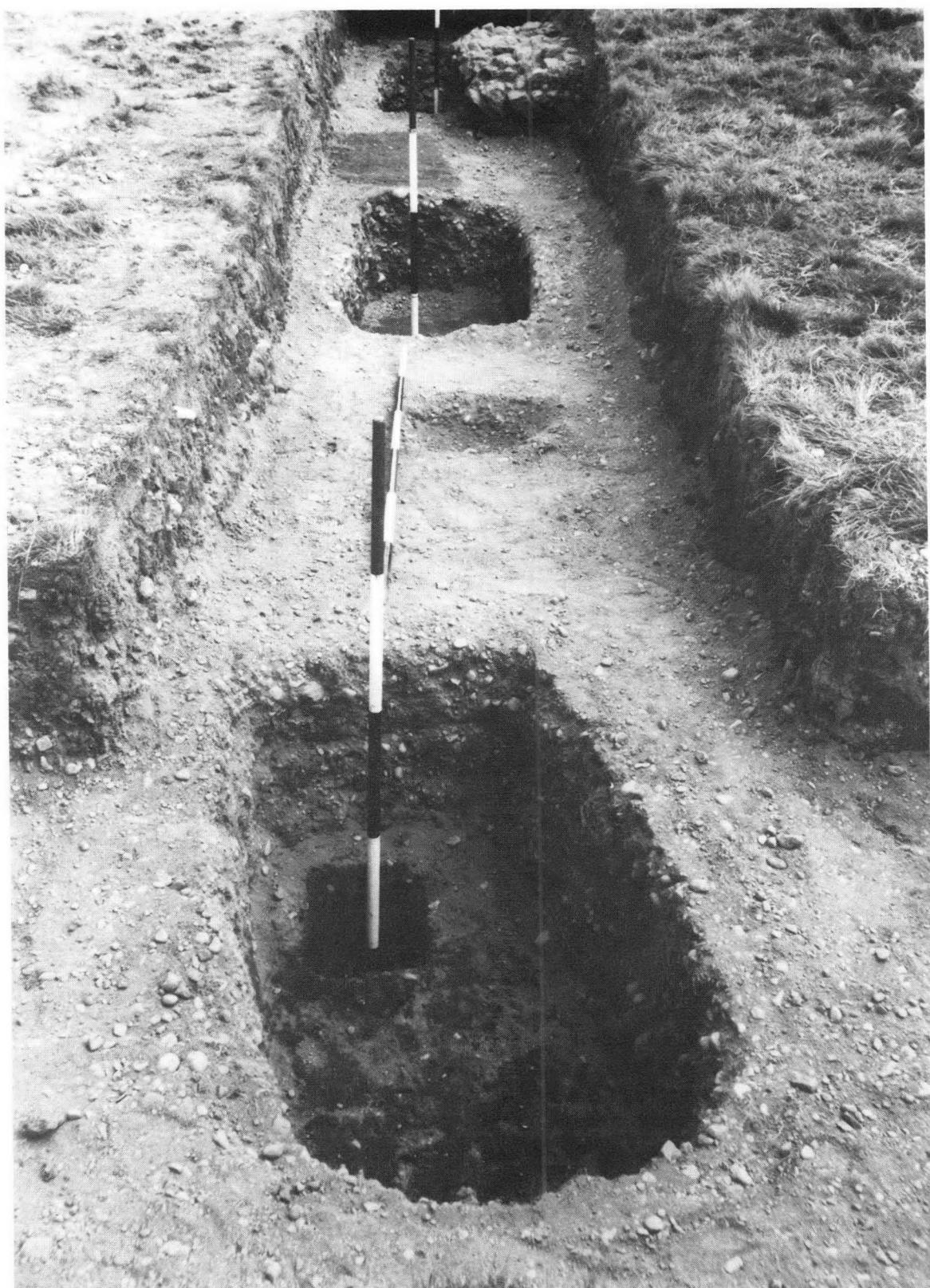


FIG. 10 The South-west Gate, detail. Scale, 1:41.



(Photo: I.A. Richmond)

Pl. X The South-east Gate: southernmost row of post-pits, looking east, with southern wall-terminal in the background (p. 71). Scales in feet.

L-shaped as at Vetera I, Nijmegen I and Vindonissa, whereas simple rectangular towers are the norm in Britain. The towers at Inchtuthil differ from the others so far excavated in Britain in having a nine-post grid instead of the usual six-post grid (Manning and Scott: *Britannia* 1979: 19 f.; figs. 1 and 8); but the general plan is typical of gates in Britain in the first century. The number of posts and the width of the gateways presumably reflect the difference between a fortress and a fort; the great size of the towers called for extra posts because of the larger span.

C. THE DEFENCES: DISCUSSION

The Ditch

A squared slot at the bottom of a ditch is fairly common (Jones M.J. 1975: 36). Its 'ankle-breaking' effect has often been pointed out but this may have been fortuitous or at any rate a secondary intention (except at the middle ditch at Hod Hill: Richmond 1968: 68 f.). Such slots are almost certainly the result of the method of digging, which was in stages, producing stepped sides which were later sloped back leaving the central slot. The method can be seen in an unfinished *titulum* at Cawthorn, where a narrow trench was dug to the depth and length required and then widened at the top (Richmond, *Arch. Journ.* 1932: 22–4). Subsequent ditch-clearing with a shovel would gradually deepen them.

A single ditch seems to have been normal at fortresses both in Britain and on the continent, for instance at Lincoln, Caerleon, Chester, Nijmegen and Bonn. The double-ditch systems at Haltern, Vetera I and Vindonissa are perhaps ascribable to their early foundation-dates. The V-shaped ditch is that most commonly found in the first century A.D. Sizes of ditches varied greatly, depending on the subsoil and the rest of the defensive system; but in first-century Britain the majority measured 4 to 9 ft. (1.2 to 2.7 m) deep by 8 to 20 ft. (2.4 to 6.1 m) wide; single ditches usually had a width of 12 to 16 ft. (3.7 to 4.9 m) (Jones M.J. 1975: 106). Inchtuthil fits this pattern; and although wider than many, its ditch is by no means the largest known. The legionary fortress at Chester had a ditch of comparable size in the second century and the ditch at Caerleon measured about 27.9 ft. (8.5 m); the latter was exceptionally large. On the whole, legionary ditches appear to have been wider than those at auxiliary forts, perhaps because the latter often possessed a multiple-ditch system and thus each ditch did not, in itself, have to serve as the main obstacle.

A wider ditch was obviously necessary in certain types of soil if a reasonable depth was to be obtained. In loose subsoils the sides could not be cut at such sharp angles and this is probably the explanation for the wide ditch at Inchtuthil. Evidence exists at some sites for the lining of ditches to prevent slippage, for example with clay at Kinwaston (*JRS* 1953: 84) and Colchester (*Britannia* 1977: 70) and with turves at York (*JRS* 1961: 169). No trace of any lining is recorded at Inchtuthil; similarly the ditches at Haltern were cut at very steep angles in a sandy soil and yet there was no sign of the lining which was almost certainly necessary. The gentler slope of the sides may, however, have been sufficient at Inchtuthil; indeed, clay suitable for such a lining was not readily available in the area.

'Obstacle' on the Counterscarp Bank

The provision of some form of hedge or fencing (*Annäherungshindernis*) to delay attackers within missile range is not unknown at other fortresses. At Vetera at least two sets of trenches (0.8 by 0.3 m) were discovered beyond the main Neronian ditch; they were interpreted as containing an entanglement of branches (Lehner 1930: 31).

Similar remains have been found at Bonn (Sadée 1925: 20) and Neuss camp B (v. Petrikovits: *BJ* 1961: 458). Neuss E and F had a line of close-set post-holes, presumably for sharpened stakes, 32 ft. (10 m) and 16 ft. (5 m) respectively beyond the ditch (v. Petrikovits: *BJ* 1961: 461–4). At Vindonissa the inner ditch was W-shaped with signs of a thorn hedge on the central peak (Laur-Belart 1935: 17–18); a similar type of defence existed at Hofheim (Ritterling 1913: 12).

British examples of such defences exist but are not as yet known at other fortresses. Their existence at these cannot be ruled out because such slight remains are easily eroded, and the

excavation of a sizeable area in front of the main ditch has not been carried out. The *lilia* at Rough Castle are well known but of Antonine date; other obstacles dated to the first century form a better comparison with Inchtuthil. At the mid first-century fort at Metchley a slot was observed on the shoulder between the two ditches (*JRS* 1969: 216); at the Flavian fort of Brough-on-Humber a small V-slot 6 in. by 6 in. (0.15 by 0.15 m) was found on the berm between the ditches (Wacher 1969: 12); at the Claudian fort of Cirencester stakes were placed between the second and third ditches (all the ditches here were especially shallow because of the loose soil and high water-table and an extra form of defence was necessary: Wacher and McWhirr 1982: 36). A rock-cut slot with stake-holes was found at Trawscoed (Nash-Williams 1969: 115) and a similar slot existed between the ditches at Strageath. Nineteen large holes for a defensive screen were discovered around the inner edge of the outermost ditch at the south-east angle of the fort at Glenlochar (*Trans. Dumfriess. & Galloway N.H. and Ant. Soc.* 1951–2: 6) and aerial photographs indicate the presence of similar post-holes at the north-west angle (*JRS* 1965: 79). A narrow V-shaped trench, probably to hold obstacles, was found at the Flavian fortlet at Gatehouse of Fleet (St. Joseph in Hartley and Wacher 1983: 226, fig. 3). It lay between the two ditches, c. 35 ft. (10.7 m) from the rampart. At Newstead the Antonine I fort had two such obstacle-trenches respectively 30 and 70 ft. (9.1 and 21.3 m) from the fort wall (*PSAS* 1949–50: 12).

The Rampart

Fort ramparts in first-century Britain were normally between 18 and 25 ft. (5.49 and 7.62 m) wide. The question of the profile has already been discussed. It was common to cut back an existing turf rampart to receive a stone wall, as at York, Lincoln and Chester. Sometimes, as at Lincoln, this was necessary because of a narrow berm and the consequent proximity of the wall to the inner lip of the ditch; but this was not the situation at Inchtuthil and there would have been room to build the wall in front of the rampart. Cutting the front of the rampart back to create a vertical face against which to set the wall, however, would avoid any constructional weakness from infilling of the gap between the back of the wall and the sloping turf face.

APPENDIX TO CHAPTER 4

Since the demonstration by P. Crummy of the use of regular modules of 200 and 300 Roman feet in laying out the *scamna* of the fortress at Colchester (*Colchester Archaeological Report* iii (1984), fig. 6) there has been some interest in the question whether standard measurements can be recognised in other fortresses. At Inchtuthil such modules defy detection.

The dimensions from south to north in Roman feet (1 p.M = 0.296 m) are as follows (see FIG. 84).

South <i>via sagularis</i>	20
<i>tabernae</i> Nos. 53–66	285
street	22.5
‘ <i>basilica exercitatoria</i> ’ to S colonnade of <i>via principalis</i>	250
<i>via principalis</i>	30
N colonnade of <i>via principalis</i> to N wall of Barrack 18	341
<i>via quintana</i>	13
Granary 2 to Barrack 19	224.5
Barracks 19–24	290
North <i>via sagularis</i>	20

It will be seen that neither these measurements nor various combinations of block-widths and street-widths result in recognisable modules.

INCHTUTHIL THE LEGIONARY PRINCIPIA

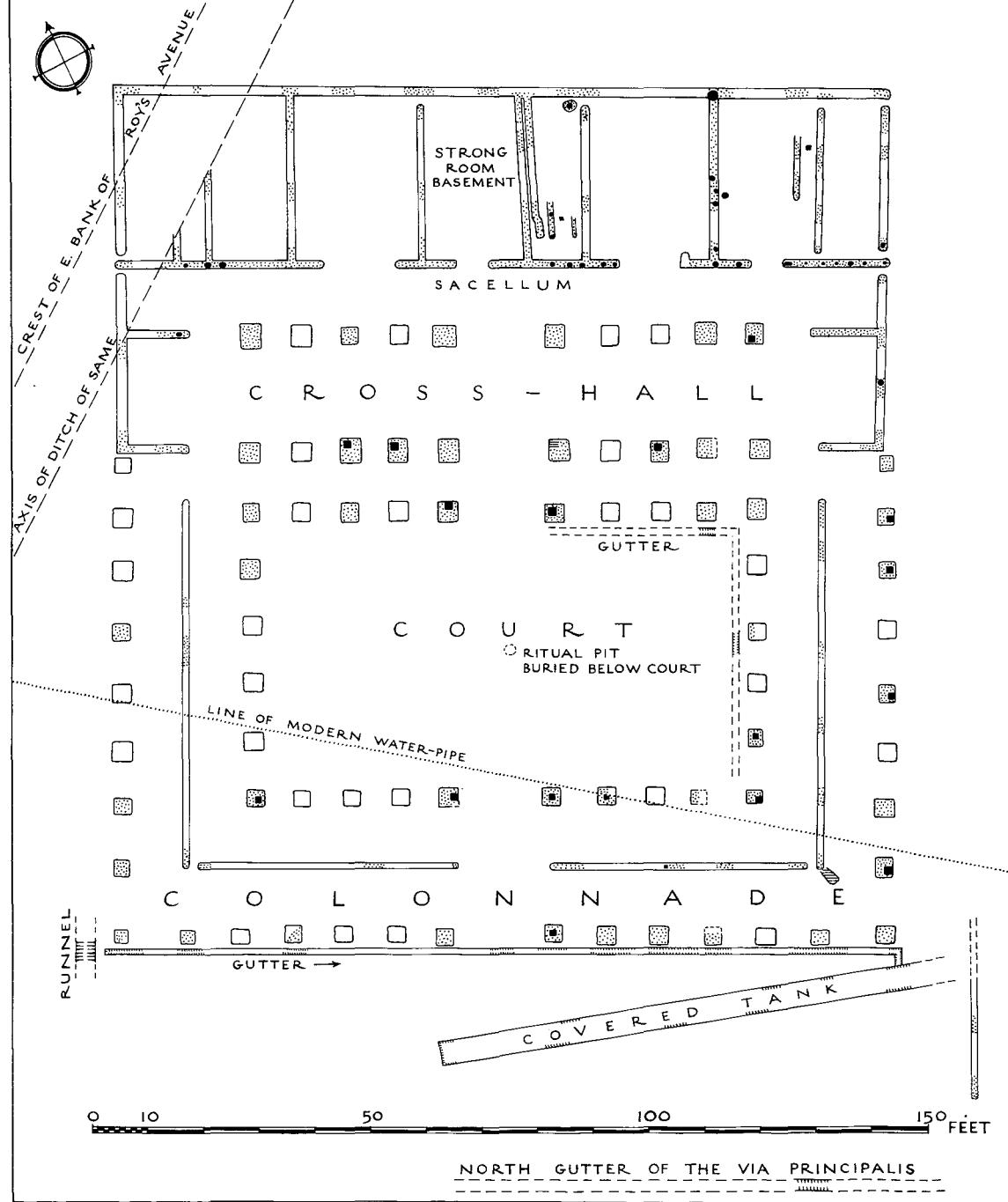


FIG. 11 The Principia, plan. Scale, 1:360.

CHAPTER 5

THE PRINCIPIA

A. THE EXCAVATED REMAINS (FIG. 11)

In 1953 the headquarters-building was excavated and its detailed layout investigated. The *principia* occupied the usual central position in the fortress; it was, however, much smaller than expected, and stood in the centre of a large open space set back some 40 ft. (12 m) from the junction of the *via principalis* and *via praetoria*. The whole of this central area had been artificially levelled before any construction took place. The *principia* measured 148 ft. (45.1 m) north-south by 138 ft. (42 m) east-west, a total area of 20,424 sq. ft. (1897 m²). (For comparative dimensions of *principia* elsewhere see Table I, p. 86).

The *principia* comprised a courtyard with surrounding colonnades, a cross-hall or *basilica* and a range of offices at the rear including the *aedes* (FIG. 11). Many of the post-pits, together with large sections of the construction-trenches, were located by cross-trenching and a detailed plan securely established.

A gutter 18 in. (0.46 m) deep and 20 in. (0.5 m) wide ran along the front of the building and drained into a long trench which lay at an angle to the south-east corner of the *principia*. This trench was approximately 4 ft. 7 in. (1.4 m) wide, 3 ft. 10 in. (1.16 m) deep and at least 100 ft. (30 m) long. The sides were sufficiently vertical and straight to indicate that it had once been lined possibly with lead (but perhaps more probably with planks); and presumably it was also covered (FIG. 13, right). It probably served as a tank to collect rain-water from the roof of the *principia*. Water-tanks have been found in association with *principia* elsewhere as at Strageath (*Britannia* 1976: 300) and Fendoch (*PSAS* 1938–9: 122). The tank at Inchtuthil had a capacity of c. 1680 cu. ft. (47.5 cu. m) or 10,466 gallons (47,578 litres) and, although it could not have met the demands of a whole legion, it would have supplemented other sources of supply (see Chapter 17, p. 189).

The *principia* was fronted by a colonnade 10 ft. (3.05 m) deep which ran back along the sides of the building for c. 90 ft. (27.4 m) as far as the cross-hall. A construction-trench which probably represents a continuous wall separated this external colonnade from the internal one. The internal colonnade surrounded a court 85 ft. (25.9 m) wide by 45 ft. (13.7 m) deep. To the south, west and east the colonnade was 10 ft. (3.05 m) deep but to the north only 8 ft. (2.44 m) deep. The line of a gutter running around the court was located on the north and east sides. The courtyard and internal colonnade were surfaced with gravel laid over a ballasting of laid turves, the court being thus cambered to help drainage. The gravel metalling varied in depth from nearly 10 in. (0.25 m) in the centre to a mere sprinkling at the edges; but it was c. 6 in. (0.15 m) deep under the colonnade.

The courtyard was closed on its northern side by a single-aisled *basilica* or cross-hall, 140 ft. (42.7 m) by 30 ft. (9.1 m). The cross-hall occupied the full width of the building. The hall comprised a nave 18 ft. (5.5 m) wide and beyond that an aisle 10 ft. (3.05 m) wide. There is no

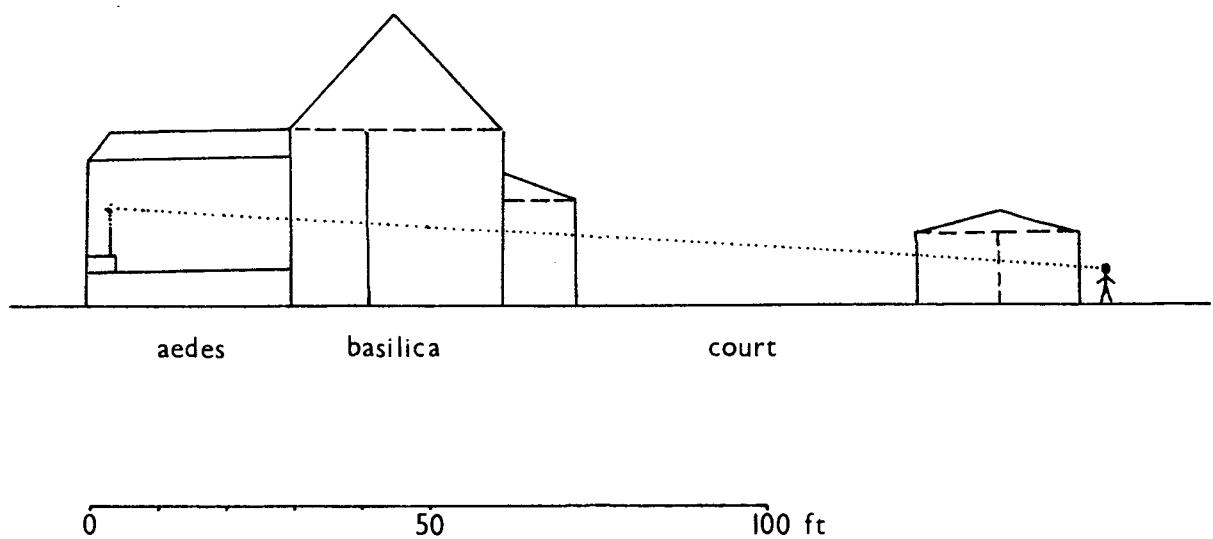


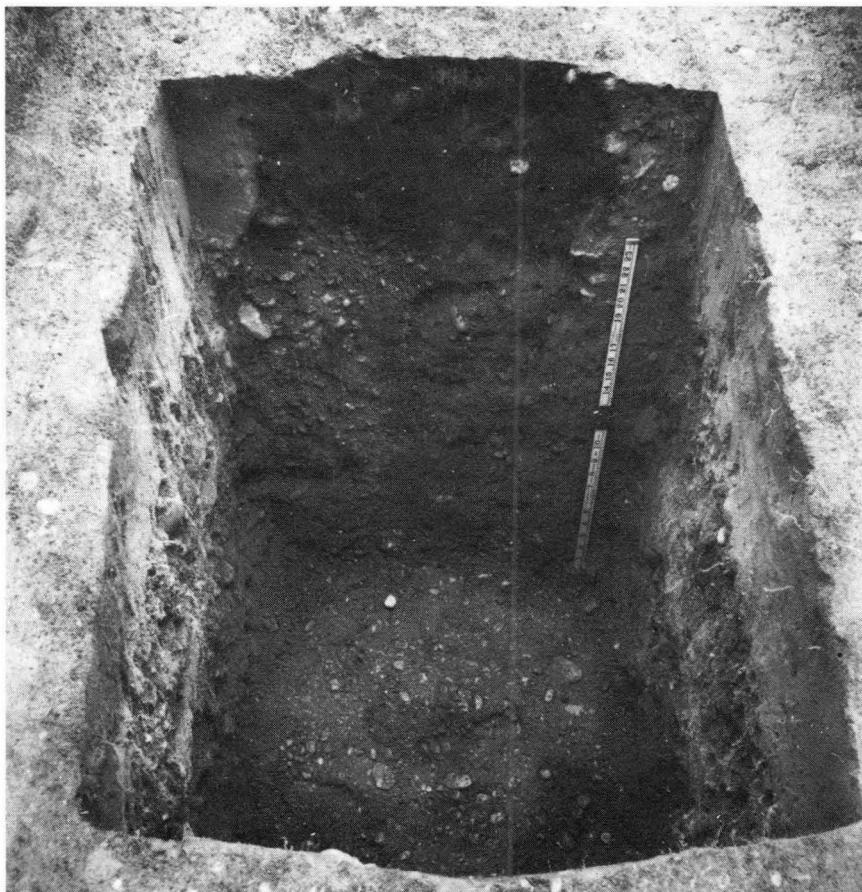
FIG. 12 The Principia, reconstructed cross-section showing line of sight to the *aedes*. Scale, 1:338.

continuous construction-trench dividing the nave from the courtyard colonnade, but it seems unlikely that the southern side of the hall was left open in view of the weather conditions and the risk of a gale raising the roof. The wall was probably formed by planking nailed to the *basilica*'s columns. At other sites *basilica* walls are represented only by large post-pits rather than by trenches, for example at Longthorpe (*Britannia* 1974: 19) Pen Llystyn and Gelligaer II (Nash-Williams 1969: 157) and Fendoch (*PSAS* 1938–9: 126). Sufficient light would be let in by the doorways and by clerestory lighting; the latter is indicated by the unusual size and depth of the post-pits in the *basilica*, suggesting a higher roof here than elsewhere in the building.⁶⁶ The cross-hall was probably entered through the main central doorway and by a smaller door at either end associated with a way through to the external colonnade of the courtyard, indicated by the termination of the wall-trenches dividing the colonnades, c. 8 ft. (2.4 m) south of the *basilica* wall (FIG. 11). Similar entrances are known at Chester (*J. Chester Arch. Soc.* 1951: 15).

At each end of the nave there was a recess enclosed by continuous wall-trenches measuring c. 10 ft. (3.05 m) east-west. At least one of these probably served as a tribunal. In fact, investigation of the eastern alcove revealed stone packing 1 ft. (0.305 m) high which may have formed the base of a raised dais.

To the north of the *basilica* lay a row of rooms interpreted as the *aedes* (shrine) and the main offices of the legion. The block was symmetrically arranged, measuring 140 ft. (42.7 m) by 28 ft. (8.5 m); in the centre lay the *aedes*, 28 ft. (8.5 m) square, to each side of which were three rooms. Adjacent to the *aedes* lay rooms 22 ft. (6.7 m) wide and beyond these groups of two narrower rooms divided by a central corridor. Thus there were in all seven rooms at the rear of the *principia* at Inchtuthil; legionary headquarters normally possessed more than the five rooms found in most auxiliary forts. The central room here appears to have been raised above the level of the rest of the range having a ground-level basement room, perhaps a strongroom c. 15 ft. (4.57 m) wide underneath. The grid of quasi-parallel trenches found in the eastern half of the square (FIG. 11, PL. XIII A) is probably to be interpreted as support for a raised floor much in the manner of granary-construction. The entrance to the ground-level room lay to the west of the building's axis but the *aedes* itself was presumably entered by steps on the centre line of the *principia*. This line dominates the whole building; an entrance-way of two intercolumniations, 16 ft. (4.88 m) wide, runs from the front of the building across the courtyard and *basilica* to the rear range. This axiality means that the *aedes* together with *signa*, *imagines* etc. would have been visible to all entering the *principia* from the south by the main doors, provided that the doorway of the *basilica* itself was of sufficient height. The standards would have stood over 15 ft. (4.57 m) above ground-level; the entrance must, therefore, have been over 12 ft. (3.66 m) high (FIG. 12) to allow a clear line of vision. At Fendoch Richmond argued that the roof of the *sacellum* must have been as

66. Compare Richmond's reconstruction of the *principia* at Fendoch, *PSAS* 1938–9, fig. 7.



(Photo: I.A. Richmond)

Pl. XI The *Principia*: Section of delve and post-hole in front wall of the administrative rooms (p. 85). Scale: 24 inches (two feet).

high as that of the *basilica* in order to provide adequate lighting for the standards. The construction-trenches at Inchtuthil are too slight for the *aedes* to have been equal in height to the *basilica*, but windows in the rear wall and lamps would have lit the standards adequately. The visibility of the standards from the entrance is in keeping with their great importance to the Roman army.⁶⁷

In the centre of the courtyard, roughly on the north-south axis, a pit was discovered (PL. XIII B). This lay beneath the gravel metalling and turf ballasting and obviously pre-dated the completion of the building. The pit was visible from above as a dark patch containing charcoal: it is described in detail on p. 59. A sample of the fill contained minute scraps of bone. The purpose of the pit is uncertain; its axial position and the presence of burnt bone led Richmond to identify it as a 'sacrificial pit'. The pit may represent a sacrifice made before construction began, similar to the ceremonies supposed to have taken place at the foundation of a colony.⁶⁸ Parallels are unknown from other *principia*, but there is an altar in the centre of the courtyard of the *principia* at Nijmegen (Bogaers, *Noviomagus* 1979: 41–2); this suggests that the pit at Inchtuthil may also have served a religious purpose. Other interpretations of the pit are, however, possible; it may rather have belonged to the construction period, the charcoal fire having been used for metal-working such as for the final moulding of hinges etc. A central position, suitably distant from the timber buildings, would naturally have been chosen. The axial position does, nevertheless, argue in favour of the ritual significance of the pit.

67. Webster 1979: 134. Tertullian, *Apologia* 16: *Religio Romanorum tota castrensis signa veneratur, signa iurat, signa omnibus deis praeponit* ('Roman military religion worships the standards, takes oaths by them, and gives them precedence over all the gods').

68. See E.T. Salmon, *Roman Colonization under the Republic* (1969), 24. When a camp was laid out, the central position, in front of the commander's tent, was marked first by a pole (Marquardt 1891: 112; Polybius vi. 27.2; Hyginus 12), and it is possible that a ceremony may have taken place at that point.

B. TIMBER CONSTRUCTION AS EVIDENCED BY THE PRINCPIA

The majority of the post-pits for the colonnades and for the *basilica's* columns were traced in plan and several were fully excavated. In some of these the exact position of the timber itself was visible as an unusually dark mark in the fill (FIG. 13, PL. XII B). The dimensions of the construction-trenches were established by frequent cross-sectioning; here not only the positions and dimensions of the main uprights were traced (PL. XII B) but also those of the wattles between them.

The post-pits for the colonnades measured approximately 3 ft. by 3 ft. (0.9×0.9 m) and were about 3 ft. (0.9 m) deep. The uprights varied from 10 to 18 inches square (0.25 to 0.46 m) (FIG. 13). The post-pits in the *basilica* were larger, ranging from 3 ft. 6 in. square (1.06 in.) to 4 ft. square (1.22 m); they were at least 4 ft. (1.22 m) deep. The timbers were all at least 15 in. (0.38 m) square. The larger size and greater depth of the pits, together with the more than average scantling of the timbers, suggest that the uprights were taller than those employed in the colonnades, enabling clerestory lighting to be provided: this was necessary since the offices on the north and the portico on the south prevented admission of light to the hall at a lower level.

The construction-trenches were also of varying dimensions, presumably in accord with the height of the wall and the load carried. The trench dividing the internal and external colonnades was approximately 2 ft. (0.61 m) across and 2 ft. 4 in. (0.7 m) deep (FIG. 13); the outer walls of the rear range were c. 2 ft. 4 in. (0.7 m) across and 2 ft. (0.61 m) deep. Trenches of this size are far

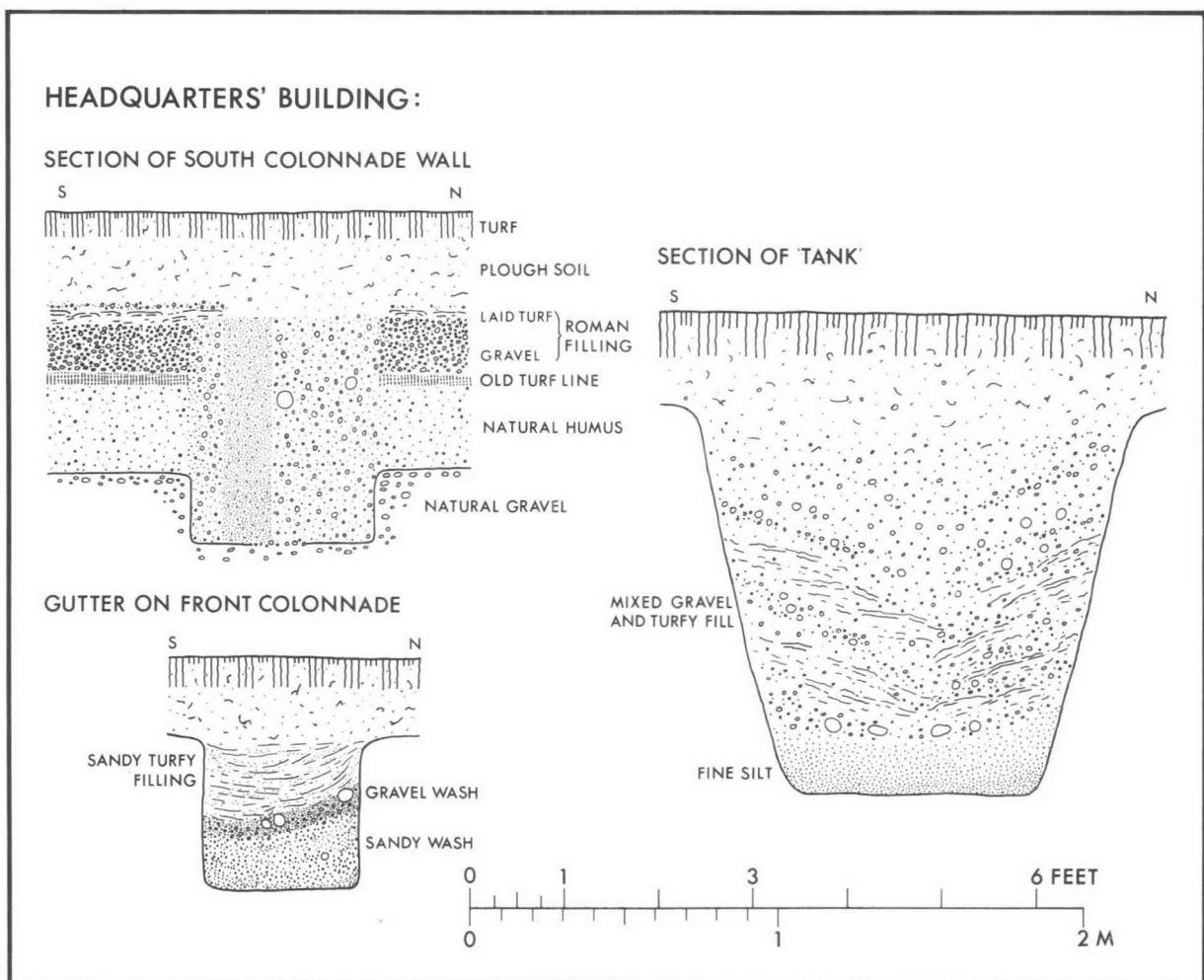
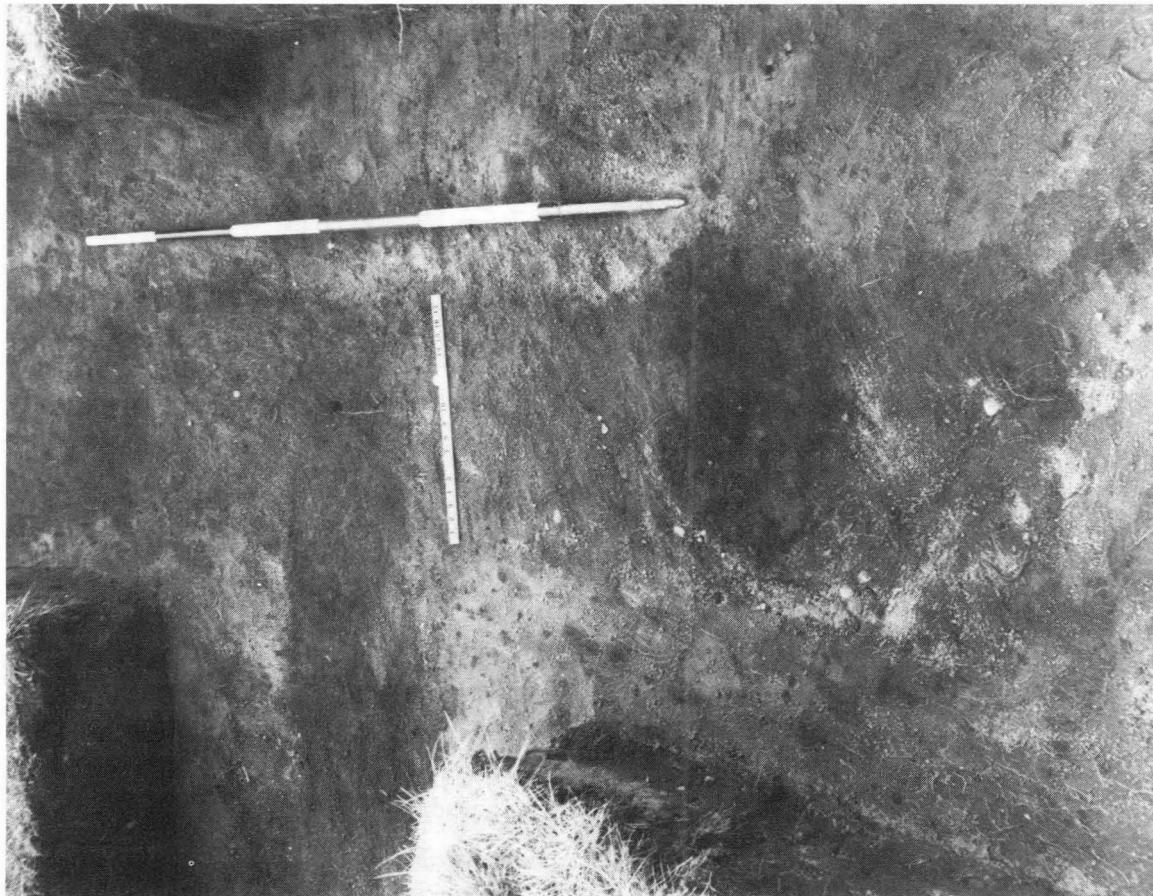


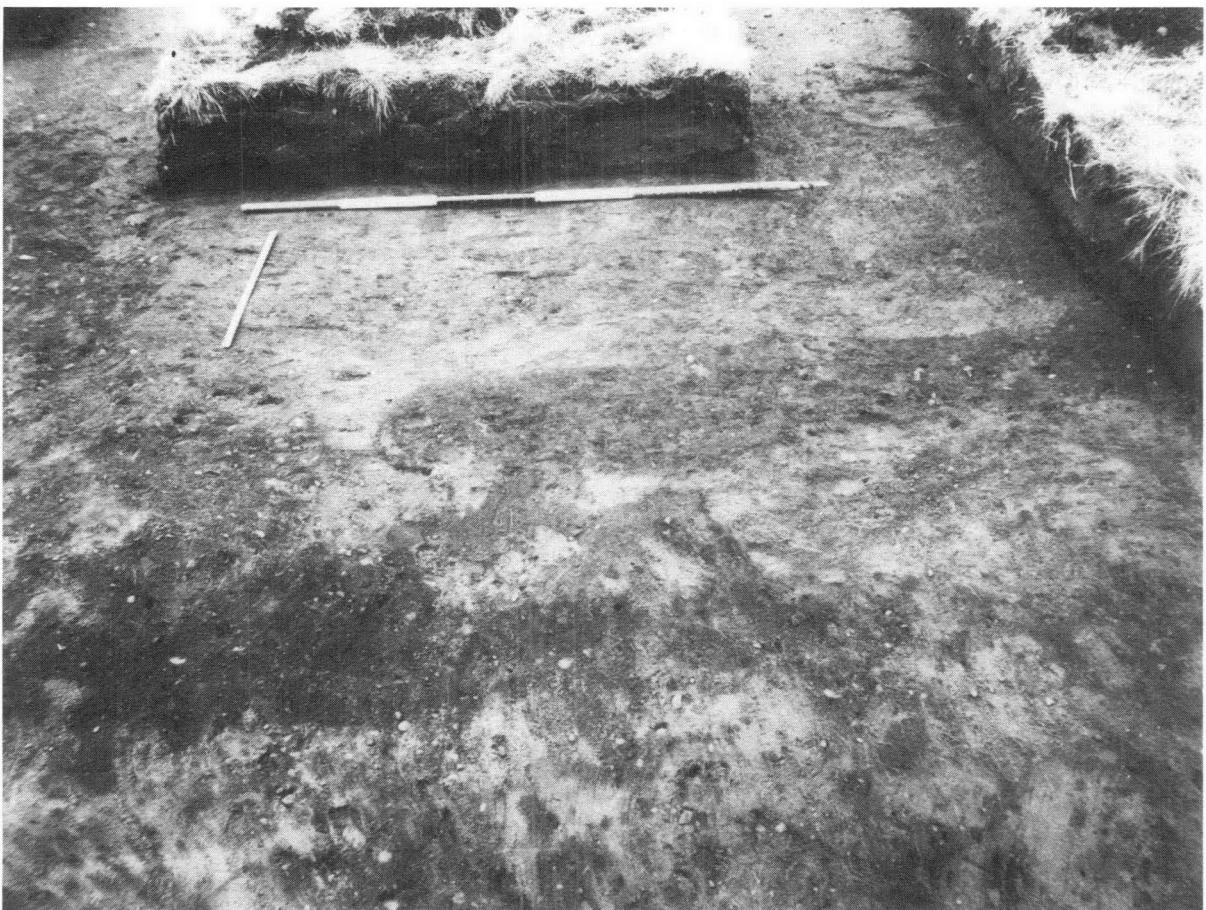
FIG. 13 The Principia, Sections. Scale, 1:24.



(Photos: I.A. Richmond)

Pl. XII A The *Principia*: T-junction of wall-trench at south end of administrative rooms (p. 85). Scales: 18 inches and 6 feet.

XII B The *Principia*: front wall of administrative rooms, Section of wall-trench and post-hole (p. 85). Scale: 24 inches (two feet).



(Photos: I.A. Richmond)

Pl. XIII A The *Principia*: grid of trenches in the *aedes*, looking east (p. 85). Scales: 2 feet and 6 feet.



Pl. XIII B The *Principia*: ritual pit in the centre of the courtyard (p. 81). Scale: 24 inches (two feet).

more substantial than those usually found in auxiliary forts.⁶⁹ The internal dividing trenches, for example the west wall of the *aedes*, were shallower; c. 2 ft. (0.61 m) across and 18 in. (0.45 m) deep. The partition walls were not as substantial as the exterior walls and clerestory lighting for the *aedes* seems unlikely. In contrast, the southern trench of the rear range, dividing it from the *basilica*, was 2 ft. 4 in. (0.71 m) across and 3 ft. 6 in. (1.07 m) deep (PL. XII B). The greater depth was necessary here to support a wall of greater height than in the rest of the rear range since it formed the northern wall of the *basilica*.

The posts of the colonnades and of the nave of the *basilica* were set approximately 8 ft. (2.44 m) apart; this appears to have been a standard measurement (the veranda posts of the barracks were also 8 ft. apart). The main posts in the construction-trenches were c. 6 in. (0.15 m) square; the distance between them varied from 2 to 5 ft. (0.61 to 1.52 m). Between the post-holes were stake-holes for the wattle-work. Evidence for the wattle-work between the timber uprights is seldom found and most of our knowledge of the method of construction⁷⁰ comes from waterlogged sites such as Valkenburg. The recognition of the stake-holes at Inchtuthil is, therefore, remarkable.

Analysis of wood samples from Inchtuthil showed that the main timbers were of oak and the wattles of hazel and birch. This, however, tells us little about the source of the timber. Those trees are all indigenous to the area; but a sufficient quantity of timber is unlikely to have been available in the immediate vicinity and some was probably transported from further afield. The timbers used at Inchtuthil were all 'squared' rather than rough-cut; they did not, however, always have a square cross-section nor were they of standard dimensions. Hanson (*Britannia* 1978: 293 f) used the lack of standardization in his argument against the stock-piling of timber by the Roman army; but stores of timber cut to an approximate standard rather than an exact one are a strong possibility. Some form of stock-piling must have taken place in order to provide the quantity of timber required in Scotland.

The parallel trenches in the eastern half of the *aedes* are an interesting structural feature (PL. XIII A). They are probably to be interpreted as bedding for rows of posts supporting a raised floor. The trenches themselves are much slighter than the others in the *principia*, being only 14 to 15 in. (0.35 to 0.38 m) wide and 7 in. (0.18 m) deep. These dimensions clearly indicate that these trenches were not intended to carry a structural load. The break in the construction-trench on the southern side of the *aedes* is off-centre (FIG. 11); it probably represents a doorway to a ground-level room. The *aedes* itself must have had a central doorway at a higher level.

C. DISCUSSION OF THE PRINCPIA: ITS SIZE AND SIGNIFICANCE

The *principia* at Inchtuthil is the smallest known at any legionary fortress (TABLE I); it is even smaller than that at the vexillation fortress at Longthorpe, although appreciably larger than those in auxiliary forts. Moreover the percentage of the fortress-area occupied by the *principia* at Inchtuthil is only 0.8 compared to an average of 3 at other fortresses; even at Haltern the *principia* occupies 1.5% and at the double-legionary fortress at Vetera the headquarters-building accounts for 1.95% of the total area. The percentage is usually higher in auxiliary forts (TABLE I, p. 86). Inchtuthil, then, represents a break with standard army practice. The small size of the building does not seem to be connected with its date but rather to be the product of its intended temporary character.

69. Richmond 1961: 19. Trenches were normally 10 to 12 inches (0.25–0.30 m) wide and 10 to 18 inches (0.25–0.46 m) deep. The trenches at Strageath, for example, were c. 1 ft. by 1 ft. (0.30 m). The trenches in the main buildings at Fendoch were, however, c. 2 ft. (0.61 m) wide.

70. For a full discussion of timber building techniques see I.A. Richmond 1961: 15 f.

TABLE 1
RELATIVE SIZES OF PRINCIPIA

<i>Fortresses</i>	<i>Dimensions</i>	<i>Area</i>	<i>Percentage of Fortress Area</i>
Inchtuthil	42 × 45 m	1897 m ²	c. 0.8%
Exeter	45 m wide		
Chester	74 × 100 m	7400 m ²	c. 3%
Caerleon	66.2 × 93.5 m	6270 m ²	c. 3%
Longthorpe	49 × 54 m	2646 m ²	c. 2.4%
Haltern	49 × 54 m	2646 m ²	c. 1.5%
Nijmegen	65 × 85 m	5525 m ²	c. 3.3%
Neuss	90 × 85 m	7650 m ²	c. 3.1%
Bonn	75 × 115 m	8525 m ²	c. 3.5%
Vetera	95 × 120 m	11400 m ²	c. 1.95%
Vindonissa	90 × 160 m	14400 m ²	c. 6.4%
Lauriacum	70 × 80 m	5600 m ²	c. 2.8%
Carnuntum	60 × 105 m	6300 m ²	c. 3.4%
Lambaesis	90 × 98 m	8820 m ²	c. 3.8%
Novae	75 × 105 m	7875 m ²	
<i>Auxiliary Forts</i>			
Fendoch	24.4 × 30.5 m	744 m ²	c. 4%
Pen Llystyn	23.1 × 27.3 m	640 m ²	c. 3.8%
Caerhun	30.5 × 29.8 m	909 m ²	c. 4.7%
Brecon Gaer	32 × 34.8 m	1114 m ²	c. 3.5%
Caernarvon	25 × 25.3 m	633 m ²	c. 3%
Castell Collen	25 × 23.6 m	592 m ²	c. 4%
Gelligaer	24 × 21 m	504 m ²	c. 3.4%
Valkenburg	c. 30 × 30 m	900 m ²	c. 7%
Künzing	35 × 33 m	1155 m ²	c. 5%
Gellep	31 × 29.5 m	914.5 m ²	c. 2.8%
Hod Hill	17.7 × 25 m	442.5 m ²	c. 1.08%

It is reasonable to assume that this small *principia* would eventually have been replaced by a much larger structure. In fact a large levelled area appears to have been reserved for this purpose. There was ample space for a *principia* measuring c. 60 to 70 m. by 80 to 90 m. in the centre of the fortress. Inchtuthil was obviously abandoned before rebuilding could take place, but the analogy of the two *fora* of Roman London is instructive. There the second, larger, *forum* encapsulates the earlier building, and it is reasonable to believe that the intention was for the latter to continue in use until a late stage of construction (*Britannia* 1977: 37). A similar sequence may have been planned at Inchtuthil.

The enlarged *principia* would probably have been built of stone. The defences and the main administrative buildings were the first parts of a fortress to be rebuilt in stone elsewhere, as at Nijmegen and Chester. The addition of the stone wall to the defences at Inchtuthil suggests that the process was already underway here. A permanent stone structure was possibly envisaged from the start, but such a building would take a long time to erect and a temporary structure was needed to house the standards and basic administrative staff in the meantime. It would have been pointless to build a full-size timber *principia* when it was only intended for short-term use. The same considerations apply if Agricola originally planned the fortress for a short period of occupation only. The unfinished state of the fortress is further illustrated by the lack of a *praetorium*, although space was reserved beside or behind the *principia* (p. 187); two tribune's houses and possibly two granaries were also never built. Clearly the most necessary buildings

were erected first so that the fortress could be fully occupied and fully operational as quickly as possible.

The orientation of the *principia* is seen to differ from that of the main streets and the other buildings of the fortress by approximately 2 degrees (FIG. 84). This would be surprising in anything but a 'temporary' building, granted the normal precision of Roman military surveying which is apparent in the rest of the fortress at Inchtuthil.⁷¹

The only fortress which may have possessed a *principia* similar in size to that at Inchtuthil is Exeter. The headquarters-building itself has not yet been excavated there but the layout, as known, suggests that it cannot have been more than 45 m wide (Bidwell 1979: 8 f.). The depth of the building is unknown. Superficially, then, Exeter appears to offer a parallel to Inchtuthil, but there was no room for later expansion at Exeter without the demolition of other buildings; the small size at Exeter, if it is a valid supposition, was not due to the temporary nature of the building. The fortress as a whole is unusually small, the site being limited by steep slopes; the barrack blocks, although they possess fourteen *contubernia*, are much shorter than those found elsewhere. The whole of the Exeter fortress seems to have been erected on a reduced scale either for topographical reasons or because it was not intended for a full legion. It does not, therefore, provide a useful comparison with Inchtuthil.

At Caerleon (Boon 1970: 11 f.) no traces of a timber predecessor for the stone *principia* have been found although its existence cannot yet be ruled out. The stone building itself was built in stages and was left unfinished, without a floor, for some time. This is a clear indication of the length of time involved in completing such a massive structure and the consequent need for a temporary substitute as at Inchtuthil.

D. THE RAISED FLOOR IN THE AEDES: THE QUESTION OF THE STRONGROOM

One of the functions of the *principia* was to house the military treasury; this presumably included both the official legionary funds and the *deposita* (savings) of the soldiers.⁷² Security was obviously important and this was ensured not only by the guards who *excubant ad signa* ('keep watch at the standards') (Fink 1971: 541) but by the development of specially constructed underground strongrooms, familiar at several late second- and third-century forts such as Caersws II, Newstead, Chesters and Segontium, and by the simpler stone-lined cists, as at Rough Castle and Brecon Gaer; the latter were much more common.

It was once assumed that these treasures were at the earliest a third-century phenomenon (for example Webster 1979: 190); but examples are known from the mid first century onwards. In general, there seems to have been a development from a simple strongbox, a pit let into the floor of the *aedes*, to the more elaborate vaulted strong-room reached by steps, as at High Rochester and Great Chesters. The development of the latter may be associated with the erection of stone *principia*, since the early examples in timber forts are of the pit variety.

One of the earliest examples known is at the Neronian fort of the Lunt (*Britannia* 1971: 262).⁷³ Here a carefully dug pit 5 ft. (1.52 m) square and c. 3 ft. (1 m) deep was cut into the floor of the *aedes*. This pit appears to have been timber-lined since there was a post-hole at each corner and grooves for the timber-framing around the base. Access was probably by means of a trap-door. Identification as a strongbox was further indicated by the discovery of

71. The accuracy of the Roman army surveyors was demonstrated during the reconstruction of the gateway at the Lunt, where the levels were checked by modern equipment (Hobley: 1971a, 17).
72. B.J. 1967: 233 f.; *P. Columbia* vi. v. 325 (A.D. 143) refers to τὰ συλλεγέντα ἐκ πρινκιπίων ((bona) collecta ex principiis). This is a receipt for *deposita* from the *principia*.
Vegetius ii. 20: . . . ut ex donativo, quod milites consecuntur, dimidia pars sequestraretur apud signa et ibidem ipsis militibus servaretur . . . ('So that of the donatives obtained by the soldiers half was laid aside for safe keeping with the standards and kept there for the recipients themselves'). Cf. *CIL* iii 3526.
73. For a full report, see Hobley, *Trans. Birmingham and Warwickshire Arch. Soc.* lxxxv (1972), 23–5.

6 *denarii* and 2 *asses* in the silt at the bottom. This pit seems to have been an early version of the stone-lined cists. A similar timber-lined pit was found in the *aedes* of the Flavian-Trajanic fort at Brough-by-Bainbridge (*JRS* 1969: 206–7). Stone-lined cists continued in use through the second and third centuries, but at the same time vaulted underground chambers reached by flights of stone steps were constructed, as at Caersws II in the mid second century. The underground cellar in the Hadrianic *principia* at Ambleside would date the development even earlier; but the lack of dating material makes it uncertain that the cellar is Hadrianic and not a later addition (*Trans. Cumb. & West. Ant & Arch. Soc.*² xv: 38 f.). Many examples are known in the third century.

Inchtuthil is unusual in having a strongroom rather than a pit as at the Lunt; it is the only known timber example. The room was, however, at ground level not underground; it could, therefore, be entered by a door from the *basilica*; there was no need for trap-doors or steps. The room was probably between 4 and 5 ft. (1.22–1.52 m) in height. This type of strongroom may represent a transition from the simple pit to the elaborate vault, and it is possible that other examples, as yet undiscovered, existed elsewhere. There appears to have been a ground-level cellar under the *aedes* in the stone *principia* at Novae (*Polish Archaeologia* 1977: 206 f.); The floor of the *aedes* was 4 ft. (1.2 m) above the ground. The dating is not certain but the earliest levels may be late first-century; Novae would thus provide a stone-built parallel to the timber strongroom at Inchtuthil. There were also two cellars under the *aedes* in the stone *principia* at Burnum which was abandoned in A.D. 69 (Fellmann 1958: 130). The late Flavian stone *principia* at Nijmegen probably had a cellar under the room to the left of the *aedes* (v. Petrikovits 1975: 173 n.72). Therefore, although the timber treasury at Inchtuthil is at present unique, it does not occur in isolation, but fits into the general pattern of development in *principia* design in the late first century.

E. THE PLAN OF THE PRINCIPIA AND USE OF THE ROOMS

The small size of the *principia* at Inchtuthil resulted in the presence of fewer rooms than are found in legionary headquarters-buildings elsewhere. The *principia* of auxiliary units normally consisted simply of a colonnaded court, cross-hall and a range of five rooms at the rear, as at Gelligaer and Housesteads; sometimes, as at Fendoch, there were also long side-rooms (*armamentaria*) behind the colonnades or, as at Künzing, a series of small rooms lining the court. Legionary *principia* were, in general, a much more elaborate version of the same basic plan. The colonnaded courtyard and cross-hall were normally surrounded by rooms used as offices, stores, *armamentaria* etc. The rear range usually had four rooms to each side of the *aedes* rather than two, for example at Carpow, Caerleon, Neuss, Nijmegen and Lauriacum (Boon, *Arch. Camb.* 1970: 16); these rooms were often continuous with the lateral chambers of the building. In plan, then, (FIG. 11) the *principia* at Inchtuthil represents an enlarged version of the administrative buildings being erected by Agricola's army at the auxiliary forts in Scotland such as Fendoch and Strageath, rather than their fully-developed legionary counterpart.

The development of the *principia* has been fully discussed by R. Fellmann (1958) with special reference to Vindonissa. Since then new evidence and fresh interpretation have produced a more uniform picture. A row of nine rooms, the central one of which is apsed and has the appearance of an *aedes* has been discovered to the south of the *basilica* at Vindonissa (*Jber. Gesell. pro. Vind.* 1968: 59 f., pl. 1). The *principia* there now fits the normal pattern better since, although it is still cut by the *via principalis* and still has a double court, the main offices and shrine were, in fact, approached through the *basilica* and did not face it across the courtyard. The influence of the 'Italian' *forum* is thus less marked. Also the second court at Lambaesis may have been a *basilica* (Baatz, *Germania* 1977: 266): a substantial section of masonry 4 m long and 1.5 m wide may have formed the stylobate for the second row of columns essential for an aisled hall. Fellmann overemphasized the variant of an open court in place of a *basilica*, for many of his examples are doubtful, such as Lauriacum and Neuss.

The basic form of the *principia* had been fully developed by the Flavian period. Haltern illustrates an earlier phase when there was still access from the rear of the building; but the court, hall and offices were already present. The *principia* at Inchtuthil, because of its temporary nature, resembles that at Haltern much more closely than any legionary *principia* of later date; both are of a very simple form. Marching- or siege-camps did not have *principia*; their central space continued to be occupied by the *praetorium* or general's tent, as at Masada. The difference between the central area at Masada and Inchtuthil thus serves to stress their different natures. The latter was a permanent fortress not a temporary camp and as such needed a normal administrative building; even if of a reduced size and simplified plan, it contained all the essential features.

A room devoted to the standards and the statues of the gods and emperor was an essential part of any *principia*; it is attested in literature and inscriptions.⁷⁴ The use of the other rooms at the rear for the administration of the legion is confirmed by the extensive epigraphic evidence from Lambaesis (Cagnat 1913: 463 f). One of the rooms was occupied by the *tabularium legionis* (administrative office of the legion); an inscription recording its presence was found in Room 5 at Lambaesis (ILS 9100). A second inscription from the *principia* there (ILS 2446) refers to the *tabularium principis*. *Tabularia* occur on other inscriptions at Lambaesis and elsewhere.⁷⁵ The Roman army kept detailed daily records of everything, and offices were needed for the storage of these and for the scribes employed on them; Vegetius (ii.19) stresses the quantity of the records and the men thus employed.^{75a} The use of rooms as *scholae* for the various *collegia* is indicated by the Lambaesis inscriptions. Military *collegia* (guilds) are not generally believed to have existed in the first century (epigraphic evidence for them is all of later date, mid second century onwards), and if this is so the question of whether *scholae* were present in the *principia* is not relevant at Inchtuthil. H v. Petrikovits has, however, suggested that *scholae* and *collegia* existed from the reign of Claudius onwards, arguing that a later change of room-usage in already-existing *principia* would be strange

74. Tacitus, *Histories* i 36: *Haud dubiae iam in castris omnium mentes tantusque ardor, ut non contenti agmine et corporibus in suggestu, in quo paulo ante aurea Galbae statua fuerat, medium inter signa Othonem vexillis circumdarent* ('By now all in the praetorian camp had lost their doubts, and so great was their fervour that, not content with giving Otho an escort of their bodies, they placed him amid the standards and ensigns on the platform where recently the gold statue of Galba had stood').

Tacitus, *Annals* iv 2: . . . *coli per theatra . . . effigies eius interque principia legionum sineret* ('. . . allowed his effigies to be worshipped in the theatres . . . and in the *principia* of the legions').

Herodian, *Histories* iv.4.5: *εἰσέπεσεν ἐς τὸ στρατοπέδον ἔς τε τὸν νεών ἔνθα τὰ σημεῖα καὶ τὰ ἀγάλματα τοῦ στρατοπέδου προσκυνεῖται . . .* (He burst into the camp and the shrine where the military standards and images are worshipped . . .).

CIL iii 3526 = ILS 2355: *Excubitorum ad tutel(am) signor(um) et imagin(um) sacrar(um)* P. Turran. Firminus vet. ex cornic. leg II Adi. Ant. p(ecunia) s(ua) a solo rest(ituit) (Aquincum, A.D. 216).

CIL xiii 7753 = ILS 2349: . . . *signorum cum edicula . . .* (Niederbieber, A.D. 239).

RIB 1262: *Genio d(omini) n(ostr)i et signorum coh. I Vardul(lorum) et N(umeri) explorator(um) Brem(eniensium) Gord(ianorum)* (inscribed on an altar found in the central rear chamber at Bremenium).

Antiq. Journ. 1961: 224–8: *aedem principiorum cum basilica . . .* (Reculver). Also a statue of Antoninus Pius was found in the rear room of the *principia* at the Saalburg.

75. ILS 9100: *Tabularium legionis . . . fecerunt L. Aemilius Cattianus cornicular. et T. Flavius Surus actarius, item librari et exacti leg III Aug. p.v. . . .* (Lambaesis).

ILS 2446: *Tabularium principis . . . optiones coh. primae de suo fecerunt . . . tabularium princ. cum imag. domus divinae renovatum ab Ulpio Antonino princ. et optiones coh. prim. et adiut. de suo fecerunt . . .* (Lambaesis).

CIL xiii 6746: . . . *tabularium pensile a solo fecit . . .* (Mainz).

CIL xiii 7752: *genio tabulari lib(rariorum) a Vib. Mercurialis librari . . .* (corner room in *principia* at Niederbieber).

AE 1957, 87: *Minervae Aug. Sacr. Diogenes et adiutores tabularii rationis kastrensis* (Lambaesis).

AE 1957, 85: . . . *(ta)bularium equitum leg III Aug . . .* (Lambaesis).

75a. Vegetius ii 19: . . . *Totius enim legionis ratio, sive obsequiorum sive militarium munerum sive pecuniae, cotidie adscribitur . . . cotidianas etiam in pace vigilias, item excubitum . . . Quando quis commeatur acceperit vel quot dierum, adnotatur in brevibus.* ('the administration of the whole legion, whether services or military duties or financial transactions, is written down every day . . . their daily peacetime guard duties and watches . . . Each man's leaves of absence and their duration is noted in the rosters.'

(1975: 133). In any case the unusually small number of rooms at Inchtuthil means that much of the administrative staff must have been provided with offices elsewhere. In view of the climate it seems unlikely that the clerks could have worked in the porticoes around the court; they are more likely to have used some of the many *tabernae* as offices or perhaps some of the buildings in the Officers' temporary Compound outside the fortress (p. 207).

There is no room in the *principia* suitable for use as the *armamentaria* attested elsewhere.⁷⁶ At some other sites a weapon store is assumed to have existed in one of the rooms off the main courtyard, as at Fendoch (*PSAS* 1938–9: 124). Weapons could obviously not be stored in the open porticoes at Inchtuthil; storage space must have been provided elsewhere, perhaps in the *fabrica* or the *tabernae*.

The temporary headquarters-building at Inchtuthil thus performed the most important functions of a *principia*. Size was not essential, since a whole legion could never have assembled inside any *principia*; mass meetings would presumably have taken place on the parade-ground.⁷⁷ A *basilica* was needed for smaller assemblies, for instance of centurions for the issue of orders, and the hearings of military courts.⁷⁸ An *aedes* and a strongroom which could be guarded were of the utmost importance. Other functions were subsidiary and temporary provision could be made elsewhere.

76. *RIB* 1092: . . . *Gordianus P.F. Aug. principia et armamentaria conlapsa restituit . . .* (Lanchester). *CIL* viii 2563: *Domui Divinae Auggg. L. Caecilius Urbanus opt. val. cur. operi arm(amentarii) posuit* (Lambaesis, *principia*). Weapons have been discovered in several *principia* e.g. Vetera, Künzing, Lauriacum, Novae. At Lambaesis there was a store of 6,000 slingstones and 300 large stones, and at Housesteads there were 800 arrowheads in the *principia*.
77. The location of the parade-ground is unknown; it had probably not yet been metalled when evacuation occurred. Perhaps part of the area south of the fortress was used for this purpose (FIG. 2). Josephus *B.J.* iii. 83: θώκοι τε λοχαγούς καὶ ταξιάρχους, ὅπῃ δικάζοιεν, εἴ τινες διαφέροιντο. ('seats of judgement for centurions and tribunes where they may adjudicate on any differences which may arise'). Livy 28, 21: *forma tamen Romanorum castrorum . . . tribunos . . . et iura reddere in principiis sinebant.*

CHAPTER 6 THE HOSPITAL

A. THE BUILDING (FIG. 14)

The hospital stood in the middle *scamnum* of the left *retentura*; its position corresponded to that of the *fabrica* in the right *retentura* (FIG. 84), from which it was suitably distant to provide a peaceful atmosphere for the patients, as recommended by Hyginus (Ch. 4).⁷⁹ The building occupied an area of 300 ft. (91.44 m) east-west by 192 ft. (58.52 m) north-south, thus covering 57,600 sq. ft. (5,351 m²). The hospital at Inchtuthil was larger than those at Neuss and Vindonissa, although smaller than the Neronian hospital at Vetera; it occupied an unusually high percentage of the total fortress area (for full comparative details see TABLE II).

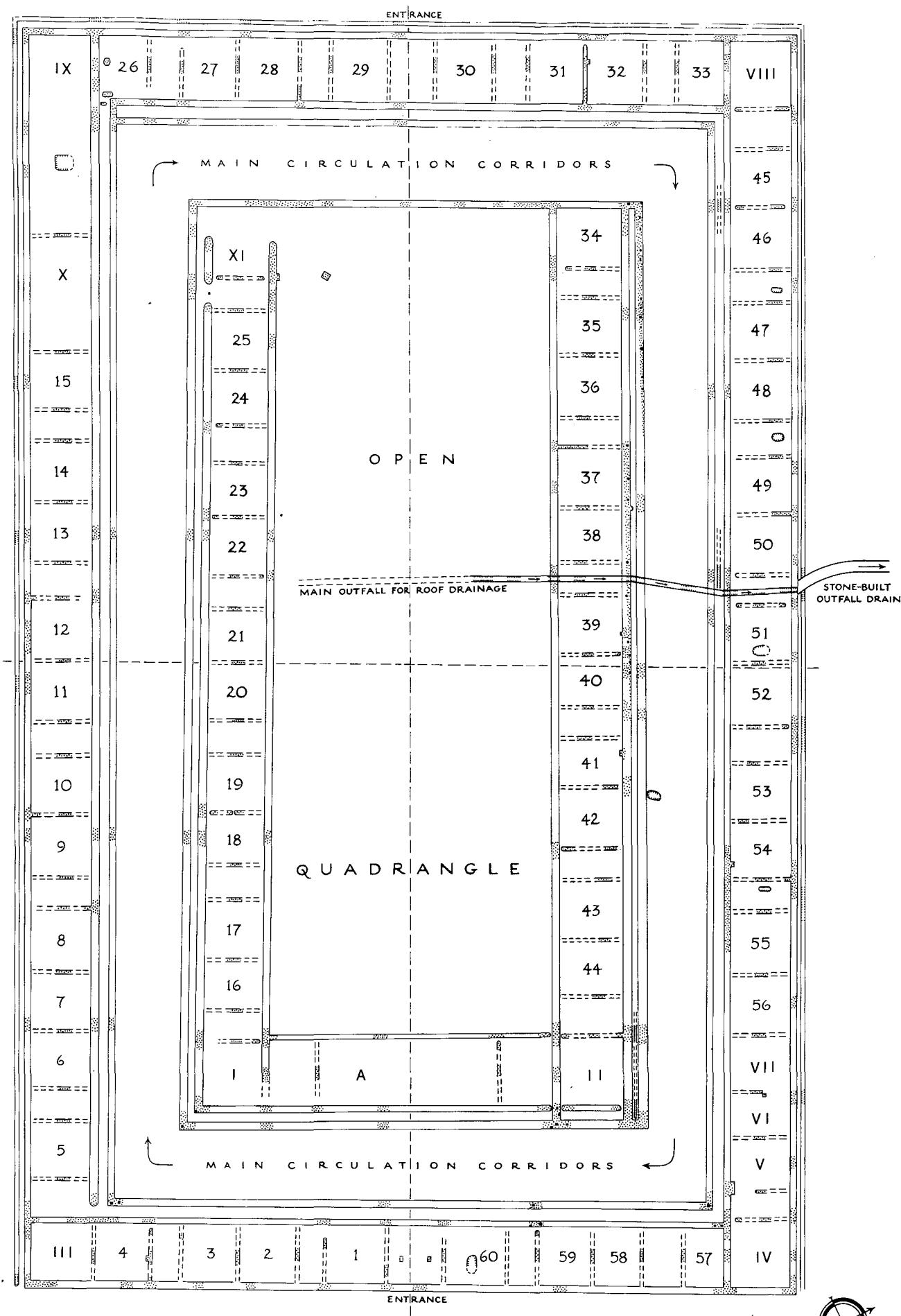
In the centre of the building lay a large open court measuring 70 ft. (21.33 m) by 196 ft. (59.74 m), 13,720 sq. ft. (1,274 m²), and representing approximately 23.8% of the total area of the hospital. Remarkably the internal courtyards also occupied about 23% of the hospital area at Vindonissa and Vetera I, whilst at Neuss the figure was only 7.6% (TABLE III). The large amount of space involved suggests that the courtyards served some practical purpose other than providing a sheltered exercise-ground for convalescents; that they were used to grow medicinal herbs or vegetables to supplement the patients' diet is a reasonable assumption (Liversidge 1968: 329; Davies 1970: 84 f.; Knorzer 1970: 137 f.).

All the known legionary hospitals are similar in plan (v. Petrikovits 1975: fig. 27). All are rectangular buildings with two ranges of rooms arranged around an internal courtyard; both ranges opened on to a circulating corridor. The majority of these rooms were wards, but some served as kitchens, baths, stores etc. In several of the hospitals a group of rooms in the inner range has been identified as the operating theatre.

The main entrance to the hospital at Inchtuthil was from the south-east, facing the granary and the *intervallum*. There was a second entrance from the street to the north-west (FIG. 80). As at Vetera and Neuss, these entrances lay on the long axis of the building, whereas the entrance at Vindonissa was on the short axis. The hospital at Inchtuthil had no fore-hall or large reception area such as those at Vetera and Vindonissa. Both the entrances gave access on to the main circulation corridor through a small vestibule.

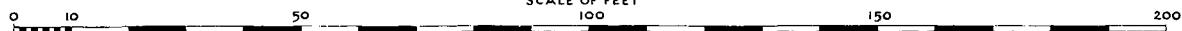
At the south-eastern end of the inner range of rooms was a hall (A) 44 ft. by 16 ft. (13.41 m by 4.88 m) flanked by two smaller rooms 12 ft. by 16 ft. (3.66 m by 4.88 m). By analogy with the hospital at Neuss (Davies 1970: 95), these rooms can almost certainly be identified with the operating theatre and its ancillary chambers. A hall of similar size projected into the courtyard at

79. Hyginus 4, . . . *hoc est veterinarium et fabrica, quae ideo longius posita est, ut valetudinarium quietum esse convalescentibus posset* ('that is, the veterinary clinic and *fabrica*; the latter is placed further away to ensure that the hospital has quiet for the convalescents.')



INCHTUTHIL: THE HOSPITAL OR VALETUDINARIUM

SCALE OF FEET



SCALE OF METRES

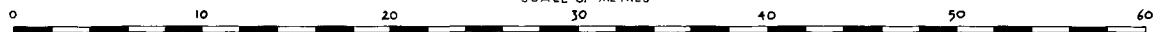


FIG. 14 The Hospital (*valetudinarium*), plan. Scale, 1:400.

TABLE II

RELATIVE SIZES OF LEGIONARY HOSPITALS AND PRINCIPIA

Fortress	Total Area	Hospital Area	Percentage of Whole	Principia Area	Percentage of Whole
Inchtuthil	21.7 ha	5351 m ²	2.46	1897 m ²	0.87
Haltern	16.7 ha	3520 m ²	2.1	2646 m ²	1.5
Vindonissa (Stone)	22.17 ha	4410 m ²	1.9	14400 m ²	6.4
Neuss	24.7 ha	4500 m ²	1.82	7650 m ²	3.1
Vetera I (Nero)	59.28 ha	6890 m ²	1.01	11400 m ²	1.95
Vetera I (Claudius)	59.28 ha	4320 m ²	0.72	11400 m ²	1.95
Carnuntum	18 ha	5890 m ²	3.27	6300 m ²	3.4

TABLE III

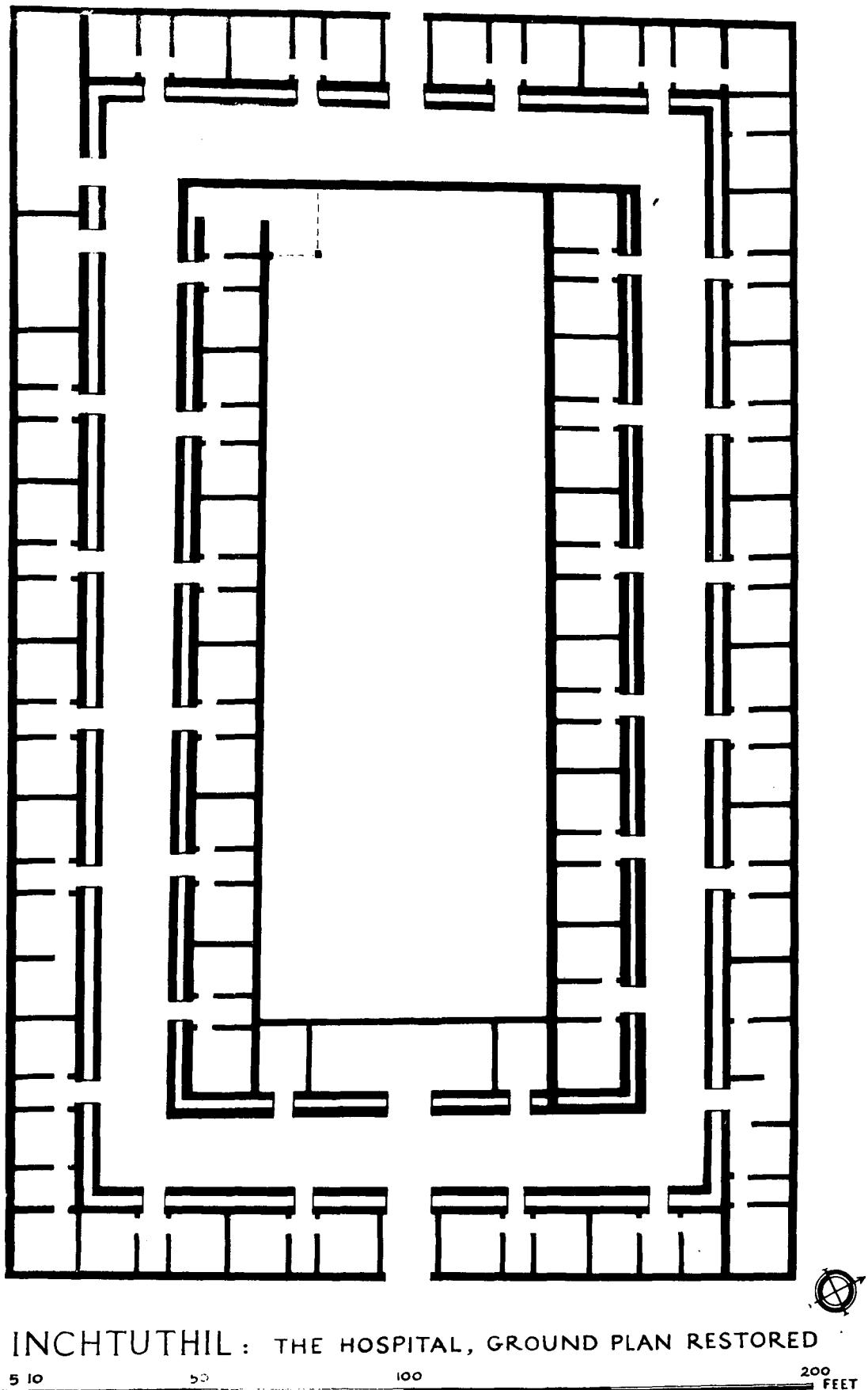
RELATIVE SIZES OF INTERNAL COURTYARDS OF LEGIONARY HOSPITALS

Fortress	Area of Courtyard	Percentage of Hospital Area	Percentage of Fortress Area
Inchtuthil	1274 m ²	23.8	0.58
Vindonissa	1005 m ²	22.8	0.45
Neuss	342 m ²	7.6	0.18
Vetera I (Nero)	1616 m ²	23.4	0.27
Carnuntum	2025 m ²	34.3	1.12

Vetera; this was associated with a small room equipped with numerous hearths, presumably used to sterilize surgical instruments. Unfortunately no surgical instruments or medicines, such as those from Neuss, were found at Inchtuthil and so positive identification of the room-function is not possible here. The size of Hall A at Inchtuthil and the lack of a reception area suggest that the hall may also have been used as a surgery when operations were not in progress. The north-western end of the central court was closed by the main circulation-corridor; there was no counter-part to Hall A facing the rear entrance to the hospital. The inner range of rooms had no north-west wing.

The two ranges of rooms contained at least sixty wards in addition to various ancillary chambers. The wards were almost all organized in pairs on either side of a small passageway which connected them to the main corridor. Each ward was approximately 13 ft. by 14 ft. (3.96 by 4.27 m), giving a floor-space of 182 sq.ft. (16.91 m²). Richmond (*Limes Studien* 1959: 122) suggested that this area was sufficient for three beds. H. von Petrikovits (1975: 101) suggested an average figure of four to five beds per ward in legionary hospitals. Various different figures, ranging from two to eight, have been proposed at different sites (Davies 1970: 120 n.150). At Inchtuthil it is helpful to compare the wards with the *contubernia*; the rear rooms of the latter were on average 13 by 14 ft, that is the same size as the hospital wards. Since the *contubernia* housed eight men, probably in bunks, there would have been room for, at least, four beds in the wards. The size of the wards at Inchtuthil fits the average figures given by von Petrikovits, that is 15 to 20 m². The dimensions of the wards in the various legionary hospitals display a fair degree of uniformity; it is, therefore, possible to assume that a uniform number of beds was available in each, representing a fixed percentage of total legionary manpower. When necessary, extra patients could obviously have been accommodated in temporary beds, for instance in the corridors and ancillary rooms.

The dividing passageways were 6 to 7 ft. (1.83 to 2.13 m) wide. The fact that the wards were only accessible from these passageways ensured greater privacy and quiet and also allowed individual patients to be isolated if necessary. The presence of such passageways would have



INCHTUTHIL: THE HOSPITAL, GROUND PLAN RESTORED

0 5 10 50 100 200
FEET

FIG. 15 The Hospital (*valetudinarium*), reconstructed plan. Scale, 1:442.

helped to keep the main corridor clear. They were, no doubt, used to store medicines and equipment near the patients and to accommodate the attendants on duty; in fact, at Neuss small rooms were divided off at the far end of the passages. No trace of similar partitioning was, however, found at Inchtuthil.

The corner rooms were larger than the ordinary wards (FIG. 14, III, IV and VIII). These may have been used as administration and service rooms or as wards for the officers, who would almost certainly have been separated from the men. Richmond (*JRS* 1957: 198 f.) described the east and west corners of the building, between Wards 15 and 26 and 56 and 57 respectively, as administration rooms because the normal partition walls were not located in these sections (FIG. 14). The possibility that at least parts of these served as wards cannot, however, be excluded. In the eastern section there was a large corner room (IV) next to Ward 57; to the north-west of this and separated from it by a passageway lay a room (V) with the dimensions typical of the wards. The internal arrangement between this room and Ward 56 is not entirely clear, but it is possible to see the room next to 56, that is VII, as a ward in view of its dimensions. There would, however, have been no passageway separating the two and, if they were both wards, Ward 56 would then be unusual in being entered directly from the main corridor. This arrangement is paralleled at the southern corner of the hospital where Ward 7, situated between Wards 6 and 8, must also have opened straight on to the circulation corridor. Room VII, if a ward, may have been entered via a passageway (VI) in the normal manner.

The division of the western section (IX and X, between Wards 15 and 26) into wards and passageways is less probable. Only one internal construction-trench was discovered in the 75 ft. (22.9 m) section, and others are unlikely to have existed since some trace of the numerous partition walls needed for wards and passages would surely have been found. Space was, in any case, needed in the hospital for other purposes. At Vetera rooms have been identified as kitchens, baths, surgery, dispensary and mortuary; similarly mortuaries and kitchens have been identified at Neuss (Davies 1970: 95). The purpose of this section of the Inchtuthil hospital cannot be so precisely determined, but similar functions are possibilities, as is accommodation for the doctors (see below, p. 103).

Richmond counted some sixty wards in the hospital at Inchtuthil (*JRS* 1957: 198); but there appear in fact to have been at least sixty-four wards, leaving aside the corner rooms which may have been reserved for the officers. The extra four are accounted for by V and VII (discussed above) and by I and II at the south-eastern end of the two central ranges, left unnumbered by Richmond. There was then a sufficient number of wards for one to be allotted to each century of the legion, including the extra centuries of the 'double' first cohort (see pp. 164–9). The pairing of wards on either side of a central passageway is reminiscent of the facing pairs of centurial barracks. Thus Wards 7 and 56, which did not form part of a pair, should perhaps be seen as separate wards for isolation purposes or for the officers, whilst the corner rooms in the south-east wing (III and IV) served as ordinary paired wards. Rooms 7 and 56 were both fairly close to the main entrance and the probable operating theatre and surgery (A), and were, therefore, conveniently situated to receive patients needing special care.

An allocation of one ward per century, with four to eight beds per room, would allow for a 5 to 10 percent casualty-rate at Inchtuthil. The contemporary hospital at Fendoch, if correctly identified as such (Gillam, *Arch. Ael.*⁵ v 1977: 58 f.), provided accommodation for a similar percentage; the building there was divided into ten rooms, one for each century of the cohort in garrison. G. Boon (1972: 76–7) suggested a figure of sixty-four wards, or one per century, at Caerleon, but insufficient work has been carried out on the hospital there to confirm this. In fact, only at Vetera I is the plan of the hospital known in sufficient detail to calculate the number of wards. Schultze (*BJ* 1934: 54 f.) calculated a total of sixty wards at Vetera (and Neuss) and once again allotted one per century. The situation at Vetera is complicated by the fact that it was a double-legionary fortress. The size of the Neronian hospital there, not much greater than hospitals elsewhere (and indeed the Claudian hospital was smaller than usual, see TABLE II, p. 93), suggests that it served only one of the two legions. The known hospital lay in the right *praetentura*; there must have been another hospital for the other legion, presumably in the corresponding position in the left *praetentura* where the layout is as yet unknown. If the figure of

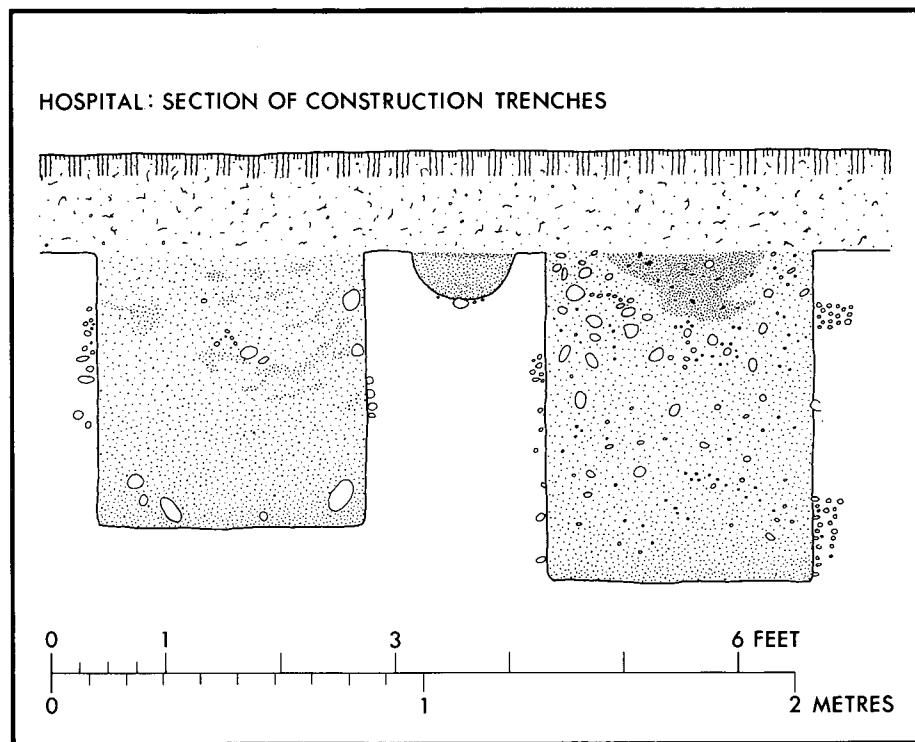


FIG. 16 The Hospital, Section of construction-trenches between corridor and wards. Scale, 1:20.

INCHTUTHIL THE HOSPITAL SECTION THROUGH THE NORTH WING

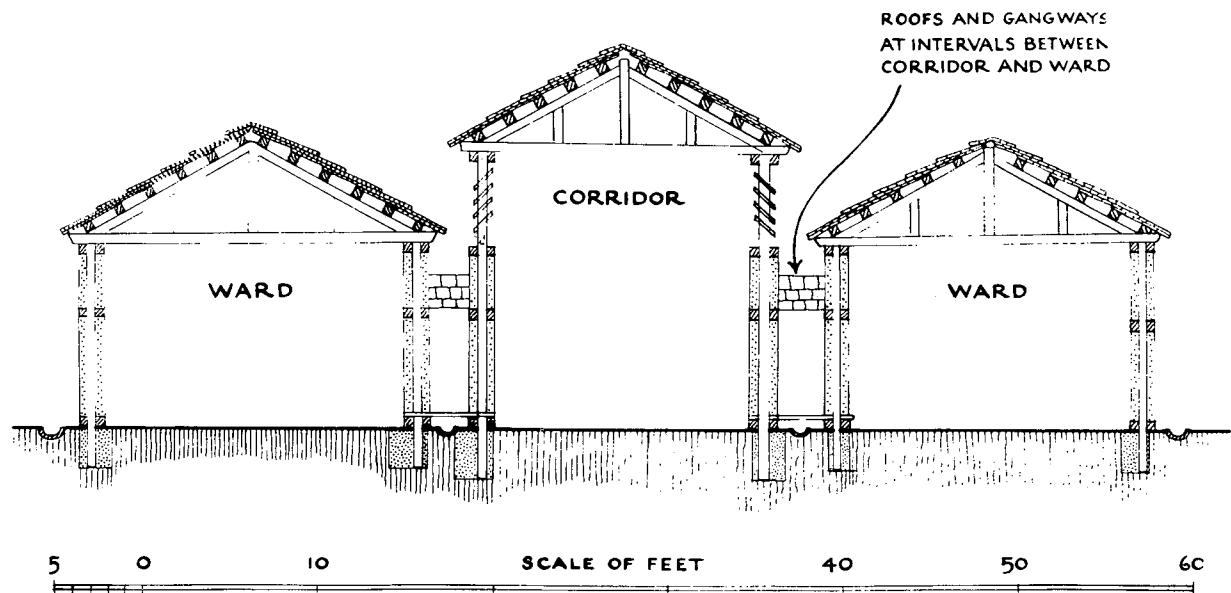


FIG. 17 The Hospital, restored cross-section of north wing, showing suggested method of construction. Scale, 1:130.

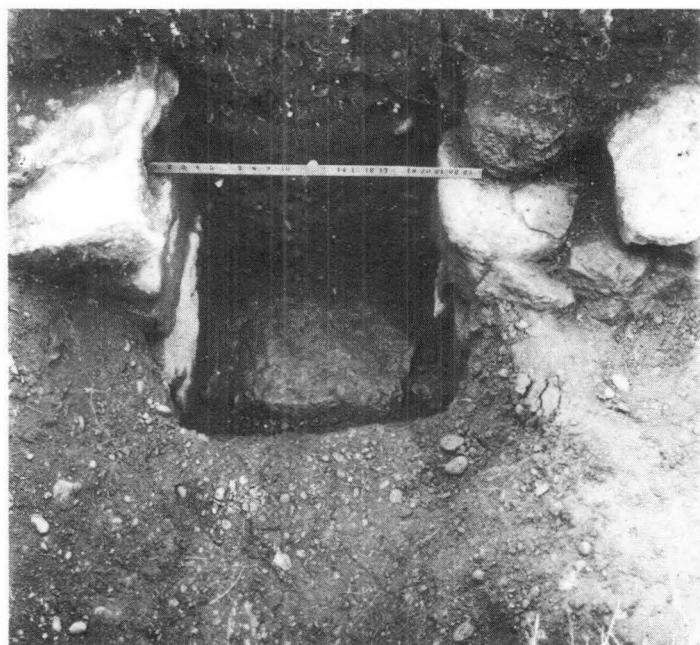


(Photo: I.A. Richmond)

Pl. XIV Stone-lined drain leading north from hospital between Barracks 27 and 28. Scale: 24 inches (two feet).

sixty wards is correct, it may reflect the date of the fortress, since the first cohort may still have been quingenary in the pre-Flavian period; the extra four rooms present at Inchtuthil would not, therefore, occur at Vetera I. The evidence available from legionary hospitals is not really sufficient to establish the size of the first cohort at any particular period (see below, pp. 164–9). Not enough hospitals have been fully excavated, and the identification of wards and service rooms at Inchtuthil and elsewhere remains uncertain. Furthermore, the amount of space allocated to the officers and other members of the legion not on the centurial books is an unknown factor, making precise calculation impossible.

The main circulation corridor was 16 ft. (4.88 m) wide. It was separated from the wards by two walls set approximately 2 to 2½ ft. (0.6 to 0.76 m) apart. A drip-trench was located between these two walls at the eastern corner of the inner range and on the north side of the northern corridor. These gutters were c. 5 in. (0.13 m) deep and narrowed from 10½ in. (0.26 m) across at the top to 6½ in. (0.16 m) at the bottom (FIG. 16). The presence of the gutters makes clear that the space between the two walls was open to the sky. Richmond reconstructed the building with the two sets of wards and the central corridor individually roofed (FIG. 17). This arrangement would have reduced the height and length of the main timbers and purlins and would also have allowed



(Photos: I.A. Richmond)

Pl. XV A The Hospital: start of the stone-built drain outside north wall, fed by open channel (looking north). Scale: 24 inches (two feet).



Pl. XV B The Hospital: open channel leading into stone-lined drain outside the north wall (looking west).



Pl. XVI A Junction of hospital drain (right) with northern *intervallum* drain, here stone-lined (looking east). Scales in feet.
XVI B Junction of hospital drain with northern *intervallum* drain, with outflow to the north. Detail, looking north.



(Photos: I.A. Richmond)

the circulation corridor to be lit from above the roof-level of the flanking wards. There would, however, have been problems involved in keeping the eavesdrip channels clear, especially in winter when the narrow space would surely tend to fill with snow. At the very least, there must have been some means of access from the circulation corridor whereby the space could be cleaned out at regular intervals. A similar construction-technique appears to have been used in the Flavian hospital at Caerleon (*JRS* lv (1965), 200, fig. 10; Boon 1972: 76) but when this was rebuilt in the second century the wards and main corridor were roofed together in the basilican manner, presumably, with clerestory lighting. The separate roofing system, as at Inchtuthil, was no doubt developed in order to simplify the problems of erecting such a large building in timber. The same method was not employed in the later stone hospitals, partly because the drainage problems created complications, and partly because stone walls were not subject to the same constrictions as timber ones.

The eavesdrip channels drained into a larger channel 8 in. (0.2 m) deep and 18 in. (0.46 m) wide flowing into a stone-lined drain in the centre of the north-east side of the hospital (see FIG. 14). This stone-lined drain measured 2 ft. 4 in. (0.71 m) across and 3 ft. 6 in. (1.07 m) in depth (PL. xv). It ran northwards between Barracks 27 and 28 and, at a stone-built intersection, joined with the timber-lined gully which ran along the inner side of the *intervallum* road carrying away rainwater from the barrack roofs and street surface (p. 194, PLS. XIV, XVI). The combined outflow from these drains was then carried out of the fortress through the northern rampart. The drain was found to have a slight but consistent fall of 1 in 500 from the hospital to the rampart, ensuring a constant flow within it. The importance of proper drainage for the hospital is emphasized by the fact that only one other stone-lined drain has been located in the fortress, that which runs under the *via principalis* near the west gate (p. 193); others may have been intended, but the fortress was abandoned before they could be installed. Stone drains are virtually unknown in Flavian Scotland. Timber-lined channels were normally employed.

As with the water-supply, work on the fortress ceased when the installation of the main drainage system had only just begun. Temporary drainage channels were adequate until the buildings, of greater importance, were erected. Piped water and stone drains were a secondary requirement. On abandonment of the fortress (see Chapter 25) the capping stones were removed and the hospital drain itself was tightly packed with gravel. This was part of the general demolition work which rendered the fortress useless to the enemy.

HOSPITAL

Plan of construction trenches:
east side, inner range

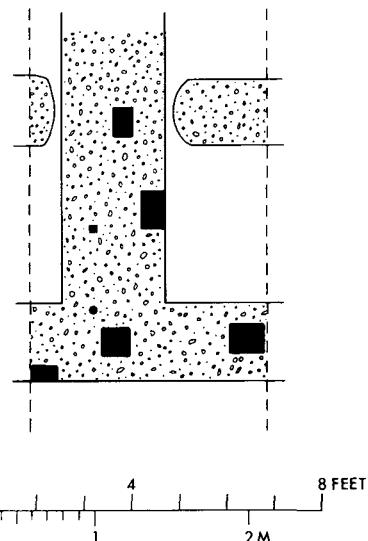


FIG. 18 The Hospital, detail of construction-trenches. Scale, 1:48.

A small bath block and latrines were located in the hospital at Vetera I, and at Neuss the latrines were associated with special drains. No latrines have been identified in the hospital at Inchtuthil, but some provision must surely have been made (there is a lack of identified latrines throughout the fortress). The stone drain may have been intended to serve the latrines as well as to carry away rainwater. It so the latrines must have been situated or planned on or near the drain. The timber channel seems to have been too shallow for this usage and the latrines cannot, therefore, have been located in the courtyard. There is insufficient space in the passageway between Wards 50 and 51 and access to the wards would have been impeded. There remains the possibility that the latrines were intended to be situated outside the hospital over the stone drain; but there was very little room for an external latrine building here since the hospital lay only 10 ft. (3.05 m) away from the barracks. The stone-lined channel was thus probably intended only for drainage and not sewerage, especially as the constant supply of running water necessary for it to function as a sewer was not present. The curved line of the drain (FIG. 14) was necessary for it to pass under the passageways rather than the wards and then down the centre of the alleyway between Barracks 27 and 28 (FIG. 80); it was not the result of the siting of the latrines. If there were no flushed latrines, latrines of the soak-away variety are a possibility. A possible location for such a latrine is Room XI at the western corner of the inner range. Chamber-pots of some form were probably provided for the patients, and the attendants may have emptied these into the drain rather than taking them all the way to the rampart.

In long lengths of the construction-trenches, especially in the north-east wing, a number of post positions were located (FIGS. 18, 19). The main uprights seem to have been about 5 in. (0.13 m) square and to have been set 1 to 2 ft. (0.3 to 0.61 m) apart. The wattles which must have existed in between these as in the *principia* had left no trace.

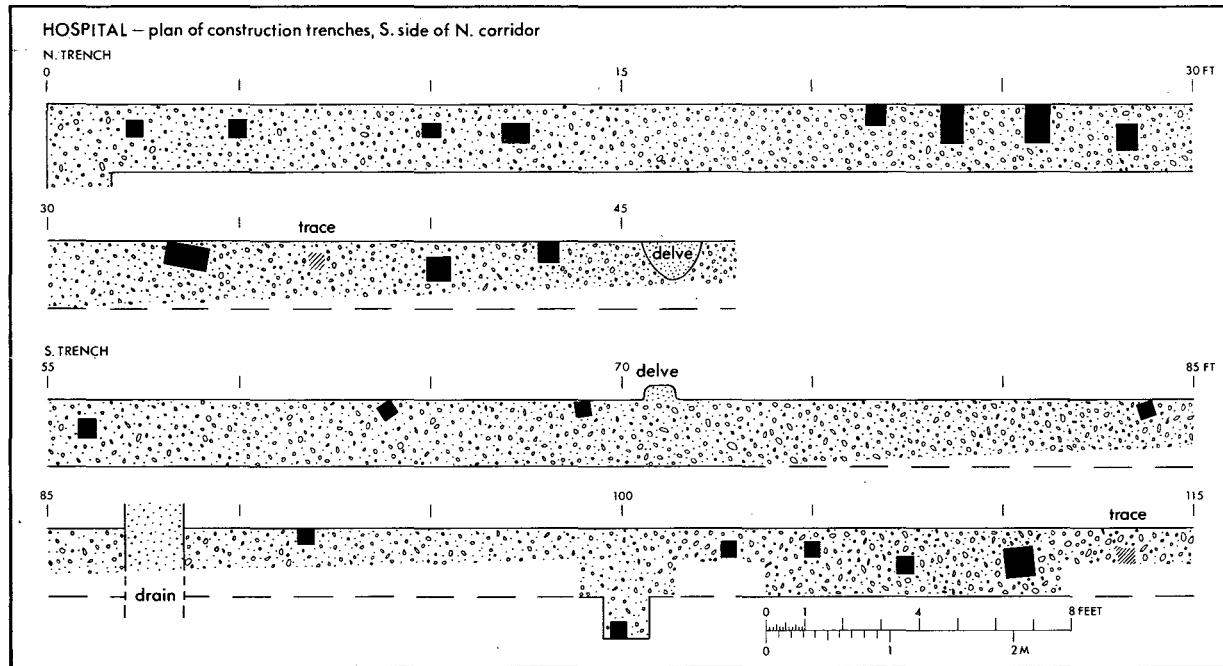


FIG. 19 The Hospital, plan of post-holes in continuous construction-trenches. Scale, 1:60.

B. THE HOSPITAL STAFF

Although the precise functions of rooms other than the wards cannot be determined, there does not seem to have been any permanent accommodation for the numerous hospital staff. The medical staff of a legion came under the overall command of the *praefectus castrorum* (Vegetius ii.10). The Digest (L, 6, 7) lists an *optio valetudinarii*, *medici* and *capsarii* (dressers) among the

immunes, and these posts are also epigraphically attested.⁸⁰ In addition to the various medical orderlies, clerks, cooks and others would have been attached to the hospital staff; a *librarius* (clerk) is recorded on an inscription from Lambaesis cited in note 80. Orderlies on duty at night could presumably have rested in the various administrative rooms and in the passageways close to the patients. The majority of the lower-ranking medical staff and the clerks etc. must have been on the books of the centuries and, when not on duty, would have been accommodated in their centurial barracks; this arrangement is suggested by the epigraphic evidence (cf. Breeze, *JRS* 1969: 50–5) and by the discovery of part of a pair of forceps in a barrack at Caerleon bearing the inscription *7 Cu . . . anili* (Davies 1969: 87). Various scenes from Trajan's column which depict the *capsarii* in full armour on the battlefield indicate that these men were also fully-trained soldiers who could fight with their unit if necessary. The *optio valetudinarii* was probably of higher rank, a *principalis* rather than an *immunis* (although listed in the Digest as the latter); but he too would have been attached to a century, as were the other administrative staff of the legion (see p. 171). That the post of *optio* was purely administrative rather than medical is illustrated by the career of C. Lucceius Sabinus: an ordinary soldier in the *cohors I Urbana*, he was promoted to tribune's assistant, *optio valetudinarii* and finally placed in charge of the prison (*CIL* ix, 1617 = *ILS* 2117). The absence of suitable rooms in the hospital is not surprising, then, since all the staff would have been accommodated elsewhere in the fortress.

The epigraphic evidence suggests that there were *medici* of several different kinds in the legion, distinguishable by their ranks. The inscriptions have been fully discussed by E. Sander (*Historia* 8 (1959), 239 f.), R.W. Davies (*Epig. Stud.* 8 (1969), 83 f. and 9 (1972), 1 f.) and V. Nutton (*J. Chester Arch. Soc.* 55 (1968), 7 f.). There were *medici* with the rank of *immunis*,⁸¹ as the Digest records, others with the rank of *principalis*⁸² and possibly others who ranked as centurions⁸³ (Davies 1969: 90). The existence of a legionary doctor of senior rank above *medici ordinarii* and other hospital staff seems a reasonable assumption. The evidence for such a doctor has been discussed by V. Nutton and R.W. Davies with special reference to two dedications in Greek by doctors at Chester (*RIB* 461 and *JRS* 1969, 235, No. 3). Both these inscriptions were found in the area behind the *principia* in the building normally identified as the *praetorium*, suggesting that these may have been the private doctors of a legate, resident in the *praetorium*, as part of the commander's household (Claudius was attended by Caius Stertinus Xenophon on his visit to Britain, and provincial governors frequently included a doctor on their staff). Recent work at Chester, however, suggests that the building in question may be the hospital (*Britannia* xiv (1983): 297–8). The existence of a senior army doctor is in any case a reasonable assumption; and indeed inscriptions record a *medicus castrorum* or *castrensis*, a title which would best suit such a doctor.⁸⁴ Davies suggests (1969: 91) that these doctors, often Greeks, were probably of equestrian rank. This is reasonable, since they would have been recruited as qualified doctors, as happens in the British army today.

80. *CIL* viii, 2553 (*ILS* 2438) – dedication by hospital staff at Lambaesis: . . . *optiones valet.* (2), *pequari. Librarius et discentes capsariorum* (2) . . .
CIL, xiii, 8011: . . . *optio valetudinari* . . .
 For full lists of inscriptions mentioning medical staff see Davies, *Epigraphische Studien* 8 (1969), Appendix; and E. Sander, *Historia* 8 (1959), 239 f. (for various *medici*).
81. *Miles medicus*: *CIL* xiii, 7943; iii, 15347, 5; and the many *medici* e.g. *CIL* vi, 3537; 6747; 7449; 7490; viii, 2834; 2872; 2874.
82. *Medicus principalis*: *CIL* iii, 7449; vi, 1058/9.
Medicus duplicarius: *CIL* vii, 1144.
83. *PSI* 1063 (Egyptian papyrus, A.D. 117): Λονγεινφ Τίτουληιφ ἵατρω φέκατονταρχω. also, according to Davies, possibly 'medici ordinarii' e.g. *CIL* viii, 18314; iii, 5959: iii, 4279.
84. *CIL* vi, 31172 (*ILS* 2193a): . . . Ν Eq. Sing. Aug. Q. *Marcius Artemidorus medicus castrorum* . . .
CIL xiii, 1883 (*ILS* 2126): D.M.M. *Aquini Verini optionis karceris ex cohort. XIII urban.*, *Bononiuis Cordus medicus castrensis* . . .
AE 1957, 180: *Aesculapio T. Martius castrensis med. leg. II Aug.* . . .
 Achilles Tatus iv.10: . . . τὸν τοῦ στρατοπέδου ἵατρόν . . . (the doctor of the *castra*).

The senior legionary doctor will have required accommodation of a standard commensurate with his equestrian status. He will obviously not have been accommodated in the barracks. Nor is he likely to have lived in the *praetorium* which, in any case, was as yet unbuilt at Inchtuthil. The only section of the hospital available for living-quarters was at the western corner, Rooms IX and X (FIG. 14); but the lack of internal divisions and the relatively small size mean that this is not really suitable; furthermore living-quarters are unknown in other hospitals. If the doctor were of equestrian status, he would probably have been accommodated in a house of a type similar to those of the tribunes. There is no such house in the vicinity of the hospital at Inchtuthil. The eventual number of officers' houses in the *scamnum tribunorum* at Inchtuthil is uncertain because of the unfinished state of the fortress; but there appears to have been space for only the six tribunes and the prefect, although there may have been enough houses at Lambaesis and Neuss to accommodate the doctor as well (see Chapter 10). At Inchtuthil there is one other possible location for the doctor's quarters, that is in a house in the right *praetentura* to the south of the *scamnum tribunorum* (FIG. 35, Buildings A and B) (see pp. 143–6 for a discussion of these buildings). This house at Inchtuthil and similar buildings identifiable in other fortresses are the most likely solution to the problem of the accommodation provided for the senior doctor.

INCHTUTHIL
THE CONSTRUCTION-SHOP : FABRICA

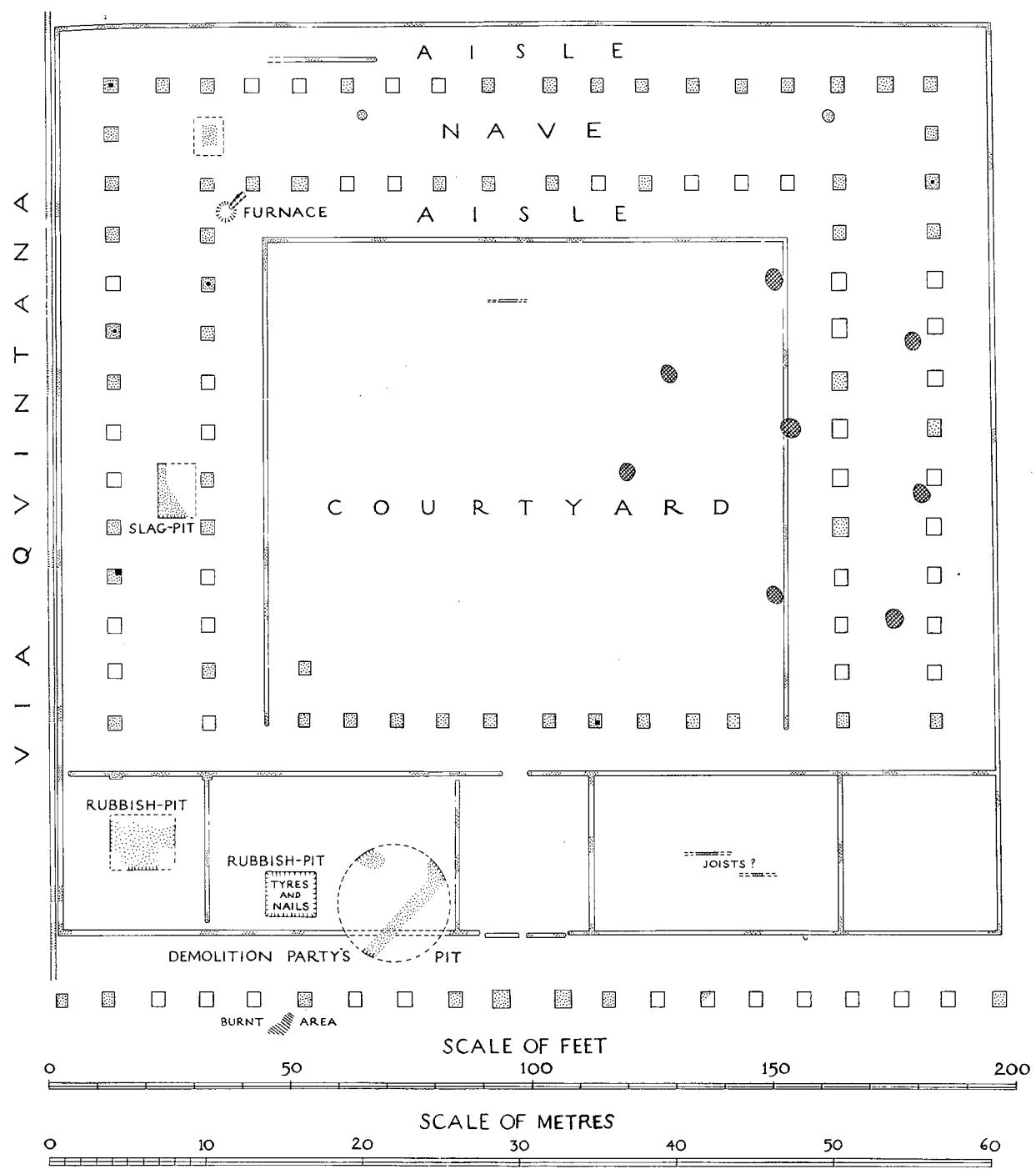
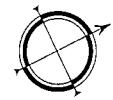


FIG. 20 The Fabrica, plan. Scale, 1:400.

CHAPTER 7

THE FABRICA

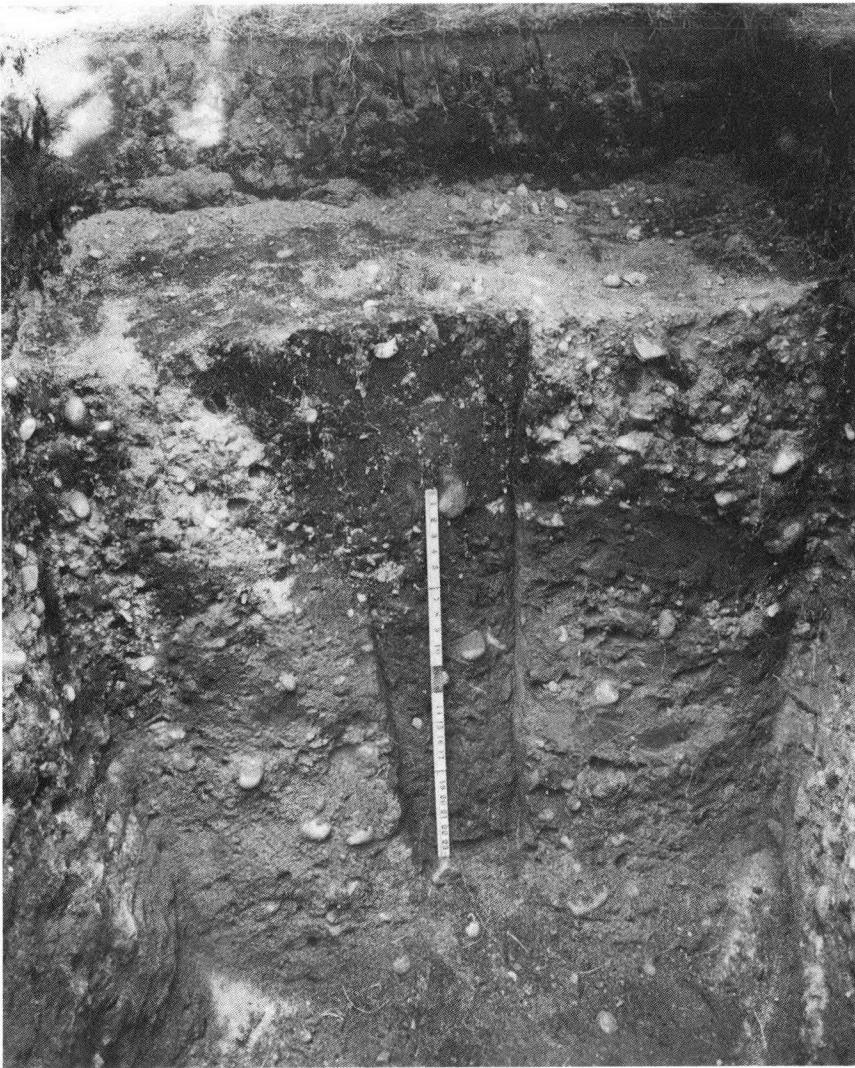
A. THE BUILDING (FIG. 20)

A large courtyard building in the central *scamnum* of the west *retentura* was identified as the legionary *fabrica*. It stood behind the barracks of the first cohort and faced on to the wide street running along the west side of the *principia*. Well-marked ruts were discovered in the *via quintana* which lay to the immediate south of the *fabrica* (p. 183), presumably caused by heavy traffic moving to and from the *fabrica* and also to Granaries 5 and 6 to its rear. Waggons from the *fabrica* will almost certainly have reached the fortress gates via the *via quintana* and *via sagularis*, rather than by the main central streets, in order to avoid congestion (FIG. 84).

The building measured 196 ft. (59.74 m) north-south by 192 ft. (58.52 m) east-west, having an area of 37,632 sq. ft. (3,496 m²); it was thus approximately a third of the size of a small auxiliary fort. The *fabrica* was fronted by a colonnade 14 ft. (4.27 m) deep, carried on posts which were set, as normal, 7 to 8 ft. (2.1 to 2.4 m) apart. The central entrance was marked by a wider intercolumniation of c. 10 ft. (3.05 m) and by noticeably larger post-pits; the latter measured c. 4 ft. by 4 ft. (1.22 m by 1.22 m) in section as opposed to 3 ft. by 3 ft. (0.91 m by 0.91 m). The greater size and depth of these pits indicate that the posts were taller, and this suggests that there was a high doorway.

The *fabrica* was organized around a central courtyard, approximately 105 ft. (32 m) square (FIG. 20). This courtyard was perhaps originally surrounded by a colonnade on all four sides; post-pits for the columns were, however, only located on its east side with one also on the south. The former were set 7 to 8 ft. (2.1 to 2.4 m) apart, creating a portico some 9 ft. (2.7 m) deep. The single post-pit at the south-eastern end of the south-west side suggested that the colonnade continued along this side at least, but here it would have been only 6 ft. (1.8 m) deep. However, search near the west angle failed to trace further posts on the south-west and north-west sides. Yet the presence of a drainage channel c. 9 ft. (2.7 m) from the north-western wall of the courtyard does indicate a likely further continuation of the colonnade. The attempt to locate the precise lines of the enclosing colonnades was much hampered by the presence of a grove of trees in this area (some of these trees are marked as cross-hatched circles on FIG. 20); although the area was tested by trial trenches, systematic investigation was impossible (p. 53).

The front (south-eastern) range of the *fabrica* was formed by a row of five symmetrically-arranged rooms, 32 ft. (9.75 m) deep. In the centre was an entrance hall 27 ft. (8.23 m) wide. The doorway into the courtyard was clearly identified by a central break in the construction-trench, but the eastern or front construction-trench of this room revealed a more complex situation. There was a wide gap of 17 ft. (5.2 m) in the main trench, but this was closed by a secondary trench set parallel to the main trench but slightly further east (see FIG. 20); it is difficult to determine the appearance of the superstructure at this point. The secondary trenches presumably represent the position of the threshold-beams in which were set the door-pivots and bolts. They were perhaps set forward in this way so that a two-leaved door could be opened right back, a full 180 degrees, as in barn-doors today.



Pl. XVII A The *Fabrica*: post-hole in south-west range of the south-west wing (p. 107). Scale: 24 inches (two feet).



(Photos: RCAHM (Scotland): Crown copyright)

On either side of the entrance hall was a large room, 51 ft. (15.54 m) by 32 ft. (9.75 m). Two parallel trenches, c. 3 ft. 9 in. (1.14 m) apart, were discovered running longitudinally in the centre of the right-hand room (FIG. 20 – marked JOISTS ?). The purpose of these slots is not clear; Richmond's suggestion that they were floor joists is not entirely convincing since these are not a common feature in timber buildings erected by the Roman army, nor were any others discovered at Inchtuthil. These trenches, slighter than the main construction-trenches, possibly mark the position of internal partition-walls within this room; they are suitably far apart to form a corridor. Alternatively the trenches may be interpreted as fixtures for a permanent work-bench (see below). Richmond certainly regarded the rooms either side of the entrance hall as large undivided areas. The two corner-rooms in this wing were approximately 32 ft. (9.8 m) square.

The other three sides of the courtyard were enclosed by large basilican halls. These were apparently completely open internally and the three wings were constructed as one open-plan unit rather than as three separate halls. The halls were each 42 ft. (12.8 m) wide, being divided into a nave 16 ft. (4.87 m), and two aisles 10 ft. (3.05 m) wide. A large number of the internal post-pits were located, and in some of these the position of the post itself was identified: but again the grove of trees impeded exploration, especially in the northern wing. The post-pits measured over 3 ft. (0.91 m) across and about 3 ft. in depth (FIG. 21); the posts in them were approximately 8 in. (0.2 m) square. A comparison with the post-pits in the cross-hall of the *principia* reveals that the posts of the *fabrica* were not as tall and that they carried a lighter load; the pits in the *principia* were a foot deeper and the timbers themselves were almost twice the size (p. 82). The less substantial timbers indicate a lower roof than that in the basilica of the *principia*; the uprights will even so have been reasonably tall and the halls should probably be reconstructed with clerestory lighting in the basilican manner. Although the outer aisles, at least, could have been well lit from ordinary windows, the great width of the halls will have necessitated extra lighting from above if the naves were to be usable by workmen.

A single internal trench was discovered in the north-western aisle of the north-west wing. This ran parallel to the external wall, 6 ft. (1.83 m) away from it. It was at least 15 ft. (4.57 m) long, but only the northern end was located. The function of this trench is by no means clear. It is unlikely to represent an internal partition-wall in view of the general lack of such walls in the workshops. The trench possibly belonged to some kind of cupboard such as those identified in barracks elsewhere; but trenches for these are usually much slighter than those for the walls; this trench appears to have been fairly large. A more likely possibility is that it marks the position of

WORKSHOP

SECTION OF POST-PIT IN SOUTH BAY : SOUTH AISLE

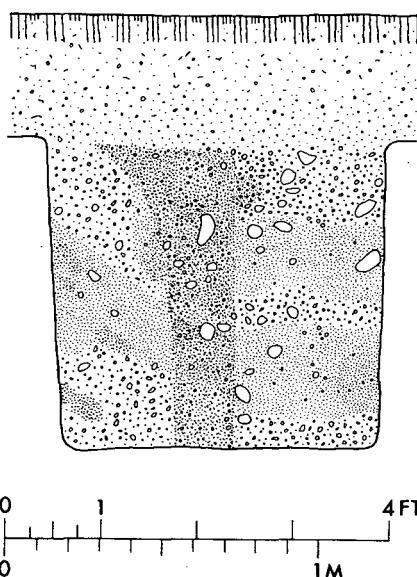


FIG. 21 The Fabrica, Section of post-pit. Scale, 1:24.

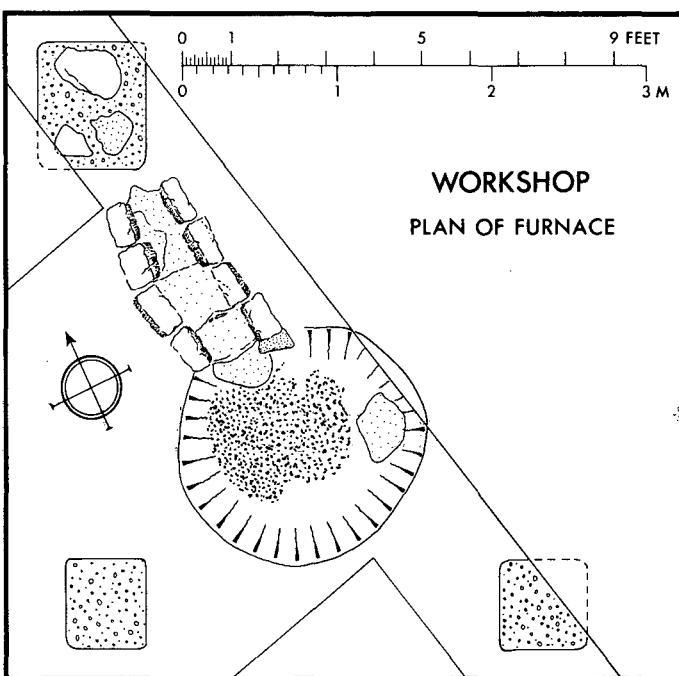


FIG. 22 The Fabrica, plan of smithing-hearth at junction of south and west wings. Scale, 1:48.

some piece of permanent workshop equipment, possibly a work-bench. At Exeter a narrow slot ran around three sides of the room at the south-east corner of the *fabrica* (Bidwell 1979: 7); this may represent a work-bench or shelving. Another parallel for the trench at Inchtuthil is perhaps offered by the two parallel slots of Period II A in Room 6 of Insula XIV at Verulamium (Frere 1972: 26, fig. 10). The fact that the floor beneath these slots was fractured is suggestive of a heavy weight or the constant hammering associated with metal-working. In the Verulamium building a cupboard is an unlikely explanation since the slots were dug in the centre of the front room, and a counter is improbable as similar trenches were not found in the other *tabernae* of the Insula. The exact purpose of the trench at Inchtuthil cannot be determined, but that it provided a firm anchoring for a work-bench associated with the metal-working attested in the southern wing seems reasonable; it would probably have faced a window in the western wall for good lighting.

The use of the southern wing of the *fabrica* for iron-working was proved by the discovery of a smithing-hearth at its western end (FIG. 22), where nails may have been made (p. 301), and a slag pit in the nave (FIG. 20). The aisled hall at Exeter was also used for metal-working, as is proved by the discovery of charcoal and plank-lined troughs containing slag, bronze off-cuts and metal scraps (Bidwell 1980: 31). Further suggestions about the use of the halls and other rooms at Inchtuthil can only be conjectured, but repair and manufacture of many different kinds will have been carried out,⁸⁵ including the repair (or possibly construction) of vehicles, as indicated by the discovery of iron tyres (p. 293); some storage and office space was almost certainly available. When considering such functions, the small *tabernae* nearby, which may well have been associated with the *fabrica*, should be taken into account (FIG. 84).

Two pairs of *tabernae* (Nos. 157–160 (FIG. 83)) stood in front of the *fabrica* on the line of the street; they were symmetrically positioned in front of the east and south corners of the workshop. These *tabernae* were of the usual plan and dimensions (see Chapter 14). Between these, also on the street frontage, lay a smaller free-standing structure, measuring 25 ft. by 10 ft. (7.62 m by 3.05 m). This building blocked the view of the *fabrica* from the street but still lay to the south of its entrance, allowing direct access. At the north corner of the *fabrica* stood a third pair of *tabernae*; their colonnaded frontage faced the rear wall of the workshop. At the west corner of the *fabrica* lay a building c. 40 ft. (12 m) square. This was divided into four rooms and had the appearance of a pair of *tabernae*, but was fronted by two shallow rooms rather than by a veranda.

85. Vegetius ii 11 lists the various craftsmen under the *praefectus fabrum*. See Appendix to this chapter, p. 114.

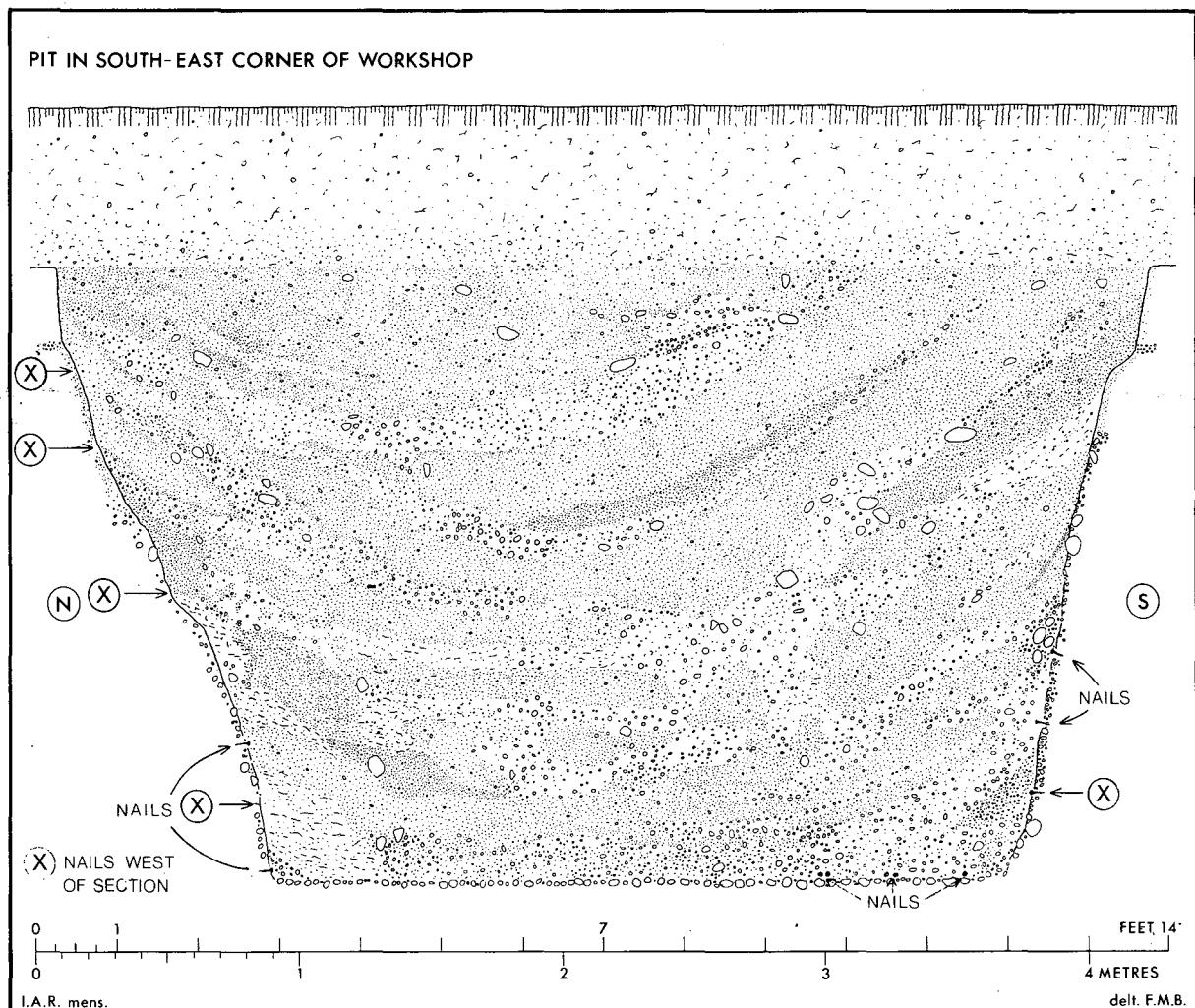
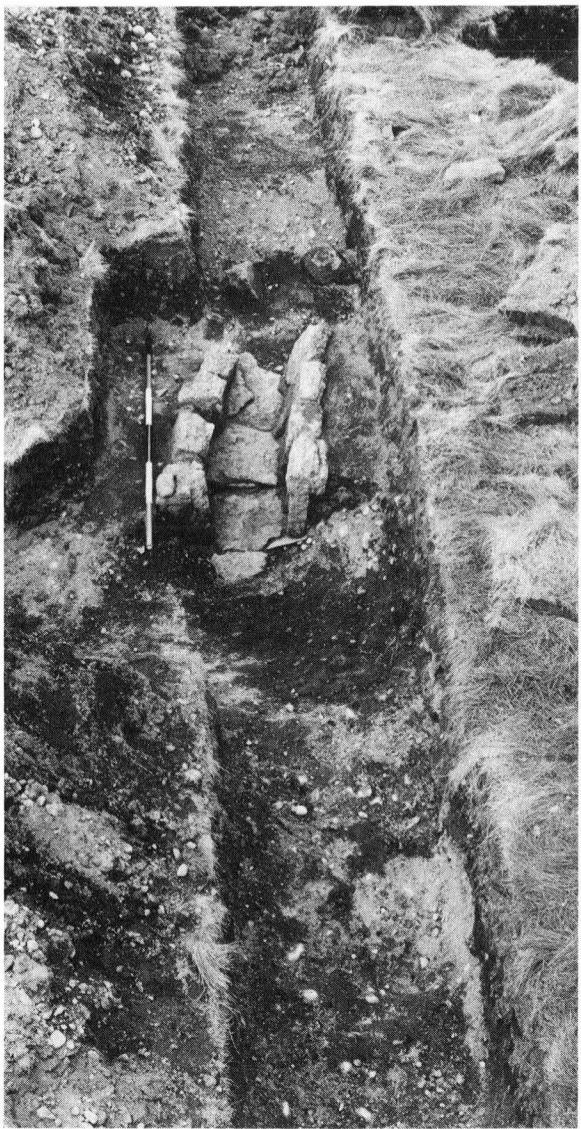


FIG. 23 The Fabrica, Section of timber-lined pit near south-east corner, showing position of nails *in situ*. Scale, 1:28.

This building appears to have faced on to the *via quintana*. Similar structures, identified by Sir Ian Richmond as offices, were discovered in the extramural Officers' Compound (p. 213, FIG. 62). The use of these five buildings as offices associated with the *fabrica*, and perhaps also with the granaries nearby, is a reasonable assumption when account is taken of the large amount of clerical work involved in the administration of the stores and workshops. The close association of these buildings with the *fabrica* implies the presence of a subsidiary entrance to the workshop from the rear for direct access to them; this entrance was possibly in the centre of the north-western wing where the central columns of the nave were found to have a wider intercolumniation than elsewhere, 10 ft. (3.05 m) rather than 8 ft. (2.44 m). There was, then, in the right *retentura* at Inchtuthil not simply a workshop but a whole group of buildings which can be recognized as forming an 'industrial complex' similar to those which have been identified in other fortresses such as Vindonissa, Nijmegen, Carnuntum and Dangstetten. The possible use of Barracks A and B beside the first cohort by the specialized craftsmen of the legion is discussed in Chapter 13, p. 169.

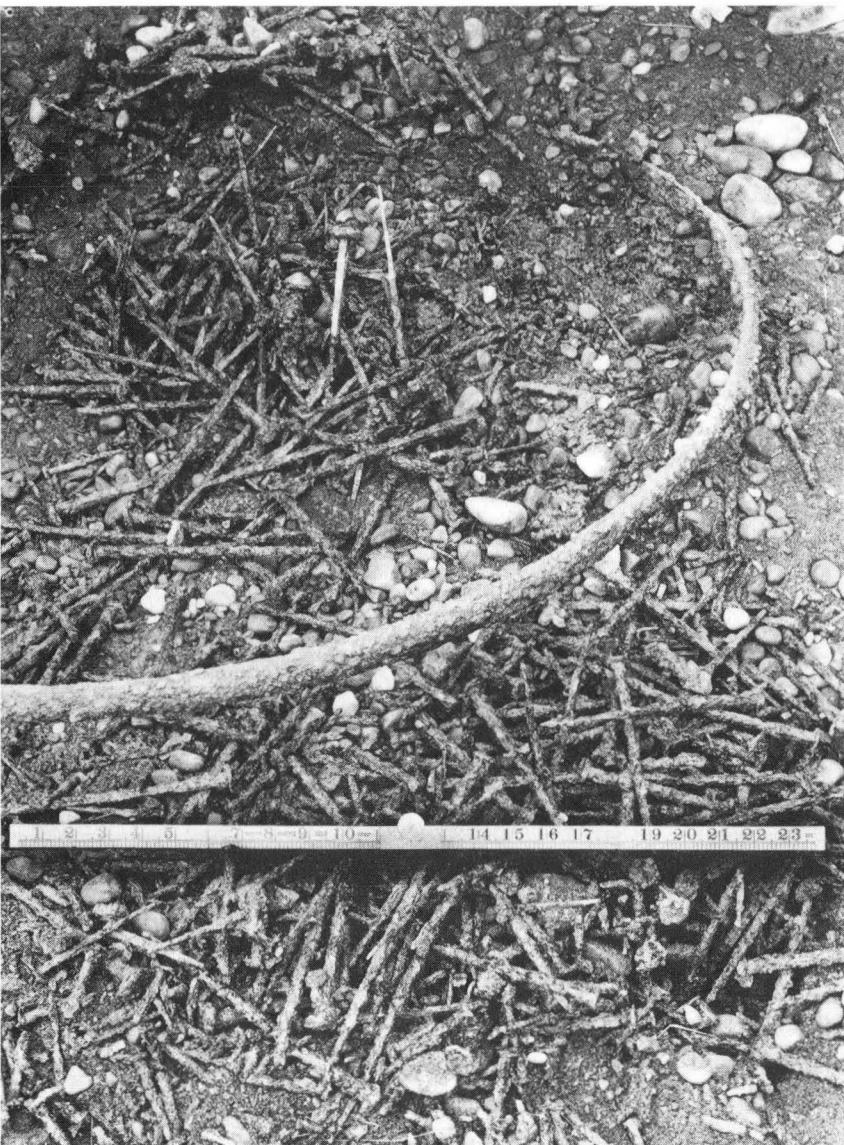
The excavation of the *fabrica* revealed various features belonging to the demolition phase. The post-pits in the workshops showed clear signs of the removal of the timbers (FIG. 21). A large circular demolition-pit cut across the construction-trench of the outer wall of the eastern range, at least 22 ft. (6.7 m) across. Other pits located inside the building were used for the disposal of unwanted material during both the occupation and demolition periods. That in the room at the south corner had formerly been timber-lined, as the presence of nails in its sides showed (FIG. 23). The pit excavated in the south-east wing, in the room to the south of the entrance, is of particular interest; it measured 10 ft. 7 in. by 9 ft. (3.07 by 2.74 m) and was 12 ft. (3.66 m) deep. This pit had been sealed by 6 ft. (1.83 m) of gravel to prevent later recovery of its contents by the natives



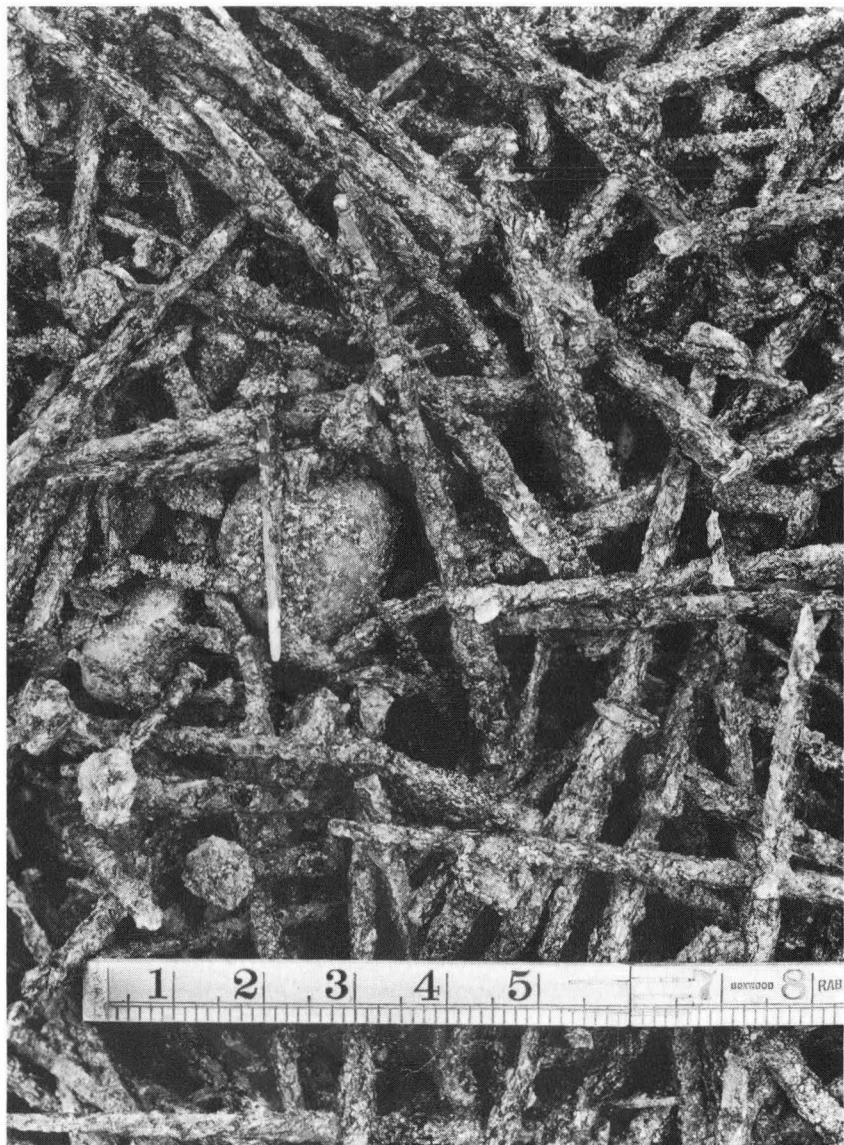
Pl. XVIII A The *Fabrica*: the smithing-hearth (p. 108). Scale in feet.
XVIII B The *Fabrica*: excavation of the pit containing nails (p. 112).



(Photos: RCAHM (Scotland): Crown copyright)



Pl. XIX A The *Fabrica*: iron tyre and nails *in situ* in the pit (pp. 112, 293). Scale in inches.
XIX B The *Fabrica*: detail of the deposit of nails. Scale in inches.



(Photos: RCAHM (Scotland): Crown copyright)



(Photo: RCAHM (Scotland): Crown copyright)

Pl. XX The *Fabrica*: heap of nails removed from the pit. Scale in feet.

(since the pit was probably dug while the building was still standing, no one outside would be aware of its existence). A large hoard of ironwork, buried when the fortress was abandoned, was discovered beneath the gravel (PLS. XVIII B-XX). This hoard included nine iron tyres over 3½ ft. (1.06 m) in diameter and nearly ten tons of mainly unused iron nails (pp. 289-92). The outer nails had corroded to form an impermeable crust, thus creating almost anaerobic conditions in which the central core had survived almost untouched by rust. A thorough scientific examination of these nails was carried out.⁸⁶ There were, as a minimum, some 875,428 nails, which were classified by size and head-type into six groups.⁸⁷ Small, disc-headed nails were by far the most common, but there were also large nails suitable for securing heavy timbers; their pyramidal heads were capable of withstanding prolonged hammering (p. 289, FIG. 86). The round-sectioned nails (F) are unique; they were perhaps used to fasten timber to masonry as their chisel-shaped points suggest. Metallographic analysis revealed that the nails were heterogeneous in structure, containing patches of high carbon; the hardness of the tips was high compared with that at the

86. N.S. Angus, G.T. Brown and H.F. Cleere, 'The iron nails from the Roman legionary fortress at Inchtuthil, Perthshire', *Journal of the Iron and Steel Institute* (1962), 956 f.

87.

	<i>Size</i>	<i>Shank-section</i>	<i>Head-shape</i>	<i>Number</i>
A	9¾-15½"	(244-372 mm)	square	1344
	8⅞-10¾"	(225-273 mm)	"	
B	6¾-9½"	(171-241 mm)	"	25088
C	4-6⅛"	(102-155 mm)	" "	
D	2⅞-4"	(73-102 mm)	" "	85128
E	1½-2¾"	(38-70 mm)	" "	763840
F	8½-8¾"	(216-222 mm)	round Flattened cone	28

(numbers obtained by counting a weighed sample)

heads. H. Cleere suggested that these differences were the result of the method of manufacture.⁸⁸ The fact that the larger nails appear to have a higher carbon content might suggest grading of the bloom before manufacture.

The high quality of the nails and the general consistency of size demonstrates both the skill of the Roman army metalworkers and the fact that there must have been some form of quality-control. The discovery of large numbers of nails within the *fabrica* might suggest that they were, in fact, manufactured there (p. 301); iron-working is proved by the presence of furnace slag in the building as well as by the smithing-hearth. Bonded carboniferous ores were available in Fife and bog-ore may have been found even closer to the fortress. The supply of iron in the form of ingots is also attested by the recent discovery of several such pigs at Strageath. However, the large number of man-hours needed to manufacture large quantities of nails by hand suggests that, at least initially, some of the nails required were imported ready-made from further south. On the other hand, the burial of nails in the *fabrica* indicates that stocks were stored here. Storage was perhaps the main function of the east range.

B. THE FABRICA: DISCUSSION

The large number of nails serves as a reminder of the vast scale of the Roman military supply-system. Enormous quantities of nails would have been needed in the construction of a timber fortress or even a fort. Since the major part of the fortress itself had been completed before the nails were deposited, the large number kept in stock may indicate that Inchtuthil was the main source of supply for the whole command. No *fabrica* has been identified at Fendoch, for example, although there were various small buildings where repairs and small-scale manufacture could have taken place, the facility for producing all the nails etc. required for the initial construction of the fort is unlikely to have existed there. An increasing amount of evidence for metal-working and other crafts at auxiliary forts has come to light in recent years (H. v. Petrikovits 1974: 1–21), but the forts in question tend to be of later date; even then the nails needed for initial construction-work must have been brought to the fort sites from elsewhere. The large quantity of nails at Inchtuthil should probably be interpreted as supplies not only for existing forts but for installations still to be built at the moment when the evacuation of northern Scotland occurred. They may provide evidence of an intention of Agricola, or even perhaps his successor, to extend the line of forts further north; these plans were necessarily curtailed on the transfer of large numbers of troops to the continent (see pp. 273–80). Apart from the forts themselves, smaller outpost forts, signal-stations and so on needed to be supplied with nails and other fittings from a central workshop/depot since they would certainly not have had the facilities for producing their own. Inchtuthil was well placed to have served as this central source. Other fortresses may have served a similar function in their respective regions, since the numbers of store-buildings in them indicate the presence of large reserve supplies.

Legionary workshops were often sited in the *retentura* and various ‘industrial’ buildings were often grouped together; this arrangement would facilitate administration and also ensure that noise, smoke and so on were restricted to one area. In these respects Inchtuthil follows the normal pattern. The building-plan itself is not, however, as yet paralleled elsewhere. H.v. Petrikovits (1975: 91 f.) divides the known legionary workshops into several types: long rectangular buildings; *Doppelhakenförmigen* (E-shaped or, rather, winged) buildings; *Basartyp* (a mass of interconnecting rooms); and *tabernae*. The *fabrica* at Inchtuthil fits none of these categories; it does not resemble the other *fabricae* in the *Doppelhakenförmig* group except possibly that at Lambaesis. The building at Lambaesis is, however, merely part of a much larger complex. Although big halls without partitions were used as workshops, for example at Vindonissa, groups of smaller rooms were evidently preferred. The open-plan *fabrica* at Inchtuthil is unusual.

The closest resemblance to the *fabrica* at Inchtuthil is perhaps to be found at Exeter. Only part

88. Manufacture was probably a threefold process: (1) the consolidation of the bloom by forging and hammering; (2) the hot forging of nail blanks; (3) the reheating and shaping of the head in a nail-die.

of this building has been excavated, the rest having been obliterated by modern development. The main feature was an aisled hall, 9 m wide and, therefore, narrower than those at Inchtuthil, with at least four bays; at its south-east end was a room measuring 9 m by 7.5 m. The corner of a second room was discovered separated from the street by an entry (6 m wide) (Bidwell 1979: 7 f. and 1980: 31); the excavators have suggested that another two aisled halls may have enclosed a central court in the manner of the *fabrica* at Inchtuthil, although the court would be much narrower. The barrack layouts in the two fortresses are also similar in some respects (see p. 172). The other fortress where the *fabrica* shows some resemblance to that at Inchtuthil is Caerleon. This building was classified by v. Petrikovits as a *Basartyp* and in its final form it has that appearance. The structures within the courtyard appear, however, to be later additions (Boon 1972: 82 f.). The basic form of the Caerleon building seems to have been of the courtyard type, with long rectangular halls on the north-west and south-west sides (these were open-plan but not aisled), and possibly originally on the north-east as well. It is interesting that the closest parallels to the *fabrica* at Inchtuthil are offered by two early (Claudian and Flavian) fortresses in Britain; the *fabricae* have not been located at Chester, Gloucester or other British fortresses. The similarity of the plans of the known legionary *fabricae* in Britain is surely significant, representing another regional difference in the practices of the Roman army.

Another interesting comparison between these three fortresses is the apparent provision of accommodation for at least some of the workforce in the immediate vicinity of the *fabrica*. The south-eastern side of the Caerleon workshop was formed by a row of square 'houses' with rooms opening off a central passageway; extra houses were later erected in the courtyard itself. At Exeter the *fabrica* was closely associated with two barrack blocks which do not appear to have formed part of a cohortal grouping. The possibility that Barracks A and B at Inchtuthil (FIG. 83) were used to house the *fabricenses* is discussed below (p. 170). The large numbers of men involved in manufacture and repair is revealed by the lists in Vegetius ii. 11 and Digest L.6.7; (see Appendix to this Chapter); all of these could not have lived in this special accommodation. Possibly the most highly skilled, the true specialists, lived here, separate from the centuries to which they were attached, while the ordinary labour-force remained in the centuriel barracks. At least one officer in charge of the daily administration of the workshops would be needed under the *praefectus* who had overall control. However, only the Digest attests an *optio fabricae* and this merely as an *immunis*. CIL iii, 8202 is often quoted as evidence for this post, but this inscription is much restored, and only the letters FABRIC actually appear on the stone. The titles and number of the administrative staff at work in the *fabrica* are, therefore, unknown but the small buildings in front of the workshop at Inchtuthil probably served these men as offices.

APPENDIX TO CHAPTER 7

1. Vegetius ii: 11

Habet praeterea legio fabros tignarios structores carpentarios ferrarios pictores reliquosque artifices ad hibernorum aedificia fabricanda, ad machinas turres ligneas ceteraque, quibus vel expugnantur adversariorum civitates vel defenduntur propriae, praeparatos, qui arma vehicula ceteraque genera tormentorum vel nova facerent vel quassata repararent. Habant etiam fabricas scutarias loricarias arcuarias, in quibus sagittae missibilia cassides omniaque armorum genera formabantur. Haec enim erat cura praecipua, ut quicquid exercitui necessarium videbatur numquam deesset in castris . . . Horum iudex proprius erat praefectus fabrum. ('The legion also possesses carpenters, wagon-builders, blacksmiths, painters and other craftsmen for constructing buildings in winter-quarters and for making engines of war, wooden towers and other devices for attacking the cities of the enemy or defending their own, trained to manufacture or repair arms, vehicles and every sort of artillery. There were also factories for shields, armour and bows in which arrows, javelins, helmets and every variety of arms were manufactured. It was their particular aim that everything required by the army should be available within the fortress . . . All these were under the direction of the *praefectus fabrum*.'

2. Digest L.6.7.

Tarruntenus Paternus libro primo militarium. Quibusdam aliquam vacationem munerum graviorum condicio tribuit, ut sunt mensores, optio valetudinarii, medici, capsarii, et artifices et qui fossam faciunt, veterinarii, architectus, gubernatores, naupegi, ballistrarii, specularii, fabri, sagitarii, aerarii, bucularum structores, carpentarii, scandalarii, gladiatores, aquilices, tubarii, cornuarii, plumbarii, ferrarii, lapidarii et hi qui calcem cocunt, et qui silvam infindunt, qui carbonem caedunt et torrent. In eodem numero haberi solent lani, venatores, victimarii, et optio fabricae, et qui aegris praesto sunt, librarii quoque qui docere possint et horreorum librarii, et librarii depositorum, et librarii caducorum, et adiutores corniculariorum, et stratores, et polliones, et custodes armorum, et praeco, et bucinator. hi igitur omnes inter immunes habentur. ('Tarruntenus Paternus [writes] in his first book on military matters: 'The duties of some entitle them to relief from heavy fatigues; such are the surveyors, the *optio* of the hospital, the surgeons, dressers, craftsmen and those who dig the ditch, veterinary officers, the architect, helmsmen, shipwrights, *ballista*-builders (? or -crews), glaziers, artificers, archers, coppersmiths, shield-boss-makers, wagon-drivers, shinglers, gladiators, conduit-inspectors, trumpet-makers, horn-makers, plumbers, blacksmiths, masons, lime-burners, hewers of timber, charcoal-burners. In the same category are usually counted the butchers, huntsmen, sacrificial assistants, the *optio* of the *fabrica*, sick-bay attendants; clerks capable of teaching, granary-clerks, savings-bank clerks, intestate-estate clerks; assistants to the *cornicularii*, remount officers, furriers(?); the weapon-store keeper, the herald and the trumpeter. All these are classed among the *immunes*.'

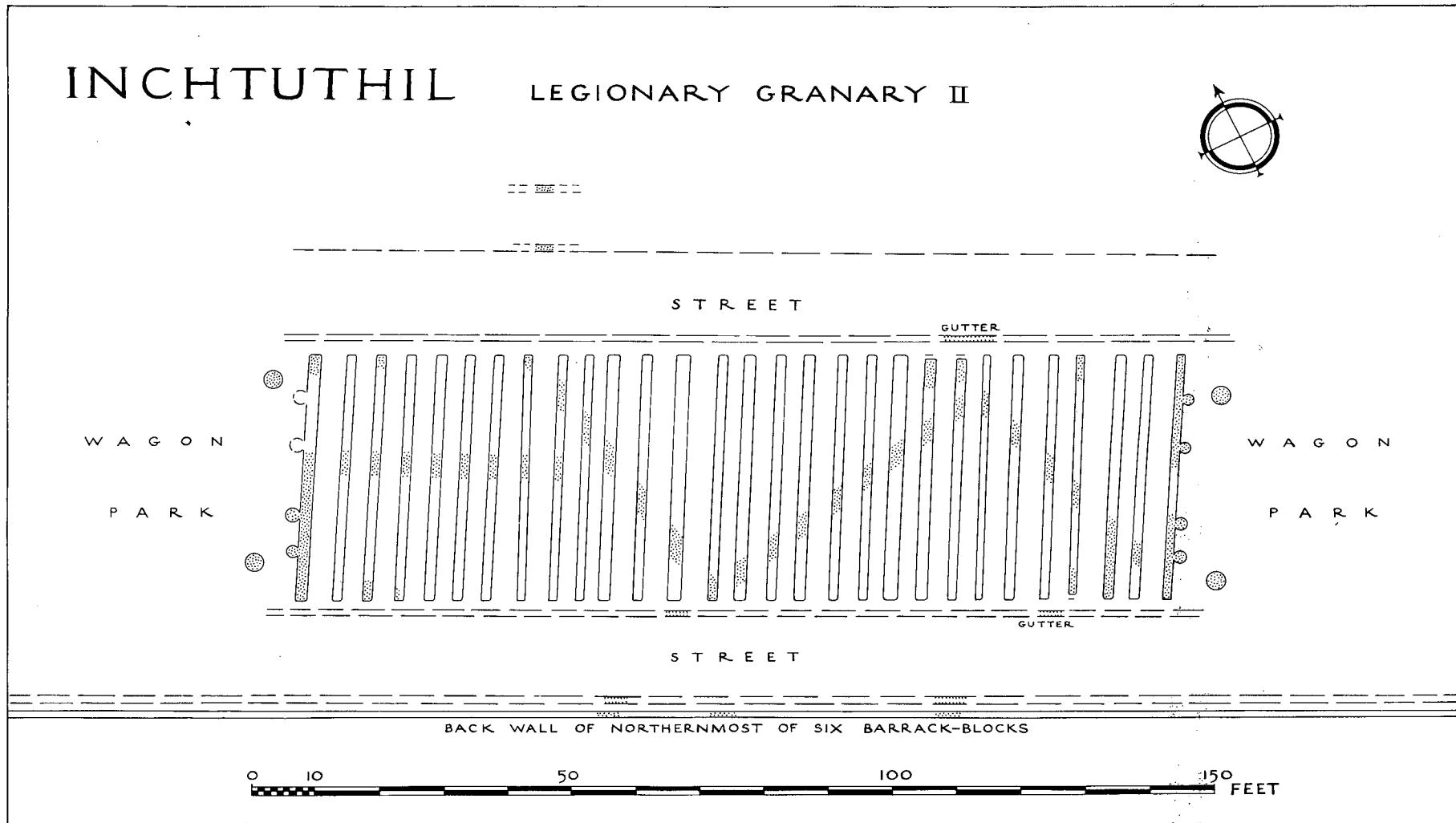


FIG. 24 Granary II, plan. Scale, 1:300.

CHAPTER 8

THE GRANARIES

A. THE BUILDINGS

The excavations showed that six granaries had been provided at Inchtuthil and there was a possibility that two more would have been erected in corresponding positions, specially reserved, had the fortress been completed. All six granaries were so sited that they were easily accessible from the *intervallum* road; thus the supply waggons did not need to use the main streets (FIG. 84). Granary 1 lay near the *porta praetoria*, Nos. 3 and 4 near the *porta decumana*, Nos. 2, 5 and 6 in the *retentura* behind the hospital and workshop respectively (FIGS. 79–82). There was space for a seventh to the west of the *via praetoria* and an eighth to the north of Granary 2.

These six buildings are easily recognizable as granaries by the grid of parallel construction-trenches characteristic of timber granaries (W. Manning, S.J. 1975, 105; figs. 7, 8). Granary 1 is clearly visible on aerial photographs of the left *praetentura* (PLS. XXV, XXVI). All six granaries were of similar dimensions, having the same basic plan (FIGS. 79–84). Granary 2 (FIG. 24)



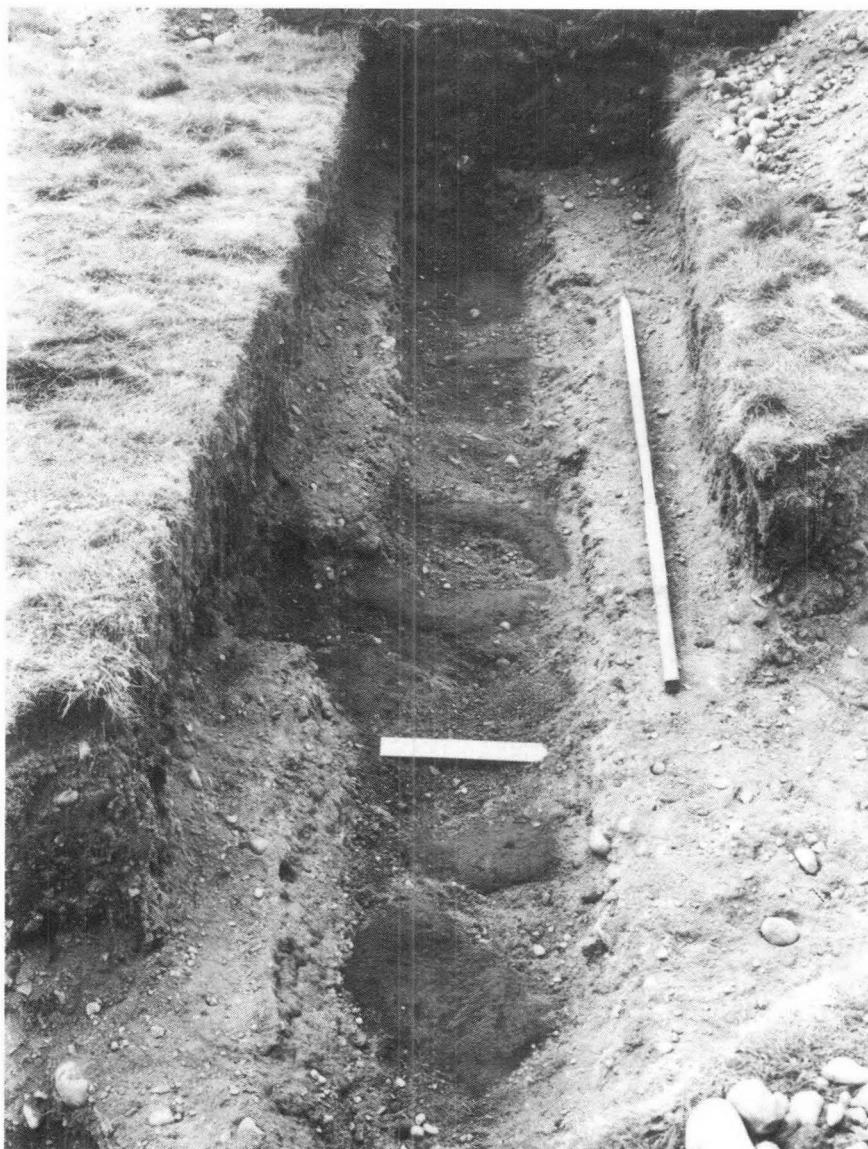
(Photo: RCAHM (Scotland): Crown copyright)

Pl. XXI Granary No. 2, looking north: the turf-packed westernmost construction-trench runs parallel with and to left of the ranging-rod, containing dark turves (p.118). The dark filling of an adjacent post-hole is seen left of this in the foreground. The straight line running obliquely below the rod is a photographic blemish. Scale in feet.

occupied an area of 136 ft. (41.45 m) by 42 ft. (12.80 m), 5712 sq.ft. (530.6 m²); there was a gravelled area at each end of the building for the supply waggons. It appears that the granary could have been entered from either end. A porch some 8 ft. (2.44 m) deep projected into the waggon park at each end; these covered areas presumably served as loading bays.

The positions of the parallel construction-trenches were economically located by means of zig-zag excavation trenches throughout the length of the building. The terminal construction-trench at each end and the post-holes for the loading bays were investigated in more detail in Granary 2.

There were twenty-nine cross-trenches in each granary; the posts which carried the joists of the raised granary floor were set in these trenches. No beams or base-plates were discovered at Inchtuthil, although Richmond suggested that here, as at Fendoch, the delving at the ends of the trenches indicated their existence and later removal. However, no beams such as those from the granary at Valkenburg 5 have yet been found in Britain, except possibly in Richborough IV (but this is of a unique plan); in fact, in some granaries the posts have been shown to have stood on or near the bottom of the trenches, as at Richborough and Usk (Manning 1975: 106 f.) On the whole, it seems unlikely that base-plates or beams were ever present at Inchtuthil; they were unnecessary structurally when the posts themselves were so deeply set. In Granary 2 there was evidence that turves had been used to pack the posts (PLS. XXI, XXII).



(Photo: I.A. Richmond)

Pl. XXII Granary No. 2: east construction-trench, looking south, showing turf packing after removal of a few inches of gravel. Scales: 1 and 5 feet.

The cross-trenches were not cut at precise intervals nor were they exactly parallel (FIG. 24), but the spacing was fairly regular. The distance from the centre of one trench to the centre of the next was approximately 5 ft. (1.52 m). This is the normal requirement for the spacing of the posts, both along the rows and between the rows, as Manning has shown (1975: 107–8 with charts 1 and 2). The grids of the granaries at Inchtuthil were not laid out with exact regularity; but this would not have affected the superstructure, since the posts are unlikely to have continued above the level of the platform.

The roofs of the loading bays were carried on two posts set in large post-pits; these pits measured between 3 ft. and 3 ft. 6 in. (0.9 m and 1.1 m) across and were approximately 2 ft. (0.6 m) deep. Four post-holes, 2 ft. (0.6 m) across, were found to adjoin the outer faces of the terminal trenches of Granary 2. Similar projecting post-holes were not located in the other granaries; but since these buildings were less fully excavated their existence cannot be ruled out. If, on the other hand, these main uprights were only offset in one of the six granaries, they may be an indication of the differing building-techniques of the work-gangs employed on the several granaries. Other slight discrepancies in the plans support the idea that more than one gang erected the granaries. The post-pits for the loading bays of Nos. 2 and 4 were rounded in outline whilst those of 3 were squared. Furthermore the size of the trenches varied from granary to granary; those in No. 2 fluctuated between 1 ft. 6 in. and 2 ft. (0.46 m and 0.6 m) in width whilst those in No. 3 were narrower, measuring only 1 ft. 2 in. to 1 ft. 4 in. (0.35 m to 0.41 m) across.

B. THE GRANARIES: DISCUSSION

The size of the offset post-holes in Granary 2 (FIG. 25) suggests that they served some important structural purpose; this implies that they were also present in the other granaries. The post-pits for the loading bays also appear to be unnecessarily large if they were only intended to support a roof extension. The purpose of the offset posts has not as yet been considered in any reconstruction of a Roman timber granary, presumably because they have not been recorded at any other site. The purpose is perhaps connected with the fact that the granaries at Inchtuthil are much longer than other known timber granaries; only Richborough I and Usk Type I (= Usk A) approach them in length (Manning, S.J. 1975: 108, chart 2). The granary at Exeter was probably 40 m by 15 m but the plan is not known in sufficient detail for a useful comparison (Bidwell 1980: 37). Granary I at Richborough had longitudinal construction-trenches; accordingly such

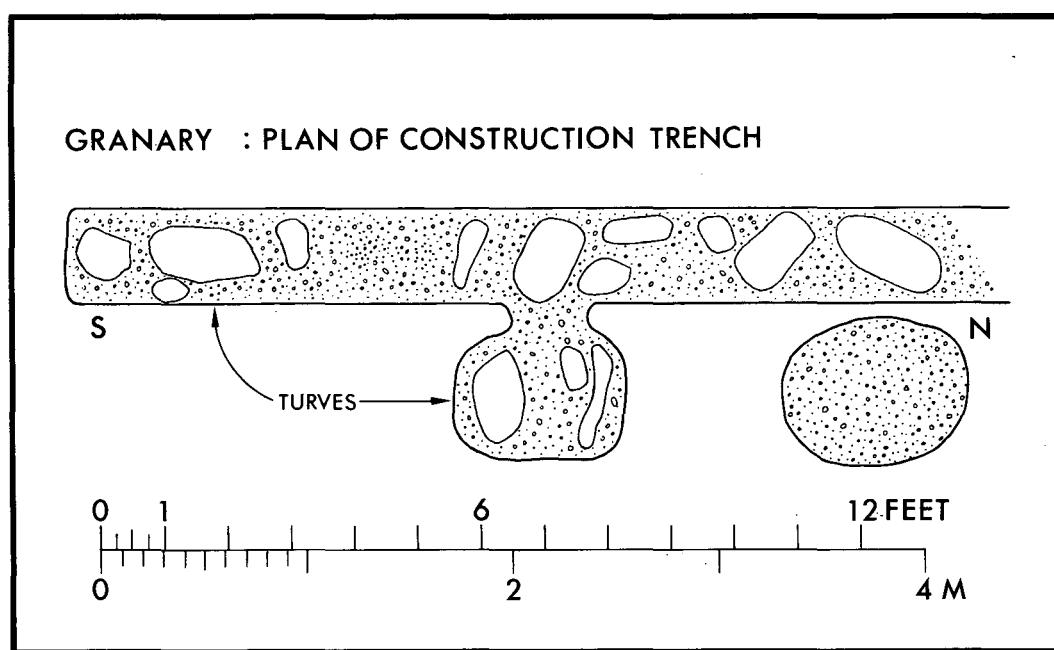


FIG. 25 Granary II, detail of construction. Scale, 1:36.

structural posts could have been placed in these more easily than in the lateral trenches at Inchtuthil. Usk Granaries A-C had posts in 25 trenches to carry the platform, but there were also three large post-holes at one end of each loading bay area; these presumably served a purpose similar to the two post-pits at Inchtuthil (Manning 1981: figs. 49 and 96).

According to Manning's reconstruction, the grid of posts supported a platform on which the superstructure of the granary rested (S.J. 1975: 112, fig. 3). The roof was carried on uprights which were slotted into the floor-joists and supported the purlins. On analogy with medieval timber barns, trusses were probably used to help to concentrate the weight on to these uprights. The ends of the building were vulnerable to an outwards thrust exerted by the weight of the roof being spread longitudinally by the trusses (FIG. 26). Extra-stout posts were needed to counteract this pressure and thus extra-large pits were needed for the loading-bay posts; the extra roofing these supported could otherwise have been carried by much slighter uprights. The extra length of the granaries at Inchtuthil and Usk made such an arrangement necessary because of the correspondingly increased pressures. The structural stresses would have been much less in the smaller granaries found elsewhere. These end-posts would also have acted as major weight-carrying supports for the roof, much in the manner of flying buttresses in later cathedrals, giving greater stability by spreading the load.

The four offset posts in Granary 2 at Inchtuthil are also probably related to the same problem of outward pressure on the end walls. They may have acted as external buttresses placed against the end wall of the granary to prevent the wall itself buckling outwards; they will also have served as extra roof-supports. Such an arrangement can be postulated from the analogy of medieval barns. That the main pressure fell on the end walls rather than the side ones even in stone buildings is indicated at the tithe barn at Bradford-on-Avon, which has stone buttresses in positions corresponding to the four post-holes at Inchtuthil.

The above arrangement with buttress posts is not, however, possible if Manning's suggestion for the position and construction of a loading platform outside each end of the building is accepted. He argues that this loading area was created by setting the end of the building back from the edge of the supporting platform (S.J. 1975: 114; fig. 4); he uses the wider spacing of the posts and trenches at Longthorpe and Fendoch to prove that the load was lighter at the ends of the granaries. While this may be so in some of the smaller granaries, and even there the evidence is slight, it certainly does not seem to be true at Inchtuthil. Manning has ignored the evidence of the large offset post-holes. Although a covered loading area would have been advisable in view of the climate, a loading platform was not a necessity; waggons could easily have been backed up against the granary floor, once the doors were open, and corn could then have been unloaded directly into the granary. The problem raised by Manning that the steps into the granary would thus have been in the way of the waggons could easily have been overcome without erecting a projecting platform across the full width of the building. A flight of steps could have been constructed inside the granary doors inset into the platform, much as in a modern warehouse (FIG. 27) or indeed movable steps could have been provided to facilitate unloading. The end wall and doors could thus be built flush with the end of the grid, making the buttresses possible. The doors may even have been hung on the inner pair of posts so that they could open at 180 degrees.

The roof probably projected well beyond the walls of the granary on each side in order to prevent damp seeping in; gutters were located running along each side of the granaries c. 3 ft. (0.9

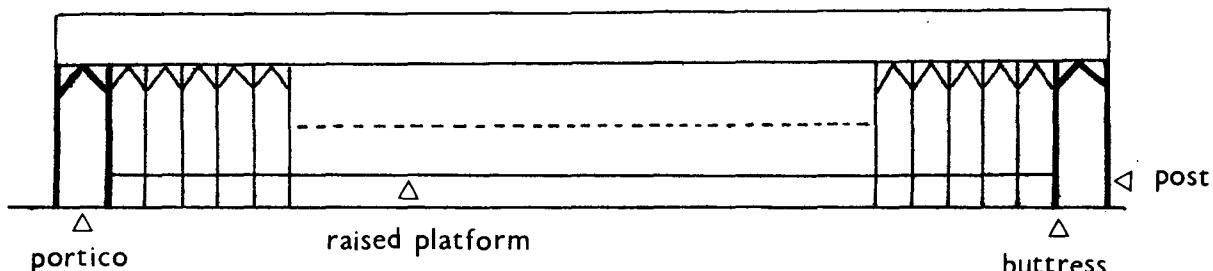


FIG. 26 The Granaries: sketch to illustrate the suggested covered loading bays.

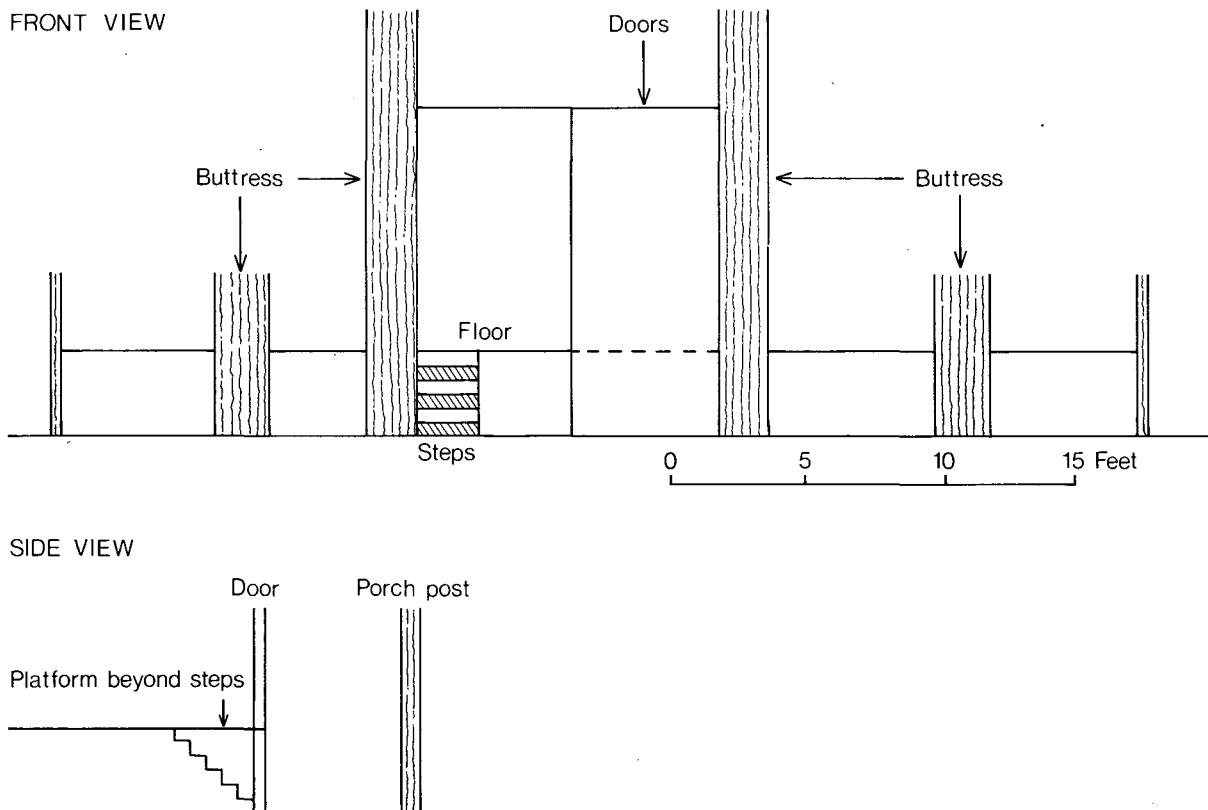


FIG. 27 The Granaries: sketch to illustrate the suggested position of steps.

m) away from the ends of the foundation-trenches. Richmond postulated a similar arrangement at Fendoch (*PSAS* 1938/9: 132; fig. 10). Manning has, however, pointed out that such wide eaves would have been impossible at other granaries, for example Usk, where the granaries themselves were only about 1 metre apart. The gutters may possibly then merely have served the streets on either side of the building (FIG. 24). Alternatively they may have had a dual purpose as street drains and as eavesdrifts to prevent water accumulating under the granary platform.

The granaries at Inchtuthil appear to have been roofed with tiles, as were the centurions' quarters (Richmond in *Limes-Studien* 1959: 154). Part of a *tegula* from Granary 4 is preserved in the National Museum of Antiquities at Edinburgh. A tiled roof would have reduced the risk of fire destroying the food supplies of the legion; this precaution was especially necessary because the granaries were built close to the ramparts for easy access, with the result that they were exposed to fire-arrows etc. from outside. The legionary granaries at Inchtuthil are in this respect better equipped than contemporary auxiliary granaries, for example at Strageath, which stood in equally vulnerable positions. The majority of timber granaries, as Manning pointed out, will have had shingle roofs. The risk of fire is perhaps one of the reasons for the scattered distribution of the granaries at Inchtuthil (FIG. 84); if one caught light the fire was unlikely to spread to all six. Here Inchtuthil differs from other sites, for example Chester and Usk, where the granaries were grouped together; perhaps this reflects the problems of supply in Scotland and Agricola's known concern with the stores (*Tacitus, Agricola*: 22,2). The siting of the granaries may also represent a logical distribution in relation to the barracks, each granary being intended to supply a specific section of the legion. The actual relationship of granary to barrack is unknown but, once all eight granaries had been erected, a possible division is as follows: Granary 1 served Barracks 1 to 12, Granary 2 Barracks 13 to 18 and the hospital, Granary 3 Barracks 19 to 30, Granary 4 Barracks 31 to 42, Granary 6 Barracks 43 to 52, the missing granary by the *porta praetoria* Barracks 53 to 64, while Granary 5 and the second missing granary held extra stores for the officers, non-military personnel, *fabrica* and so on. The fact that two granaries were not yet built does not indicate the absence of two or more cohorts; the full complement of barracks suggests that all cohorts were present (see below, p. 266). Sufficient stores for the whole legion for one winter could presumably

be contained in the six granaries; the extra capacity provided by another two would be used for less essential goods and reserve stores.

Many attempts have been made to calculate the capacity of Roman military granaries⁸⁹ and to assess how many men could be supplied and for how long, especially with respect to Tacitus's statement that Agricola equipped the forts with 'supplies for twelve months'.⁹⁰ Such calculations are, however, invalid since there are too many unknown quantities; the only extant evidence for the daily ration of corn is in Polybius⁹¹ and therefore of Republican date, not necessarily relevant to the Imperial army. It is not known how the grain was stored, whether in bins, sacks or other containers, or how high it was stacked. How much, if any, of the granary space was used to store the other kinds of food consumed by the soldiers⁹² and corn supplies for the horses is uncertain. As a result it is impossible to prove whether or not the six (or eight) granaries at Inchtuthil held a year's supply or to take this idea further, as Manning has done, and state that the six granaries were sufficient and the two extra building-plots not needed for grain-storage.

The use of sacks or similar containers for storing the grain seems, on the whole, most probable. Sacks could be both easily stacked and moved, thus facilitating distribution later and removing the necessity of emptying corn into, and scooping it out of, bins at least 5 ft. (1.52 m) deep. Bins would be difficult to empty efficiently, and a constant residue of old grain at the bottom would harbour pests. The transport of grain in sacks and baskets is attested by the Digest.⁹³ Other foodstuffs may have been stored in the *horrea*; meat, for instance, could have been hung from the beams. Other types of store-buildings also existed (v. Petrikovits 1975: 82 f.); at Inchtuthil there were numerous *tabernae* (Chapter 14). Storage of food and other commodities in the extramural compounds is also a possibility at Inchtuthil; compare the Flavian stores-annexe at Caerleon (*JRS* 1959: 103).

The capacity of the *horrea* at Inchtuthil cannot be compared with that of granaries at other fortresses because of the incomplete state of the plans elsewhere and the lack of clear identification of all store-buildings. In general, however, Inchtuthil seems to have been at least as well provided for as other fortresses; but this does not prove any innovation on the part of Agricola in the matter of supplies, such as is perhaps suggested by Tacitus in *Agricola* 22. The very remoteness of the Scottish forts and fortress and the greater severity of the northern winters would have required any commander to ensure that adequate supplies were available, and that storage capacity was sufficient for the long winter months when transport was difficult or impossible. Agricola was apparently successful in coping with this problem.

89. e.g. Rickman 1971: 236 f.; Gentry 1976: 23 f.; Richmond *PSAS* 1938/9: 129 f.

90. Tacitus, *Agricola*: 22,2. . . . nam adversus moras obsidionis annuis copiis firmabantur. ita intrepida ibi hiems . . . ('. . . for they were strengthened against long sieges by supplies sufficient for a year. And so winter in them held no fears' . . .).

91. Polybius vi, 39, 13: σιτομετρούνται δ' οἱ μὲν πεζοὶ πυρῶν Ἀττικοῦ μεδίμνου δύο μέρη μάλιστά πως, οἱ δὲ ἵππεις κριθῶν μὲν ἑπτα μεδίμνους εἰς τὸν μῆνα, πυρῶν δὲ δύο . . . ('The infantry receive a ration of wheat equal to about two-thirds of an Attic medimnus a month, and the cavalry seven medimni of barley and two of wheat').

92. For military diet see R.W. Davies in *Britannia* ii, 1971: 122 f.

93. Digest xviii, 1, 40, 3: frumenta . . . ex sacco saccarii ('from the sack of the sack-carrier'); and xxxiii, 9, 3, 11: nec frumenti nec leguminum thecae (containers) (arculae (chests) forte vel sportae (baskets)) . . . For the use of sacks at the warehouses in Ostia see Rickman 1971: 86.

CHAPTER 9

THE 'BASILICA EXERCITATORIA'

A. DESCRIPTION OF THE EXCAVATED REMAINS

The '*basilica exercitatoria*' stood in the east *praetentura* to the south of the *scamnum tribunorum* (FIGS. 82, 84). It faced on to the *via praetoria*; the *tabernae* and colonnades which lined this street were interrupted along the building's frontage for access. The whole building occupied an area of 82 ft. (25 m) by 166 ft. (50.6 m) (FIG. 28).

A gravelled court 42 ft. (12.8 m) across and 40 ft. (12.2 m) deep opened off the *via praetoria*. The gravelled surface is attested by the fill of the trench which ran across the front of the court. This trench was 15 in. (0.38 m) wide and 10 in. (0.25 m) deep; its alignment was slightly different from that of the street drains. It was backfilled with the gravel soon after being dug, presumably being deemed unnecessary or even inconvenient. The court was flanked by two rooms, each measuring 19 ft. (5.79 m) by 28 ft. (8.53 m); both opened on to the street and were fronted by three-columned verandas. These rooms were approximately the same size as the *tabernae* which lined the main streets and they probably served a similar function. They were built as single units rather than as part of the flanking *tabernae* in order to allow access along the sides of the '*basilica*' to the buildings at the rear. A 4-ft. (1.22 m) space was also left between the back walls of these rooms and the front walls of the '*basilica*' itself.

At the back of the court stood a large porch, 20 ft. (6.1 m) wide and 20 ft. deep. The front part of the roof was supported on two pairs of columns; one pair lay on the line of the front of the building while the other projected c. 8 ft. (2.44 m) beyond it into the court. The two pairs were 9 ft. (2.74 m) apart. The entrance to the building behind was set back about 10 ft. (3.05 m) from the columns. There the '*basilica*' was entered by a central doorway, 8 ft. (2.44 m) wide. Two smaller doorways may have existed on either side of the porch.

The main building consisted of an aisled hall, 40 ft. (12.2 m) wide and 85 ft. (25.9 m) long. The nave itself was 17 ft. (5.18 m) wide; it was separated from the rooms leading off the hall by aisles, approximately 8 ft. (2.44 m) wide, which ran around three sides of it. The posts dividing the nave and aisles were set 8 ft. apart.

Rooms of varying dimensions led off the hall to the right, left and rear. A rear entrance to the building may have existed at the southern (right-hand) back corner of the hall; here the construction-trenches of the central rear room were found to end some 5 ft. (1.52 m) from those of the corner room. The essentials of the layout cannot, however, be determined in every detail since not all the partition walls were located in the excavation.

A pit c. 3 ft. (0.9 m) wide and at least 6 ft. (1.83 m) long was discovered in the gap between the *taberna* and the front room to the right of the court. This appeared to have been a timber-lined tank which was fed by a pipe-duct leading from the *via praetoria* under the floor of the *taberna*. This pipe was probably intended to connect with an aqueduct running along the *via praetoria* (compare that discovered at Strageath; *Britannia* 1979: 274), although it is unlikely that the aqueduct itself was ever installed before the fortress was abandoned. The intention of installing a

piped water-supply is further attested by the presence of earthenware water-pipes in one of the tribunes' houses (see p. 136). The alternative that the tank was filled with the dirty water from the main street-drain is unlikely, while, if it had been intended to collect the rainwater from the basilica roof, the in-fill pipe would have led from a drain along the side of the building.

B. THE PURPOSE OF THE 'BASILICA EXERCITATORIA'

This building has been called the *basilica exercitatoria* in this section purely for convenience and to avoid confusion with reference to FIG. 28. The term is derived from the original identification of the building as a drill-hall by Sir Ian Richmond (*JRS* 1960: 213). The true function of the building is not, however, by any means certain.

The identification was based on Vegetius ii, 23;⁹⁴ here it is stated that the cavalry should be provided with a *porticus* and the infantry with a *basilica* in which to practise weapon-training and so on in bad weather. Vegetius does, however, go on to say that, weather permitting, even in winter *exerceri cogebantur in campo*. Neither of these buildings has as yet been identified with certainty at any fort. Schönberger (*JRS* 1969: 161, n.130) has argued convincingly that the fore-halls of the *principia* were not used for riding-practice by the cavalry. These fore-halls are not to be identified with the '*basilica equestris exercitatoria*' referred to on the Netherby inscription, dated to A.D. 222 (*RIB* 978). The other inscriptions which have been quoted as referring to these exercise-halls do not need to be interpreted in this way.⁹⁵ All four refer to a *basilica* of unspecified purpose; indeed in *RIB* 605 and 1091 the *basilica* is directly associated with a *balneum* and they are, therefore, unlikely to be dealing with drill-halls.

The unsuitability of the building at Inchtuthil for use as a drill-hall must also be taken into account. The main hall itself is certainly too small for cavalry practice, and the colonnades would make manoeuvres impossible: The division into nave and aisles also makes its use by infantry for weapon-practice unlikely. There was certainly no room for javelin-throwing or other similar exercises (v. Petrikovits 1975: 80 f.). Furthermore, if the hall was used for drilling, its enclosure by a series of smaller office-size rooms seems strange, since they could serve no useful connected purpose. On the whole, an open hall with no internal divisions would serve this purpose much better, and identification of this building as a *basilica exercitatoria* would have been infinitely more probable if no internal walls had been found in the whole block. As it is some other interpretation must be sought. As to the failure to identify the buildings described by Vegetius, it must be remembered that he was writing at a later date and such buildings may never have existed in first- or even second-century forts, the soldiers being made to practise in the open air. Parade grounds have been identified at various Roman forts, for example Hardknott, Gelligaer, Chester-le-Street, Tomen-y-mur, and also at Chester (Davies 1974a: 20 f.) but it is possible that simple barn-like buildings were erected alongside these for training purposes. This would explain the lack of suitable buildings inside the forts. The area of the parade ground has not yet been identified at Inchtuthil. There was plenty of suitably level ground on the plateau but use of this

94. Vegetius ii. 23: *missibilia quoque vel plumbatas iugi perpetuoque exercitio dirigere cogebantur usque adeo, ut tempore hiemis de tegulis vel scindulis, quae si deessent, certe de cannis, ulva vel culmo et porticus tegerentur ad equites et quaedam velut basilicae ad pedites, in quibus tempestate vel ventis aere turbato sub tecto armis erudiebatur exercitus.*
(‘Continual unceasing drill with missiles and loaded javelins was enforced, to the extent that for winter use porticoes roofed with tiles or shingles (or if these were unobtainable, then with reed, sedge or straw thatch) were provided for the cavalry, and buildings like basilicas for the infantry. In these the troops were given their training in wet or windy weather.’)
95. *CIL* iii, 6025 (= *ILS* 2615): . . . coh. I Fl. Cil. eq. basilicam fecit per C. Avidum Heliodorum praef. Aeg. et T. Flavium Vergilianum praef. castr. cura. agente 7 Statio Tauro Leg II Tr. f. curatore coh. eiusdem.
RIB 605: . . . balneum refect. (et) basilicam vetustate conlabsam a solo restitutam Eq. Alae Sebussian(ae) sub Octavio Sabino . . .
RIB 1091: *Imp. Caes. M. Ant. Gordianus P.F. Aug. balneum cum basilica a solo instruxit per Egn. Lucilianum leg. Aug. pr. pr. curante M. Aur. Quirino praef. coh. I L(ingonum) Gor(diana).*
CIL xiii, 6672: *Deae Dianaee C. Lucilius Messor mil. leg. XXII Pr. f. cus. basil. Dextro et Prisco. cos.*

INCHTUTHIL, BASILICA EXERCITATORIA

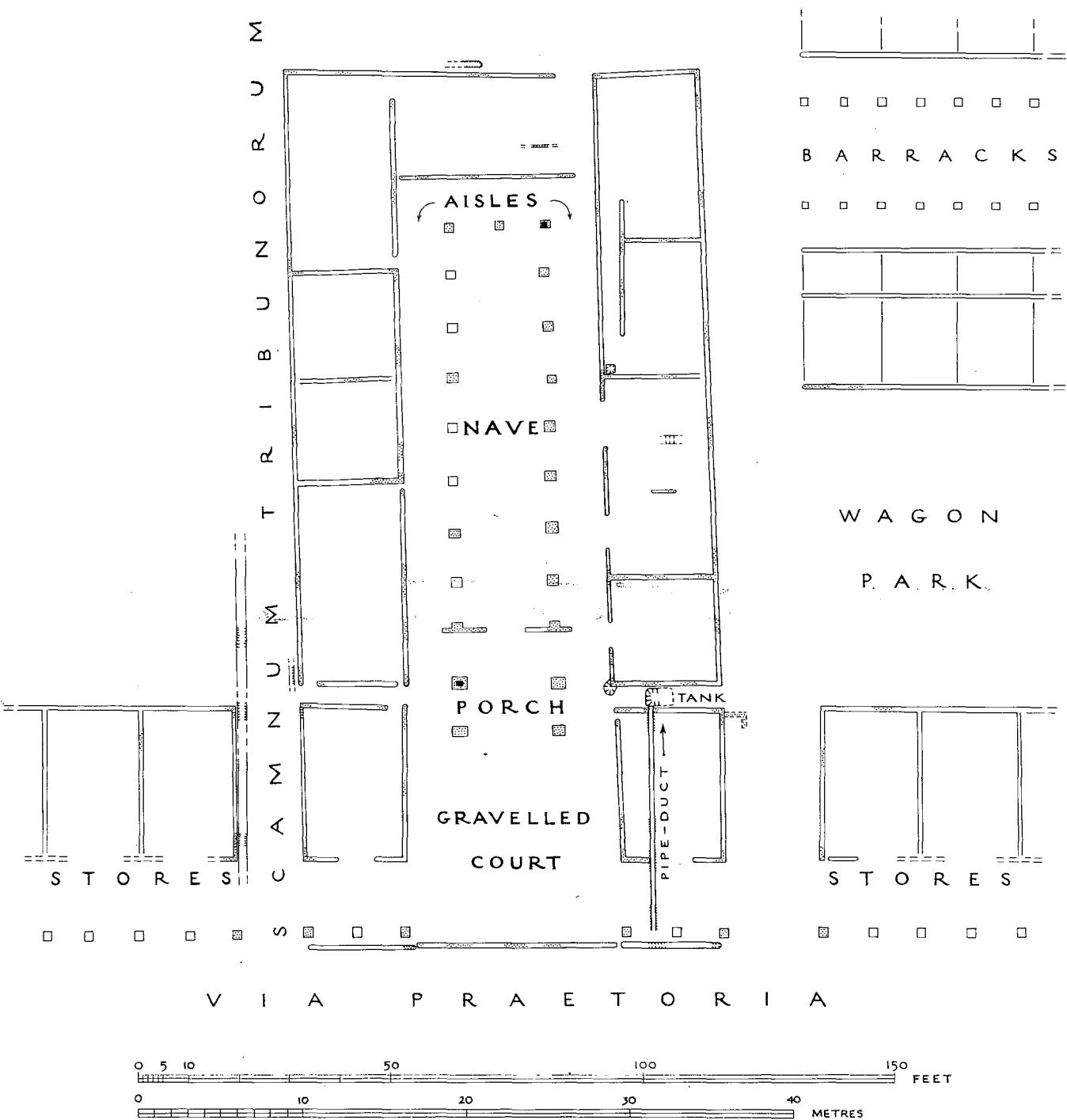


FIG. 28 The 'Basilica Exercitatoria', more probably a workshop and stores-building (pp. 123-28). Scale, 1:360.

was limited, at least for the time being, by the 'Western Vallum'. Alternatively exercises may have taken place on the lower ground beside the river.

H. v. Petrikovits (1975: 78 f.) placed this building among the group which he identified as the *schola* of the first cohort. This was not a *schola* belonging to a military *collegium*, such as those attested in inscriptions from Lambaesis and elsewhere (see p. 89) but an office related to the administration of the legion.⁹⁶ The *schola* is referred to in Hyginus Ch. 20;⁹⁷ mutatis mutandis this would imply a location near the *principia* in a fortress. The *munera* referred to will be the duty roster for the day issued from the *schola* (*ANRW* ii. 1: 500–2). The correct reading and precise meaning of this passage in Hyginus are uncertain.⁹⁸ The *schola* did not, as usually stated, belong to the first cohort; the phrase merely indicates the preferred location in the *scamnum tribunorum* facing the first cohort's barracks.

The only certain literary or epigraphic evidence for the existence of the *schola* is Hyginus, and thus the normal existence of a special building for this purpose in all fortresses is doubtful. The date of Hyginus is obviously relevant to the presence of such a building in fortresses in the first century. The probability of a late Flavian dating of Hyginus has recently been proposed by Professor S.S. Frere (*Britannia* 1980: 51 f.) and is further discussed on pp. 164–9, while Lenoir (1979) argued for a Trajanic date. Moreover, Hyginus was describing a marching-camp where special provisions had to be made for various functions which were transferred to the headquarters-building in the fortresses, for example the altars and *auguratorium*. In a normal fortress, there was plenty of office space in the *principia* and the *tabernae*. Parts of the large houses belonging to the tribunes and the centurions of the first cohort were also, almost certainly, used as offices. In a camp, however, the officers' tents did not provide the equivalent space, and a separate tent was necessary. The evidence for the identification of the *basilica* as a *schola* is tenuous, and, although this remains a possibility, other interpretations should be considered.

Before considering an alternative purpose, it will be useful to look briefly at the buildings cited as comparable by H. v. Petrikovits and described by him as *scholae*. He gives (1975: 79, fig. 17) four parallels to the building at Inchtuthil, at Caerleon, Vetera, Neuss and Carnuntum; all of these stood in the *scamnum tribunorum* but not opposite the *principia* (or *aquila*). The building at Caerleon is in reality known to be part of the large bath-complex (Boon 1972: 78 f.) and is not, therefore, comparable with the others. The buildings at Vetera and Neuss are both of a different type from that under discussion; they take the form of peristyle-courts, that at Neuss having a central water-tank. These buildings perhaps served some recreational purpose or were workshops of some kind. Webster's interpretation (1979: 201) of this building at Neuss as a stable seems unlikely. Their function is irrelevant to the *basilica* at Inchtuthil. The building at Carnuntum bears the closest resemblance to that at Inchtuthil; it too appears to be a colonnaded hall surrounded by smaller rooms on three sides. However, its position and its more complex layout suggest that it was perhaps a tribune's house, the hall being, in reality, a narrow courtyard. There are, then, no definite parallels to the building at Inchtuthil which can be identified with the *schola* mentioned by Hyginus. If a *schola* was a normal feature of a fortress, one would expect to find such a building in the other known fortresses. Their absence further emphasizes the unlikeliness of this interpretation.

The similarity of the building at Carnuntum might suggest that the '*basilica*' was a senior officer's house of which there were insufficient numbers at Inchtuthil (Chapter 10). The plan bears considerable resemblance to the house of the *primus pilus* and to Tribune's House III, apart from the replacement of the open court by the colonnaded hall. This interpretation would account for the varying dimensions of the rooms and the apparent presence of a corridor in the

96. Vegetius ii, 19: *scholae sunt quae literatos milites quaerunt*.

97. Hyginus 20 (Lenoir): *Scholae cohortibus primis, ubi munera legionum dicuntur, in scamno legatorum contra aquilam dari debent*.

98. The Codex Arcerianus reads . . . *scholae cohortis primis* . . . Lange (1848) corrected this to . . . *scholae cohortibus primis* . . . and interpreted it as a dative in apposition dependent on *contra* meaning that the *scholae* were opposite the barracks of the first cohort. Domaszewski followed this reading. Gemoll (1879) and Grillone (1977) both read . . . *scholae cohortium principiis* . . . meaning that the *munera* were given to the *principiis* (centurions) of the cohorts. Lenoir (1979) has followed Lange's reading and placed the *scholae* in the *scamnum legatorum* facing the first cohort.

south-east section (FIG. 28). The pipe-duct might also be thought to support this suggestion. The only other traces of the installation of a water-supply system were earthenware pipes found in Tribune's House IV. Nevertheless, the position of the building, the gravelled forecourt and porch are all features which tell against this hypothesis, and an alternative solution must be sought.

There are two possible interpretations of the *basilica*, (i) as a store-building or (ii) as a workshop. Several features argue in favour of one or other view; most significantly, the wide gravelled courtyard was suitable for the approach of waggons to the doorway itself. The trench which had been dug across it on the edge of the *via praetoria* had immediately been backfilled with gravel, thus removing any obstacle to wheeled traffic. The porch can be seen not only as an impressive entrance but also as a useful covered area in which to unload stores or raw materials, a function similar to that of the porches at the ends of the granaries. Richmond suggested that the open space to the south of the *basilica*, lying between it and the granary, was used as a waggon park. The proximity of such a park fits well with the identification of the *basilica* as a store or workshop. The fact that the room at the south-west corner of the building had a doorway opening directly on to the court suggests that it may have been the office of the *librarii* responsible for the paperwork involved in the administration of the building, including lists of goods moved in and out.

H. v. Petrikovits has pointed out the many different kinds of store-buildings to be found in Roman fortresses in addition to the *horrea*. Every fortress had at least one of these other store-buildings and often more. However, apart from the *tabernae*, none has as yet been recognised at Inchtuthil. These store-buildings can be roughly classified (v. Petrikovits 1975: 82 f., especially fig. 20), but no two were exactly alike. In many respects the *basilica* at Inchtuthil resembles the *Hoftyp*, in which a series of rooms opened off a porticoed courtyard. These rooms could be all of equal size as at Vindonissa, or of varying sizes as at Carnuntum and Lambaesis (as they are in this building at Inchtuthil⁹⁹). The central area of the building at Inchtuthil offers a variation to the usual plan; a covered hall was better suited to the northern climate than an open court. It is impossible to determine what might have been stored in this building, but the possibilities are various, including foodstuffs, amphorae, metal objects, and tents.

However, the ample provision for storage already existing in the *tabernae* at Inchtuthil favours the identification of the building as a specialist workshop probably provided with its own storage rooms. The hall had dimensions reminiscent of those of the halls in the *fabrica*; although not as long, it was approximately the same width and had the same internal divisions. The hall was perhaps used by the workmen, while at least some of the rooms opening off it were used as stores. This workshop will have been provided for certain specialists who were not accommodated in the main *fabrica*, perhaps, for instance, the armourers. Various different types of workshop are known in the legionary fortresses which can, like the stores, be roughly classified. This building at Inchtuthil has some of the features of the *Basartyp*, which consisted of a group of interconnecting rooms. Its closest parallel is provided by a workshop of this type at Carnuntum (v. Petrikovits 1975: fig. 23, 6). A further indication of the *basilica*'s function as a workshop is given by the provision of the pipe-fed water-tank. Schönberger (1979: 135 f.) has shown that a water-tank is often a feature of a workshop and is a good indication of use as such. A long rectangular building, similarly situated on the *via praetoria*, at Lambaesis has been identified as a waggon-repair shop. This is, however, unlikely to have been the function of the building at Inchtuthil in spite of the proximity of the waggon park. The repair shop at Lambaesis was almost twice the length of the *basilica*; it had no internal colonnade and no rooms surrounding the large hall. Furthermore there was no trace of wheel-slots in the Inchtuthil building and these were a marked feature at Lambaesis.

On the whole, the most reasonable interpretation of this building at Inchtuthil seems to be as a specialist workshop, but one combined with storage capacity. If this view is accepted, the building at Caerleon identified as a *basilica exercitatoria* (Boon 1972: 15) also needs to be

99. The building appears to have been divided into ten rooms, but the inequality of their dimensions and the traces of further internal partitions do not favour the allotment of one room per cohort.

reconsidered. This building consisted of an aisled hall of dimensions similar to the Inchtuthil *basilica*; it was flanked by long undivided rooms running the length of the building. It was adjacent to the magazine block. A combined function of workshop and store is again a reasonable interpretation. The Caerleon *basilica* stood in the middle *scamnum* of the *retentura*, a position usually reserved for the various work-buildings of the fortress. Its position thus further supports the identification of these buildings as *fabricae* of some kind rather than as *scholae*, which needed to be located near the *principia*.

INCHTUTHIL TRIBUNE'S HOUSE I

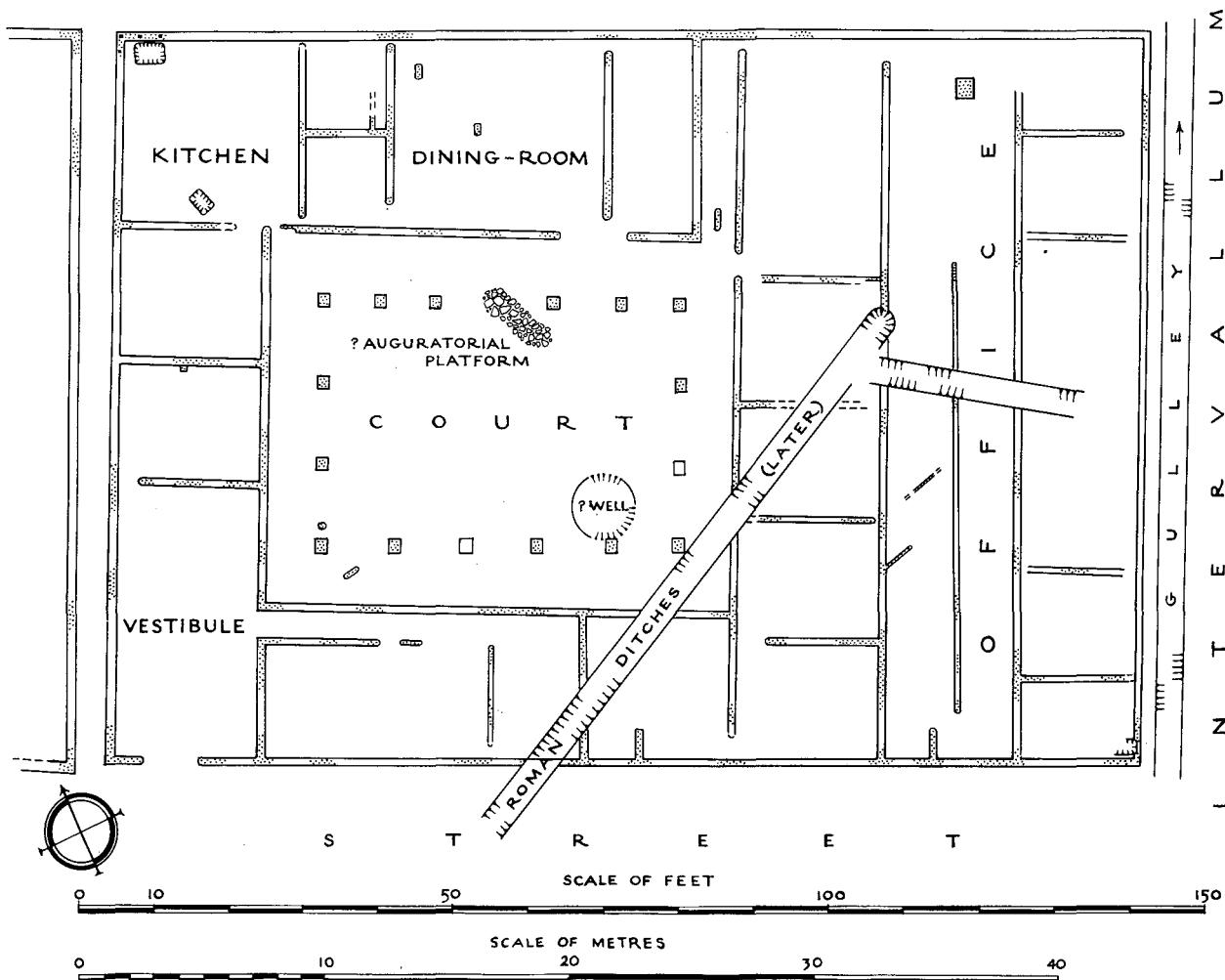


FIG. 29 Tribune's House No. I, plan. Scale, 1:300.

CHAPTER 10

THE OFFICERS' HOUSES IN THE SCAMNUM TRIBUNORUM

A. DESCRIPTION OF THE ARCHAEOLOGICAL REMAINS

HOUSE I (FIG. 29)

House I was situated in the left *praetentura* adjacent to the *intervallum* road (FIG. 81). It occupied an area of 138 ft. (42.06 m) by 95 ft. (28.95 m). The house consisted of a series of rooms arranged around a central courtyard in the peristyle manner and two rows of offices opening off a north-south corridor at the eastern end of the building. The corridor appears to have been divided in two longitudinally. There was presumably access to the offices from the living quarters, and also direct from the street to avoid the constant movement of clerks and so on through the tribune's private quarters. More than a third of the available space was occupied by the office area.

The main entrance to the building was at the western end of the southern wing; it was identified by the occurrence of an 8-ft. (2.44 m) gap in the external construction-trenches at this point. The doorway opened into a large entrance hall which measured approximately 35 ft. (10.7 m) by 18 ft. (5.5 m); a corridor led into the rest of the south wing from this vestibule. The main entrances to all four of the senior officers' houses were situated on the secondary street which ran parallel to the *via principalis* to the south of the *scamnum tribunorum*.

The western half of the house was arranged on three sides of the colonnaded courtyard. The court occupied an area of 62 ft. (18.9 m) east-west by 48 ft. (14.63 m) north-south. Porticoes 8 to 9 ft. (2.4 to 2.7 m) deep ran around all four sides of the courtyard. A circular feature, provisionally identified as a well, was discovered near the south-east corner of the courtyard. This was, however, adjacent to, if not overlapping, one of the post-holes of the portico (FIG. 29) and, in view of this, it should probably be regarded as a feature belonging to the demolition phase. Moreover, the complete absence of any other identified wells within the fortress and the low level of the water-table on the gravel plateau argue against the identification.

In the centre of the northern side of the courtyard there appears to have been an intercolumniation of double width. This was also centrally placed in relation to the large room in the centre of the north wing which was identified as the *triclinium*. In the centre of this intercolumniation and spreading south-east into the courtyard a stone platform some 10 ft. (3 m) long was excavated (PL. XXII). The function of this platform is uncertain. Richmond suggested that it may have served as an augural platform; but one would not expect to find this in the living quarters of one of the junior tribunes. The literary evidence available associates augury rather with the commander and his tent (*praetorium*).¹⁰⁰ This is supported by the presence of altars

100. Schol. Veron. Verg. x. 241: *in tabernaculo in sella sedens auspicabatur* ('he was taking the auspices, seated on a chair in his tent'). (Note continued on p. 130.)



(Photo: I.A. Richmond)

Pl. XXIII Tribune's House No. I: 'auguratorial platform' (p. 129). Scales, 24 inches (two feet) and 6 feet.

in the *praetoria* of temporary camps, for example at Masada (Fellmann 1958: 96 f.). When the augury did not take place within the *praetorium* itself, it was carried out in close proximity to it, as Hyginus, Chapter 11, shows.¹⁰¹ In permanent fortresses the *auguratorium*, like the tribunal, was probably incorporated in the *principia* (although buildings possibly used as separate *auguratoria* have been identified at Vindonissa and Nijmegen (H. v. Petrikovits 1975: 76 f.)). There is no evidence to support the location of the *auguratorium* in a tribune's house. The platform must then be otherwise interpreted. It could possibly have served as the base for an altar, of a household rather than legionary nature; but its strange alignment in relation to the building makes this

Tacitus, *Annals* ii. 13. 1: (Germanicus) egressus augurali per occulta et vigilibus ignara. ('leaving his headquarters tent by a secret way unknown even to the guards').

Tacitus, *Annals* xv. 30.1: structam ante augurale aram subdita face accendi . . . ('why was the fire on the altar in front of the headquarters tent lighted with a torch?').

Quintilian, *Instit.* viii. 2.8: tertius est huic diversus modus, cum res communis pluribus in uno aliquo habet nomen eximium ut carmen funebre proprie 'nenia' et tabernaculum ducis 'augurale'. ('A third kind, different to the above, is when a common noun with many meanings has one especial reference; thus *nenia* is used for a funeral chant and *augurale* for a general's tent').

101. Hyginus, 11: Aris institutis in praetorii parte ima, auguratorium parte dextra praetorii ad viam principalem apponimus ut dux in eo augurium recte capere possit; parte laeva tribunal statuitur . . . ('The altars are placed in the rear part of the *praetorium* and the *auguratorium* in the right-hand part near the *via principalis*, so that the general may correctly take the augury there; in the left-hand part is placed the tribunal . . .')

TRIBUNE'S HOUSE I

Plan of NW corner

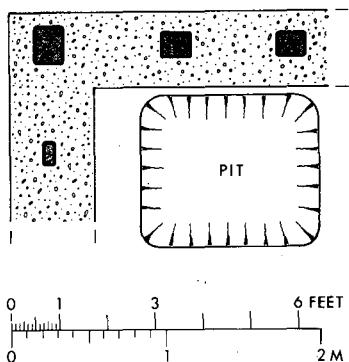


FIG. 30 Tribune's House No. I, detail. Scale, 1:48.

doubtful. Perhaps it formed part of a much larger paved area within the courtyard in front of the main entertaining room.

There was insufficient archaeological evidence to determine the function of each of the rooms surrounding the courtyard. The *triclinium* was identified by its position. The north-west corner room could be identified as the kitchen because of the large quantity of coarse-ware sherds discovered there.

The office section at the eastern end of the building has an almost exact parallel in the office block of House IV (FIG. 34). In both blocks a number of roughly equal-sized rooms opened off both sides of a north-south corridor 17 ft. (5.18 m) wide. The differences in the precise organization of these rooms visible on the plans merely reflect the fact that not all the internal divisions have been located. A central longitudinal trench was discovered in the corridor in both houses. In House I, at least, where both its ends were located, this trench did not run the full length of the corridor. The trenches are unlikely, therefore, to have been drainage channels for an open-air corridor. They may indicate the presence of an internal partition-wall intended to reduce noise and assist circulation in the corridor. The diagonal trenches in House I were very slight and are unlikely to have served any structural purpose.

The most thorough examination of the external construction-trenches was carried out at the north-west corner of the building. These trenches were found to be approximately 1 ft. 6 in. (0.46 m) wide and 1 ft. 3 in. (0.38 m) deep. Four post-holes for the main uprights were located; they were placed two to three feet (0.6 and 0.9 m) apart. The timbers themselves were approximately 8 in. by 6 in. (0.20 m. by 0.15 m) (FIG. 30).

Two ditches post-dating the house were found to cut through the construction-trenches in the south-eastern part of the building. Richmond, basing his opinion on the style in which the ditches were dug, suggested that they were later Roman features. The fill of the ditches contained no datable material. The purpose of such ditches during the demolition phase is obscure; they should perhaps rather be seen as post-Roman features, possibly field-boundaries.

HOUSE II (FIG. 31)

House II lay to the immediate west of House I in the left *scamnum tribunorum*. The two houses were separated by a 4-ft. (1.22 m) gap containing the eavesdrift. House II was bounded on its west and south sides by secondary streets (FIG. 82), and like House I occupied an area of 138 ft. (42.06 m) by 95 ft. (28.95 m). The internal arrangement of the rooms was, however, very different. The building was again divided into two separate sections, but each of these was organized around an internal courtyard.

The courtyard in the western section measured 40 ft. (12.20 m) east-west by 48 ft. (14.63 m) north-south. It was enclosed by a portico on its north, east and south sides but was separated from the street to the west by a simple wall. Rooms were arranged around three sides of the

courtyard. As in House 1 (p. 129), the main entrance appears to have been from the street to the south, where there was an 8 ft. (2.44 m) gap in the external construction-trench. This doorway opened into a long hall running the full length of this part of the southern range. A narrow corridor ran along the southern side of the courtyard. The space between the rear wall of the east portico and the front wall of the east wing is too narrow (*c.* 1 ft. 6 in. = 0.46 m) to have been a corridor. It suggests that the building was erected in sections rather than as a whole. The large room at the north-west corner of the building with its wide central doorway, which corresponds to the wider portico intercolumniation, is probably to be identified with the *triclinium*. Richmond suggested that the kitchen was located at the north-east corner of the living-quarters but there was no archaeological evidence to indicate the function of the rooms. The east wing was divided into a series of smaller interconnecting rooms.

The eastern half of the house was organized around a second courtyard. This court measured 38 ft. (11.58 m) east-west by 20 ft. (6.10 m) north-south. This was enclosed on all four sides by the trench for a wall. Several of the post-holes for the uprights were located in the construction-trench at the north-west corner; they were approximately 2 ft. (0.61 m) apart, much too close together for the columns of a portico. A corridor 9 ft. (2.74 m) wide ran around all four sides of the court; this may have had windows looking out on to the court.

At the western end of the open court was a water-tank, approximately 10 ft. (3.05 m) by 12 ft.

INCHTUTHIL TRIBUNE'S HOUSE II

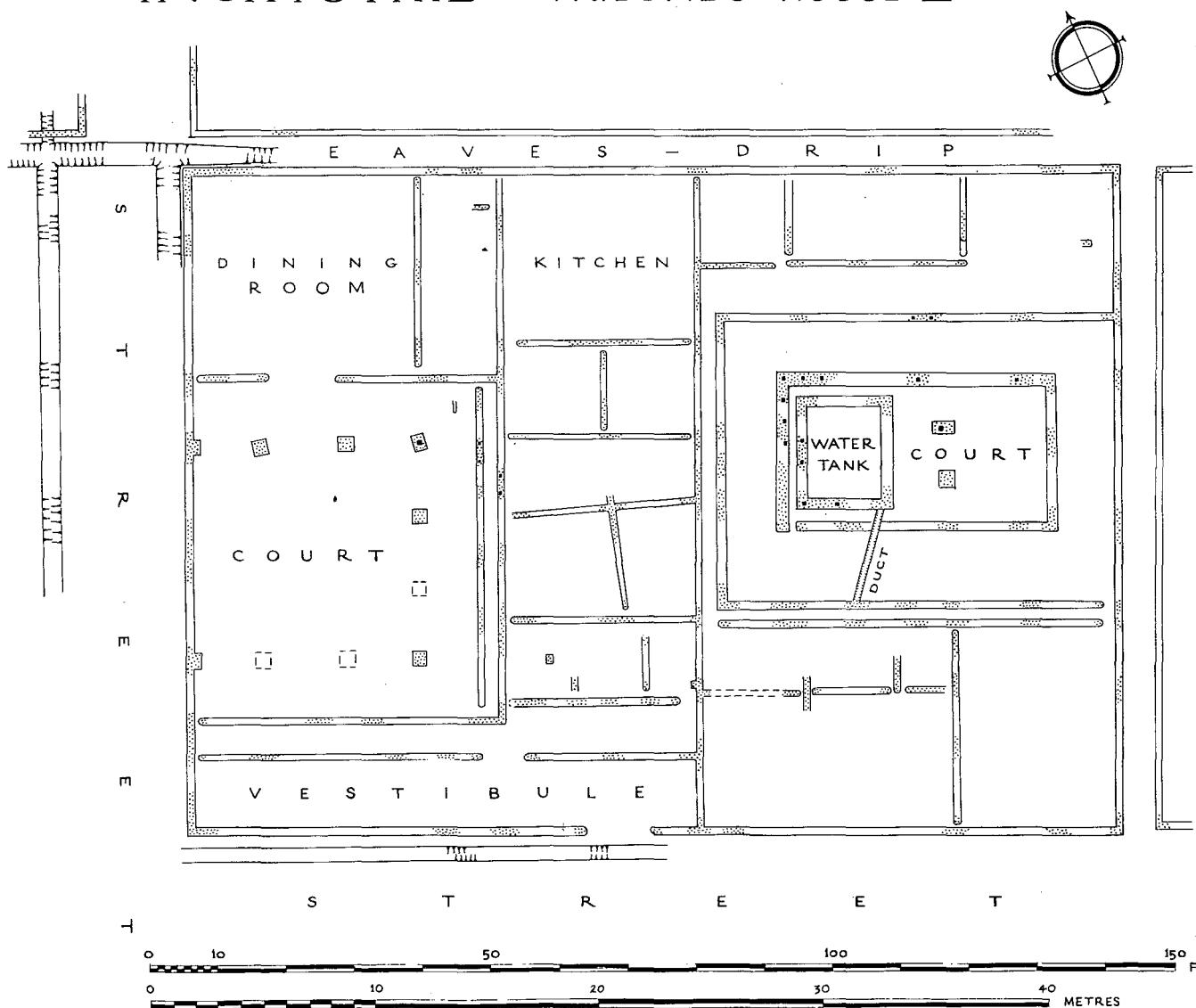


FIG. 31 Tribune's House No. II, plan. Scale, 1:300.

(3.66 m). This appears to have been timber-lined; the post-holes for some of the uprights to which the planking was fastened were located on the south and west sides. A duct led into the tank at its south-east corner; this probably carried rainwater from the narrow gap between the southern wall of the corridor and the northern wall of the rest of the building to the south. This gap was too narrow for a corridor and, as in the western half of the house, was probably the result of the method of construction, that is as individually-roofed sections (as at the hospital) rather than a whole. It is not certain whether the water-tank was open to the sky or whether it was covered, being fed by this duct alone. In the eastern half of the court two post-holes were discovered in a central position approximately 5 ft. (1.52 m) apart. The position of the post itself was located in the more northern of the two. The function of these posts is uncertain; they may indicate that this central area was roofed over or may perhaps merely represent a garden feature in an open court.

Both north and south of this central court and corridor lay groups of interconnecting rooms of varying size. On analogy with the other three houses, the eastern section of House II should be identified as offices while the western section with its typical plan served as the living-quarters. The eastern section, however, has a layout very different from the offices in the other three houses and, while the two groups of rooms mentioned above could have been offices, the function of the central area is difficult to determine. That the eastern section was the living-quarters of a second tribune (two officers sharing one building because of the lack of a sufficient number of houses) seems doubtful. The plan is not of the usual peristyle type, and once the second officer's proper house had been built this part of the building would have been impractical. The central area, if roofed over, may have served some religious purpose or, more probably, have been used as an audience-chamber by the tribune, much as the tribunal in the *principia*. If this were so, the water-tank must have been covered over and been concealed beneath the flooring. The water-tank may, on the other hand, indicate the presence of craftsmen of some kind. Schönberger (1979: 135 f.) has suggested that in auxiliary forts water-tanks are more commonly found in workrooms than in officers' houses.

In this area of the fortress a well-marked demolition layer existed in the space between this house and the *tabernae* and yielded an *as* of Domitan. This coin was dated at the time to the year 87 (JRS 1955: 123) but it was subsequently damaged by cleaning and this date is not now verifiable (p. 284, No. 7).

HOUSE III (FIG. 32)

House III lay in the right *praetentura*, at the junction of the *viae principalis* and *praetoria*; it was separated from the streets, as were all the officers' houses, by the *tabernae* (FIG. 81). Although it shares the same basic plan as Houses I and IV the dimensions of House III are appreciably greater, thus suggesting that it housed one of the most senior officers. In fact, it occupied an area of 165 ft. (50.30 m) east-west by 95 ft. (28.95 m) north-south. The extra space was given over to the living-quarters. The office block at the eastern end varied little in size from those in Houses I and IV: it too consisted of rooms opening off a north-south corridor.

As in the other houses, the living-quarters were organized around a central colonnaded courtyard which measured 85 ft. (25.9 m) east-west by 45 ft. (13.7 m) north-south. The main entrance was probably from the secondary street to the south. The functions of the individual rooms are uncertain but Richmond suggested that the rooms at the west and east ends of the northern wing served as kitchen and dining-room respectively. He also located the vestibule at the south-west corner of the building; as in House I, this was connected with a corridor running along the southern wing. A secondary entrance seems to have existed at the eastern end of the south wing, where a passageway ran from the court to the external wall.

The small room (10 ft. = 3.05 m by 5 ft. = 1.52 m) next to the vestibule was identified as a latrine. The pit for the latrine was fully excavated (FIG. 33); it was approximately 7 ft. (2.13 m) long by 3 ft. (0.91 m) wide and 4 ft. (1.22 m) deep and yielded a group of pottery sherds (p. 323). A drainage-channel ran into it from the south-east corner of the courtyard, presumably carrying rainwater from the court. This would not have provided the constant flow necessary for a flushed

INCHTUTHIL: TRIBUNE'S HOUSE III AND ADJACENT STORES

V I A P R I N C I P A L I S

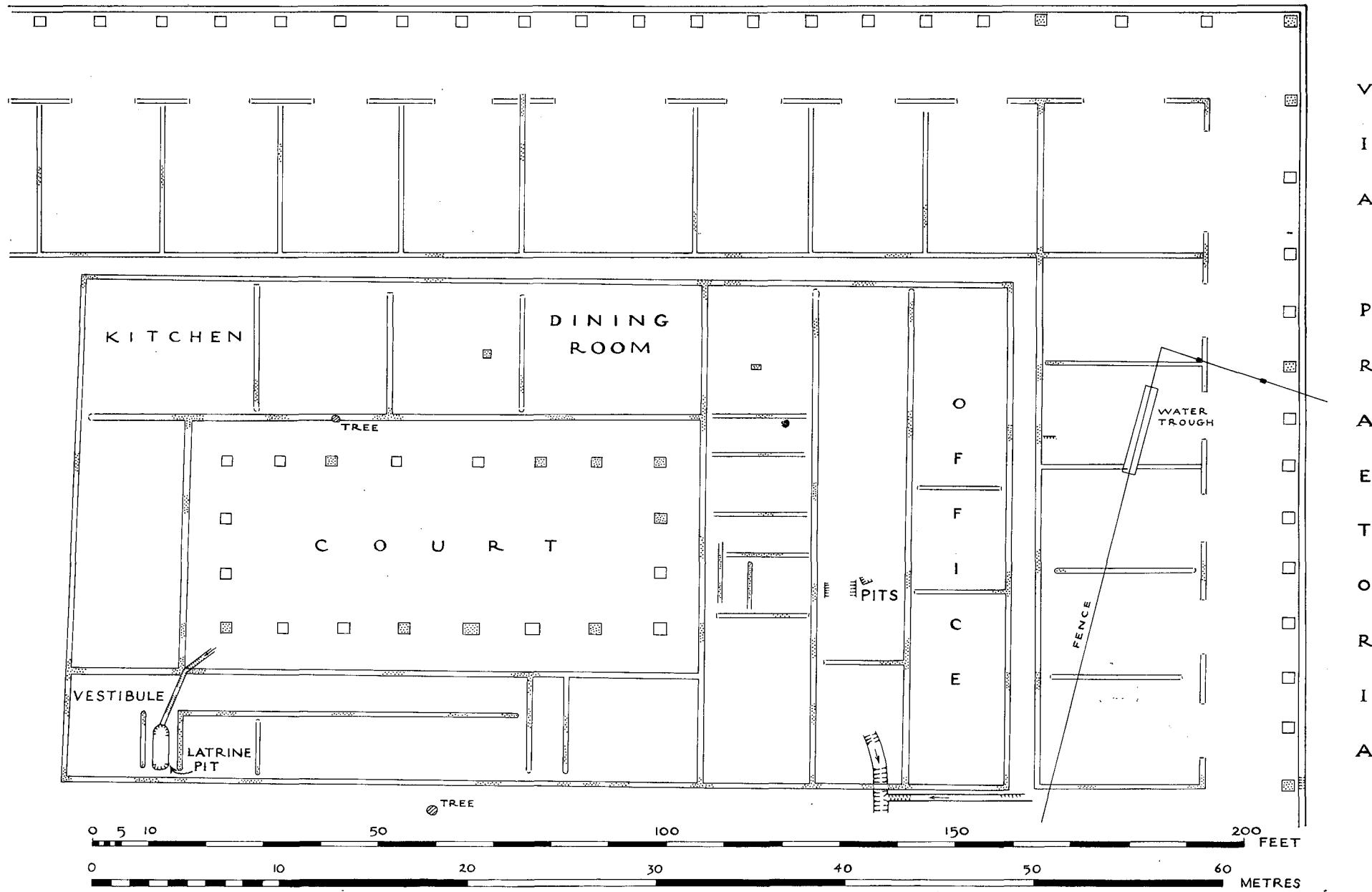


FIG. 32 Tribune's House No. III and adjacent *tabernae*. Scale, 1:300.

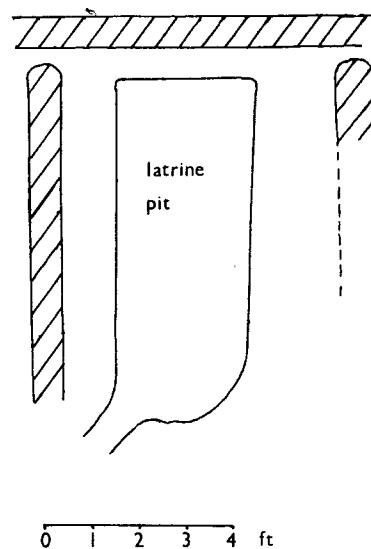


FIG. 33 Plan of latrine pit in Tribune's House No. III. Scale, 1: 48

INCHTUTHIL: TRIBUNE'S HOUSE IV

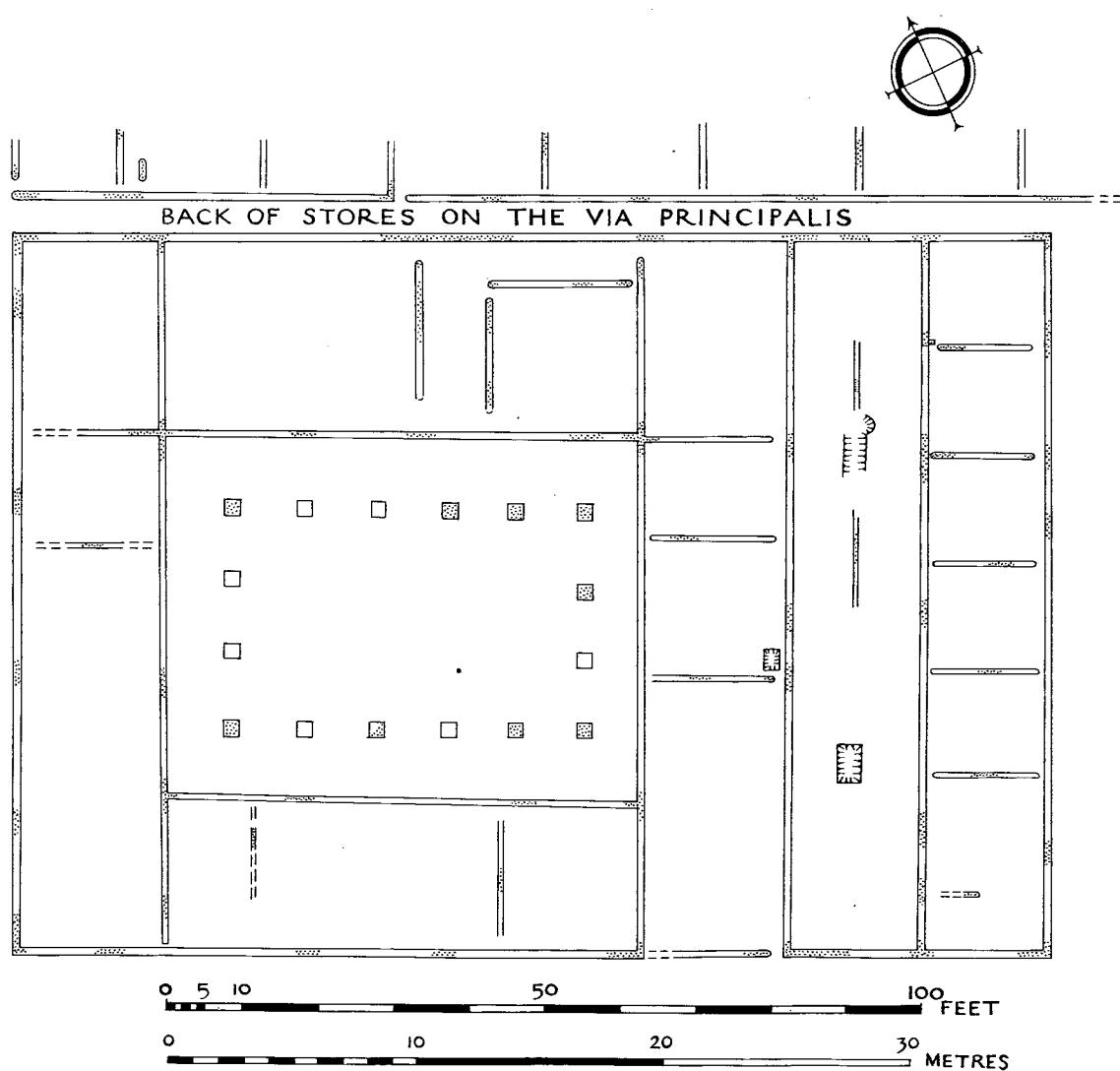


FIG. 34 Tribune's House No. IV, plan. Scale, 1:300.

latrine and there was, in any case, no outlet. If the room was a latrine, it was of the soakaway variety; the pit combined the function of latrine and soakaway for the courtyard drains. A wider drain flowing out of the office corridor and joining the street drain was also in use during the occupation of the house. This is to be distinguished from the trenches in Houses I and IV (p. 131). The origin of the drain was not traced.

HOUSE IV (FIG. 34)

House IV lay in the right *praetentura* separated from the west *intervallum* road by a space which was presumably reserved for another house (FIG. 81). It occupied an area of 138 ft. (42.06 m) east-west by 95 ft. (28.95 m) and thus had exactly the same dimensions as House I. The internal organization of these two houses was also very similar. This house like the others was divided into two sections; the eastern half, serving as offices, had a series of small rooms opening off a north-south corridor and the western half, the living quarters, was arranged around a central courtyard. The only differences in the plans of the two houses are to be noted in the size and layout of the rooms in the private quarters of the tribune; presumably the basic army plan could be adapted to an officer's individual requirements.

Evidence for the planned installation of a piped water supply was discovered here in the form of terracotta water-pipes (and there was evidence of a different kind at the so-called *basilica exercitatoria*, pp. 123, 189). These pipes at House IV were not, however, found in position; they were stray finds in the demolition debris and were probably not yet laid when Inchtuthil was abandoned.

The building, as a whole, had obviously been in use for some time before the abandonment of the fortress since its excavation produced a large quantity of Flavian coarse-ware.

B. TRIBUNES' HOUSES: DISCUSSION

Four peristyle-houses were excavated in the *scamnum tribunorum* at Inchtuthil. There was, in fact, ample space for another three or even four houses in the *scamnum* (FIG. 84), two between House II and the *via praetoria*, one between House IV and the west *intervallum* road and possibly one between Houses III and IV. The presence of a passageway between *Taberna*e 17 and 18 suggests that this last space, although large enough for a house, was not reserved for one since such passages elsewhere in the fortress lead into alleys running between buildings (as on the northern side of the west *via principalis*). Smaller buildings serving as stores and offices would probably have been erected on either side of the alleyway (compare the buildings found to the south of the west *scamnum tribunorum*, FIGS. 35, 36). Trial-trenching revealed no trace of any building on these empty plots, which seem to have been reserved for the officers' houses, in the same way that the large areas north and east of the *principia* were probably reserved for the *praetorium* and baths (see Chapter 16). The apparent reservation of plots for specific buildings has also been noted at Caerleon.¹⁰² There was, therefore, space allowed in the layout of Inchtuthil for seven, possibly eight, peristyle-houses for the senior officers of the legion, in addition to the legate's residence.

Elsewhere in the empire the full complement of officers' houses has been excavated only at Lambaesis. There, however, the precise number of houses cannot be determined because of the confused state of the various building-periods and the consequent impossibility of separating the plans of the individual houses; but there must have been at least seven houses at Lambaesis. Only two houses have so far been identified in the *scamnum tribunorum* at Caerleon, but Boon has suggested that space was allowed for seven. At Neuss four houses were excavated in the left *scamnum* and traces of three more were found in the right *scamnum*. An eighth house of similar dimensions and layout, situated to the rear of the left *scamnum tribunorum* has been ascribed by H. v. Petrikovits to the commander of the auxiliary unit, to whose barracks it is adjacent; but it is possible that this building may have been occupied by one of the officers of the legion; its

102. Boon 1972: 30 refers to the possibility of reserved plots for the baths, *praetorium* and *basilica exercitatoria*.

position corresponds to that of the so-called *basilica exercitatoria* at Inchtuthil (for the possibility that the *basilica* may have been an officer's house see above, p. 126). Two houses are known at both Vindonissa and Nijmegen, but the full complement cannot be estimated at either because of the unusual layouts of these fortresses. Two houses were identified at Carnuntum and the so-called *schola* probably represents a third, since its plan resembles that of a peristyle-house. Finally, seven houses have been excavated at Vetera; but twice this number were needed in this double-legionary fortress.

When an estimate can be made, then, it seems that adequate space for seven houses was allotted to the senior officers in the fortresses. There is, however, insufficient archaeological evidence as yet available to determine finally the number of officers' houses at any one site or to support the hypothesis that seven would eventually have been erected at Inchtuthil. On the other hand, an idea of the number of houses required can be obtained by considering the number of officers needing accommodation.

As well as the legate, each legion had six tribunes (one *laticlavus* and five *angusticlavii*) and, senior to the *angusticlavii*, a *praefectus castrorum*. The senior post of *praefectus fabrum* referred to in Vegetius ii.11 does not seem to have continued in existence much after the reign of Claudius (Dobson 1965: 61 f.). Vegetius presumably found the term, without explanation, in one of his sources and ascribed duties to this officer based on the etymology of the title. The duties described appear to overlap those of the *praefectus castrorum* (Vegetius ii. 10); Vegetius shows similar confusion over the role of the *praefectus legionis*.¹⁰³ There is no other evidence connecting the *praefectus fabrum* with the *fabri*; the epigraphical sources give no indication of his duties. Indeed, apart from Vegetius, there is no evidence to suggest the existence of a senior legionary officer called a *praefectus fabrum* after A.D. 69; later epigraphic references, when not referring to a civilian post, refer to a junior post at the very beginning of a military career. On the contrary, the literary sources of the Flavian period indicate that this did not exist as a senior post at this time.¹⁰⁴ The *tribunus semestris* does not seem to have been a regular officer of the legion. The epigraphic and literary evidence suggests that this post was a short-term honorific appointment, possibly on the staff of the provincial governor (Passerini 1949: 578 f.). Such an officer does not need to be taken into account when considering the provision of accommodation in the fortresses. Thus from the Flavian period onwards, in addition to the legate, there were seven regular senior officers in each legion and consequently a total of seven houses suitable to their rank must be assumed. The presence of additional vexillations or auxiliary units, as at Neuss, obviously necessitated provision of extra housing. No accommodation for such extra troops had yet been provided at Inchtuthil, although space may have been reserved for auxiliary barracks in the east *praetentura* (see p. 145). If an auxiliary unit was to be there, a house would be needed for its commander. Accommodation commensurate with his rank was required for the senior doctor, but this did not need to be in the *scamnum tribunorum* (see pp. 103, 145). At Inchtuthil there would eventually have been seven peristyle-houses in the *scamnum tribunorum* accommodating the *praefectus castrorum* and the six tribunes in addition to a large 'palace' for the legate in or behind the *latera praetorii*. There was space available in the west *scamnum* for another house should one have been required for an auxiliary commander. The fact that there was adequate space for seven, or possibly eight, houses further strengthens the improbability that the *basilica exercitatoria* was a house (see pp. 126-7).

Houses I, III and IV had roughly the same plan, but III was much larger than the other two while House II, although it had the same dimensions as I and IV, had a different plan. These

103. Dobson has shown that *praefectus legionis* is merely a contraction of *praefectus castrorum legionis* common from the second century A.D. onwards (1978: 69, cf. *CIL* viii 2587 and *AE* 1942-3, 37).

104. Tacitus, *Histories* ii. 89, describing the order of march of Vitellius's army into Rome: *ante aquilas praefecti castrorum tribunique et primi centurionum candida veste*. Josephus, *Bell. Jud.* iii 122, describing the legionary marching order: *μετὰ τούτους ἡγεμόνες τέ καὶ σπειρῶν ἔπαρχοι σὺν χιλιάρχοις ἐπιλέκτοις περὶ σφᾶς στρατιώτας ἔχοντες*. ('Then came the legates and prefects of cohorts and tribunes, with an escort of picked troops.') Although 'prefects of cohorts' is a literal translation of *σπειρῶν ἔπαρχοι*. A. v. Domaszewski (1967: 40) shows that *praefecti castrorum* are meant. There is no mention in these passages of the *praefectus fabrum* among the senior officers.

differences in size and layout might be assumed to relate to the degree of seniority of the officer accommodated in each. Such a clear distinction between the houses is not as evident elsewhere; on the contrary, the seven houses at Neuss appear to have been identical, as are those so far excavated at Nijmegen and Caerleon. At Carnuntum all three houses have different dimensions and planning, but their irregularity and confused plans make comparison with Inchtuthil difficult. The problem of identification of the individual houses at Lambaesis has already been referred to, but they do seem to vary in size. Cagnat (1913: 499 f.) states that the finest house was that near the *principia* at the corner of the *viae praetoria* and *principalis dextra*. Thus it occupies the position corresponding to that of the largest of the houses at Inchtuthil. These larger houses should perhaps be considered to be the residences of the *tribuni laticlavii* or the *praefecti castrorum*, the second and third most senior officers in the legions after the legate. Houses in the corresponding positions in other fortresses should be similarly interpreted even though their plans are not as distinctive; indeed, according to Boon's plan, the house in this position at Caerleon was probably larger than the others. The most natural position for the senior officers would be as near as possible to the *principia*, in the same way that the senior centurion of the first cohort was nearest to the *principia*.

At Inchtuthil the reserved area in the angle of the *vía praetoria* and the *vía principalis sinistra* is large enough for one normal-sized house and one of the larger size. Perhaps, then, one should imagine a larger house on each of the two corners facing the *principia*, belonging to the two senior officers, the *praefectus castrorum* and *tribunus laticlavius*, while the other smaller houses accommodated the *tribuni angusticlavii*.

The relative seniority of the legionary officers was established by A. v. Domaszewski as legate, *tribunus laticlavius*, *praefectus castrorum* and *tribuni angusticlavii*. He reached this conclusion on the basis of three inscriptions. *CIL* viii 18078 is a dedication by the senior officers of Legion III Augusta,¹⁰⁵ who are presumably listed in order of rank; the first and second of those named can be identified from other inscriptions as the *tribunus laticlavius* and *praefectus castrorum* respectively.¹⁰⁶ The *tribunus laticlavius* might perhaps be expected to have occupied the house to the right of the *principia* (that is, House III), since it was normal practice in the Roman army for the senior officer to be on the right. There is, however, no evidence as yet to confirm this hypothesis; such an arrangement would mean that the *praefectus castrorum* remained in the temporary compound throughout the occupation of Inchtuthil (but see Chapter 21) or that he was accommodated elsewhere in the fortress, perhaps in House II.

It is inconceivable that the *praefectus castrorum* was not present during the construction period; his very duties made his presence essential since he was responsible for the surveying and construction of the fortress, being in charge of the workmen.¹⁰⁷ Moreover the *praefectus castrorum* could be put in charge of sections of the legion in the absence of the legate and of the *tribunus laticlavius* (Dobson 1978: 71), as the well-known episode of Poenius Postumus during the Boudiccan rebellion illustrates (*Tacitus, Annales* 14, 37; cf. Syme, *Tacitus*: 764 f.). Thus it is possible that the prefect was the most senior officer present at Inchtuthil, at least in the initial phase. In the absence of the senior tribune House III can without much doubt be allotted to the prefect.

105. *CIL* viii 18078:

... to Legat(o)

Trib(.)

Flavius Balbus L.(.)

Teltonius Marcellus(.)

Licinius Secundus(.)

106. AE 1898, 12: *Genio tribunical. Q. Flavius Balbus trib. lat. mil. leg. III Aug. p.v.*

CIL viii 2666: *Frugifero Saturno Aug. sac. Ti. Teltonius Marcellus praefec. Leg III Aug p.v. v.s.l.n.*

107. Vegetius ii.9: *Erat etiam castrorum praefectus . . . ad quem castrorum positio, valli et fossae aestimatio pertinebat . . .* ('There was a prefect of the camp whose duties included the siting of the camp and the calculation of the rampart and ditch').

Tacitus, Annals xii. 38: . . . *praefectum castrorum et legionarias cohortis extruendis apud Silarus praesidiis relictas . . .* (. . . 'the camp prefect and legionary cohorts left to build forts in the territory of the Silures . . .')

Other accommodation suitable for the prefect is to be found in the house in the Officers' temporary Compound (p. 210; FIG. 57). This was a linear villa which included two rooms with stone-built sleeper-walls. Richmond suggested that the house in the compound accommodated both the *praefectus castrorum* and the *praefectus fabrum* (*JRS* 1965: 200), but more recent study has shown (as already pointed out, p. 137) that the latter was no longer a senior officer in the Flavian period. The compound was contemporary with the builders' camps and pre-dated the full occupation of the fortress, and the house was no doubt only intended for temporary use until permanent accommodation could be provided within the fortress. (For a full discussion of this house and its occupant see Chapter 21). Initially, at least, it was almost certainly occupied by the *praefectus castrorum*; he probably moved into the fortress when his house was finished, that is House III or, if this is assigned to the *tribunus laticlavius*, possibly House II (see above). The semi-permanent nature of the compound-house and the neighbouring bath-house indicate a longer period of use. The *praefectus castrorum* may have remained in the compound throughout, finding it more convenient for directing operations (thus leaving the houses in the fortress free for the tribunes) or, as is more probable (in view of the two periods archaeologically attested in the compound), the building may have become the legate's residence afterwards (see Chapter 21). A building on the scale of a *praetorium*, especially one in stone, would take a long time to construct, and work had progressed only as far as levelling the ground when the fortress was dismantled.

However the existing houses were allocated at Inchtuthil (and a final decision on this is impossible on the evidence available), it is clear that all eight senior officers of the legion were not yet present at the time of withdrawal or, at least, that proper accommodation had not yet been provided for them. A similar situation appears to have existed at Caerleon, where signs of early occupation are lacking on the sites of the *praetorium* and of two of the tribunes' houses (Boon 1972: 33 f.). At Caerleon there was also a delay in the construction of some of the barracks, and a vexillation was probably serving elsewhere. At Inchtuthil, on the other hand, all the barrack blocks had been completed and seem to have been occupied, to judge by such evidence as rubbish pits and ovens; thus the hypothesis that the missing tribunes were away in charge of a vexillation, possibly in Germany, is unlikely (p. 266). Some of the senior officers may have remained at Wroxeter with the bulk of the legionary records etc. and some clerical staff (see p. 222). Houses would have been erected for them at Inchtuthil if and when they finally moved north. A period of overlap between two successive fortresses is to be expected.

The variation in the plan of House II (p. 131) cannot be related to rank in the same way as the larger size of House III, especially if it houses one of the *tribuni angusticlavii*, who are not distinguished from each other in the literary and epigraphic evidence available. The fact that the other three houses, despite variations in size, shared the same basic plan makes the difference in House II even more striking. Uniformity of plan does not, however, seem to have been a feature of the officers' houses in the other fortresses. All the known houses appear to have incorporated a central court, but the layout and number of the rooms varied greatly from house to house and from fortress to fortress. The houses excavated at Vetera and Nijmegen showed greater uniformity of plan than those elsewhere. Furthermore the houses at Nijmegen bore the greatest resemblance to those at Inchtuthil; they too appear to have been divided into two sections, the residential quarters around a courtyard and the offices opening off a corridor. This similarity in plan is perhaps to be associated with the fact that the construction of Inchtuthil and the rebuilding of Nijmegen in stone took place at approximately the same time. Army surveyors at this time apparently all used the same basic plan for officers' houses; but variations in the layout of the living quarters, as in the centurion's quarters, reveal that allowance was made for the individual taste and requirements of the occupants. The amount of space needed for an officer's house also varied both within individual fortresses, where, as stated above, it reflects the occupant's rank, and between fortresses (see TABLE IV, p. 140).

The difficulty of determining the specific use of any one room within the private quarters has already been mentioned; the suggested functions must remain provisional. The identification of the main entrances and the vestibules in Houses I and II is reasonably certain, based as it is on the doorways clearly marked by breaks in the external construction-trenches. The kitchens were identified on the basis of the large amount of coarse-ware sherds found in them compared with

TABLE IV

COMPARATIVE AREAS OF OFFICERS' HOUSES IN DIFFERENT FORTRESSES

<i>Fortress</i>	<i>Area</i>
Inchtuthil I, II, IV	1218 m ²
III	1456 m ²
Neuss 54	1368 m ²
Carnuntum T	1224 m ²
Vetera I	1560 m ²
Vindonissa A	1280 m ²
Nijmegen	1600 m ² ?
Lambaesis	25 m long; width unknown

the rest of the houses (*JRS* 1955: 122 f.). Apart from the latrine in House III (p. 133) there was no archaeological evidence to suggest the function of any of the rooms around the courtyards or indeed in the 'office' blocks.

The division of Houses I, III and IV at Inchtuthil into residential and office areas is very clear from the plans. The offices cannot be so easily identified in the officers' houses elsewhere, but they must have existed. Office accommodation attached to each house is to be expected, since each of the tribunes as well as the prefect had their own *officium*. These *officia* are epigraphically attested (for complete lists see v. Domaszewski 1967: 39–40; 48; 49) but their existence could in any case be deduced from the large numbers of clerks etc. attached to each legion (*Vegetius* ii: 19), and the various responsibilities of the senior officers and the administration these would involve (*Vegetius* ii: 9–12). It is noticeable that the office blocks in Houses I, III and IV all have the same floor-area in spite of the larger size of the living quarters in House III. Thus the allocation of a larger house to the *praefectus* or *tribunus laticlavius* seems merely to reflect his higher social status and not the size of his *officium*. The actual sizes of the *officia* belonging to the different officers are not known; that of the *tribunus laticlavius* included a *cornicularius* and eleven *beneficiarii* (*CIL* iii 4558 and viii 2551), but whether this was the total number is uncertain since no complete list of his staff exists. The staff of the *praefectus castrorum* included a *cornicularius*, *beneficiarii*, a *librarius* and an *immunis* (*CIL* iii 3565 and *AE* 1899, 60). Of the *tribuni angusticlavii* the epigraphical evidence specifically mentions only the *beneficiarii* (*CIL* viii 2564), but other posts no doubt existed. Not all the *librarii* etc. mentioned on inscriptions without further qualification will have belonged to the *officium* of the legate: some will have served the other senior officers. The uniform size of the office blocks at Inchtuthil might suggest that the *officia* of all the tribunes and of the prefect were of equal size; but some of their staff could have been housed elsewhere depending on their specific function, and some of the buildings south of the west *scamnum tribunorum* could have provided offices for extra staff. The office blocks cannot, therefore, be used to solve the problem of the size of the *officia*.

In other fortresses office space for these men must have been provided, even though separate office blocks cannot be identified; perhaps rooms opening off one side of the courtyard were reserved for administrative use. The combination of residential accommodation and offices within one building seems to have been a normal feature of Roman military planning, presumably developing from the use of the *praetorium*, or commander's tent, in a temporary camp as the administrative headquarters. The camps at Masada, Peña Redonda and Castillejo all illustrate this combined usage (Fellmann 1958: 97). The close relationship between the *principia* and the *praetorium*, often with direct access between them, continued this practice in early forts and fortresses, for example Haltern. The inclusion of offices within an officer's house as at Inchtuthil is paralleled at Nanstallon, where one wing of the *praetorium*, which was built around three sides of a courtyard, was formed by a row of four equal-sized rooms identified as offices (*Britannia* 1972: 75 ff.).

The eastern half of House II at Inchtuthil with its striking divergence of plan remains a problem. If the house is assigned to a *tribunus angusticlavius*, the plan cannot reflect a difference in

status, since there was none; but it may suggest a difference in function. The usual office may have been arranged in this unusual manner for purely arbitrary reasons, but it seems more reasonable to assume that there was a purpose behind this change. The central area, probably a hall, could have served a religious purpose and might possibly thus be associated with the *auguratorium* referred to in Hyginus Chapter 11; but the close relationship between the *principia* and the *auguratorium* has already been pointed out (p. 130). The responsibility for augury seems to have belonged to the legate and there is no evidence to indicate a transfer of responsibility in permanent fortresses. The hall could have been used as an audience chamber. If this were so, the house would presumably have belonged to the tribune who was specifically responsible for giving the centurions of the legion their daily orders; the hall formed a suitable assembly point not available in the simple office blocks of the other houses.

House II may, however, have belonged to the *praefectus castrorum* rather than to a tribune. Although its size does not imply an occupant of higher rank than Houses I and IV, the functions of the prefect may have resulted in the unusual layout. The prefect would need a large amount of office space for the records associated with the various specialists in his charge. The central area of the eastern half would also have made a suitable drawing-office for the surveyors, builders and so on, if it had been roofed.

A third possibility, mentioned above, based on the presence of a water-tank, is that this part of the house was used not only by office staff but also by some kind of *fabri*. The duties of the tribunes listed in the Digest¹⁰⁸ do not include responsibility for workmen, and so if a tribune were the occupant an audience-chamber seems more likely than a workshop. The prefect did have such responsibility (Vegetius ii. 10 and 11), and a small group of specialists may have worked here under close supervision away from the main *fabrica*. If the *praefectus castrorum* moved from the compound to House II, rather than to House III, there is a shortfall in accommodation for the *tribuni angusticlavii*, only two houses out of five having been built. These tribunes may have temporarily shared accommodation or have been absent from Inchtuthil. If, on the other hand, a tribune occupied House II, the unusual plan is especially interesting since it suggests that a distinction of function existed among the *tribuni angusticlavii*. No such distinction is indicated in the literary and epigraphic evidence available; even the *laticlavius* is distinguished only by his social status and consequent rank. Inchtuthil thus offers possible new evidence on the senior legionary officers.

108. Digest xlix. 16. 12. 2: *officium tribunorum est, vel eorum qui exercitui praesunt, milites in castris continere, ad exercitationem producere, claves portarum suscipere, vigilias interdum circumire, frumentationibus commilitonum interesse, frumentum probare, mensorum fraudem coercere, delicta secundum sua auctoratis modum castigare, principiis frequenter interesse, querellas commilitonum audire, valetudinarios inspicere.* ('The duty of the tribunes or of the army commanders is to keep the soldiers in the camp, to lead them out on exercises, to hold the keys of the gates, to make occasional inspection of the pickets, to attend the distribution of corn, to inspect the corn, restrain dishonesty in those who measure it out, to punish offences in accordance with the measure of their authority, to attend frequently in the *principia*, listen to the disputes of their fellow soldiers and to inspect the sick.')

INCHTUTHIL: BUILDINGS ON W. SCAMNUM TRIBUNORUM
WEST GROUP

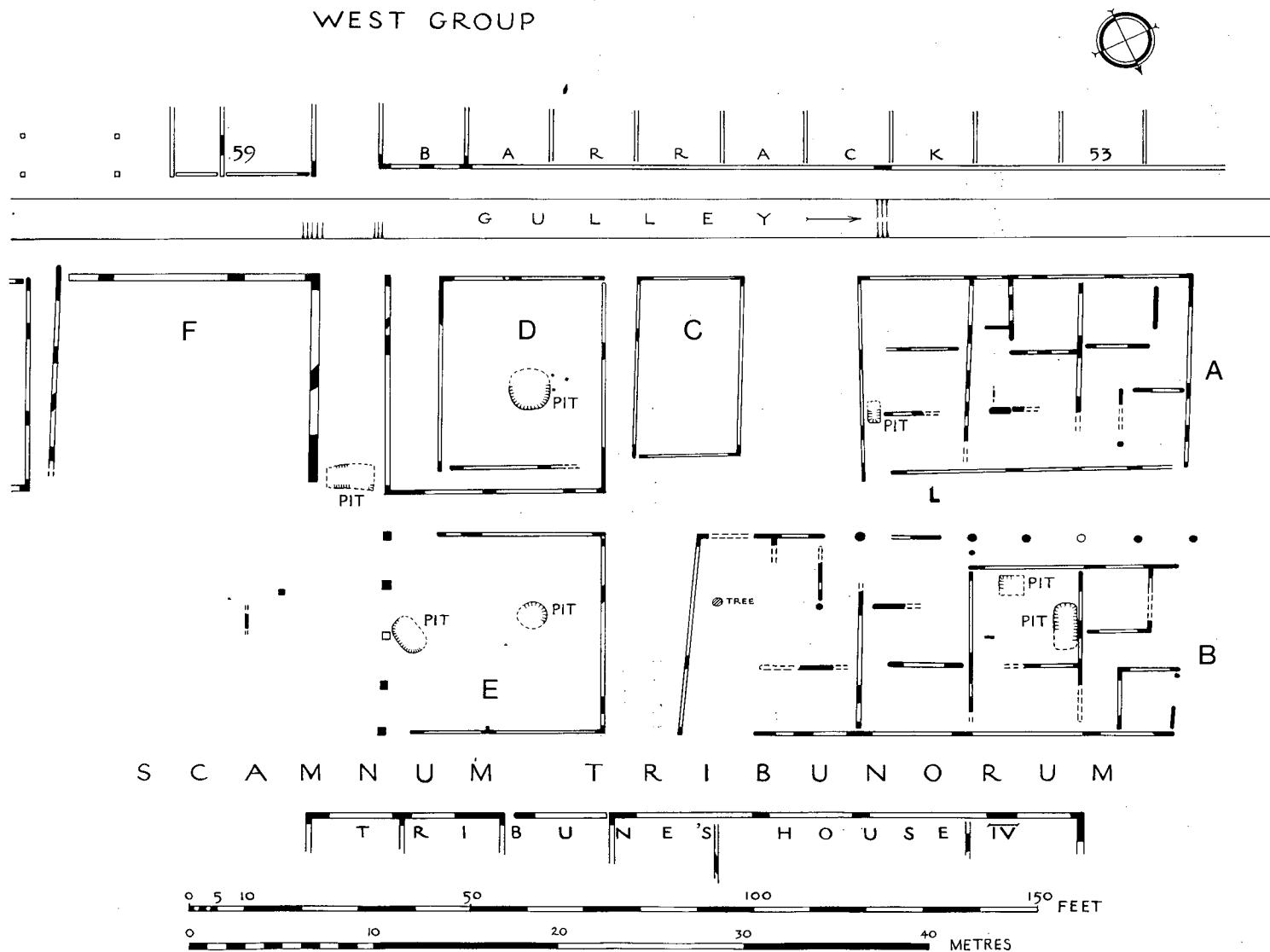


FIG. 35 Plan, western group of buildings on the western *scamnum tribunorum*. Scale, 1:360.

CHAPTER 11

THE BUILDINGS IN THE RIGHT PRAETENTURA TO THE SOUTH OF THE SCAMNUM TRIBUNORUM

The area to the immediate south of the *scamnum tribunorum* in both the western and eastern *praetentura* was cross-trenched to establish what, if any, buildings were present. In the east *praetentura* there was no trace of any building in this *scamnum* other than the so-called *basilica exercitatoria*. This was probably another area where construction was unfinished at the time of abandonment, for such a large space was unlikely to have been left free of buildings permanently; there are no such open spaces at Neuss, the only other fortress excavated in its entirety.

Excavation in the west *praetentura*, however, revealed a number of buildings of varying size and plan (FIGS. 84, 35, 36). Richmond described these as two house-like structures (A and B), two offices similar to the small building to the west of the *fabrica* (see p. 108; FIG. 79) and seven workshops or sheds. The individual function of these various buildings is difficult to determine. Various pits were excavated within these buildings. These produced the normal demolition-material, that is nails, some curved through withdrawal, clay, daub and timber. A suggestion that some small-scale metalworking may have taken place in at least one of the 'workshops' is given by the discovery of an iron bloom in Building D.

Similar clusters of miscellaneous buildings have not so far been discovered at other fortresses. The corresponding position at Neuss was occupied by the barracks of the auxiliary unit attached to the legion. At Lambaesis there was no space intervening between the *scamnum tribunorum* and the legionary barracks, although there were two groups of small buildings between the tribune-houses and the *fabrica* in the left *praetentura* and the store buildings in the right *praetentura*.

The various 'workshops and sheds' are presumably the equivalent of the *wirtschaftsbau vom bassartyp* (workshops of 'bazaar' type) identified by von Petrikovits in other fortresses, for example Neuss (1975: 94; fig. 26). The Inchtuthil buildings closely resemble individual sections of these large conglomerate buildings. Buildings A and B may also have served a similar purpose, since a series of intercommunicating rooms is not a feature of houses alone (the identity of the occupiers if they were indeed houses will be discussed below). Some of these buildings will almost certainly have provided extra office space for the staff of the tribunes, for example the row of three buildings facing the main entrance to House III (FIG. 36). The comparative dearth of *wirtschaftsbau* at Inchtuthil in relation to the other excavated fortresses supports the hypothesis that much of this area would eventually have been occupied by small workshops. There is no need to interpret any of these buildings as accommodation for the *immunes* of the legion, since these will all have been housed in their centurial barracks (see p. 171; Baatz, *Germania* 1977: 267).

Buildings A and B (FIG. 35) were both subdivided into intercommunicating rooms; Building A was rectangular in plan, measuring 60 ft. (18.3 m) east-west by 35 ft. (10.67 m) north-south; B appears to have been larger, nearly 90 ft. (27.4 m) long, but the exact layout at the eastern end is unclear. Part of the south side of B was fronted by a portico. It is perhaps possible that A and B formed one building, for there are traces of possible construction-trenches connecting the two at the eastern end of the open space between them; if this is so, the portico will have faced on to a narrow courtyard. One of these two buildings, or perhaps the two combined, may have housed the senior doctor of the legion, since he could not have been suitably accommodated in the hospital itself and there were no other suitable houses available in the fortress (Chapter 6).

INCHTUTHIL: BUILDINGS ON W. SCAMNUM TRIBUNORUM
EAST GROUP

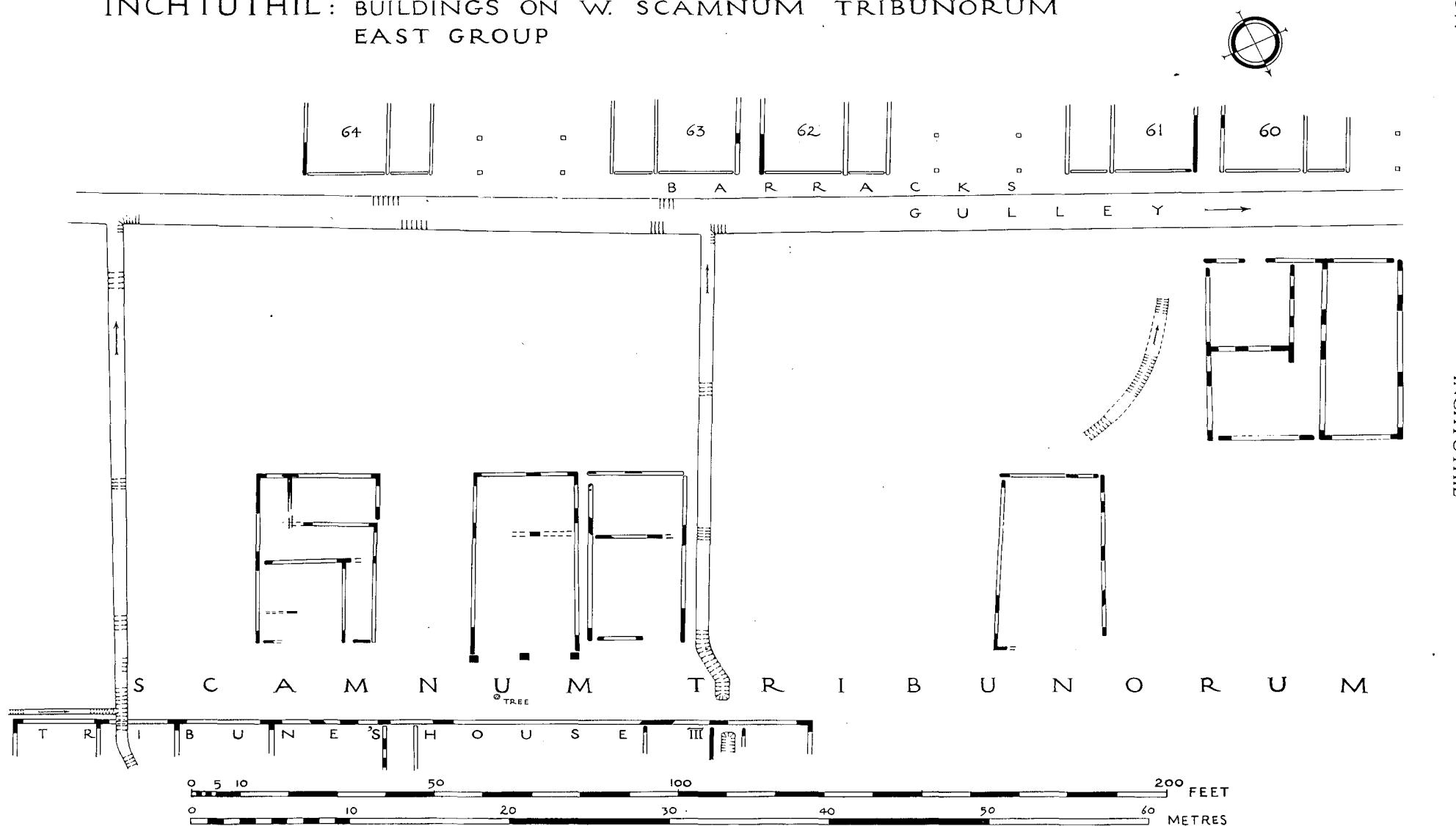


FIG. 36 Plan, eastern group of buildings on the western *scamnum tribunorum*. Scale, 1:360.

DISCUSSION

The evidence for the existence of a senior doctor has been discussed by V. Nutton (1968: 7 f.) and R.W. Davies (1969: 83 f. and 1972: 1 f.) with special reference to the doctors mentioned on two Greek inscriptions from Chester (*RIB* 461 and *JRS* 1969: 235 No. 3). These particular doctors may in fact have been the private doctors of the legates (see p. 102); but even so the existence of a legionary doctor of senior rank above the *medici ordinarii* and other hospital staff with the status of *immunes* is a reasonable assumption. Davies (1969: 91) suggested that this doctor, often a Greek, would have been of equestrian rank and he would, therefore, have required a house of a standard commensurate with his social status. The only suitable accommodation at Inchtuthil would be in these houses in the *praetentura*; the houses and empty plots in the *scamnum tribunorum* were only sufficient for the tribunes and prefect, although it is possible that there were enough houses in the *scamnum tribunorum* at Lambaesis to accommodate a senior doctor as well.

On the assumption that a senior doctor was housed in Buildings A and B at Inchtuthil, it is necessary to consider where such an officer could have been accommodated in other fortresses. The full number of officers' houses is not certain in any of them (p. 136), and thus a house of that type may have been provided for the doctor in some of them. On the other hand, buildings of a type similar to Buildings A and B at Inchtuthil have been excavated elsewhere. At Neuss, for example, there were at least two buildings of similar appearance and size in the left *praetentura*; one next to the *intervallum* road between the *tabernae* and the 'prison' and one between the auxiliary barracks and the *horrea*; the latter is described by v. Petrikovits (1975: fig. 6) as accommodation for the *immunes*. Similar rectangular buildings existed at Lambaesis in the right *praetentura* between the *scamnum tribunorum* and the store buildings, a location similar to that at Inchtuthil, and these too v. Petrikovits calls *Unterkünfte von Immunes* (*immunis*-accommodation). A rectangular building divided into rooms of varying sizes existed at Vindonissa between the *principia* and the hospital, again according to v. Petrikovits *Unterkünfte von Immunes*. The location of this building, its proximity to the hospital, supports the suggestion that it housed the doctor. Perhaps the same is true of the building only partially excavated and therefore of uncertain plan, at the rear of the *principia* at Bonn and adjacent to the hospital; again this building is labelled by v. Petrikovits as *Unterkünfte von Immunes*. If the *immunes* were accommodated in their centurial barracks, as will be argued below, p. 171 f., these miscellaneous buildings were not needed to house them, and they must be supposed to have served another purpose. Accommodation for the doctor was, however, necessary since he could not live in the barracks; it is therefore reasonable to re-interpret some of these buildings in the various fortresses in this way.

The areas devoid of buildings in both the east and west *praetentura* are unlikely to have been intended to remain so. The majority of the space at least will have been reserved for buildings which were never erected. The planned buildings may have been further structures similar to those already completed. Another possibility, on the analogy of Neuss, is that the space was reserved for the barracks of an auxiliary unit which was to be attached to the legion. The auxiliary barracks excavated at Neuss occupied a total area of 6150 m², 4050 m² in the left *praetentura* and 2100 m² in the right *praetentura*. There were eighteen barracks, each containing nine double rooms; when the officers' accommodation has been taken into account, there were approximately 130 rooms for the men, that is sufficient for a quingenary *ala*; the dimensions of the *contubernia* were similar to those of *contubernia* known to have been occupied by *ala* troops. There is, indeed, literary evidence for the presence of an *ala* at Neuss; Tacitus (*Histories* iv. 62) refers to the attachment of the *Ala Gallorum Picentiana* to Legion XVI at *Novaesium* in A.D. 70. (The fortresses at both Mainz and Bonn may also have included barracks for an *ala* since they are roughly the same size as Neuss (v. Petrikovits 1975: 57; compare G. Alföldy, *Epig. Stud.* vi: 144). At Inchtuthil a total area of 56,250 sq.ft. (5226 m²) was available for an auxiliary unit, 45,000 sq.ft. (4181 m²) in the east *praetentura* and 11,250 sq.ft. (1045 m²) in the west. Thus there was ample space for a quingenary cohort, probably part-mounted, if not for an *ala*. There was also space between the senior officers' Houses III and IV for a house for the officer in command of such a unit (see above p. 137). If an auxiliary unit were intended to be stationed at Inchtuthil it had

clearly not been installed before the fortress was abandoned since no attempt had been made to erect any buildings in these reserved areas. The lack of positive archaeological evidence means that such an intention cannot be proved, although it seems a strong possibility.

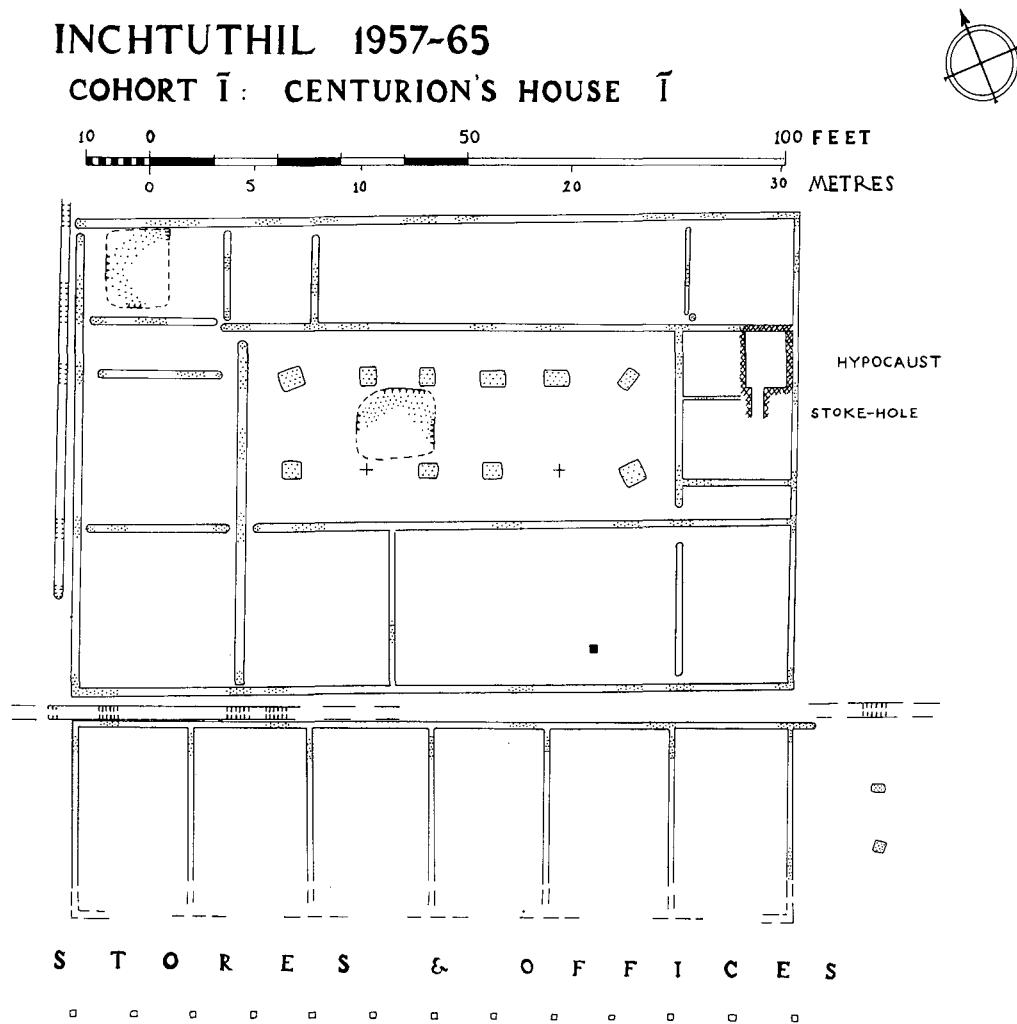


FIG. 37 Cohort I, House of the *primus pilus*. Scale, 1:360.

CHAPTER 12

THE HOUSES OF THE CENTURIOS OF THE FIRST COHORT

The five centurions of the first cohort were accommodated in the five courtyard houses situated in the right *latus praetorii* between the barracks of the first cohort and the *tabernae* lining the *via principalis* (FIG. 79). These houses were much larger than the corridor-houses of the centurions of the other cohorts (FIG. 84); their area was at least twice that of the normal centurion-houses. This difference in size gives a clear indication of the senior status of the occupants.

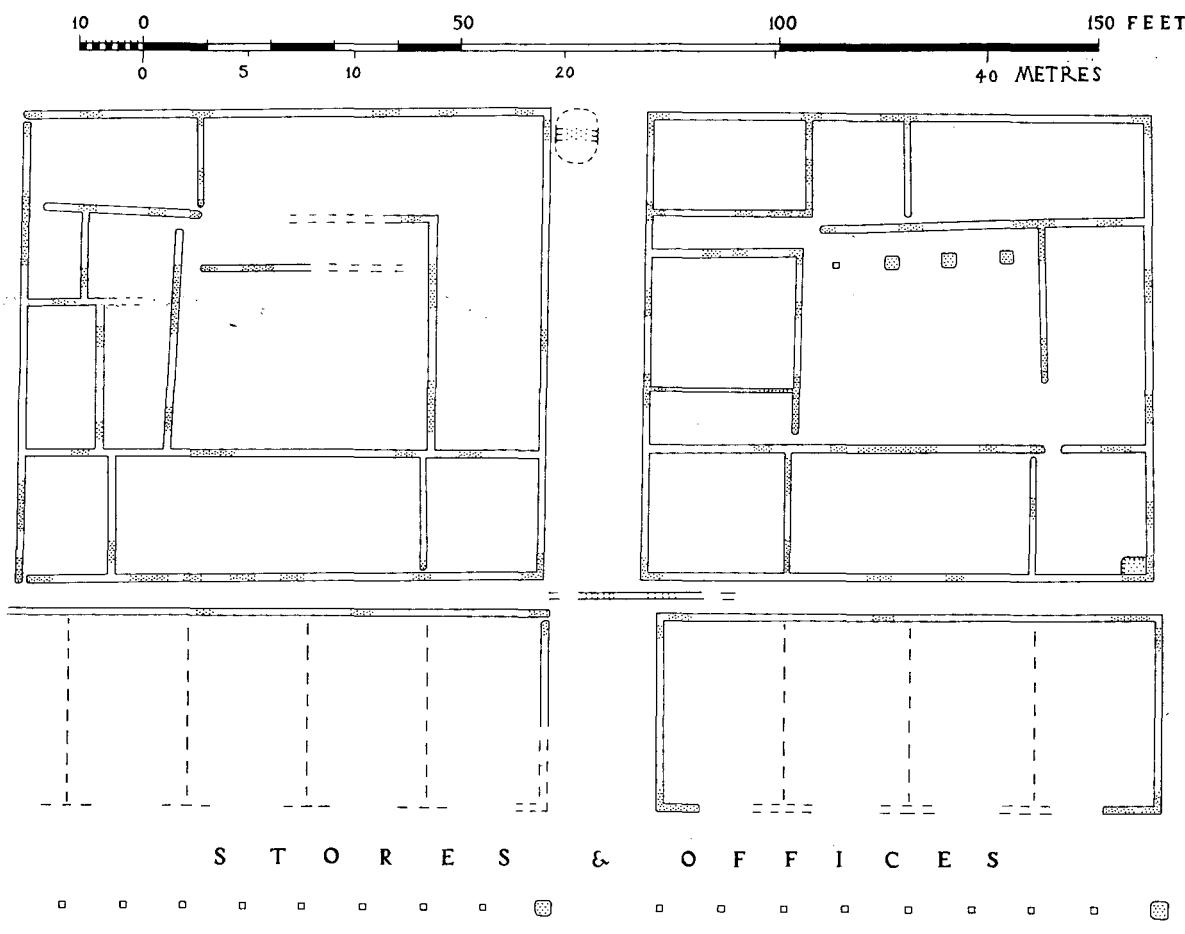
Four of the houses, that is those of the *princeps*, *hastatus*, *princeps posterior* and *hastatus posterior*, were of approximately uniform size, measuring c. 82 ft. (25 m) east-west by 62 ft. (18.9 m) north-south, giving an area of 5084 sq. ft. (472 m²). The fifth house, that nearest to the *principia* and presumably the quarters of the *primus pilus*, was larger; it measured 115 ft. (35 m) east-west by 62 ft. (18.9 m) north-south, occupying an area of 7130 sq. ft. (662 m²). Boon (1972: 88) suggested a similar arrangement at Caerleon, where three houses (each approximately 20 m by 25 m in size) have been excavated, leaving space for a further two, one of greater dimensions. The houses of the centurions of the first cohort at Nijmegen also varied in size; three of these had an area of c. 460 m² while the other two were larger, with c. 500 m² and c. 690 m² respectively; the *princeps* as well seems to have received extra accommodation here. The houses in these three fortresses were noticeably similar in size,¹⁰⁹ suggesting that an appropriate space-allowance for the senior centurions had been established in Roman legionary manuals. The houses belonging to the centurions of the first cohort have also been excavated at Carnuntum and Lambaesis; but at both these fortresses the plans are too confused to determine the dimensions and relative sizes of the individual houses. The comparable houses have not so far been located in the other fortresses.

All five houses at Inchtuthil, like those known elsewhere, had rooms of varying sizes situated around four sides of a central courtyard (FIGS. 37–39, 43). The dimensions and internal divisions were established in the four smaller houses by means of cross-trenching to locate the cross-walls and wall-junctions. The house of the *primus pilus* was more thoroughly investigated (FIG. 37). Its courtyard was larger than the others and was surrounded on four sides by a colonnade, most of the post-holes for which were located. A similar four-sided portico existed in House V (FIG. 39); in Houses III and IV no post-holes were found in the courtyards despite search, while in House II a portico was found only on the north side of the courtyard (p. 53).

All five houses, and particularly those with peristyles, have a close resemblance to those of the senior officers of the legion but are appreciably smaller, as befits the lower rank of the occupiers. The houses of the *tribuni angusticlavii* occupied approximately 13,110 sq. ft. (1218 m²) but the actual living-quarters, as opposed to the office blocks, covered only 8,820 sq. ft. (819 m²); the living-quarters were thus only slightly larger than the house of the *primus pilus*. Some, at least, of the rooms in the centurions' houses must, however, be assumed to have been used as offices although, since the centurions' subordinates did not form individual *officia* but were part of the *tabularium principis* and thus worked in the *principia*, the need will have been less than among the tribunes' staff. The very size of these centurions' houses in relation to the houses of the junior

109. The house identified as that of the *primus pilus* at Longthorpe was of comparable size, 6210 sq. ft. (577 m²) (*Britannia* 1976: 35).

INCHTUTHIL 1957-65
COHORT I: CENTURION'S HOUSES III & II



JKSt J mensit

delt DRW

FIG. 38 Cohort I, Centurions' House II (right) and III (left). Scale, 1:360.

tribunes is significant of the senior rank of the centurions of the first cohort and their resulting social rank; on retirement they acquired equestrian status. But the relative sizes of the private quarters of these five centurions were not indicative of any great distinction in rank between them.

Vegetius (ii. 8) divided the men of the first cohort among the five centurions as follows: *primus pilus*, 4 centuries (400 men); *primus hastatus*, 2 centuries (200 men); *princeps* and *secundus hastatus*, 1½ centuries (150 men); and *triarius prior*, 1 century (100 men). Such a division is not, however, reflected in the layout of the first cohort's accommodation at Inchtuthil. Each of the centurion-houses of the quingenary cohorts was closely associated with one barrack block; but the houses of the five senior centurions do not stand in such an obvious relationship to the ten barracks. The plan of Inchtuthil does not support the Vegetian division; rather it suggests that each centurion was responsible for two centuries. The area occupied by the centurions of the first cohort at Inchtuthil was almost double that occupied by the centurions of other cohorts,¹¹⁰ this seems to have been so at Caerleon and Lambaesis also. Similarly Hyginus allotted twice as much space to the centurions of the first cohort in his marching-camp. (For a full discussion of the size of the first cohort see p. 164).

The function of the individual rooms in the houses cannot be determined. Each house can be assumed to contain a dining-room, sleeping-quarters (not only for the centurion but also for his

110. Five centurions of first cohort: 35,200 sq. ft. (3270 m²).

Six centurions of a quingenary cohort: 18,200 sq. ft. (1691 m²).

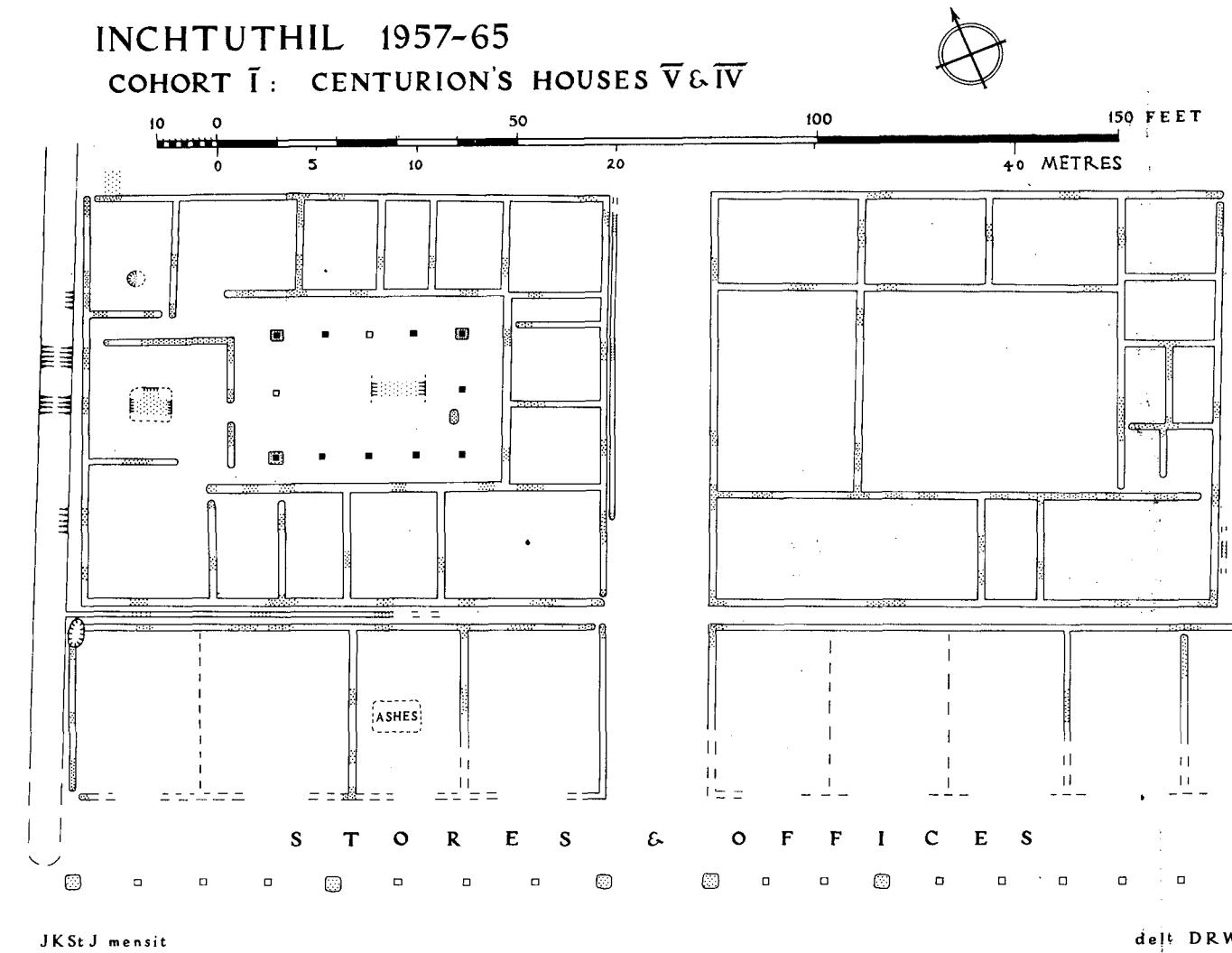


FIG. 39 Cohort I, Centurions' Houses IV (right) and V (left). Scale, 1:360.



(Photo: I.A. Richmond)

Pl. XXIV Hypocaust in the house of the *primus pilus*, looking north. Scale in feet.

servants and some of his staff) and also offices. The four smaller houses were situated in pairs on either side of two streets leading from the *via principalis*; the main entrance to each was presumably on these streets.

The most remarkable feature of these houses is the hypocaust (PL. XXIV) found in the eastern wing of the house of the *primus pilus* (FIG. 37). It is very rare for a timber building to include a hypocaust. The presence of one in the house of this officer indicates his seniority and importance, and perhaps his age. The hypocaust formed half the floor area of one of the smaller rooms which could have served as either the office of the *primus pilus* himself or as his sleeping-quarters; the former seems more probable. The room was located near to what was presumably the main entrance to the house; another entrance existed on to the street to the west; but the eastern entrance corridor was the most convenient for the *principia*. The hypocaust floor did not form a rectangle but occupied an area approximately 7 ft. 6 in. by 5 ft. 6 in. (2.3 m by 1.7 m). It was carried on supports made of Gourdie stone, as used for the fortress wall. There were originally four courses of stones, each c. 3 in. (0.08 m) deep, and these are still preserved in places, especially on the south side. The floor-level itself was about an inch above the stones. The system was fed by a flue 20 in. (0.5 m) wide from the south. The small room to the south probably served as a stoke-room. The only other hypocausts discovered at Inchtuthil were in the senior officer's residence in the temporary compound (p. 210).

CHAPTER 13 THE BARRACKS

A. DESCRIPTION OF THE EXCAVATED REMAINS

Excavations between 1952 and 1960 established the position of some 65½ barrack blocks, all of which followed the normal Flavian pattern of a double row of rooms fronted by a veranda. Of these, 54 were arranged in groups of six, that is in three facing pairs, around the perimeter of the fortress, *per strigas* and *per scamna*; the centurions' quarters were always positioned on the *intervallum* street (FIG. 84). These barracks presumably represent the nine quingenary cohorts of the legion. Inchtuthil is the only legionary fortress where the entire plan is visible with all the barracks clearly divisible into cohortal groups of six. The remaining 11½ blocks were in the *latus praetorii* to the right of the *principia*. These were aligned *per strigas* and thus did not have direct access to the *via sagularis*. A normal-sized centurion's house was not attached to each block here; instead the barracks were separated from the *taberna*e lining the *via principalis* by a row of five courtyard houses (p. 147). The western ten blocks were assumed to belong to a first cohort of double strength; an extra 1½ blocks lay nearest to the *principia*.

All the barracks were built of timber in the normal first-century manner (FIG. 41). The uprights for both the external walls and the internal partitions were set into construction-trenches cut into the subsoil. The timbers had been removed on abandonment. The trenches and post-holes form the archaeological evidence for the plan of the structure. All the trenches were cut with straight, vertical sides in the manner customary in legionary work. The external trenches were 2 ft. to 2 ft. 6 in. (0.61 m to 0.76 m) wide and up to 2 ft. 6 in. (0.76 m) deep; the partition trenches were approximately 1 ft. (0.30 m) wide. The veranda roof was carried on posts c. 6 ft. (1.83 m) apart, set in individual post-pits approximately 2 ft. (0.61 m) across. The structural remains are thus similar in type to those discovered at Fendoch (PSAS 1938/9: 114–5). The men's quarters were presumably roofed with shingles or other perishable material; but the centurions' quarters, at least those in the north-east corner, appear to have been roofed with tiles. Some large unstamped tiles of fired clay were discovered during excavation of the *intervallum* in this area. The barrack floors were of beaten earth, with what appear to have been rectangular storage pits dug into them; similar pits are common in timber forts. Rubbish pits had been dug along the veranda, one per *contubernium* (PL. XXVIII, FIG. 41); their shape suggests that they were wicker-lined; a removable basket would make emptying easier. These pits were mainly used for food refuse; their contents included animal bones.

The majority of the barracks in the rest of the fortress were 'identified and planned in outline' (Richmond, JRS 1961: 160). In several places the barrack blocks were identified by cutting a single trench across them to locate the three longitudinal construction-trenches. This established the width of the building and probable function but not the length nor the internal divisions. The positions of some centurions' quarters were established by the location of the four corners of the building, but the construction-trenches of others were only investigated at one end of the building.



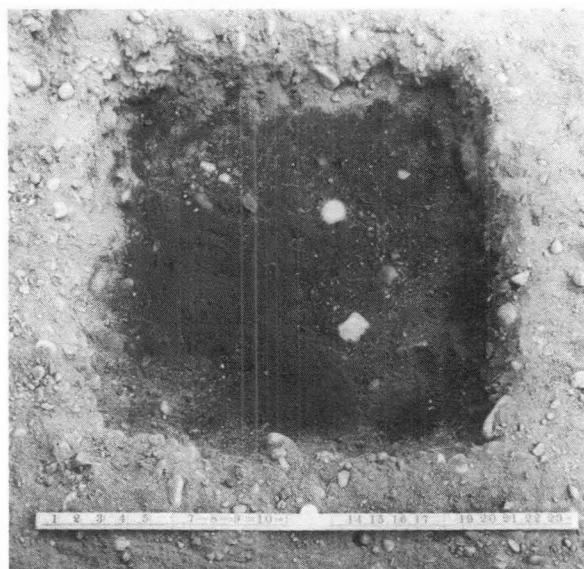
(Photo: Cambridge University Collection: Ministry of Defence, Crown copyright reserved (DD 73), July 1949).
Pl. XXV Barracks 1-12 in the south corner of the fortress showing in drought-parched grass (1949): looking west to the *via praetoria*. The south-west wall of the fortress is seen (left) as a broad white line.



(Photo: Cambridge University Collection (AZJ 20), July 1969, copyright reserved)

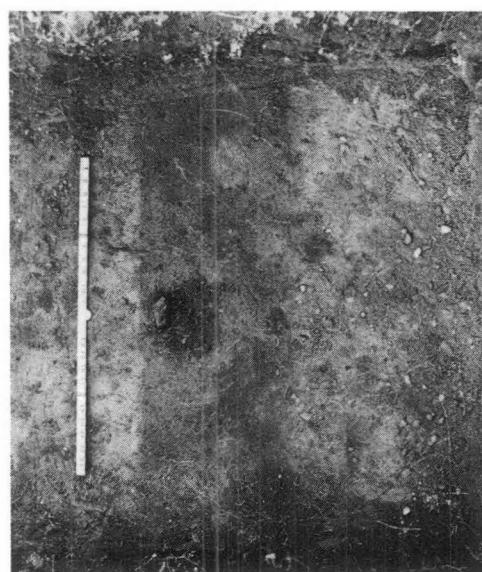
Pl. XXVI Barracks 1–12, looking west north-west. Crop-marks reveal lines of rubbish-pits in the verandas of Barracks 7–12, Granary No 1 in the background, and the prehistoric ritual earthwork (p. 248) running obliquely to them.

More detailed investigation was carried out on the barracks in the *latera praetorii*, both the 11½ to the right of the *principia* and the 6 arranged *per scamna* on the east *intervallum* street (FIG. 79, 80). Air photographs taken of the site are of use in determining the internal planning of the blocks (PLS. XXV, XXVI). These photographs reveal construction-trenches, veranda-posts and pits belonging to the barracks in the south-east corner of the fortress. The men's quarters are seen to be divided into the series of double rooms of normal *contubernia*. Richmond assumed that a standard pattern was used for the barracks throughout the fortress and his plan (FIG. 84) depicts all the barracks and their internal arrangements restored in accordance with the above evidence. Excavations at other fortresses suggest, however, that all the barracks were not necessarily of a uniform plan or length. For instance, instead of a series of *contubernia* of uniform size, rooms of larger dimensions or with different internal divisions are known to exist at the end of blocks, for example at Gloucester, Neuss and Vetera. These perhaps accommodated the *principales*, who would have received extra space in accordance with their higher status. Barrack lengths are also known to have varied within a fortress, for example at Bonn and Caerleon. It is, therefore, possible that the barrack-blocks at Inchtuthil were not so entirely uniform as is suggested on the general plan.



(Photo: I.A. Richmond)

Pl. XXVII A Barrack No. 18, veranda post (p. 151). Scale: 24 inches (two feet).



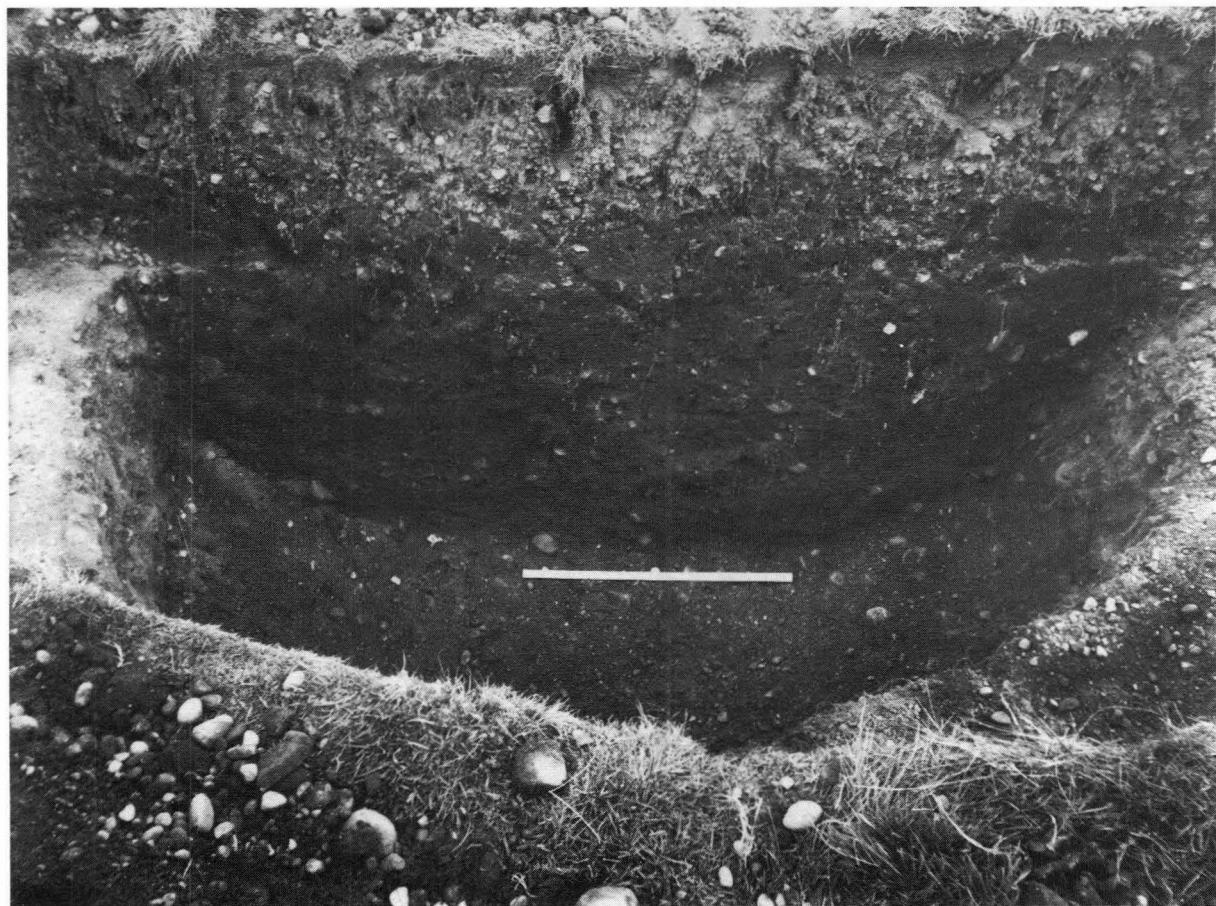
(Photo: RCAHM (Scotland): Crown copyright)

Pl. XXVII B Barrack No. 42, west wall-trench, showing post-hole for upright (p. 151). Scale: 24 inches (two feet).

1. DESCRIPTION OF THE BARRACKS OF THE NINE QUINGENARY COHORTS
 (Nos. 1 to 42 and 53 to 65 – FIGS. 79–84)

In every case the men's quarters were separated from the centurions' by an alleyway; this varied between 5 and 12 ft. (1.52 and 3.66 m) in width. This alley should be borne in mind when comparing the overall lengths of barracks, including the centurions' quarters, from different fortresses; a more accurate comparison is that between the lengths occupied by the *contubernia* alone (TABLE V, p. 173). In most fortresses the centurions' quarters were connected to the rest of the barrack block; but at Colchester, Gloucester and Chester and possibly at Wroxeter the two formed separate buildings, as was also the case in the eastern part of Haltern. H. von Petrikovits (1975: 62) suggests that the alleyway was a first-century characteristic; but this does not seem to be a universal rule, since such alleyways did not exist at Neuss or in the early timber period at Vindonissa, both of which are first-century in date. The existence of alleyways is more probably to be connected with the idiosyncracies of the surveyors of the individual legions. It is interesting that Colchester, Wroxeter, Inchtuthil and Chester (the stone period) can all be assumed to have been built and occupied by Legion XX Valeria Victrix.

The overall length of the barrack-blocks was, on average, 275 ft. (83.82 m), of which the centurions' quarters occupied between 66 and 73 ft. (20.10 and 22.25 m), that is approximately one quarter of the total length; this is a somewhat smaller percentage than in the other fortresses, where the centurions received closer to a third of the overall length, although the centurions' quarters at Wroxeter were again only 60 to 70 ft. long. The centurions' quarters at Inchtuthil varied between 34 and 38 ft. (10.36 and 11.58 m) in width. In most cases the longer centurions' houses were separated from the *contubernia* by a narrower alleyway. The area of the centurions' houses varied between c. 2,300 and 2,650 sq.ft. (214 and 246 m²). This, as is to be expected, is less than the total area of the centurions' houses in the stone-built fortresses (the area of ground needed for a timber building is less than that needed for a stone building of similar internal



(Photo: I.A. Richmond)

Pl. XXVIII Barrack No. 18, rubbish-pit at west end of veranda (p. 151). Scale: 24 inches (two feet).

dimensions because of the relative wall-thicknesses involved) but the difference in area is greater than can be explained by the building-material; moreover, the internal area of the centurions' houses at Chester and Caerleon is still greater than the total area at Inchtuthil (TABLE VI, p. 174). Within Britain the fortresses of earlier date have smaller centurion-quarters, while centurions generally seem to have received a smaller space allowance in Britain than on the continent. It has been noted in the past that auxiliary units in Britain were allotted less space than those in Germany. The reason for this discrepancy is unknown.

In the majority of the centurions' houses at Inchtuthil only the external dimensions were established, and in some even these dimensions are uncertain; but more detailed work was carried out on those in the left *latus praetorii* (Nos. 13–18), while in the left *praetentura* near the *porta praetoria* much detail of Nos. 1–6 was revealed by aerial photography (FIGS. 40, 82). The internal planning was not uniform but, as in other known fortresses, the basic pattern of rooms leading off a central corridor was used throughout. The peristyle-house was, as elsewhere, confined to the centurions of the first cohort. In normal centurions' quarters the number and size of the rooms varied from house to house; facing pairs were reasonably alike (FIG. 41). The variations indicate the possibility of adapting the standardized layout to individual requirements.

Baatz (1973: 56 f.) suggested a connection between the position of the different centurions' houses in an auxiliary fort and the relative seniority of these officers. He showed that in any pair of barracks the senior centurion was on the right to someone looking along the barracks towards the centurions' quarters and, subject to this, the senior centurion of a unit was on the right when looking in the direction of the fort's orientation. He based this theory on the different sizes of the centurions' houses in the *numerus* fort at Hesselbach and supported it with reference to Valkenburg I, Pen Llystyn and Hod Hill. The larger officer-house is on the right of the pair of cavalry barracks at Hod Hill and of each pair of barracks in the *praetentura* at Pen Llystyn; but this is not so in the *retentura* at the latter where all appear to be the same size. Valkenburg I is not a

INCHTUTHIL: CENTURIONS' QUARTERS 13, 15 & 17

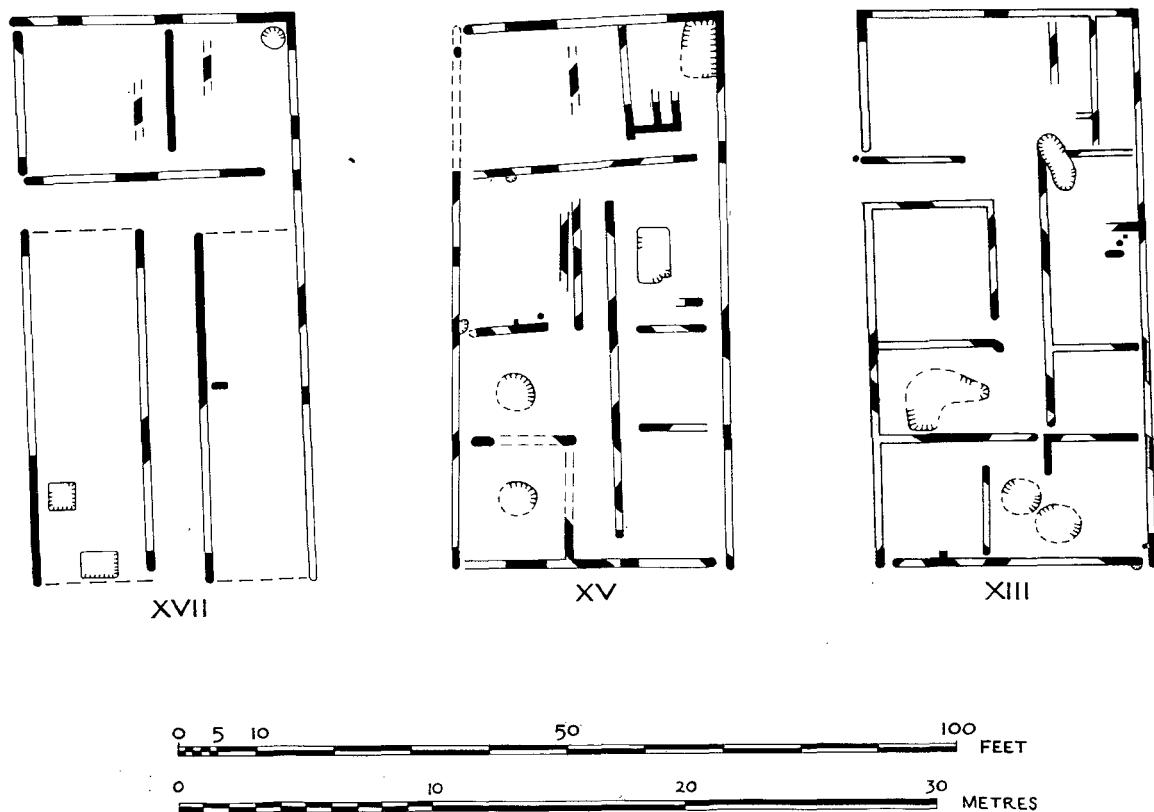


FIG. 40 Centurions' Houses in Barracks 13, 15 and 17. Scale, 1:300.

INCHTUTHIL

NORTHERN PAIR OF SIX BARRACKS, NORTH OF THE
VIA PRINCIPALIS, ON THE EAST INTERVALLUM ROAD

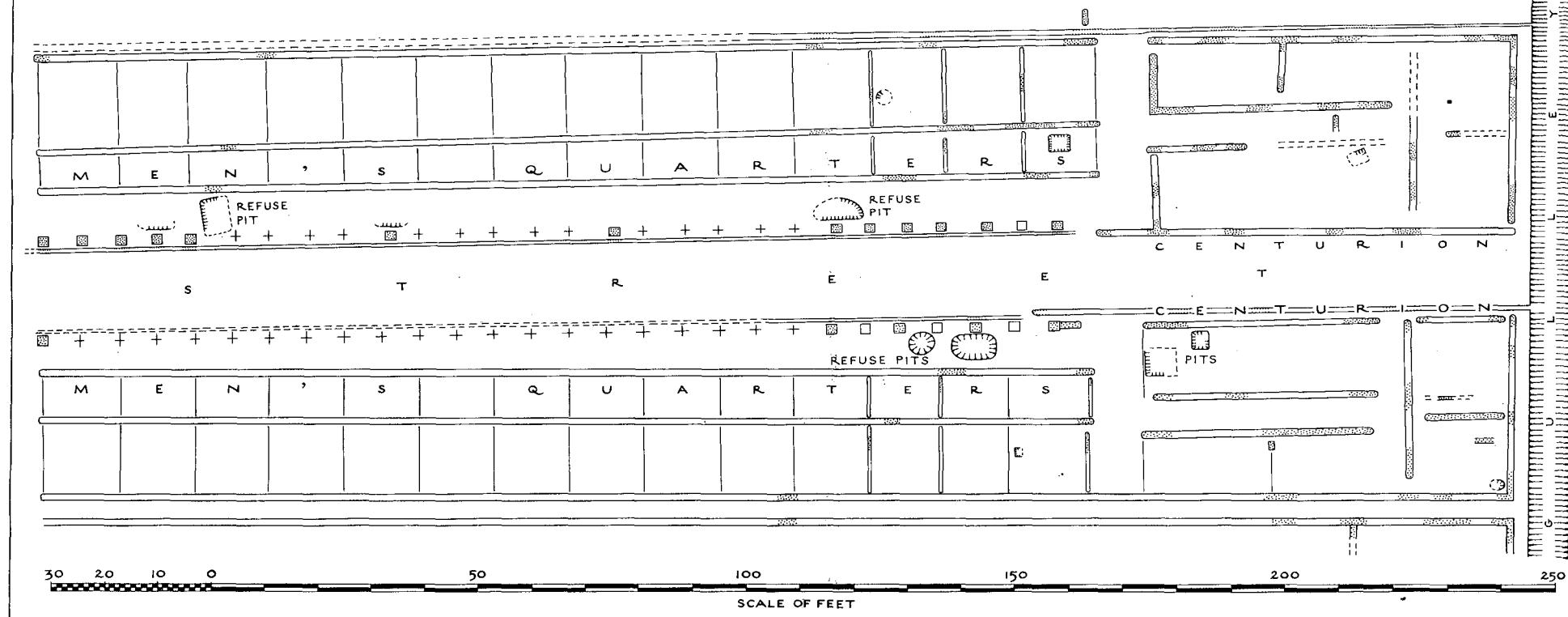
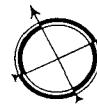


FIG. 41 Plan, Barracks 17 (bottom) and 18 (top). Scale, 1:360.

useful comparison since in each pair of barracks only the right-hand block ends in a centurion's house, the other having only a general-purpose communal room (Glasbergen 1974); the centurion's house is obviously larger than this building, and this led Baatz to use Valkenburg as an example. In fact, in each pair of centurions' houses in this fort the larger is on the left looking along the barracks but, looking in the direction of the fort's orientation, the houses decrease in size from right to left, thus confirming the second half of his theory. That the senior centurion in any unit was on the right seems probable (the first cohort lay to the right of the *principia*), but the relationship between each pair of centurions is less certain. Baatz himself pointed out that from the later first century onwards the tendency was for all centurion-houses to be the same size, and so the ground-plans of later forts can offer no support for his theory on seniority.

Baatz further stated that in legionary fortresses the centurion-houses of Cohorts II to X were similar in size; for this reason von Domaszewski had assumed that all these centurions were of the same rank. At Inchtuthil, in the area of Cohort I the largest house, and the senior officer, were on the left looking along both the barracks and the line of orientation of the fortress. The variations in the size of the centurions' houses have been noted above (and see TABLE VIII, p. 176). The dimensions of all are not known, but in Barracks 13 to 18 and 37 to 42 the larger house in each pair seems to have been on the right. In Barracks 1 to 6, however, the two halves of each pair were of similar size, the largest (6) lying on the left as one looks along the barracks in the direction of the fortress's orientation. This evidence does not, therefore, allow any firm conclusions to be drawn as to the seniority of the centurions within each cohort.

The men's quarters varied in length from 196 to 204 ft. (59.74 to 62.18 m) but they were mostly c. 198 ft. (60.35 m) by 26 to 28 ft. (7.92 to 8.53 m) wide (TABLE VIII, p. 176). Each barrack block was fronted by a veranda c. 9 ft. (2.74 m) wide; the latter was carried on posts set approximately 6 ft. (1.83 m) apart. Each pair faced on to a street approximately 15 ft. (4.57 m) wide, which had a drainage-channel down each side. A space of c. 4 ft. (1.22 m) was left between the rear walls of adjacent barracks, with a drainage gully for the eavesdrip running down the centre. A more normal practice elsewhere seems to have been to build the two blocks back to back as one building; but individual blocks existed at Caerleon, Gloucester, Wroxeter, Neuss and Nijmegen. Roofing and lighting were much simpler in the latter type. The choice does not seem to have been connected with the use of timber for building the original fortress since both types are found at Valkenburg during its timber phases. Nor is it connected with a first-century establishment date, for barracks were built back to back as one building at Vetera, Vindonissa and Nijmegen, where both designs appear.

The barrack blocks were divided into the normal sets of two rooms, as the three parallel longitudinal trenches indicate. The rear rooms, for sleeping, were between 13 and 15 ft. (3.96 and 4.57 m) deep and the front, for storage of equipment, c. 9 ft. (2.74 m) deep. Where transverse partitions were found they appear to have been c. 13 ft. (3.96 m) apart. These measurements are all internal. Each *contubernium* thus had an average floor-area of 299 sq.ft. (27.78 m²). This compares well with the dimensions of the *contubernia* in other known fortresses, especially those of the same period (for full comparison see TABLES V, VI (pp. 173 f.).

Richmond assumed that each block was divided as above through its entire length and thus deduced a total of fourteen *contubernia* for each. Elsewhere fourteen *contubernia* are recorded only at Longthorpe and possibly Exeter. The numbers of *contubernia* varied from fortress to fortress and also within fortresses as at Caerleon, Neuss and Bonn (see TABLE V, p. 174). Larger rooms not subdivided into sleeping and storage areas often existed at one end of the block. No such end-rooms were located at Inchtuthil but the method of excavation forbids their being ruled out entirely. The barracks in the left *latus praetorii* seem to fit the assumed pattern (see FIG. 41) as do those in the left *praetentura* as far as can be determined from the aerial photographs (PLS. XXV, XXVI). However, since the internal divisions were not located in the majority of the blocks, different subdivision is possible. Variation was indeed found in the barracks to the right of the *principia* (p. 161, FIG. 43).

The length of the barracks, where established, can be seen to vary (TABLE VIII, p. 176). The restoration of equidistant transverse divisions on Richmond's overall plan (FIG. 84) thus led to the creation of a fifteenth room in Barrack 53 and extra-wide fourteenth rooms in other blocks in the

right *praetentura* (FIG. 81). In fact, only Barrack 53 was internally explored, and this insufficiently to establish its layout in detail. The longer blocks here and elsewhere in the fortress (for example Nos. 19 to 24) may have possessed either a fifteenth *contubernium* or an extra-large fourteenth *contubernium*. An alternative solution would be to make all the *contubernia* slightly wider, thus using up the extra space available. Any such hypothetical subdivisions are open to doubt when inevitably only a sample could be excavated in detail. While the general plan of Inchtuthil (FIG. 84) is obviously correct in outline, many details remain to be filled in; care is needed in drawing conclusions.

2. LOCATION OF COHORTS

As has already been demonstrated, the variations in the size of the centurions' quarters are of little use in determining the relative ranks of the occupiers. The location of the different cohorts is equally difficult to determine from the lengths of the barracks; the variations in length do not indicate an obvious pattern and are not, in fact, significantly great (TABLE VIII). Hyginus (§ 18) claimed that the *porta decumana* derived its name from the fact that the tenth cohort lay next to it. H. von Petrikovits (1975: 113) suggested that the cohorts marched and camped in accord with their number, the even on the left and the uneven on the right; Vegetius's (ii. 15) reference to the fifth cohort on the left wing is dismissed as irrelevant since it applied rather to the battle line. Cohorts II and III thus lay next to the *porta praetoria* and IX and X next to the *porta decumana* (see FIG. 42A). The longest barracks at Inchtuthil would, on this theory, belong to the third, fifth and eighth cohorts. A similar system of numbering would also be possible at Caerleon, Neuss, Lauriacum and Carnuntum.

A different and simpler form of numbering is, however, suggested by the larger size of barracks in the right *praetentura* at Inchtuthil (FIG. 42B). This system would place the cohorts in numerical order moving in an anti-clockwise direction around the fortress; Cohorts II and III would thus occupy the right *praetentura*, IV and V the left *praetentura*, VI the left *latus praetorii*, VII and VIII the left *retentura* and IX and X the right *retentura* (Cohort V would now be on the left, in accord with Vegetius). The tenth cohort would no longer be next to the *porta decumana*, but this is not of great importance since the statement in Hyginus may be purely aetiological or anachronistic; it should perhaps no more be used to locate the cohorts than should the *via quintana*.

On the whole, Inchtuthil adds little, if anything, to our knowledge of the order in which the cohorts were organized in permanent fortresses. Rather, it suggests that the junior and senior cohorts had similar accommodation allotted to them. The sizes of centurion-houses in the different cohortal groupings (TABLE VIII, p. 176) favour the simpler system of numbering, that is around the camp, rather than the system of H. von Petrikovits. The houses in the right *praetentura* are larger than those in the left *praetentura*. The size of the centurions' quarters is more relevant to the cohortal order than is the size of the men's quarters. There is no evidence to suggest that the

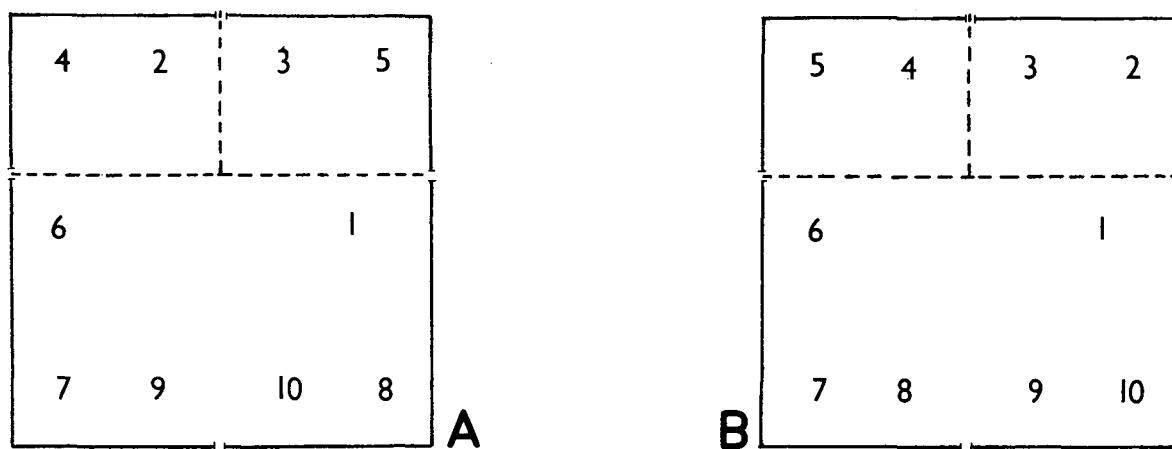


FIG. 42 Diagrams to illustrate the possible location of cohorts.

INCHTUTHIL COHORT I, CENTURIES I-III

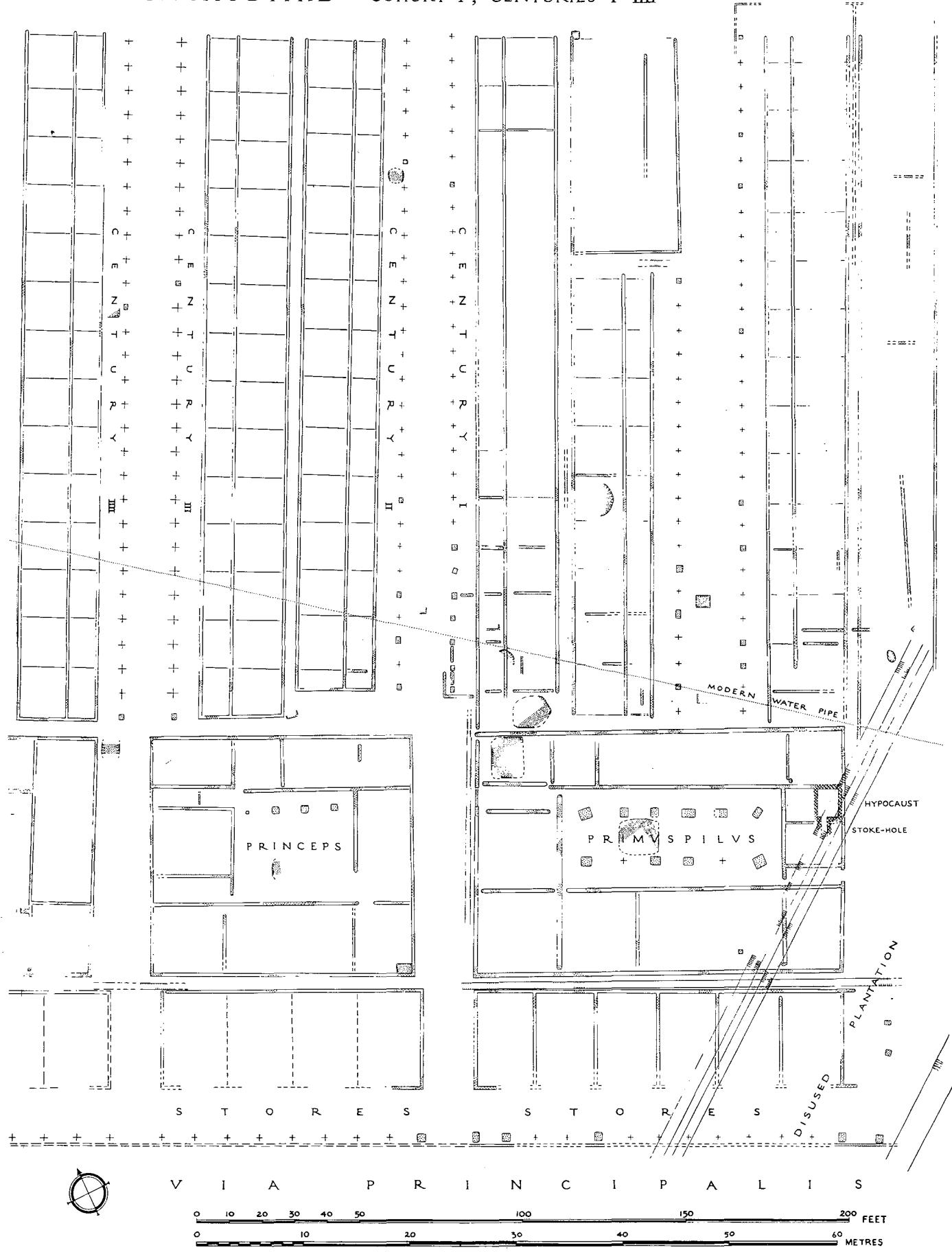


FIG. 43 Cohort I, Centuries 1-4 (Barracks 49-52 and Buildings A and B (right)). Scale, 1:480.

ordinary soldiers were graded in seniority by cohort; but evidence does exist that centurions were so graded, as is shown by the career of Ti. Claudius Vitalis (*ILS* 2656 as expanded by von Domaszewski 1967: 95–6).¹¹¹ Although it favours the simpler numbering system, Inchtuthil does not offer sure proof of the cohort positions.

3. DESCRIPTION OF THE BARRACKS IN THE RIGHT LATUS PRAETORII (Nos. 43–52, A and B; FIGS. 79 and 43)

The barrack blocks in the right *latus praetorii* differed from the rest in that they were associated with five large peristyle-houses which were arranged in a row between the barracks and the *tabernae* which lined the *via principalis*, rather than with the normal centurion-houses described above. This, combined with their position to the right of the *principia*, indicates that at least some of these barracks belonged to the first cohort of the legion. More detailed excavation was carried out in this area of the fortress than on the majority of the other barracks.

The barracks were aligned *per strigas*. The main access to the men's blocks was from the *via quintana* to the north; but narrow passageways led between the centurion-houses and the groups of *tabernae* on to the *via principalis* (FIG. 79). The ten western blocks (Nos. 43 to 52) are generally assumed to have belonged to a double first cohort. The excavations established that Nos. 43 to 50 were barracks by cross-trenching to locate the three longitudinal walls in each. Although there is little solid evidence, these barracks appear to have followed the normal pattern of fourteen *contubernia*.

More detailed work was carried out on the fifth facing pair (Nos. 51 and 52; FIG. 43 'centuries I and II'). These were shorter than the others, being about 190 ft. (57.91 m) long as opposed to 198 to 200 ft. (60.35 to 61 m); there was thus insufficient space for fourteen equal-sized *contubernia*. The three longitudinal construction-trenches, the normal distance apart, were located in the western block (No. 51); but the transverse partition-trenches were investigated only at the southern end, where an east-west trench was found 5 ft. (1.52 m) from the end wall. This suggests that the whole of the block was not divided into uniform *contubernia*; the end of the building was perhaps organized differently to accommodate an *optio* or *signifer*. The three longitudinal construction-trenches of the eastern block (No. 52) were located, and also four of the transverse partition-walls for the *contubernia*; but the southern two *contubernia* were associated with various additional construction-trenches. Two may have supported minor internal features. The enclosure of the southern end of the veranda by a wall across it, and by another linking the three end-posts of the veranda, suggests either provision of a guard-post here, where the street led south between the houses of the two senior centurions (an idea entertained by Richmond, who noted that an extension of the front wall of Barrack 52 blocked access to the east), or else that special accommodation may have been provided for the senior *principales* of the first cohort who were in line for promotion to the centurionate; these men would be in need of office space. The excavated trenches of the *contubernia* were 12½ to 13 ft. (3.81 to 3.96 m) apart; the rooms were thus slightly narrower than elsewhere in the fortress. Barrack 52 had space for twelve of these *contubernia* in addition to the rooms for the *principales*.

Between these ten blocks and the street running down the side of the *principia* lay a further three long rectangular buildings, interpreted by Richmond as 1½ barrack blocks and a row of *tabernae* (FIGS. 43 and 79). Access to the pair of barracks (A and B) was from the *via quintana* near the entrance to the *fabrica*; there was no means of direct access to the *via principalis*; the street running between the barracks was closed at its southern end by the rear wall of the largest of the five peristyle-houses. On the west side of this street were two separate buildings. To the south

111. . . ordinem accepit (in cohorte decima hastatus posterior) in legione V Macedonica, successione promotus . . . (in cohorte nona hastatus posterior) in legione I Italica . . . successione promotus . . . (in cohorte octava hastatus posterior) in legione I Minerviam, . . . successione promotus . . . (in cohorte septima hastatus posterior) in legione XX Victricem, item promotus (in cohorte quarta hastatus posterior) in legione eadem, item successione promotus . . . (in cohorte tertia hastatus posterior) in legione IX Hispanam, successione promotus . . . (in cohorte secunda hastatus posterior) in legione VII Claudiam piam fidelem, item successit in legione eadem, militavit centurio in cohorte II princeps posterior annis XI vixit annis XLI.

lay a barrack-like building, A, which measured 130 ft. (39.62 m) by 25 ft. (7.62 m); it was fronted by a 9-ft. (2.74 m) veranda. Some of the internal construction-trenches were located; a longitudinal trench 8 ft. (2.44 m) behind the front wall, and some transverse trenches which suggest a division into nine *contubernia* c. 14 ft. (4.27 m) wide. At the southern end, however, an extra north-south trench was discovered between the front two longitudinal construction-trenches, suggesting either a more complex layout at this end or perhaps the position of an interior fitting; the extra trench did not re-appear in the next room to the north. There appears to have been a 5-ft. (1.52 m) gap, with a central drainage-channel, between this block and the building north of it. The northern building measured 64 ft. (19.5 m) by 33 ft. (10 m) and had traces of an internal longitudinal construction-trench 8 ft. (2.44 m) from the front wall. The dimensions were somewhat smaller than those of the normal centurions' quarters at Inchtuthil but they were close enough to suggest a comparison. This will be discussed further when the purpose of the 1½ extra barrack blocks is dealt with below.

The eastern block, B, was taken to be c. 200 ft. (61 m) by 25 ft. (7.62 m) fronted by an 8-ft. (2.44 m) veranda. The northern end wall's construction-trench was not in fact located but, although the drainage-channels on either side extended another 9 ft. (2.74 m) to the north, the supposed end of the building is probable; the ends of two of the construction-trenches and the final veranda-post are in line with the ends of the other blocks along the *via quintana*. An internal longitudinal trench was found 8 ft. (2.44 m) behind the front wall and this, together with the veranda posts outside, suggested identification of the building as a barrack facing the smaller one, A, discussed above. Insufficient partition-trenches were located to determine the internal arrangement. Richmond suggested that the block was divided into thirteen uniform *contubernia*; the front wall's construction-trench projected 8 ft. (2.44 m) beyond each end of these, possibly indicating two additional narrow rooms, one of them perhaps sharing the back wall of the house of the *primus pilus*; however, FIG. 43 suggests that Richmond took the southernmost 8 ft. of the front wall-trench to have been dug too long in error. The median longitudinal wall did not reach the south end of the building. North of the transverse wall, lying 8 ft. from the house of the *primus pilus*, are two further transverse walls at 13-ft. (3.96 m) and 3-ft. (0.91 m) intervals. The first of these was taken as the *contubernium* partition, and the second is unexplained.

To the east of these two buildings (A and B) lay a third long rectangular building; this measured at least 220 ft. (67 m) by 24 ft. (7.32 m) and was again fronted by a veranda (FIG. 79). This building has in the past been interpreted as *tabernae*, but its width is closer to that of the barracks than to that of the *tabernae* on the main streets; the latter were c. 30 ft. (9.14 m) wide. The presence of an internal longitudinal wall c. 8 ft. (2.44 m) from the front trench (an internal division not discovered in the other *tabernae*) suggests that this block too may have served as barracks, although of exceptional length.

B. THE BARRACKS: DISCUSSION AND COMPARISON WITH OTHER FORTRESSES

1. THE SIZE AND AREA OF THE BARRACKS (TABLES Vand VI, pp. 173–4)

The average internal area of each *contubernium* at Inchtuthil was c. 299 sq.ft. (27.78 m²); this was made up of an inner room for sleeping of 182 sq.ft. (16.91 m²) and an outer room for storage of 117 sq.ft. (10.87 m²).

Hyginus (§ I) states that in his marching-camp each tent, measuring 10 by 10 Roman feet, housed eight men. In addition a space five Roman feet deep was allowed in front of each tent for weapon storage and another nine Roman feet for pack-animals. The area of each tent was 100 Roman sq.ft. (94.28 sq.ft.; 8.76 m²), that is approximately 11.8 sq.ft. (1.1 m²) per man. The same total of eight men could thus have been accommodated with relative comfort in the permanent barrack-buildings at Inchtuthil, each man receiving double the amount of sleeping space, that is 2.1 m² (cf. von Petrikovits 1975: 35). The storage space for each *contubernium* was over double that allowed by Hyginus for the tented camp (47.2 sq.ft.; 4.38 m²). The space for animals was

replaced in the fortress by the verandas. The siege camps at Masada reveal that in the Flavian period troops on campaign could receive even less space than that allowed by Hyginus, that is only 80 sq.ft. (7.43 m^2) per *contubernium* (Richmond, *JRS* 1962: 146).

The floor-space of legionary *contubernia* seems to have been similar throughout the empire; there was a gradual increase in the amount of space allotted from the early first to the third century A.D., as one would expect (TABLES V and VI; pp. 173, 174). The external dimensions obviously increased by a greater amount since masonry walls needed more space than timber ones. The greater increase was in the storage area (the barracks at Lambaesis, by far the largest with an allowance of 505 sq.ft. (46.92 m^2) per *contubernium*, had *contubernia* made up of two rooms and a passageway, as did those at Lauriacum). The general uniformity in size supports the belief that a set number of men would always share a *contubernium*. The dimensions at Inchtuthil are in accord with its Flavian date. The area of the rear rooms was fairly close to that of the rear rooms at Gloucester and Vindonissa, but larger than those at Haltern, Exeter and Neuss.

Legionaries generally seem to have received more space than auxiliary infantry (TABLE VII, p. 175). The smaller-sized *contubernia* of the auxiliary forts presumably still housed eight men, but allowed less space per man in accord with their lower status. The allowance, nevertheless, was still greater than in marching-camps as described by Hyginus. The standardization is of interest with respect to the units at Hod Hill and Valkenburg. The barracks at Hod Hill had only a single row of rooms and these rooms were exceptionally small, 116 sq.ft. (10.8 m^2); this is smaller than the rear rooms of any known fortress including Haltern, but is comparable with the rear rooms at auxiliary forts, for example Fendoch and Pen Llystyn. This smallness may indicate the temporary nature of the fort or may perhaps suggest that the occupying troops were not, in fact, legionaries.¹¹² In contrast, the size of the rear rooms of the barracks at Valkenburg I seems to suggest legionary occupation. The *contubernia* are comparable with those at Haltern and Neuss, and there are thirteen of them to each century.

In general, the standardization of the legionary *contubernia* is most striking. The number of *contubernia* in a barrack block did not affect the size of the individual *contubernia*. If the size had varied one might have supposed that the *centuria* was distributed among the *contubernia* in groups of more or less than eight men, but this does not seem to have happened. According to Hyginus (§ 1) a *centuria* consisted of eighty men; each century, therefore, needed only ten *contubernia*; auxiliary infantry forts fit this pattern (Breeze and Dobson 1974: 16–17). The purpose of the rooms other than the basic ten necessary to accommodate the century will be discussed below.

Inchtuthil had a very high number of *contubernia* per barrack, that is fourteen. Longthorpe Barrack I was also divided into fourteen *contubernia* but the comparison is not altogether satisfactory since the *contubernia* were of irregular width and consequently area; nor was Longthorpe a full fortress; with detachments of troops the number of *contubernia* might easily fluctuate. Of the fortresses excavated, Inchtuthil has the largest number of *contubernia* per barrack known except possibly Gloucester (*Antiq. Journ.* 1974: 19, fig.4), where the barracks in the right *latus praetorii* appear to have been exceptionally long, c. 260 ft. (79.3 m), allowing room for about eighteen or nineteen *contubernia* if the full length was equally divided. These barracks were, however, exceptional; and the increased length may have been connected with their siting and possible use by the first cohort; the reconstruction is mainly hypothetical and the mens' quarters may have been shorter since only small ordinary centurion-houses have been allowed for. The barracks at Exeter probably possessed fourteen *contubernia*, but not many partition-walls have been located (Bidwell 1979: 6–7; 1980: 35). In general, legionary barracks appear to have been divided into eleven or twelve *contubernia* (TABLES V and VI, pp. 173–4) although in the *praetentura* at Nijmegen there were as few as eight, while at Lambaesis, Haltern and Valkenburg I there were thirteen. The numbers of *contubernia* vary not only from fortress to fortress but also

112. One of the indications for the presence of legionaries at Hod Hill was the identification of *ballista* platforms (Richmond 1968: 73) for there are no definite first-century examples of the use of *ballistae* by auxiliaries (Baatz, *BJ* 1966: 194); however, possible *ballista* bolts have been found in the first-century forts at Aislingen and Burghöfe (Ulbert: 1968). The small *contubernia* at Hod Hill are similar in size to the tents at Masada, suggesting perhaps that only a brief occupation was envisaged. However, the presence of more than a very few legionaries is uncertain (Frere and St. Joseph 1983: 89). See now also D.B. Campbell, *Britannia* 1984: 77 ff.

within fortresses, for example at Bonn and Caerleon (twelve and thirteen) and Vindonissa (ten and eleven). Boon (1972: 86) suggested a connection with the status of the different cohorts since at Caerleon it was the quingenary barracks in the *latera praetorii* that had the larger number. Literary evidence, however, only refers to the special status of the first cohort. The variations in *contubernia* numbers recorded elsewhere are relevant to Inchtuthil where the longer barrack blocks, for example No. 53, may have had fifteen *contubernia*. It is important to remember that, since neither the ends of many of the barracks of Inchtuthil nor their internal partitions were located, the precise length of the barracks and the exact number of *contubernia* is in most cases uncertain. The barracks at Inchtuthil may have been as varied as those elsewhere.

In several fortresses the barracks included a room or rooms at one or other end of the block, which were of dimensions different from those of the *contubernia*, as at Lambaesis, Neuss or Gloucester. These rooms were presumably for the *principales* of the century. The presence of such rooms cannot be entirely ruled out at Inchtuthil on the evidence of the excavations. Even if the barracks at Inchtuthil were composed of fourteen sets of rooms exactly alike, at least one of these was probably used to accommodate the *principales*. The number of *contubernia* allotted to the ordinary soldiers would thus be comparable with the number known from other fortress. As a result the large number of *contubernia* at Inchtuthil does not necessarily imply that the centuries were larger than elsewhere, although there is the possibility that the extra rooms accommodated the veterans serving with the legion (for discussion of veteran service see below).

In spite of the presence of extra end-rooms elsewhere, the mens' quarters at Inchtuthil, 197 ft. (60 m) long, were surpassed in length only by those at Lambaesis, 226 ft. (68.9 m) and Longthorpe, 228 ft. (69.5 m) (TABLE V, p. 173); accommodation at Lambaesis was generally more spacious and the barracks at Longthorpe were irregular in plan. The width of legionary barracks seems to have been generally consistent throughout the empire, 26 to 28 ft. (7.9 to 8.5 m) plus a veranda.

In contrast to the men's quarters, the centurion-houses were smaller than usual at Inchtuthil. The width of such buildings, indeed, was again fairly uniform in all fortresses, but the houses at Inchtuthil were shorter than most, accounting for only a quarter of the overall barrack length rather than a third as elsewhere. Their smaller size is perhaps connected with their Flavian date and timber construction since those at Haltern, Gloucester and Colchester were also small (TABLE V). The difference in size is, however, too slight to indicate an intentional adaptation of the layout for a short-term occupation of the site, supposing such a thing to have been envisaged.

2. THE FIRST COHORT: POSITION WITHIN THE FORTRESS AND SIZE (FIG. 79)

The ten barracks (Nos. 43–52) and five peristyle-houses to the right of the *principia* at Inchtuthil have, since their excavation, been used as the prime example of a double first legionary cohort. The plan has been used to support the ancient sources for the existence of a double first cohort; if, however, such a cohort was normal in a Roman legion, it is strange that other excavated fortresses do not offer a similarly striking layout. Inchtuthil appears to be the exception rather than the rule. The comparative archaeological evidence must be surveyed and its relationship to the literary and epigraphic sources on the Roman army considered.

H. von Petrikovits (1975: 38) lists three main characteristics for the identification of first-cohort barracks: (i) that they lay to the right of the *principia* or in the right *praetentura*,¹¹³ (ii) they were more spacious, (iii) they were associated with five, not six, large centurion-houses. He therefore believes that the accommodation provided for the first cohort can be identified at Inchtuthil, Chester, Gloucester, Caerleon, Nijmegen, Neuss, Lauriacum, Carnuntum and Lambaesis. The barracks in the right *latus praetorii* at Inchtuthil were associated with five large

113. Hyginus 3,4: *Igitur, si legiones impares, hoc est tres acceptae fuerint, duae primae lateribus praetorii per rigorem viae sagularis tendere debebunt, alia in praetentura similiter per rigorem viae sagularis intrantibus portam praetoriam parte laeva.* ('And so if there is an odd number of legions, for instance three, two first cohorts will camp in the *latera praetorii* along the *via sagularis*, the third in the *praetentura*, still along the *via sagularis*, on the left as one enters through the *porta praetoria*.'

houses, but the individual *contubernia* do not appear to have been more spacious than those in the other barrack blocks. Some, at least, of Blocks 43 to 52 are likely to have been occupied by the first cohort.

Caerleon gives the initial impression of being very similar to Inchtuthil; but in fact very little of the right *latus praetorii* has been excavated. Three peristyle-houses, similar to those at Inchtuthil, have been found, and there is space for a further two; but although there are traces of ten long rectangular buildings, not all of these were suitable for use as barracks. So far, two barracks have been located next to the rampart, then a narrower building (this was only 6 m wide and was divided into a single row of rooms); there is then space for three buildings followed by a narrow block, two barracks and a third narrow block. A total of six barrack-buildings is probable (Boon 1972: 89). Although the barracks to the left of the *principia* have an extra *contubernium*, those to the right appear to have belonged to the first cohort because of their position and the associated peristyle-houses. Unless extra barracks, as yet undiscovered, existed elsewhere in the fortress, there is no evidence here of this cohort being double; but admittedly these stone barracks are of Antonine date and nothing is known of the first-century barracks which presumably underlie them. As Frere has shown (*Britannia* 1980: 58), there is sufficient space for the timber barracks of a milliary first cohort beneath these buildings. The blocks of single-room width are of interest (similar buildings are known at Nijmegen), but they can hardly have been used as legionary barracks. They are more likely to have been used as store rooms or offices.

The identification of the first-cohort barracks to the right of the *principia* at Chester rests on their position and the irregular arrangement of the buildings (*J. Chester Arch. Soc.* 1956: 27). There is insufficient evidence on which to base any firm conclusions about their size or number. The position at Gloucester is also uncertain (*Antiq. Journ.* 1974: 19). The restored plan shows exceptionally long barracks to the right of the *principia*, aligned *per scamna*, with perhaps as many as nineteen *contubernia* and six normal centurion-houses up against the eastern *intervallum*. But there is no evidence for the total number of centurion-houses in this cohort, and almost none for their extent westwards or character. Excavation was limited, and it is possible that there may have been larger houses and fewer *contubernia* (*TBGAS* 1974: 18, fig. 2; *Antiq. Journ.* 1974: 19, fig. 4).

The layout at Lambaesis is not clear (Cagnat 1913: 457). There were five (or possibly six) large centurion-houses along the *via principalis dextra*. The confused barrack layout indicates at most eight blocks, but more probably six with an additional row of store rooms or offices. Both Carnuntum and Lauriacum appear to have only six barrack blocks in the right *latus praetorii*. The probable first-cohort barracks at Nijmegen lay in the right *praetentura*. These were associated with five large peristyle-houses (Brunsting, *Numaga* 1960: 15; 1961: 49 f.). However, of the eight long rectangular buildings excavated, only six appear to have been barracks; the other two were narrower, containing only one row of rooms; these blocks were placed between facing pairs of barracks and presumably served as stores or offices (as at Caerleon). At Neuss, in its final phase, there were six barracks only in the right *latus praetorii* (Koenen, 1904: 138 f.; pl. III). Since the total number of barracks at this time appears to have been sixty, Neuss at that time had no accommodation for a double first cohort. That there were more barracks in an earlier phase is a possibility since traces of earlier walls were discovered under the bath-building in the left *latus praetorii*; other alterations in plan were noted. The significance of a larger number of barracks having existed at an earlier date will be discussed below.

At none of the fortresses where it is possible to identify the barracks of the first cohort is there a parallel to the ten barracks at Inchtuthil. The first-cohort barracks are normally found to the right of the *principia* associated with five peristyle-houses, as von Petrikovits suggested, but they are in general no longer or more spacious than the other barracks of the fortress. The consistency of the evidence from the other fortresses indicates a first cohort of ordinary quingenary size; Inchtuthil is thus exceptional.

The archaeological evidence indicates the existence of only five centurions in the first cohort. Vegetius ii.8 (. . . *sic decem centuriae cohortis primae a quinque ordinariis regebantur* . . . – ‘thus the ten centuries of the first cohort were commanded by five centurions’) supports this view but should not perhaps be used as evidence, since Vegetius shows great confusion over numbers and allotments.

only five centurions to every cohort; whereas it is known that Cohorts II to X had six centurions (the centurions are also incorrectly named in Vegetius). Tacitus, *Annales* i.32.3 (*prostratos verberibus mulcant, sexageni singulos, ut numerum centurionum adaequarent* – ‘they threw them to the ground and applied the lash, sixty strokes to a man, one for every centurion in the legion’) should not, on the other hand, be used to argue for six centurions in the first cohort; Tacitus was presumably using a round number, that is sixty, although there were only fifty-nine centurions in a legion. The epigraphical evidence supports the archaeological (Passerini, *Dizionario Epigrafico*: 586 f.). No inscriptions record the post of *pilus posterior* of Cohort I; although arguments *ex silentio* are always open to attack, nevertheless (since there are large numbers of inscriptions recording other centurions) it seems likely that this post did not exist. The main evidence for the presence of only five centurions is *CIL* viii 18072 from Lambaesis of A.D. 253; this is a dedication by the *tabularium principis* listing the *optiones* of the centurions of the first cohort; again only five are mentioned and the *pilus posterior* is omitted. In contrast *CIL* viii 18065 lists seven centurions in Cohort I, two being termed P.P., that is *primus pilus*; this inscription, however, appears to represent a transitory situation created by retirement and promotion (the number of centurions listed in each of the ten cohorts varies between five and eight) and cannot be used in an argument concerning the establishment of centurions. The first cohort, then, possessed five centurions; the manpower of this cohort may now be considered.

The main literary source for a double first cohort is, of course, Hyginus, Chapter 3: *cohors prima . . . et quoniam duplum numerum habet duplam pedituram accipiet* (‘The first cohort being of double strength, will occupy a double area’). This statement, which does not include actual figures, is supplemented by Vegetius ii.6: (*prima cohors*) *habet pedites mille centum quinque, equites loricatos CXXXII et appellatur cohors miliaria* (‘The first cohort has 1105 infantry and 132 armoured horsemen, and is called a milliary cohort’) (according to Vegetius a *cohors quingenaria* had 555 infantry and 66 cavalry): and by ii.8, quoted above. The dubious nature of any precise numbers quoted by Vegetius has been pointed out above; his figures, derived from the small amount of information available to him at the time of writing in the late fourth century, and his own mathematical deductions, have been discussed by D. Cooper (unpub. D.Phil. thesis, Oxford). The size of the Vegetian cohorts, 550 men, appears to have been derived from the size of legionary vexillations (see Dio 76.12.5 and Hyginus § 5). Vegetius seems to have discovered that the first cohort was *dupla* but the number of centurions was not; he is unlikely to have had any more precise numerical information. Many of his figures are fictitious, calculated to fit an assumed pattern, as the strange division of men among the centurions of the first cohort indicates (ii.8). As a result, it is dangerous to base any assumption about the strength of the first cohort on Vegetius. His knowledge of its *duplum numerum* may even have been derived from Hyginus rather than a lost third source, in which case the only original literary evidence for a double first cohort would be Hyginus.

The word *duplus*, it must be remembered, need not have been used in its strict sense by Hyginus. The Romans did not use the words *millaria* and *quingenaria* literally when describing various auxiliary units. The manpower ratio of a *cohors quingenaria peditata* to a *cohors milliaria peditata* was 3:5; their respective forts had six and ten barrack blocks (Davies, *Epig. Stud.* iv (1967), 108–11). There would thus be no problem in the ten barracks at Inchtuthil representing a cohort of double strength (the ratio still being 3:5) but it is far from certain that this was the true position.

Other literary sources refer to sixty centuries in a legion rather than sixty-four; these are Isidorus Orig. ix.3.46, Servius *ad Aen.* xi, 436, and Aulus Gellius xvi. IV.6. This figure may simply represent a round number, as in Tacitus *Annales* i. 32.3 (above), but here the contexts are more specific. There is no epigraphic evidence for the exact size of the first cohort, although two discharge lists of second-century date suggest that the first cohort may have been larger than the others since more men retired from it (*CIL* iii 6178; 14507; Breeze, *JRS* 1969: 50–5; Frere, *Britannia* 1980: 52).¹¹⁴ Obviously the number of inscriptions is too small to provide indisputable

114. *CIL* iii, 6178, V Macedonica, A.D. 134: 40 names under cohort I, 17 under cohort II, 14 under cohort III, 10 under cohort IV and 12 under cohort IX. 14507, VII Claudia, A.D. 195: 47 under I, 22 under II and 18 under III. Cf. *AE*

evidence; but they do suggest that first cohorts in the second century were not all of normal quingenary pattern as the fortresses so far excavated indicate.

There is then a divergence in the evidence available on the size of the first cohort. An explanation for this should be sought and the identity of the men who occupied the extra barracks at Inchtuthil should be considered (cf. Frere, *Britannia* 1980: 51 f.). The suggestion has been made that the larger size was due to the presence of the majority of the administration staff in the first cohort (Webster 1956: 11); but they were not in fact so attached, for discharge-lists reveal that these men together with those away on the staff of the provincial governor were drawn equally from all the cohorts (Breeze, *JRS* 1969: 50–5). The fact that the *aquilifer* and *imaginifer*, for instance, were probably always attached to the first cohort (*Vegetius* ii.6; *CIL* iii, 6178) is not sufficient to affect the numbers. Nor were the various craftsmen attached to the legion carried on the books of the first cohort rather than the others.

Hyginus gives no actual information on the numbers of men involved; he is concerned with space. The dimensions of the area occupied by Cohort I are ‘double’. At Inchtuthil the space occupied by the barracks and centurion-houses in the right *latus praetorii* is indeed approximately twice that occupied by each of the other cohorts, that is circa 154,000 sq. ft. (including Blocks A and B and the building nearest to the *principia*) as against 75,600 sq. ft. Similarly the area occupied by the five centurions’ houses is approximately equal to the area occupied by twelve ordinary centurion’s houses, that is 36,400 sq. ft. A similar situation exists at Caerleon where the area of the right *latus praetorii* is again roughly double the area occupied by a quingenary cohort; but here, at least in the second century, not all the buildings were barracks. It is, therefore, apparent that Hyginus’s proportions were followed in some legionary fortresses even if the amount of accommodation provided does not indicate a double-strength cohort.

From the second century onwards, the excavated fortresses indicate that the first cohort was provided with only six centurial barracks associated with five houses. The evidence of *Vegetius* ii.8 suggests that the extra century was under the command of the *primus pilus* who thus commanded two centuries rather than one, as befitted his rank. As well as at Inchtuthil, there are, however, indications elsewhere that the situation may have been different in the first century A.D. Frere (*Britannia* 1980: 58 f.) has pointed out that the area to the right of the *principia*, partially occupied by the second-century barracks of the first cohort, was large enough to have accommodated ten centuries in timber barracks in the first century at Caerleon, Chester, York and Bonn. The stone fortress at Nijmegen dates to c. 90 and has only six first-cohort barracks; but this fortress could not have accommodated a full legion and its evidence should be discounted. The Neronian fortress at Gloucester does not appear to have had ten first-cohort barracks, but it has not been fully excavated; part of the cohort may even have been outposted. The evidence from Neuss is not clear; but it suggests that, although in the second stone period there were only six, or possibly seven, barracks to the right of the *principia*, there may have been ten barracks in the first stone period or in the timber period before that. The second stone period is of Flavian date, suggesting that in Flavian times the first cohort of Legion VI Victrix was already quingenary.¹¹⁵ Some of the first cohort may, however, have been housed to the left of the *principia* since there are traces of stone barracks under the later bath-building (Baatz, *Germania* 1977: 268). The layout of Inchtuthil with provision for a first cohort of double strength may not have been unique in the last quarter of the first century. The archaeological evidence indicates a change of establishment c. A.D. 90–95 involving reduction of the first cohort’s accommodation from ten to six centurial barracks. The plan of Inchtuthil would thus be the only surviving example of the normal layout of the period c. 70 to 95. The only firm evidence that the first cohort was quingenary in the first century is provided by the hospital at Vetera I which had sixty wards, one per century if all the cohorts were quingenary; but Vetera I is, of course, of pre-Flavian date.

1955: 238, II Traiana, A.D. 157. The fortresses where these three legions were stationed, Troesmis, Viminacium and Nicopolis respectively, have not been excavated, so there is no archaeological evidence available.

115. The fortress, laid out in pre-Flavian times with room for a first cohort of only quingenary size, would not have had space for a milliary cohort to right of the *principia*.

The existence of a double-strength first cohort in the late first century A.D. could explain not only the unusual layout of Inchtuthil but also the otherwise anomalous reference in Hyginus if it were possible to date the *Liber de Munitionibus Castrorum* to the first century and to take it as perhaps describing an expeditionary force in Domitian's war against the Marcomanni and Quadi of c. A.D. 90. This would be a very neat solution to the problem. The possibility of this dating for the work has been discussed recently by S.S. Frere (*Britannia* 1980: 51 f.) and a strong case was made; the details will not be repeated here. To this case E. Birley has replied with a short paper setting out two objections (G. Wirth (ed.), 1982: 277–81). His first, that the mention of *comites Augusti* by Hyginus indicates a date in the reign of Marcus Aurelius, when an exceptional number is known, does not stand up to examination: Dessau's index (*ILS* iii, 1, p. 354) lists *comites Augusti* in the reigns of Augustus, Tiberius, Claudius, Trajan and Hadrian, and any emperor going on campaign would be almost bound to have some with him. Although none are attested in Domitian's reign, the probability exists that Sex. Julius Frontinus played that role during the Chattan War (Syme, *Tacitus*: 127, 214).

More serious is Birley's second objection, namely than there is a strong case for inferring that the *equites singulares Augusti*, who figure among the troops listed by Hyginus, were not established as a unit until the reign of Trajan. The case, proposed by M. Speidel (1965, 91–2), depends upon the date of their earliest appearance in epigraphy. An inscription (*CIL* vi 31138 = *ILS* 2180) records men discharged from service in 118, and so perhaps recruited in 93. Speidel has shown that members of the unit normally served a period of 3–7 years in an *ala* before transferring to the *equites singulares Augusti*, and the normal service in the latter unit was for 20 years. A date of 97 or 98 is therefore suggested, and if it was really a hundred men who left the *Equites* in 118, this suggests to him a large intake at the former date, perhaps marking the foundation.¹¹⁶ Yet if 100 men were really discharged in A.D. 118, it perhaps merely reflects an unusually large release of men retained during the Parthian war.

It is never safe to place heavy reliance upon negative evidence. The inscription is the earliest of a large group of similar records all found at the Via Tasso in Rome near St. John Lateran, where the camp of the *Equites* is accordingly thought to have been until it was rebuilt in 193–7 on a nearby site. All we can safely claim is that by 118 the camp of the *Equites* was at the Via Tasso. There is no means of knowing how much (if at all) earlier than 118 the camp was established there. It is unwise to assume that because no earlier records of the unit were found at this site, accordingly no *equites singulares Augusti* existed before Trajan. They would appear to be a necessity to an Emperor engaged in repeated campaigning, as Domitian was from 83.

That Domitian did possess *equites singulares* is virtually proved by *CIL* vi 3255 (= *ILS* 2211), the tombstone of T. Flavius Quintinus, who died after only six years' service, during which he had transferred to the *equites singulares Augusti* from the army in Raetia, where he had been a trooper in the *ala Flavia pia fidelis milliaria*.¹¹⁷ The titles *pia fidelis* show that this transfer took place after 89, the year in which the distinction was awarded. But the formula *Dis Manibus*, written in full without abbreviation, strongly indicates that his death occurred before the end of the century. His citizenship, granted (as was normal) on transfer to the *Equites*, was the gift of Domitian, as the names Titus Flavius show.

Lenoir in his 1977 edition of Hyginus argues a date under Trajan for the text; but he gives (pp. 116 f., 122 f.) two reasons for a pre-Trajanic date additional to those given by Frere. Lenoir does not believe that a real army was being described by Hyginus.

Whatever the problems of Hyginus, the first-century date of Inchtuthil does seem to explain the enlarged first cohort's unique appearance in the excavated buildings there. The first cohort may have been of double strength in the Flavian period. It may have been Vespasian, as Frere suggested, who made it milliary, just as he was the first to create milliary auxiliary units. This

116. The reading *hom.c* in *emeriti ex numero eod. hom. c* is very dubious; *hom* is inscribed over an erasure, and it would be very unusual to refer to soldiers as *homines*. Dessau reads merely . . . *ex numero eodem*.

117. *Dis manibus T. Flavius Quintinus eq. sing. Aug., lectus ex exercitu Raetico ex ala Flavia pia fidelis milliaria, stipendiorum sexs, vixit annis XXXVI, Publius Crescens et Claudius Paternus heredes benemerenti posuerunt.* The Editor thanks Margaret Roxan for drawing his attention to this inscription.

theory would satisfy the evidence of the Neronian hospital at Vetera, with its sixty wards suggesting only sixty centuries, and the lack of barracks for a milliary cohort at Gloucester and perhaps also at Neuss in the pre-Flavian period.

The augmented size of the first cohort can be explained by incorporation of veterans, previously brigaded separately (*Britannia* 1980: 59 f.). At a later date the cohort was again reduced in size, or at least the number of men requiring accommodation was reduced. Although there is some epigraphic evidence (*Britannia* 1980: 52 n. 6, 59) that the first cohort was still discharging more men than the others, this anomaly may be explained either in the way that Frere explained it (*ibid.*, 60) or, as E. Birley has suggested (Wirth (ed.), 1982: 280 f.), because picked men were continually transferred to the first cohort, involving the other cohorts with enlisting more young recruits to replace them – a process which would normally mean that at any one time the first cohort had more men ready for discharge.

Finally, brief mention must be made of the *vexillarii* referred to in Hyginus Chapter 5. These numbered approximately six hundred men and were to encamp in the *latus praetorii* next to the first cohort but away from the *intervallum* road. These *vexillarii* are not to be confused with the *vexillum veteranorum* in Tacitus (*Annales* iii, 21; iii, 36); they are a completely different phenomenon (D. Cooper: unpub. D.Phil. thesis, Oxford). They were a fighting force and not, as von Domaszewski thought, a non-combatant unit of hospital staff and the like. They comprised a vexillation of another legion and were not under the command of the *legatus legionis* in the camp although they had a special relationship with him; they were not, therefore, to be trusted with the defence of a section of the *vallum*. The phrase in Hyginus § 5, *causa impedimentorum*, recalls that in § 3, *causa signorum et aquilae*, used with reference to the first cohort. The *impedimenta* were not the tools of military workmen but the baggage of an independent unit. There is then no reason to consider the accommodation of the *vexillarii* in a normal fortress as Breeze has suggested (*JRS* 1969: 55). There were no *vexillarii* in Blocks A and B at Inchtuthil (insufficient space) nor, almost certainly, in Blocks 49 to 52.

3. THE OCCUPANTS OF BARRACKS A AND B; THE LEGIONARY CAVALRY AND THE FABRI (FIG. 43)

The internal subdivisions show that Buildings A and B, adjacent to the first cohort, served as barracks. They contained at least twenty *contubernia* and an officer's house. Richmond (*JRS* 1957: 132) ascribed these blocks to the legionary cavalry, but later work suggests other possibilities; there are no comparable buildings in other fortresses.

There is no reference to the legionary cavalry in Hyginus, but their existence is well attested elsewhere. Josephus (*Bell. Jud.* iii.120) states that there were one hundred and twenty *equites* in each legion in Judaea in A.D. 67, and elsewhere legionary *equites* are attested on various inscriptions. The existence of legionary *equites* in the reign of Domitian is confirmed by the career of Ti. Claudius Maximus who progressed from *eques legionis* to *quaestor equitum* to *singularis legati legionis* to *vexillarius equitum legionis* (*JRS* 1970: 142 f.). The evidence on the organization of these cavalrymen is less clear. In the later fourth century Vegetius (ii.6; 14) says that there were sixty-six *equites* in each cohort (132 in the first) organized in two *turmae* of thirty-two men under a *decurio*. Vegetius is possibly confusing the organization of the legionary *equites* with that of an *ala*; but, if he is describing the *equites* of his day, this system presumably reflects a third- or fourth-century reform, for the epigraphic evidence generally indicates that from the first to the mid third century the *equites* were carried on the books of the centuries, at least for administrative purposes (Breeze, *JRS* 1969: 54), and were not organized separately in *turmae*.¹¹⁸ *Equites* attached to centuries occur on *RIB* 254 (Lincoln, A.D. 47–71); *RIB* 481 (Chester, 71–87), *ILS* 2325 (Carnuntum, first century); *ILS* 2326 (Lambaesis, late second century); and an *optio equitum* is listed in the fifth *centuria* of the eighth cohort of Legion III Augusta on a *laterculus* dating to A.D. 220 (*CIL* viii 2568, 18). The *equites* may have been divided among the centuries of the legion, two

118. The expansion of the inscription on the ring from Baden, A.D. 43–69, (*CIL* viii 10024, 31) from *eq. leg. XXI sexti t. to . . . sexti turma* is by no means certain.

per century; this assumption is supported by the mention of two *equites* (Celsus and Crispinus), apparently in the same century, on the monthly roster of Legion III Cyrenaica of c. A.D. 90 (Fink 1971: 210 No. 58 col. 1, 36). Alternatively the *equites* may have remained in the century in which they first enrolled as infantry recruits.

The fact that they were on the books of the centuries makes it possible that the cavalrymen were housed in the barracks of their own century. Since they did not always act as a unit (one of their main functions was as mounted messengers, Livy 37:7), there was no need for them to be housed together, nor indeed for their horses to be in close proximity (cf. v. Petrikovits 1975: 53); in case of alarm they would not be expected to make a mounted charge against the attackers. On the other hand, the *equites* did have their own administrative office (*AE* 1957, 85: . . . [tab]ularium equitum – III Aug . . .) and, since they appear to have trained, marched and fought as a unit,¹¹⁹ it is possible that they had separate accommodation as a unit. Various cavalry officers are recorded, but none for any unit smaller than the full legionary complement of *equites*.¹²⁰ The existence of a *quaestor* indicates that at least part of the cavalry finances were dealt with separately. The cavalry unit must have had an overall commander, presumably with the rank of centurion, although no such officer has as yet been definitely attested (but see Spiedel, *JRS* 1970: 152 f.; possible reading of *ILS* 2244 as [centurioni] eq. leg. ?).

If they were accommodated as a unit, barracks belonging to the legionary cavalry must have existed in each fortress. It is misguided to look for legionary cavalry-barracks along the *via decumana* on the strength of Polybius vi.28 (he was writing on the Republican army), or next to the *principia* using the position of the *equites singulares* in Hyginus § 7 as an authority (the *singulares* were an independent unit; see Spiedel, *JRS* 1970: 142 f. and 1978). The failure of Hyginus to mention the *equites legionis* implies not their non-existence but rather that their accommodation-needs had been dealt with elsewhere. He may have included them in the area allotted to each century or possibly, if Barracks A and B at Inchtuthil were indeed occupied by the cavalry, in the double space allotted to the first cohort. The area occupied by the first cohort at Inchtuthil is only double that occupied by the other cohorts if these two barrack blocks are included.

One hundred and twenty men could have been housed in the 1½ barrack blocks (A and B) at Inchtuthil.¹²¹ There were sufficient rooms (20 *contubernia*) for the *equites* to be allowed more space than the infantry, and the northern end of Block A offered adequate accommodation for a commanding officer, assuming such existed. At Inchtuthil, then, the legionary cavalry could have been provided with separate accommodation; none of the other known fortresses, however, contains analogous barracks and, although this is mainly the result of the incomplete state of the plans, it suggests that such accommodation was not normally provided, and that the cavalry in fact lived with their centuries.

If Barracks A and B were not occupied by cavalry at Inchtuthil, there remains the problem of who else they were intended for. In determining this their siting is surely of great significance. In stressing the proximity of the barracks to the *principia* and the first cohort, the fact that they were sited next to the *fabrica* is often overlooked. These two alone of the barracks in the *latus praetorii* had direct access only to the *via quintana* and not also to the *via principalis*. The alleyway between A and B met the *via quintana* opposite the colonnade of the *fabrica*. Moreover, the house for the officer was placed at the northern end in proximity to the *fabrica*.

The legion included large numbers of specialists; among these were various craftsmen who worked in the *fabrica* (*Digest* L.6.7.6; *Vegetius* ii.11; see Appendix to Chapter 7, p. 114). These men were presumably on the century lists for administrative purposes but some, at least, may have been housed separately in the vicinity of their work, just as some of the hospital staff

- 119. On the march: Josephus *Bell. Jud.* iii, 120; Tacitus *Ann.* iv, 73, 2. In battle, combined with auxiliaries: Tacitus *Hist.* i, 57; the cavalry were addressed separately by Hadrian in his review speech at Lambaesis, *ILS* 2487.
- 120. *optio*: *CIL* viii 2568, 18; *vexillarius*: *CIL* viii 2562, 3; 4; viii 16549; *AE* 1957, 341; *AE* 1969/70, 583; *tesserarius*: *CIL* viii 2562, 5; *magister kampi*: *CIL* viii 2562, 6; *magister equitum*; *CIL* v 8278; *quaestor*: *AE* 1969/70, 583.
- 121. Breeze (*JRS* 1969: 55) argues that 120 cavalry needed two full blocks since in auxiliary forts each block housed two *turmae* of 32 men; but cavalry barracks in auxiliary forts were much shorter, containing only 8 *contubernia*. On this analogy 120 *equites* would need only 16 *contubernia*; there are 20 available in Blocks A and B.

probably lived in the hospital. That some of the *fabri* lived in the extra one-and-a-half barracks at Inchtuthil is then a reasonable assumption. The house would have accommodated the head of the *fabrica* – not the *praefectus fabrum*, a post not in existence at that time, but a *magister* or *optio fabricae*. The latter is attested epigraphically (*CIL* iii 8002; xiv 230) and in the Digest where he is, however, only referred to as an *immunis*, not a *principalis*, and is perhaps of lower rank. A *doctor fabrum* is also known (*CIL* iii 10516).

H. von Petrikovits (1975: 50) suggested that some of the *fabri* were normally housed in the *fabrica* itself (there is no sign of this at Inchtuthil) or in special blocks nearby. Part of the *fabrica* at Caerleon seems to have provided accommodation for workmen, including houses similar to those provided for the centurions (Boon 1972: 82–5). The *fabrica* at Exeter contained small rooms suitable for offices, but nearby were barracks and a centurion's house. At Neuss (Koenen, 1904, pl. XIV) Building 123 possibly accommodated the *fabri*, and von Petrikovits has identified many buildings in other fortresses as accommodation for various specialists. The one-and-a-half blocks at Inchtuthil would not, therefore, be inexplicable, and although there is no positive evidence the idea of their occupation by the *fabri* seems a reasonable solution.

4. THE ACCOMMODATION OF THE PRINCIPALES AND IMMUNES

H. von Petrikovits (1975: 43–50; 59–62) has discussed the need for special accommodation for the large numbers of *principales* and *immunes* in the legion. It seems reasonable, however, to assume that many of these were in fact housed in the centurial barracks since the majority, at least, were on the books of their centuries. Certainly the large number of *contubernia* at Inchtuthil, fourteen, could have accommodated more than the basic complement of eighty fighting men which von Petrikovits suggested. The presence of 'special' barracks in other fortresses, if real (but see Baatz, *Germania* 1977: 265 f.) perhaps signifies a later development, with greater segregation of combatants and non-combatants for easier administration.

That the *equites* were carried on the books of the centuries and may have shared the communal barracks has been pointed out above (p. 169). In the same way, the operators of the *ballistae* also formed part of the century and probably occupied the centurial barracks. According to Vegetius (ii.25) each legion possessed one *onager* per cohort and one *carroballista* per century; each machine needed a team of eleven men to operate it. (For the possibility of storage of these in *tabernae* see p. 181). There is no precise evidence on the *ballistae* in the first century A.D. but Baatz (B.J. 1966: 194 f.) has argued that the Vegetian arrangement dates back at least to Vespasian; Josephus (*Bell. Jud.* iii.7.4) refers to 160 *ballistae* being used by the three legions at the siege of Jotopata. The *ballistarii* will have formed a specialist group within the century but since, at least in the first century A.D., their machines were used for attack rather than defence, there is no need to look for special accommodation for them.

The exact number of administrative and technical staff in a legion is unknown, but at least 154 different posts below the rank of centurion are attested (Breeze, *JRS* 1969: 51).¹²² Some of these posts are presumably duplicated since their titles changed over the years: for instance Vegetius (ii.7.14) calls *signiferi draconarii* and *imaginiferi imaginarii*; but even so the total number of specialists will have been high. In the Flavian period Josephus mentions the large numbers of skilled men in the Roman army (*Bell. Jud.* iii.5.1).

The terms *principalis* and *immunis* must be used with care. *Principalis* is first attested in 107 (*P. Mich.* viii: 466:18) and again in 113 (*ILS* 2160), but *immunis* does not appear before 134 (*CIL* iii 6178.i.9). Watson (1965: 45 f.) has suggested that it was Hadrian who introduced the distinction between the two. The distinction was basically one of pay; both groups performed special functions and were, therefore, exempt from certain duties; but the *principales* also received extra pay. Vegetius gives us two lists based mainly on the *matricula* of his own day: in ii.7 the *principales* and in ii.11 the soldiers under the command of the *praefectus fabrum*. The exact status of the latter is not clear. These lists are also somewhat confused chronologically (D. Cooper, unpub. D.Phil.

122. For a full list of *principales* see von Domaszewski 1967, 1–80 and for *immunes*, *Digest* L.6.7 (Appendix to Chapter 7, above, p. 115).

thesis, Oxford). The Digest (L.6.7, see p. 115) gives a list of those *quibusdam aliquam vacationem munerum graviorum condicio tribuit* ('whose duties entitle them to some exemption from fatigues') based on Tarruntenus Paternus, c. A.D. 180. This list overlaps both those of Vegetius, and the term *immunis* should not here be taken to refer to rank; some, at least, must have ranked as *principales*, for example the *optio fabrica* and the *optio valetudinarii*. The evidence at present available does not allow precise lists of these ranks to be drawn up nor their exact numbers to be calculated.

On the other hand, the epigraphical and papyrological sources clearly indicate that the *immunes* were part of the centuries and not placed in separate units.¹²³ The duty-list for Legion III Cyrenaica c. A.D. 90 (Fink 1971: No. 58) lists those members of the century *opera vacantes* (excused normal duty) and includes *librarii* and an *armorum custos*. The small number of men left for ordinary duties, only thirty-one, suggests that the *immunes* were included in the eighty men of the century (Hyginus § I) and were not in addition to them as von Petrikovits has suggested. Not all the *immunes* will have been engaged on their special task all the time and no doubt all the specialists were also fully trained for combat if need be; builders and hospital staff are depicted in full armour on Trajan's column and Josephus refers to artisans active in the sieges (Baatz: *Germania* 1977: 265 f.).

The *tabularium principis* (*CIL* viii 18072) was composed of regular members of the first cohort who were no doubt accommodated with their comrades. Some of the specialists may have been housed away from their centuries; some of the hospital staff, for instance, would almost certainly have needed to sleep in or adjacent to the hospital. The possibility that the *equites* and/or some of the staff from the *fabrica* lived together as a unit has already been discussed (pp. 170 f.). The majority of the specialists will, however, have shared in the centurial barracks; indeed, if they did not do so, there would surely have been fewer *contubernia* per block.

Hyginus (§ I) records the number of men in a century as eighty; assuming eight men per *contubernium*, a century would need ten *contubernia*. Vegetius refers to units of ten men under *decani* and he, therefore, assumes that a century consisted of one hundred men, as do other classical writers (Festus p. 46, 25 f.: Claudio Donatus on *Aeneid* xi.463). A *centuria* may originally have contained one hundred men, but in practice the number fluctuated greatly (Caesar, *Bellum Civile* iii.91: 120 men per century) and the paper strength of any one legion presumably varied from year to year. The basic number of eighty men included ordinary soldiers, *equites*, *ballistarii* and at least some of the other specialists of ordinary rank. The higher-ranking *principales*, fewer in number, attached to each century were perhaps not included in the figure. Since the same may be true of soldiers on permanent detachment, for example on the staff of the provincial governor (von Petrikovits 1975: 186 n.152), the number of men on a century's books may have been closer to one hundred than eighty.

The *principales* presumably received extra living space in accordance with their rank, but this accommodation would be near if not in the centurial barracks. It has been suggested (see p. 164) that the rooms at one or both ends of the barrack blocks in various fortresses which are found to vary in dimensions or layout from the normal *contubernia* belonged to the *principales*. Such rooms, or sets of rooms, have been discovered at Gloucester, Neuss, Carnuntum, Vindonissa and Lambaesis. No rooms of this type were definitely located at Inchtuthil, but the possibility of their existence in the barracks of the first cohort has been pointed out (p. 161). Some, at least, of the extra *contubernia* at Inchtuthil (four in each block over and above the number necessary to accommodate eighty men) were probably used to accommodate the *principales*; their living-quarters would thus have been more spacious with fewer men per set. This would account for the exceptionally large number of rooms at Inchtuthil and Exeter; in fact the discrepancy in numbers becomes less glaring if the 'end' rooms of larger dimensions are added to the numbers of *contubernia* in other fortresses. Each century would probably need more than one room to accommodate its administrative and tactical N.C.O.'s, including at least three *tesserarii*, an *optio* and a *signifer*, especially if the paperwork was carried on in the barrack building.

123. For example, *pecuarii*: *CIL* viii 2568, 4; 2569, 28. *cl(avicularius)*: *CIL* iii 14507. *scutarius*: *BRGK* 1927: 119. *armorum custos*: *AE* 1902: 147a; 147b.

For the staff of the *officium legati* to have been accommodated in the *principia* itself would have been totally impractical; there was certainly no space for this at Inchtuthil and, in any case, the security risk would have been too high, especially when the presence of the treasury is taken into account. Equally it is improbable that the *librarii horrei* actually lived in the granaries rather than with their fellow soldiers; the small cubicles found in stone-built granaries are more likely to have served as offices.

The building to the immediate right of the *principia* at Inchtuthil bears a close resemblance to the barrack blocks (see p. 162). This building may possibly have housed the central administrative staff; but this is unlikely as the staff of the *tabularium principis* belonged to Cohort I and were probably accommodated with them. However, the rooms in Court C of the *principia* at Vindonissa and the unusual building behind the *principia* at Bonn may also have accommodated administrative staff. The building at Inchtuthil may have been c. 220 ft. (67 m) long and could have been divided into about sixteen *contubernia* (its precise dimensions were not established). If so, the *equites* could have been housed in this block or possibly the *singulares legati legionis*; the latter are now firmly attested in the first century A.D. (AE 1969/70: 583), but their numbers, although uncertain, were probably smaller than those of the *equites*. Office accommodation in the *principia* at Inchtuthil is very short and the building adjacent may possibly have served as supplementary offices. In any case, there is at Inchtuthil a general lack of the *sonderunterkünfte* (separate accommodation) mentioned at other fortresses by von Petrikovits (1975: 43 f.) as housing *immunes*. The identification of such buildings anywhere is highly tenuous, and the above discussion of *immunes* has shown it to be unnecessary; most of the legionaries at Inchtuthil would have been accommodated in the centurial barracks.

TABLE V A

COMPARATIVE DIMENSIONS OF LEGIONARY BARRACKS (in metres)

Fortress	Overall Length	Length of Centurion's House	Length of Men's Quarters	Length of Alley/Extra Rooms
Inchtuthil	83.8	21.3	60.4	2.44
Hod Hill	36	11/12	24/25	—
Longthorpe	104.5	34.77	59.5	10
Haltern north	70	24	46	—
Haltern east	65	9	51	4.5
Colchester	79	22	57	—
Neuss <i>praetentura</i>	77	24.5	48	4.5
Neuss <i>retentura</i>	78	25	48.5	4.5
Gloucester	75	18.5	50	6.5
Carnuntum	76	28	40	8
Vindonissa	86	33	53	—
Caerleon	72	24	48	—
Chester	77.7	25.9	50.3	1.5
Vetera	85 ?	—	53	?
Nijmegen <i>retentura</i>	70	25	45	—
Nijmegen <i>praetentura</i>	65	25	30	10
Lauriacum	66.6	None	66.6	—
Lambaesis	93	24	60	9
York	—	24.4	—	—
Exeter	62	17	45	—
Wroxeter	—	21.4	—	—

TABLE V B

COMPARATIVE DIMENSIONS OF LEGIONARY BARRACKS (in metres)

Fortress	Number of Contubernia	Width of Centurion's house	Width of Barracks	Width of Veranda
Inchtuthil	14	10.98	10.98	2.75
Hod Hill	6/7/8	7.6	3/3.65	None
Longthorpe	14	16.47	14.95/9.76	2.13
Haltern north	13	9	6	?
Haltern east	10/12	9	6	?
Colchester	-	10	-	-
Neuss <i>praetentura</i>	12	12	12	4
Neuss <i>retentura</i>	12	12	12	4
Gloucester	12	10	10	2
Carnuntum	10	12	9	?
Vindonissa	11	11	11	3
Caerleon	12	11	11	2
Chester	11	10.97	11.3	2.7
Vetera	11	-	-	-
Nijmegen <i>retentura</i>	11	12	12	2
Nijmegen <i>praetentura</i>	8	12	12	2
Lauriacum	12	None	11.5	3
Lambaesis	13	14.5	13.5	3
York	-	12.2	-	-
Exeter	14	10.5	11	4
Wroxeter	-	10.4	?	?

TABLE VI

GENERAL COMPARISON OF AREAS OF LEGIONARY BARRACKS

Note: all figures are in square metres; all areas are internal except at Vetera, Nijmegen and Lambaesis

Fortress	Overall Area	Centurion's House	Men's Quarters	Contubernia Rear	Contubernia Front	Total Number
Inchtuthil	914	234	390	16.95	10.9	27.85
Hod Hill	265.5	82.25	64.8	One Room		10.8
Haltern north	630	216	273	15.7	5.2	21
Haltern east	414	81	297	?	6.75	27
Colchester	?	220	-	-	-	-
Neuss <i>praetentura</i>	924	294	285	15.75	8	23.75
Neuss <i>retentura</i>	936	300	294	15.75	8.75	24.5
Gloucester	-	185	309.6	17.2	8.6	25.8
Carnuntum	-	-	-	13.2	6.3	21.6
Vindonissa	946	363	308/336	17	11	28
Caerleon	792	264	369.6	17.2	13.6	30.8
Chester	854.7	286	359.7	18.5	14.2	32.7
Vetera	-	-	352	-	-	32
Nijmegen	840	300	440	-	-	40
Lauriacum	566	None	418.5	19.52	15.36	34.9
Lambaesis	1396	348	611	-	-	47
Exeter	682	210	315	11.25	6.25	17.5

TABLE VII A
COMPARATIVE DIMENSIONS OF AUXILIARY BARRACKS

Note: all figures are in metres.

Site	Overall Length	Length of Officer's House	Length of Men's Quarters	Width of Men's Quarters (minus veranda)
Fendoch	47	10.37	36.6	8
Strageath	42.7	18.3	24.4	8
Pen Llystyn	47.3	12.2	35.1	6.4
Brough	47.3	11.59	35.7	5.6
Nanstallon	32	None	—	8.2
Bearsden	36.4	8.7	27.7	6.4
Bar Hill	33.5	None	—	7.3
Barburgh Mill	47.5	23.5	24	7.4
Crawford	19.8	—	—	7.2
Raeburnfoot	18.3	—	—	7.3
The Lunt	48.7	—	—	6.1
Housesteads	49.3	—	—	8.5
Valkenburg I	80	11	54.2	6.5
Kunzing ret.	50.5	11	39.5	11 ?
Echzell	70	—	—	12 ?
Oberstimm	47	—	—	—
Hesselbach I	34.6	—	—	4.35

TABLE VII B
COMPARATIVE DIMENSIONS OF AUXILIARY BARRACKS

Site	Number of Contubernia	Area of Contubernia (m ²)	Front Room (m ²)	Rear (m ²)	Date
Fendoch	10	16.5	5.52	11	Agricolan
Strageath	8	20.3	9.3	11	Agricolan
Pen Llystyn	10	16.5	5.52	11	Flavian
Brough	10 ?	17.2	5.58	11.62	Flavian
Nanstallon	7/8	26.3	11.3	15	Neronian
Bearsden	8	22.4	—	—	Antonine
Bar Hill	10	24.5	—	—	Antonine
Barburgh Mill	10	22	—	—	142–158
Crawford	10(in 2 blocks)	22	—	—	Antonine
Raeburnfoot	—	23	—	—	—
The Lunt	—	15.47	—	One Room	1st Century
Housesteads	10	25.5	—	—	2nd Century
Valkenburg I	13	21	7	14	Claudian
Kunzing ret.	10	36	17.2	18.8	1st/2nd Century
Echzell	10 + 1	33	—	—	c. A.D. 100
Oberstimm	8	12	—	—	1st Century
Hesselbach I	9	15.5	—	—	c. A.D. 100

TABLE VIII

DIMENSIONS OF BARRACKS AT INCHTUTHIL

Barrack Number	Length	Men's Quarters Width (minus veranda)	Length	Centurion's House Width	Alley Width
1	60.4 m	8.85 m	20.74 m	10.98 m	3 m
2	60.4 m	7.9 m	20.74 m	10.98 m	3 m
3	60.4 m	8.2 m	20.74 m	11.28 m	3 m
4	60.4 m	8.5 m	20.74 m	11.28 m	3 m
5	60.4 m	8.2 m	20.74 m	11.59 m	3 m
6	60.4 m	8.85 m	21 m	11.59 m	3 m
7	60.4 m	8.5 m	21.4 m	11.59 m	2.13 m
8	60.4 m	8.5 m	21.4 m	11.59 m	2.13 m
9	60.4 m	8.5 m	21.4 m	11.59 m	2.13 m
10	60.4 m	8.5 m	21.4 m	11.59 m	2.13 m
11	60.4 m	8.5 m	21.4 m	11.59 m	2.13 m
12	60.4 m	8.5 m	21.4 m	11.59 m	2.13 m
13	59.8 m ?	8.85 m	20.74 m	11.59 m	2.44 m
14	59.8 m ?	8.5 m	20.74 m	10.36 m	2.44 m
15	59.8 m ?	8.5 m	20.74 m	11.28 m	2.44 m
16	59.8 m ?	8.5 m	20.74 m	10.36 m	2.44 m
17	59.8 m ?	8.5 m	21.4 m	10.98 m	2.44 m
18	61 m. ?	8.5 m	20.74 m	11.59 m	2.44 m
19	62.2 m	8.5 m	?	?	1.83 m
20	62.2 m	8.5 m	20.74 m	11.59 m	1.83 m
21	62.2 m	8.5 m	20.13 m	11.28 m	1.83 m
22	61 m	8.5 m	21.4 m	11.59 m	1.83 m
23	61 m	8.5 m	21.4 m	?	1.83 m
24	61 m	8.5 m	?	?	1.83 m
25	60.4 m	8.2 m	21.7 m	10.98 m	1.52 m
26	60.4 m	?	?	?	1.52 m
27	60.4 m	8.5 m	?	?	1.52 m
28	60.4 m	7 m	?	?	1.52 m
29	60.4 m	7.62 m	?	?	1.52 m
30	60.4 m	?	20.13 m	10.36 m	
31	?	?	?	10.98 m	?
32	?	7.9 m	?	10.6 m	?
33	?	8.2 m	?	10.98 m	?
34	?	?	?	10.6 m	?
35	?	8.5 m	21.4 m	10.6 m	?
36	?	8.5 m	21.4 m	10.6 m	?
37	60.4 m	8.2 m	21.4 m	10.98 m	
38	60.4 m	8.2 m	21 m	10.6 m	
39	59.8 m	8.2 m	21 m	10.98 m	
40	59.8 m	8.2 m	?	10.6 m	
41	60.4 m	8.2 m	?	10.6 m	
42	60.4 m	8.2 m	?	10.6 m	
43	?	7.9 m	See Table IX		
44	61.3 m	7.6 m	See Table IX		
45	61.3 m	7.9 m	See Table IX		
46	?	7.3 m	See Table IX		
47	?	7.3 m	See Table IX		
48	?	7.6 m	See Table IX		

Barrack Number	Men's Quarters		Centurion's House		Alley Width
	Length	Width (minus veranda)	Length	Width	
49	61 m	7.6 m	See Table IX		
50	60.4 m	7.9 m	See Table IX		
51	58 m	7.4 m	See Table IX		
52	58 m	7.7 m	See Table IX		
53	61.3 m	8.85 m	22.3 m	10.98 m	1.22 m
54	?	?	?	10.98 m	1.22 m
55	?	8.2 m	?	?	1.22 m
56	?	8.2 m	?	?	1.22 m
57	?	?	?	?	1.22 m
58	?	8.2 m	?	?	1.22 m
59	?	8.5 m	?	?	?
60	?	8.5 m	?	10.98 m	?
61	?	8.5 m	21.4 m	10.6 m	?
62	61 m	8.5 m	?	10.98 m	?
63	?	8.2 m	?	11.59 m	?
64	?	8.2 m	?	?	?
<i>end block</i>					
Building A	49.7 m	7.6 m	19.5 m	10 m	1.5 m
Building B	61 m	7.6 m	19.5 m	10 m	

TABLE IX
HOUSES OF CENTURIONS OF FIRST COHORT AT INCHTUTHIL

Centurion	Depth	Width	Area	
<i>primus pilus</i>	21.96 m	34.77	763.4 m ²	alleyway 4.88 m
<i>princeps</i>	21.96 m	24.7 m	543.4 m ²	alleyway 4.58 m
<i>hastatus</i>	21.35 m	24.4 m	519.7 m ²	alleyway 1.83 m
<i>princeps posterior</i>	21.35 m	25 m	533.7 m ²	alleyway 4.27 m
<i>hastatus posterior</i>	21.96 m	27.45 m	602.8 m ²	



(Photo: I.A. Richmond)

Pl. XXIX Taberna on north side of the *via principalis* (east), showing the front wall (left) with side of doorway in foreground and a partition-wall running right. Scale in feet.

CHAPTER 14

THE TABERNAE

A. DESCRIPTION OF THE EXCAVATED REMAINS (FIGS. 79–83)

*Taberna*e is the name given by modern writers to the rows of rooms which lined the main streets of the fortress. There were at least 160 of these at Inchtuthil in addition to the possible block of *taberna*e to the right of the *principia* (see above, p. 162). They were located on both sides of the *viae praetoria* and *principalis*; there were none, however, in front of the ‘*basilica exercitatoria*’, the *principia* or the empty site beside it, destined probably for the Bath-building (p. 187). *Taberna*e also flanked the northern section of the *via decumana* and there were two pairs on either side of the entrance to the *fabrica* (p. 108).

The exact measurements of every individual *taberna* were not determined by excavation, but sufficient work was done to show that these rooms were of reasonably uniform appearance, on average 27 ft. (8.23 m) deep by 18 ft. (5.49 m) wide (TABLE X, p. 180). The corner rooms at the intersection of the *viae praetoria* and *principalis* were larger, measuring 27 ft. (8.23 m) square. Not all the partition-walls between the *taberna*e were located, and some may have been less regularly divided; the plan of the block to the south of the *via principalis sinistra* (FIGS. 83; Nos. 90–99) is by no means certain, where dividing walls could not be traced (FIG. 82), but it contained some narrower rooms.

Cross-trenching did not reveal any further subdivision of the individual *taberna*e, into a front and rear room for example; such divisions have been found in similar buildings used as shops and workrooms in towns such as Verulamium. The exception is the block facing the right side of the *principia*, discussed above on p. 162, which did resemble a barrack block.

The front construction-trenches were seldom uncovered along their entire length and thus the position and width of the doorways is uncertain. If they were used primarily as workshops and store-rooms, some *taberna*e may have been open-ended, the whole of the end facing the street being closed by shuttering (compare the *taberna*e in Romano-British towns and indeed shops in modern Italian towns). The T-shaped construction-trenches found in front of some of the *taberna*e (PL. XXIX), for example on the *via principalis dextra* (No. 28), although they do not disprove the theory, suggest that the shutters did not extend across the entire frontage of each *taberna*. The major part of the front side of each *taberna* does, however, seem to have been left open as a doorway.

The *taberna*e were fronted by a row of wooden columns set in post-holes which formed a portico 14 ft. (4.27 m) wide. The post-holes were found to be approximately 8 ft. (2.4 m) apart. There were three posts per *taberna*, one in front of each partition-wall and one halfway along the frontage, thus narrowing the effective entrance to 8 ft. (2.44 m) each side of this.

The *taberna*e were divided into groups of varying size by alleyways which gave access from the main streets to the buildings behind the *taberna*e.

TABLE X
DIMENSIONS OF TABERNAE AT INCHTUTHIL

<i>Number of Taberna</i>	<i>Internal Depth</i>	<i>Internal Width</i>	<i>Position</i>
1–6	8.23 m	5.8 m	S. <i>via principalis dextra</i>
7	8.23 m	3.96 m	
8	8.23 m	5.49 m	
9	8.23 m	4.88 m	
10–24	8.23 m	5.8 m	
25	8.23 m	9.15 m	
26–28	8.23 m	5.8 m	
29	8.23 m	8.24 m	corner
30–52	8.23 m	5.49 m	W. <i>via praetoria</i>
53–71	8.23 m	5.49 m	E. <i>via praetoria</i>
72	8.23 m	8.24 m	corner
73–89	8.23 m	5.49/5.8 m	S. <i>via principalis sinistra</i>
90	8.23 m	5.18 m	
91	8.23 m	5.49 m	
92	8.23 m	3.05 m	
93	8.23 m	4.27 m	
94	8.23 m	3.05 m	
94a	8.23 m	9.15 m	
95	8.23 m	4.88 m	
96	8.23 m	3.66 m	
97	8.23 m	5.18 m	
98	8.23 m	22.86 m	
99	8.23 m	5.8 m	
100–109	8.23 m	5.49/5.8 m	N. <i>via principalis sinistra</i>
110	8.23 m	12.8 m	
111	8.23 m	9.76 m	
112–134	8.23 m	5.49/5.8 m	N. <i>via principalis dextra</i>
135–145	8.53 m	5.49 m	<i>via decumana</i>
146–156	8.53 m	5.49 m	
157–160	8.24 m	5.49 m	By <i>fabrica</i>

(gap between veranda posts always 1.83 to 2.44 m)

B. TABERNAE IN OTHER FORTRESSES AND THEIR USE

Buildings similar to the *tabernae* at Inchtuthil have been recognized on the main streets in several other fortresses (Neuss, Bonn, Vindonissa, Lambaesis, Lauriacum, Vetera, Carnuntum, York), and their presence has been postulated in others. The dimensions varied, but the basic arrangement, consisting of a row of open-fronted units behind a colonnade, remained the same. At both Neuss and Vetera the *tabernae* were divided into a front and back room, a plan reminiscent of town shops. The numbers of *tabernae* in other fortresses are uncertain owing to incomplete excavation; Neuss appears to have had about 106, but these were of larger dimensions than those at Inchtuthil. The *tabernae* were, then, normal to the layout of a fortress and should therefore be supposed to have fulfilled a similar purpose in all.

On analogy with the *tabernae* in towns and the *horrea* in Rome and Ostia (Baatz, *Germania* 1964: 260 f.), at least some of these buildings in the fortresses can reasonably be assumed to have served as store-rooms and workshops. Shops as such are unlikely to have existed within the defences; traders are known to have been barred from the camp itself in Republican times (Caesar *B.G.* v:1:37). Archaeological evidence from various fortresses supports interpretation as stores; indeed, at Inchtuthil itself quantities of broken glass and samian were found in the gutter outside *Tabernae* 112–113 on the *via principalis* and in the eastern wall-trench of No. 112. Some of the glass had fused in a fire. Large amounts of glass and pottery were found amongst the rubbish at the rear of

the *tabernæ* lining the *via principalis* at Carnuntum (R.L.O. 12, 1914: 2 and 8) and the buildings along the *via principalis* at Vindonissa contained much ceramic debris (Laur-Belart 1935: 58). This use can be traced back to the camps of Republican times, when much of the baggage was stored in the area in front of the tribunes' tents (Polybios vi.27.5). *Tabernæ* themselves can be seen in an early phase of their development at Haltern (Augustan); very few have been found there, but a row of rooms facing the street in front of the *principia* was equipped with cellars, similar to those known in the shops lining the streets in the *vici* outside German auxiliary forts such as the Saalburg; these cellars at Haltern were rich in finds, including many pots in good condition which had apparently been stored there and not fallen in during demolition (Wells: 1972: 187; v. Schnurbein 1974: 54 f.). In addition to pottery and glassware the *tabernæ* would have been suitable as store-rooms for weapons, tools, tents, leatherwork, bronze fittings and so on. The *principia* at Inchtuthil was not large enough to have contained a weapon store such as that postulated at Lauriacum (R.L.O. 10, 1909: 94–6) and Lambaesis (Cagnat 1912: 493 f.). The six *horrea* (Chapter 8) would have been used to store the grain, but some of the many other foodstuffs necessary (Davies 1971: 122 f.) could have been kept in the *tabernæ*.

There is only limited archaeological evidence for activities such as metalworking being carried on in the *tabernæ* at Inchtuthil,¹²⁴ but some of the legionary craftsmen almost certainly worked in them and there were traces of workshops along the main streets at Haltern. Other *tabernæ*, especially those near the *principia* and in front of the *fabrica*, will have been used as offices. Many offices were needed to house the clerks dealing with the vast amount of paperwork indicated by the detailed lists which have survived and the large number of *librarii* known to have existed.

It has been suggested that the *tabernæ* housed the *ballistae* and the waggons when they were not in use; but this seems improbable. The vehicles could have been manoeuvred between the columns of the portico, since these were 8 ft. apart and the Roman cartwheel gauge was less than 5 ft.; and the *carroballista* would also have been small enough; but the T-shaped construction-trenches (and walls) would have made such a use inconvenient. A waggon park (for example that at the rear of the '*basilica exercitatoria*' at Inchtuthil), taking the form of an open-sided shed or merely a gravelled area, would have been more practical. An open shed would have left few archaeological traces, and certainly at Inchtuthil there was plenty of space available for such in the *intervallum* area where relatively little excavation has taken place. If necessary, the waggons could have been further protected from the weather by leather sheets.

The *tabernæ* were certainly not needed for living accommodation for the legionaries, nor even for the cavalry (see above, p. 170). Some of the many non-military personnel may, however, have slept in these rooms, for example the *muliones* (muleteers), *calones* (servants) and so on. Slaves and servants would naturally have slept where they could, some with their masters, others in the workshops or with the animals they tended.

HORSES AND MULES

Each legion possessed a large number of horses and mules; the exact number of animals involved can obviously not be calculated but it must have been very high, perhaps one thousand or more (Mócsy: *Acta Ant.* 1972: 153). There were naturally mounts and remounts for the 120 *equites* and for the higher-ranking officers. Each century needed pack-animals to carry the heavier baggage such as the tents, as did the officers to an even greater degree (Josephus, *Bell. Jud.* ii: 521; iii: 90). In addition animals were needed to draw the waggons (*ibid.*, iii: 121) and the *carroballistæ* (Vegetius iii. 24). Trajan's Column includes various scenes which illustrate these needs clearly. Where these animals were kept remains uncertain. Attempts to identify stables at various sites are beset with problems, and convincing evidence is exceedingly rare. The amount of stabling necessary for all the legionary animals would be very great, and it seems unlikely that all could have been stabled within the fortresses. Indeed no stables have been positively identified at Inchtuthil, although various suggestions have been made.

The suggestion that the *equites* and their horses were housed in the *tabernæ* of the *retentura* seems unlikely (von Petrikovits 1975: 50–4; this was, of course, the position occupied by the

124. For evidence of iron-working along the *via decumana*, see p. 300.

cavalry in camps of the second century B.C., cf. Polybios vi: 28). The arrangement of two men and two horses per *taberna* seems too cramped, and it has already been demonstrated. (pp. 169 f.) that the *equites* themselves were almost certainly accommodated elsewhere in the fortress. The privileged position of the *equites* makes it unlikely that they would have slept with their mounts; on the other hand grooms and stable boys may well have done so.

Since regularly-spaced cross-walls were not located throughout the long rectangular blocks flanking the *via decumana* at Inchtuthil (or indeed at Vindonissa and Lauriacum (von Petrikovits 1975: 166 n.30)), it is possible that part of these buildings were not *tabernae* but stable-blocks; positive identification as such is, however, impossible, as the frequent attempts which have been made to identify stables in various forts illustrate; moreover, evidence of ironworking was found there (p. 300). At few forts is the evidence for stables as convincing as the presence of a central drain at Brough-on-Noe (*Derbys. Arch. J.* 1968: 91) and at Ilkley (Hartley 1966: 23 f.). The 'stables' at Hod Hill (Richmond 1969: 82–4; pls. 47 and 62) were really more suited to the pack-animals than mounts since the distance between the worn patches supposedly caused by front and rear hooves is only 3 ft. (0.9 m), giving a probable height of only 10 hands (3 ft. 4 in. = 1.02 m); the skeletal remains at Newstead and Xanten, for example, indicate that the majority of horses were c. 14 hands (4 ft. 8 in. = 1.42 m). The amount of space allowed per animal is also too narrow. More space is allowed lengthwise per horse in the reconstruction of stables at Longthorpe (Frere, *Britannia* 1974: 24) and Künzing (Schönberger 1975: 58–64; figs. 13 and 14) but the internal division into small units seems impractical. The stables at Niederbieber (Wells 1977: 663) had no internal divisions and the excavators suggested that the horses were tied in two lines along the length of the building, divided, if at all, by beams only. The last arrangement might be considered for the buildings on the *via decumana* at Inchtuthil.

Even if we assume that some of these *tabernae* (Nos. 135 to 156) were really stables, there was obviously insufficient space for all the horses belonging to the legion, even if only 3 ft. (0.91 m) is allotted to each animal. There was, however, perhaps sufficient space for the horses of the *equites legionis*. No other stable-like buildings have been discovered at Inchtuthil, nor at other legionary fortresses. The accommodation of large numbers of animals remains a problem. Wells (1977: 659–64), on the analogy of the U.S. cavalry in the last century, has suggested that the majority of the animals were kept not in stables but in the open, possibly in corrals. In some forts the horses may even have been tied to a hitching-rail outside the barracks in the same way that space was allowed for the pack-animals in front of the tents in marching-camps. Against this it has been argued that the Scottish climate is too severe for animals to be kept outside all winter; but the winters in the northern states of the United States are equally severe. In any case temporary shelters could have been erected in the pastures or even inside the fortress along the *via sagularis*. Such structures would leave little archaeological trace, and the circumstances of the excavation did not allow for a full investigation of the *intervallum* area at Inchtuthil. The *intervallum* on the northern side of the fortress at Longthorpe was about 100 ft. (30.5 m.) wide; this is ample space for the horses to have been kept there.

'Corrals' outside the fortresses have never been positively identified, but their existence is a strong possibility. Some of the many ditched enclosures discovered at different sites, such as those south of the fort at Gellep by the Baggersee (*Beiträge zur Archäologie des Römischen Rheinlands* ii Band 10: 242 f.), may have been intended for animals rather than as annexes for stores and so on. The Redoubt at Inchtuthil may possibly have served such a purpose. *Prata legionis* are known from various inscriptions, for example from Meden on Sieg near Bonn¹²⁵ (Möcsy, *Acta Ant.* 1972: 153). These *prata* can reasonably be assumed to have served as pasture for the riding horses and draught animals, not to mention the cattle that were ordinarily kept for slaughter. The latter could not have been herded within the fortress; guards would have been posted to prevent rustling from the herds. In times of extreme danger as many pack-animals as possible, and the riding horses, could have been kept in temporary corrals inside the fortress defences. Such a system of putting the animals out to grass would explain the lack of stable-like buildings in known fortresses and would also reduce the amount of fodder that would need to be stored.

125. *legio prim(a) Minerv(ia) (p)ia fideli(s) prata (A)urelian(a) (a)dampliavit.*

CHAPTER 15 THE STREETS

The principal streets had been metalled with gravel, and cambered to drain into channels at the side (pp. 193 f.). The character of the metalling can be appreciated in FIG. 44 and PL. XXX A, which record a section of the continuation of the *via principalis* outside the north-west gate. Here the street is 25 ft. 3 in. (7.70 m) wide and c. 8 in. (0.2 m) thick. A metalled road ran on from this point across the plateau, soon turning north-west in the direction of the Gourdie quarry (FIG. 1). It was sectioned in the present wood near the escarpment (PL. XXX B) and has been further traced by aerial photography and excavation on the northern side of the valley, where there is a fork, one branch aiming for the quarry and the other making for the Millhole Burn. In this area quarry-pits for metalling have been observed (pp. 47, 256).

The *via quintana* was found to be heavily rutted by traffic (PL. XXXI) in the vicinity of the south side of the *fabrica* (p. 105); this suggests the passage of waggons proceeding to this building and perhaps also to the nearby granaries (FIG. 45). The spacing of the ruts (FIG. 45) is consistent with a gauge of c. 4 ft. 8 in. (1.42 m.).

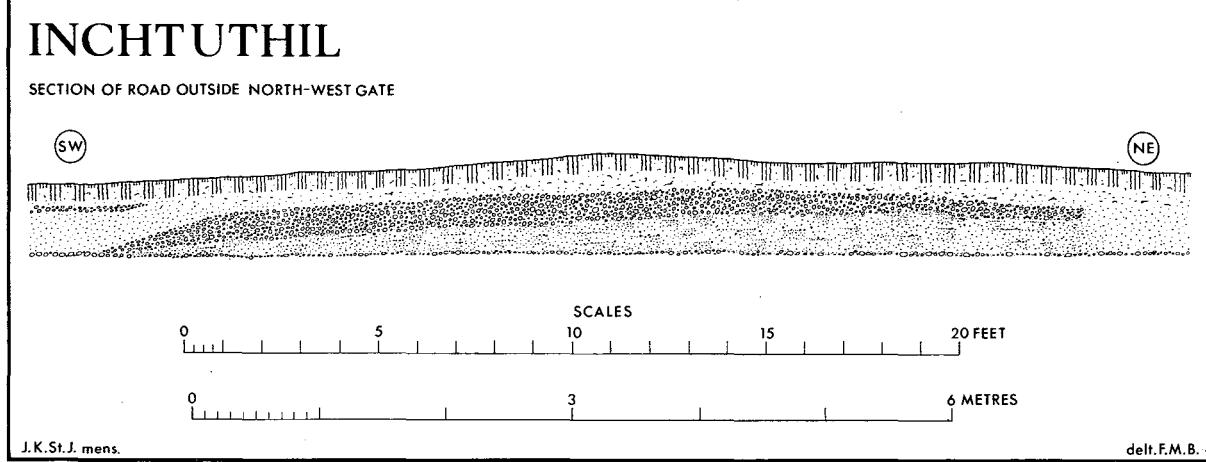
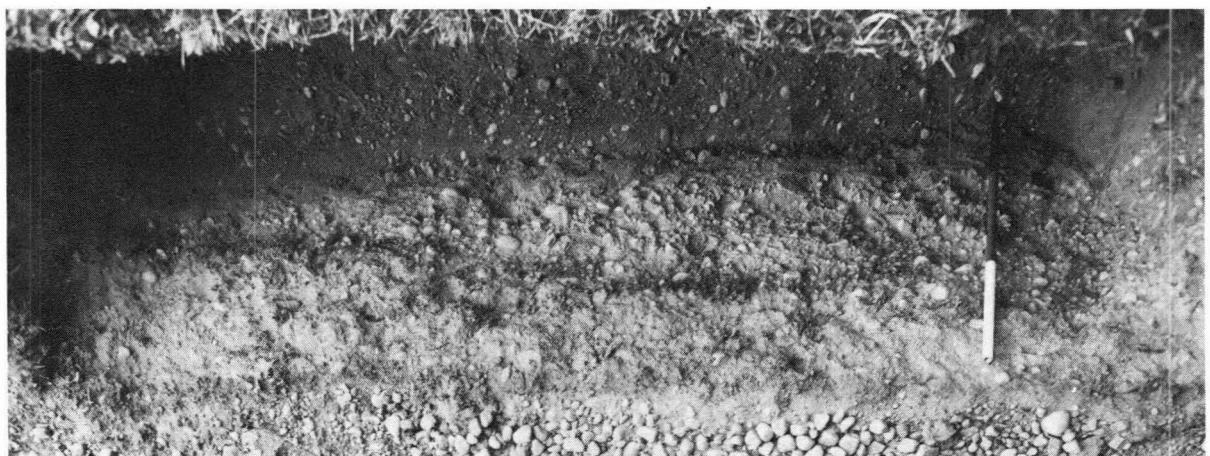


FIG. 44 Section of road 60 m outside the NW gate (*porta principalis dextra*). Scale, 1:60.



(Photos: RCAHM (Scotland): Crown copyright)

Pl. XXX A The continuation of the *via principalis* outside the north-west gate (*porta principalis dextra*) (p. 183). Scales in feet.



Pl. XXX B Section of the road to the Gourdie quarry cut in the wood c. 210 m north-west of the *porta principalis dextra* (see FIG. 2). Scale in feet.

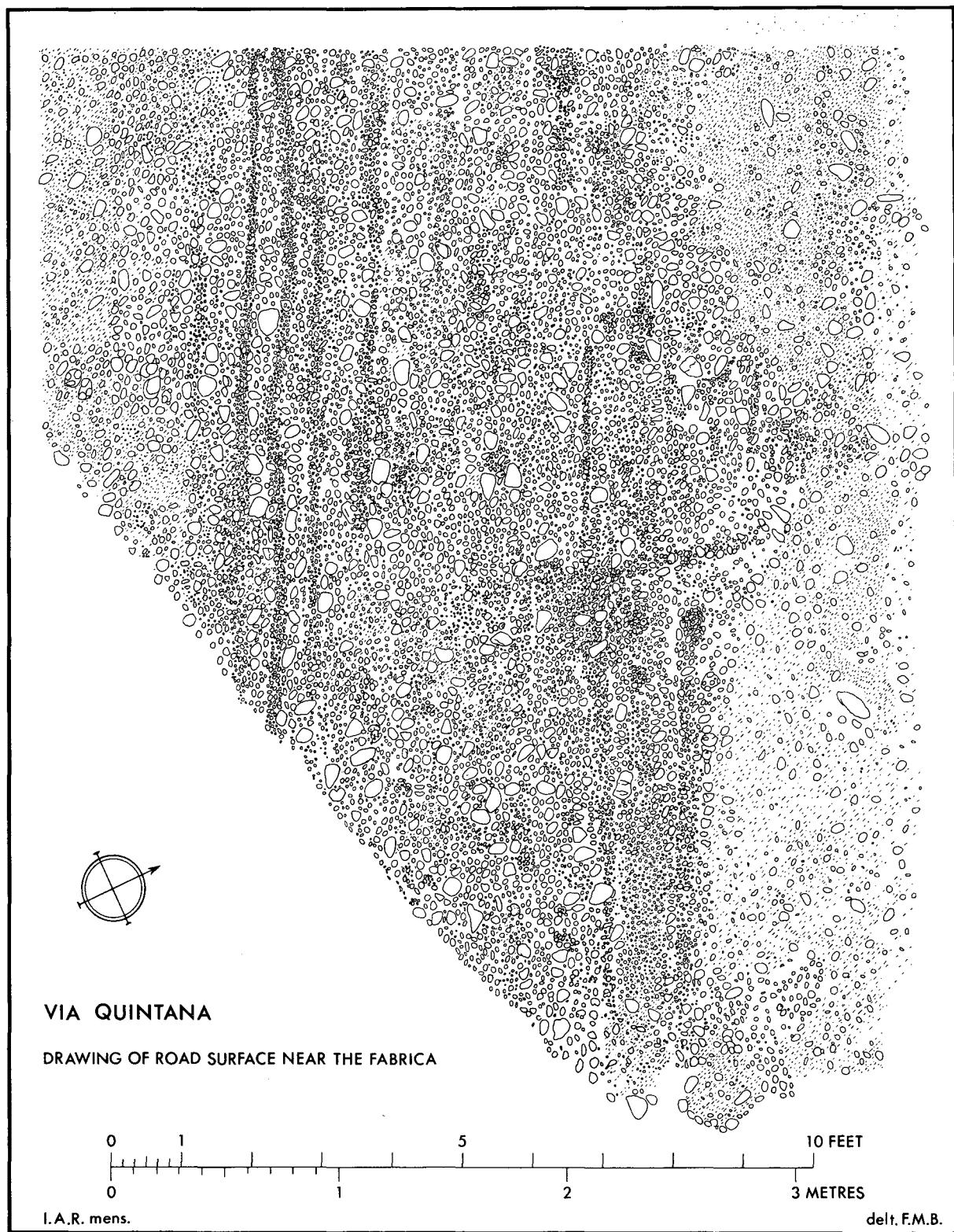
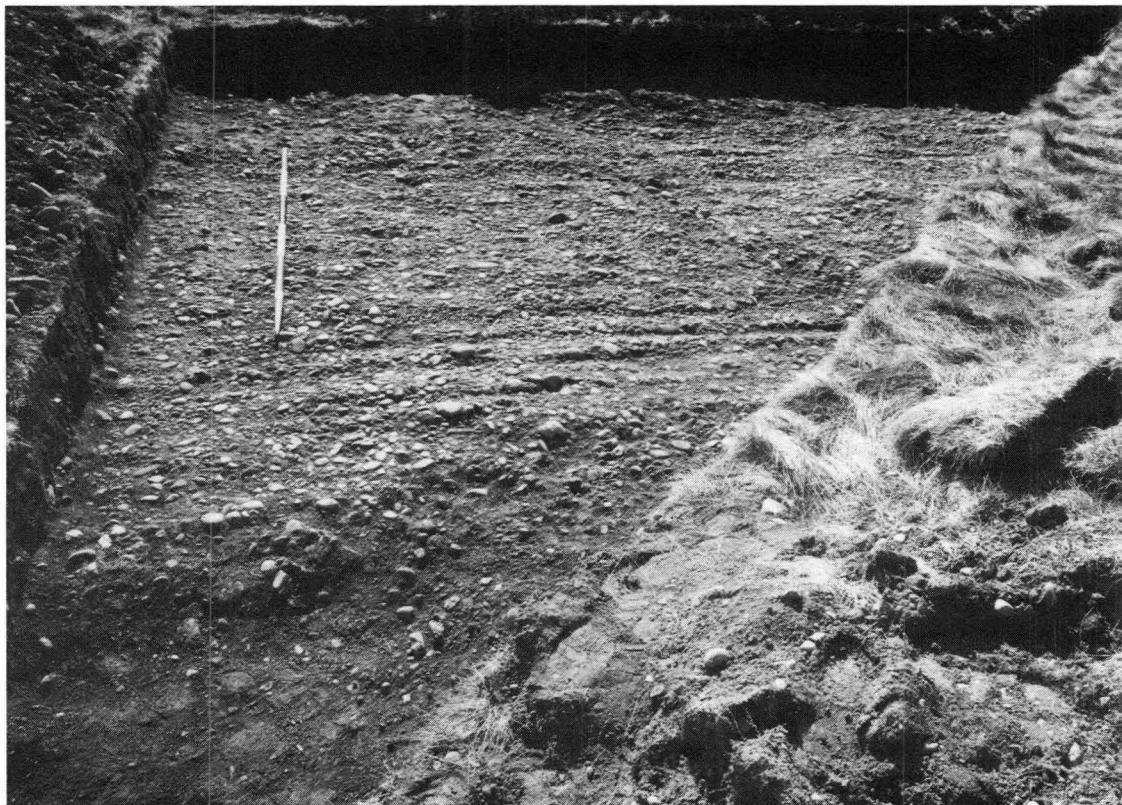


FIG. 45 Plan of traffic-ruts in the *via quintana*. Scale, 1:26.



(Photo: RCAHM (Scotland): Crown copyright)

Pl. XXXI The *via quintana* south of the *fabrica*, looking south, showing traffic-ruts (p. 183).

CHAPTER 16

POSSIBLE SITES FOR THE PRAETORIUM AND BALNEUM AT INCHTUTHIL

Neither the *praetorium* nor the *balneum* (bath-building) had been erected before the fortress was abandoned; this is probably to be explained by the length of time and amount of work involved in their construction, for the *balneum*¹²⁶ would almost certainly and the *praetorium* probably have been built of stone. The sites for these buildings would, however, have been determined during the initial laying-out of the fortress and left empty until the manpower and materials were available. In a similar manner both the *balneum* and *praetorium* at Caerleon were erected on what appear to have been 'reserved plots' some time after the completion of the rest of the fortress (Boon 1972: 30). Similarly the stone *praetorium* at Chester seems to have had no timber predecessor.

Richmond considered that the large empty area to the east of the *principia* at Inchtuthil was reserved for the *praetorium* (*JRS* 1962: 162); this area was trial-trenched but no traces of any buildings were discovered. There was a similarly empty area at the back (north) of the *principia*, partially demarcated by the street-system which was also incomplete (FIGS. 79, 82). No use has as yet been proposed for this site, and the possibility that a bath-building was planned at Inchtuthil has not been raised in previous discussions of the site or of legionary bath-houses. Legionary baths must, however, be regarded as a normal feature of a fortress (v. Petrikovits 1975: 102) and have indeed been excavated in the majority; internal bath-houses are known at Chester, Caerleon, Exeter, Neuss, Mainz, Vindonissa, Lauriacum, Aquincum, Lambaesis and Albano. That Inchtuthil, intended as it was for long-term occupation, would have been so equipped may reasonably be assumed.

Since temporary camps obviously did not have bath-houses, Hyginus can give us no indication of the usual position of the internal baths. Nor indeed is his treatise of any assistance in determining the usual site of the *praetorium* in a permanent fortress, since in a temporary camp this and the *principia* were combined on the central plot (the location for the *principia* in a fortress). For information about the normal position of these buildings we must rely on evidence from the excavated fortresses. It is immediately apparent that the *praetorium* was usually sited near the *principia*; but, although in auxiliary forts the commander's house was normally built to the right (sometimes to the left) of the *principia*, in the fortresses, according to the evidence available, the most usual position for the *praetorium* was to the rear of the *principia*. The *praetorium* stood behind the *principia* at Chester, Caerleon, Neuss, Carnuntum and possibly Haltern; it lay to the right at Carpow and to the left at Nijmegen; but neither of these fortresses can be taken as typical, since there were various other irregularities in their size and layout. There was a *praetorium* on both the right and left of the *principia* at Vetera; but this was a special case since the fortress housed two legions. The evidence is tenuous, but it seems to suggest that the legate's palace at Inchtuthil would eventually have been erected on the empty plot to the rear of the headquarters-building.

The large area to the east of the *principia* would thus have been left available for another building; a reasonable conjecture is that this was the legionary baths. Although construction had

126. Timber *balnea* existed at Vindonissa during the occupation of Legion XIII Gemina, but this was very early, before A.D. 46.

not actually begun on the site before the abandonment, extensive preliminary levelling had been carried out in preparation. A large level platform had been prepared, leaving a scarp 4 ft. (1.22 m) deep along its eastern edge slightly to the west of Barracks 13 to 18; the scarp is still visible today (PL. IV). Levelling on such a large scale is perhaps to be considered more applicable to the erection of baths with their hypocaust systems than to a legate's house; it would certainly not have been necessary for a timber building. The position of the *balneum* in the known fortresses was more varied than that of the *praetorium*; but most were situated in the *praetentura*, for example at Exeter, Chester, Caerleon, Lauriacum; that at Lambaesis was in the *retentura*. There were two internal bath-houses at Neuss, one in the right *praetentura* and one to the left of the *principia*; the latter offers an interesting parallel to the reserved plot at Inchtuthil.

The relative size of the two reserved areas should also be considered in a discussion of their intended use. The area to the east (left) of the *principia* was c. 95 m by 73 m (6935 m²) while the area to the north (rear) was c. 78 m by 62 m (4836 m²). Comparison of the relative areas of the *praetoria* and *balnea* excavated at other fortresses, although inconclusive, does suggest that the larger area was more suited to the baths than to the *praetorium*:

TABLE XI

Site	<i>Area of Praetorium</i>	<i>Area of Balneum</i>
Chester	$72 \times 72 \text{ m} = 5184 \text{ m}^2$	$80 \times 80 \text{ m} = 6400 \text{ m}^2$
Caerleon	$70 \times 60 \text{ m} = 4200 \text{ m}^2$	6000 m^2
Neuss	$80 \times 80 \text{ m} = 6400 \text{ m}^2$	$70 \times 80 \text{ m} = 5600 \text{ m}^2$
Vetera	$100 \times 80 \text{ m} = 8000 \text{ m}^2$?
Carnuntum	$65 \times 70 \text{ m} = 4550 \text{ m}^2$?
Lambaesis	?	$100 \times 60 \text{ m} = 6000 \text{ m}^2$

(the figures for the *balnea* are more consistent than those for the *praetoria*).

In conclusion, there is little doubt that a building would eventually have been erected in each of these two areas still empty at the time of withdrawal. Given the ambiguity of comparative evidence, the identity of these buildings cannot be certainly decided; but the most likely hypothesis is that a *praetorium* would have been erected at the rear of the *principia* and a *balneum* to the side.

CHAPTER 17

THE WATER-SUPPLY AND DRAINS

Besides prospection for building-materials, the provision of an adequate supply of running water to the fortress must have been a major consideration. For a short stay, fatigue-parties could have drawn water from the Tay, and animals could have been taken there to water. No doubt the requirements of construction-parties in the labour camp could have been met in this way, but as soon as troops moved into the fortress in numbers, the need for a supply of running water would become acute; the excavations produced evidence that this was intended. The discovery of a terracotta water-pipe and fragments of a second in the Tribune's House IV, the existence of channels evidently designed for pipes or conduits in the '*basilica exercitatoria*' (p. 123) and elsewhere in the *praetentura*, the size of the sewer that served as an outfall from the hospital, all point to the same conclusion.

To provide an adequate supply of fresh water was a problem not easily solved. The gravel of the plateau is permeable: after heavy rain, water may lie on the surface for some hours, but the water-table is likely to be low and fluctuating. On a plateau such as Inchtuthil there may be conditions that cause water to rise some way towards the surface, provided there is adequate hydrostatic pressure. Inverquharity, in Angus, where the medieval well in the castle often has a water-level 15 ft. (4.6 m) or more above the river plain surrounding the site, is just such an instance. However, the same geological conditions do not prevail at Inchtuthil, and the very limited springs on the plateau are far too small to be of use.

The daily requirement of water in a fully-operational fortress was considerable. Estimates vary: von Petrikovits¹²⁷ has calculated that from 150 to 200 cubic metres of water a day would be needed, while Bidwell¹²⁸ concluded that, at Exeter, 318 cubic metres a day were required for the bath-house alone. Such quantities could be provided only by an aqueduct, and at Inchtuthil the engineering difficulties are considerable as the plateau is some 40 to 45 ft. (12.35 to 13.5 m) higher than much of the low ground surrounding it (FIG. 1), and the distance to the nearest ground at a corresponding height is nearly half a mile (0.7 km). In view of this distance and of the volume of water required, a siphon involving terracotta or wooden pipes is out of the question. The water would have had to flow under gravity, and this would require an elevated channel, however supported.

As to the source of the water, the Millhole Burn¹²⁹ to the north (FIG. 1) is too small to supply a fortress, while the minor streams entering the Tay from the south have too restricted a catchment area and lack the necessary volume. The only adequate source is the Tay itself. To provide running water within the fortress, the altitude at the point of delivery could hardly be less than 160 to 165 feet, which would mean that the intake from the Tay might have had to be upstream from Dunkeld at an altitude of about 180 to 185 ft. since this would involve an aqueduct some eleven miles (17.5 km) long, largely following a contour course if advantageous use of the

127. H. von Petrikovits 1975: 105.

128. P.T. Bidwell 1979: 43.

129. As the name implies, this stream formerly provided power for a water-mill by Damend, but the necessary volume of water came from a mill-pool: the volume of the stream is small.



(Photos: I.A. Richmond)

Pl. XXXII A Intersection (looking east) of the stone-lined drain crossing the *via principalis* (west) near Tabernae 3 and 4 with the south gutter of the *via principalis*, here (exceptionally) also stone-lined. The drain runs from left to right, the gutter from bottom to top.



Pl XXXII B As PLATE XXXII A, view looking south-south-west.

ground were to be made.¹³⁰ There is now no means of telling whether a route along the south or the north side of the Tay would have been preferred. From the south, about 725 yards (663 m) of low ground would have had to be crossed: the most convenient approach from the north would seem to have been from the south end of the Spittalfield plateau. This would have meant crossing about 1100 yards (1000 m) of the flood-plain, at its lowest point some 45 ft. (13.5 m) below the level of the point of delivery. The distance in Roman times may have been a little less, because of losses by erosion round the edge of the plateau. Either route may have involved a crossing of a channel of the Tay. Whatever the final plan, the initial provision for this part of the aqueduct would presumably have necessitated an earthen embankment, perhaps with timber staging to support a channel lined with clay and boards.¹³¹ For an earthen embankment, gravel was available in quantity close at hand, but with such material the slope of an embankment could not possibly be greater than 45°, so that the amount of spoil required would be of the order of a million cubic yards. It is easy to understand that such a major engineering work could not have been completed during the brief occupation of the fortress: although no evidence has come to light, that plans were in hand for the construction of an aqueduct need not be doubted, and indeed, it is possible that work on the contour course of the channel had already begun.¹³²

There has not been a full investigation of the water-supply at any fortress; but much evidence exists that piped systems were early installed: it was one of the responsibilities of the *praefectus castrorum*.¹³³ Actual pipes for distributing water within the fortress, some of them in a context contemporary with Inchtuthil, have been found at various sites, for instance Chester (lead pipes of c. 79); Caerleon (lead and wooden pipes of the 80s) and Exeter (of the 70s). This evidence shows that a proper water-supply was normally provided in fortresses in Britain during the period of occupation of Inchtuthil.

A continuous water-supply would have been particularly necessary when the legionary bath-building came to be built (p. 187). The bath-house in the Officers' temporary Compound (p. 215) would also (when fully in service) have used a large amount of water, although much less than a large legionary *balneum*. This bath-house was probably intended for continued use after the fortress was fully functional, since construction on such a scale for purely temporary usage would have been extravagant. It was presumably intended to serve initially as a private bath-house for the occupants of the officers' house in the compound and later perhaps as a bath-house for the officers of the legion, the main *balneum* being open to all ranks. Once water had been brought to the plateau, this small bath-house would also have been connected to the general distribution system, although its position on a local high point of the plateau will have required careful planning of levels. In the meantime, these baths do not seem to have been fully operational (p. 216). The baths may, however, have been in limited use, for water could have been carried up from the river to enable some form of bathing to take place. The fact that the baths could not be

130. An interesting comparison is provided by the water-supply to the Roman town at Dorchester, Dorset. This took the form of an open leat, following a contour course, about 12 miles (19.3 km) long, at a gradient of 1 in 2400, or 0.04%. The channel, 5 ft. (1.52 m) wide at the bottom and cut 2½ to 3 ft. into the chalk, delivered an estimated maximum volume of c. 58,000 cubic metres a day. RCHM, *Inventory of Dorset* ii pt. 3 (1970), 585–8.

131. At Mainz an almost contemporary aqueduct 8 km long was constructed sometime between 71 and 86. Over the last part of its course this had to be carried for c. 1000 m on stone arches which in one stretch needed to be over 30 m (98 ft.) high. On this showing, a stone aqueduct at Inchtuthil of slightly greater length but only 50 ft. (15 m) high would not have been beyond the capacity of the legion to erect.

132. Air reconnaissance of the Spittalfield plateau has revealed, in addition to the roads and their quarry-pits, a narrow linear cropmark running from the scarp at Redgole Bank towards the point where the road divided, and then continuing beside the western fork. Sections dug in 1983–4 showed this to be a flat-bottomed channel or ditch, 3½ ft. (1.07 m) wide at the top and 2¾ ft. (0.84 m) deep, in maximum dimensions. The feature was traced for nearly 1100 yards (1000 m) across gently-undulating ground towards the north-west end of the plateau. That this was an unfinished trench dug to hold a line of wooden pipes conveying water from the upper reaches of the Millhole Burn as a *temporary* limited provision for the fortress, is an interesting conjecture, which remains unproven. The excavations in the fields of Wester Drumatherty and on the Glendelvine estate were made by kind permission of Mr. J.J. Maxwell and of Sir Gavin Lyle respectively.

133. Vegetius ii, 10: *erat etiam praefectus castrorum . . . contexitur vallum aquaeductus* ('The prefect of the camp . . . construction of the bank of the aqueduct').

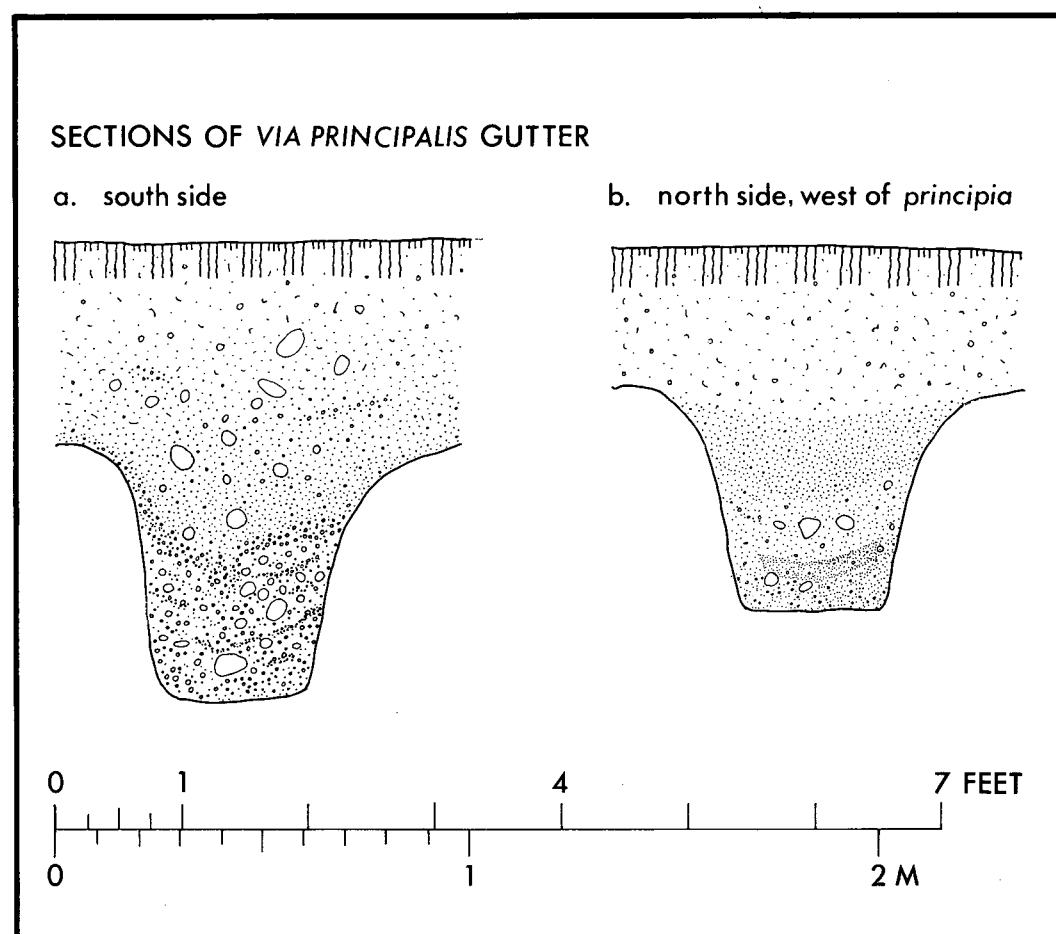
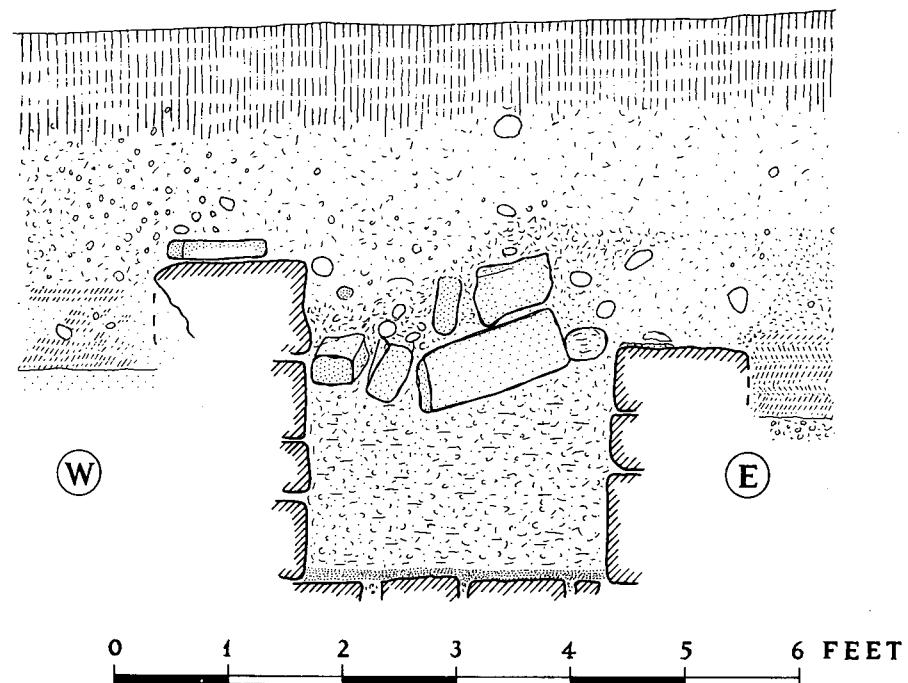


FIG. 46 Sections of the gutters along the *via principalis*. Scale, 1:18.



INCHTUTHIL 1965: CROSS-SECTION OF DRAIN PASSING ACROSS VIA PRINCIPALIS

D.R.W. after I.A.R.

FIG. 47 Section of drain across the *via principalis* (west). Scale, 1:20.

properly used until a full water-supply was provided gives further support to the idea of their intended permanence. Early descriptions of the site at Inchtuthil also refer to a bath-house to the west of the fortress (p. 36), but its existence has not been confirmed. There is no sign of such a building on aerial photographs and the writers may have confused east and west, an all too common mistake; the suggestion has been made that the well-preserved state of the compound bath-house indicates that it had not been unearthed before 1901. On this question, however, see p. 38.

During the construction of the fortress and its short occupation the necessary water would have had to be provided by means other than an aqueduct. The practice of taking the animals to water at the river could have been continued even after the installation of piped water. Water for drinking and cooking would have had to be brought up to the plateau from the river in barrels either on mules or in carts, as pictured on Trajan's Column, and presumably emptied into containers in the fortress. Sufficient water for basic needs could easily be supplied in this way; but in the long term such a solution would be impractical. The collection of rainwater from roofs into water-butts would also have provided extra supplies. There was a tank for storing water collected from the roof of the *principia* (p. 79) and another in Tribune's House No. II (p. 132). A third tank lay in the right *praetentura* to the rear of *Tabernae* 3 and 4 (FIG. 81), being fed from the drains along the *via principalis dextra*; it presumably collected the rain-water from the roofs of the colonnades lining that street. All these tanks, however, were completely inadequate for a fully-operational fortress.¹³⁴

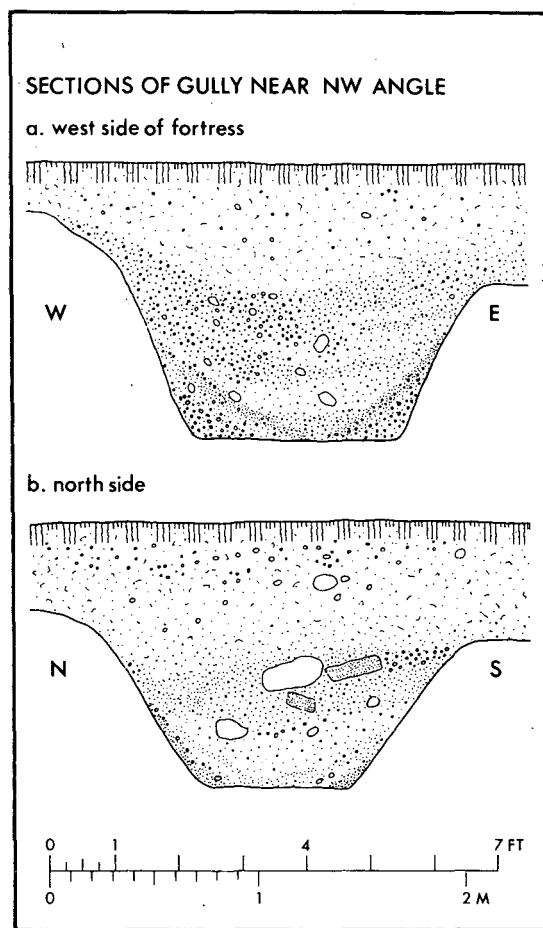


FIG. 48 Sections of drainage gully near the north-west angle of the fortress. Scale, 1:36.

The *via principalis* had a drain along each side. Their profiles (FIG. 46) show that they had once been timber-lined. The drain crossing the street to feed the tank south of *Tabernae* 3 and 4 was stone-lined (FIG. 47), measuring 2 ft. 7 in. (0.79 m) wide and deep. At their junctions with it the drains along the *via principalis* were also lined with stone for short lengths each side (PL. XXXII).

134. For the 'well' discovered in Tribune's House no. I 1, see p. 129.

Like the *via principalis* the *intervallum* street was accompanied by a drain, but along its inner side only. As already mentioned (p. 100), there was an outflow beneath the northern rampart from the intersection with a stone-lined drain coming from the Hospital, and at this intersection too all four drains were stone-lined (PL. XVI). Elsewhere the *intervallum* drain was an open channel, whose profile (FIG. 48) leaves it uncertain whether a plank lining was provided. Aerial photographs (PL. XLII, p. 242) show a second outflow from the *intervallum* drains at the west corner of the fortress (FIG. 2); it follows the slope of the ground towards the scarp. For further discussion of the drains, see p. 255.

CHAPTER 18

THE INTERVALLUM AND OVENS

From the back of the rampart to the building-line within the fortress is a distance of some 50 ft. (15.2 m). Of this the *via sagularis* and the gully near the building-line take up c. 20 ft. (6.1 m), leaving the rest of the *intervallum* as an open space which, to judge from evidence elsewhere, became gradually encroached upon by minor structures such as ovens, cook-houses, water-tanks and latrines. Two sections cut across the *intervallum* on the south-east side encountered no such features: for the remainder of that side, and for the greater part of the south-west side ploughing is likely to have destroyed much. Air photographs taken in 1949, and again in 1969, when the *intervallum* between the *porta praetoria* and the south angle was under barley, record a number of large pits near the back of the rampart (PL. XXVI, FIG. 82). Exploration of the *intervallum* was therefore concentrated on the north-west side, where the remains of seven ovens were found as well as disturbed stonework, much of it burnt, probably marking the position of eight more.

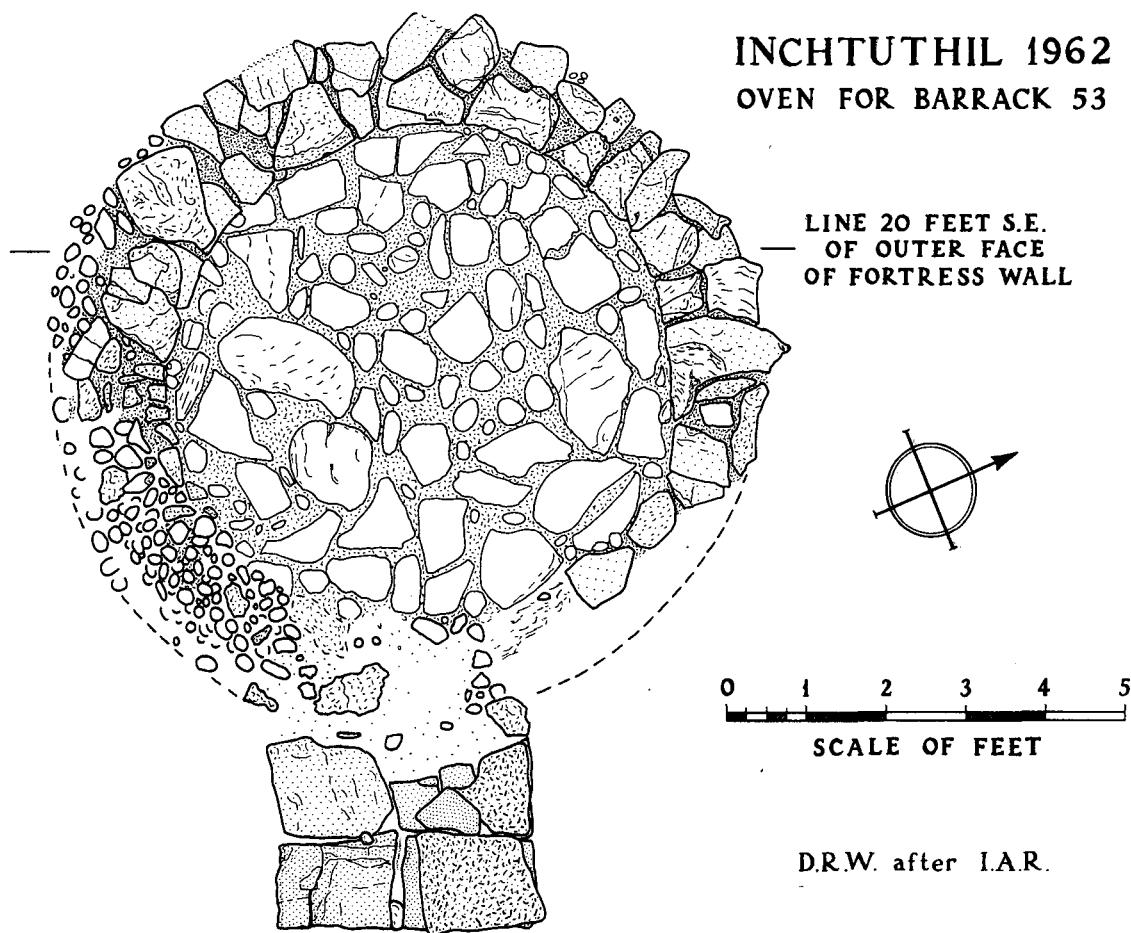


FIG. 49 Oven 53, plan. Scale, 1:28.



(Photos: I.A. Richmond)

Pl. XXXIII A Oven No. 43 looking west (see FIG. 50). Scale in feet.



Pl. XXXIII B Oven No. 53, looking north-west (see FIG. 49). Scale in feet.

Ovens

The best-preserved oven of all (I) was revealed by a trench cut across the *intervallum* opposite Barrack 53 (PL. XXXIII B, FIG. 49). The floor which showed evident traces of burning was formed of irregularly-shaped, flat sandstone slabs. The lower part of the wall was intact for almost the whole circuit, giving an internal diameter of 6½ ft. (1.9 m). The door opened to the south-east on to a well-constructed hob, 3 ft. (0.9 m) wide, which projected 2 ft. (0.61 m) from the platform. Beside the hob was a thick layer of ashes and burnt gravel.

In the *retentura*, a trench 4 ft. (1.22 m) wide, nearly parallel to the fortress wall, and at a distance of between 18 and 22 ft. (5.3 and 6.7 m) from it, was begun at a point 141 ft. (43 m) north of the axis of the *via principalis*, and continued for 640 ft. (195 m) towards the north angle. The trench was thus clear of the rampart by a few feet. Between 141 and 160 feet (43 and 49 m) from the axis, a mass of sandstone slabs was encountered not far below the surface, over the whole width of the trench, that is from 18½ to 22½ feet (5.6 to 6.8 m) from the back of the fortress wall. To judge from the extent of the burnt stonework, this represented the ruins of at least two ovens (II and III). At 177½ ft. (54 m) and at 274 ft. (83.5 m) similar spreads of stonework extended for 12½ ft. (3.8 m) and 19½ ft. (5.9 m) respectively, over the full width of the trench. Each of these spreads probably represents two more ovens (IV to VII).

Between 322 and 347 ft. (97.7 and 105.3 m) a clamp of three ovens (VIII–X) was found: their centres were about 17 ft. (5.2 m) from the fortress wall (PL. XXXIII A, FIGS. 50, 51). The southernmost and best-preserved was built of the same sandstone used for the wall: the floor was of thin slabs, and the sides, standing only 1 foot high were of slabs or blocks 12 in. (0.30 m) square by 10 in. (0.25 m). The internal diameter was about 6 ft. (1.83 m). A hob 4 ft. (1.22 m) wide extended for 3 ft. (0.90 m) towards the *intervallum* street. The slabs forming the floor had been heavily burnt, and layers of ash and of burnt clay were present on either side of the hob.

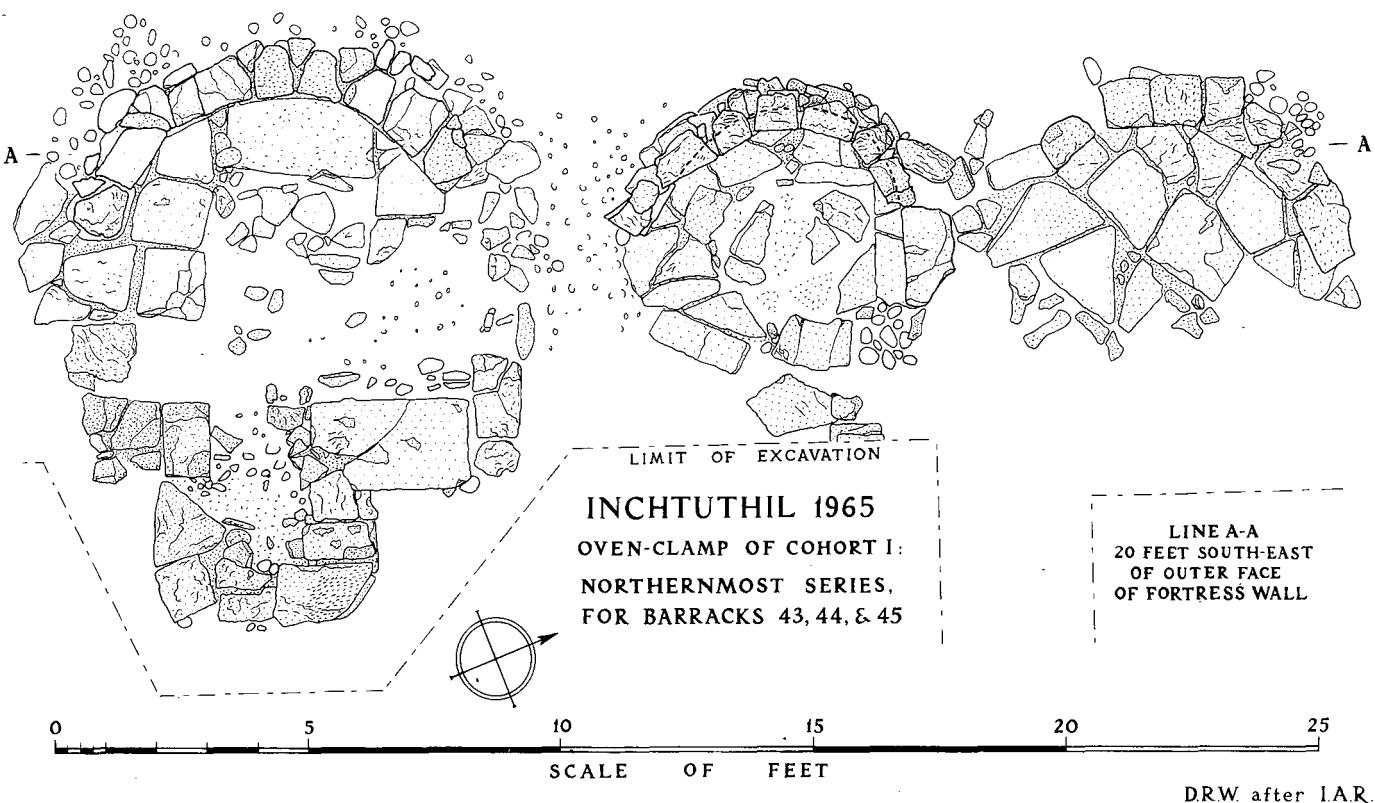


FIG. 50 Ovens 43–45, plan. Scale, 1:45.

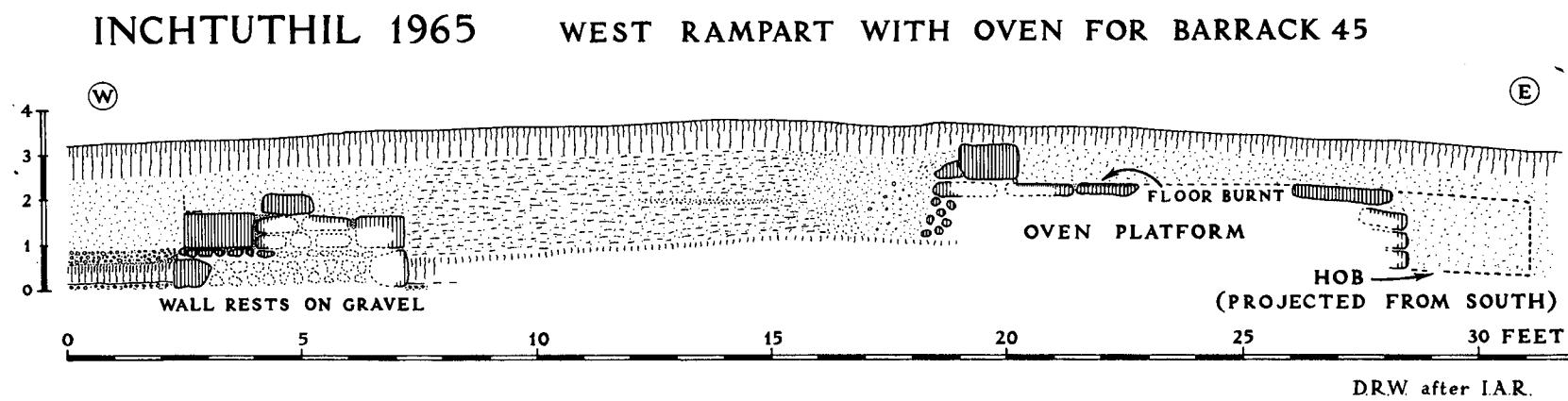


FIG. 51 Oven 45, Section. Scale, 1:48.

INCHTUTHIL 1965

OVEN FOR BARRACK 42

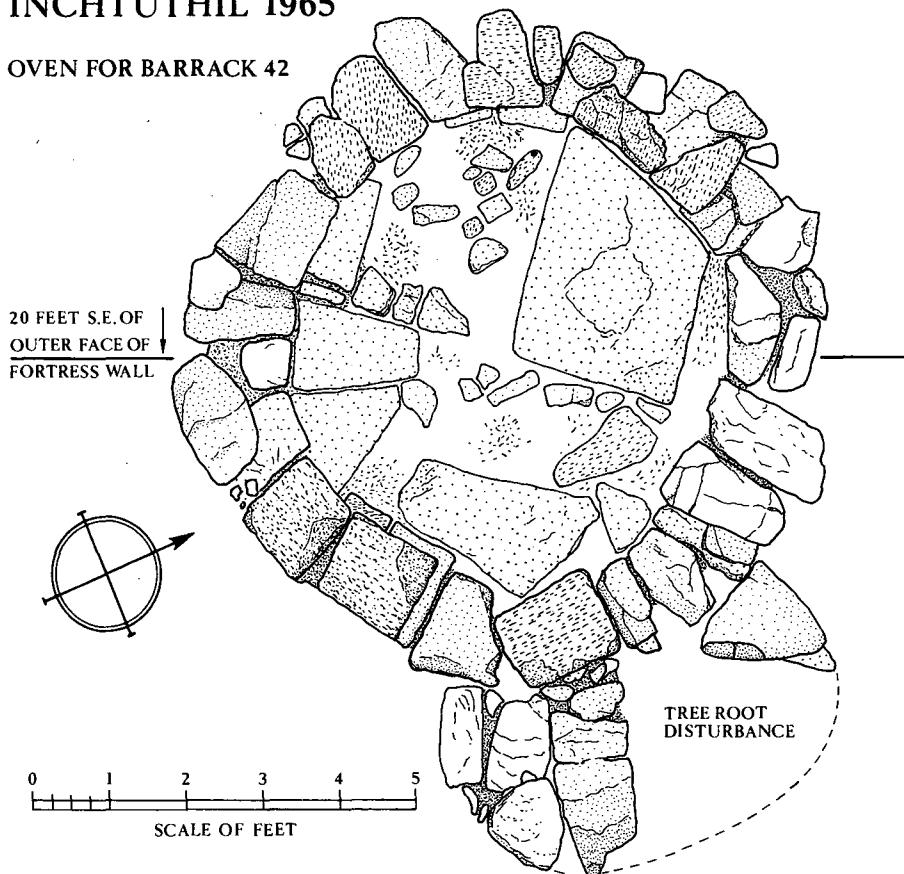


FIG. 52 Oven 42, plan. Scale, 1:30.

This oven stood on a platform of earth, cobbles and sandstone slabs, so that the floor was some 18 in. above Roman ground-level, with the highest point of the oven wall now only 6 in. below the modern surface (FIG. 51). The other two in the clamp were much damaged. Their eastern halves, furthest from the rampart, and thus less protected, had been largely destroyed. The middle oven was smaller than its neighbour with a diameter of 5 ft. (1.52 m). If other ovens were similarly raised, this explains why structures have been so easily reduced to a mass of disturbed stonework, such as was encountered further south.¹³⁵

At 388 ft. (118 m) the trench exposed a small bowl-furnace in the form of a hemispherical hollow 3½ ft. (1 m) in diameter, sunk 15 in. below the Roman surface. A few pieces of iron slag lay in the bottom where the extreme reddening of the gravel suggested that the process used involved intense heat.

At 512½ feet (156 m) a spread of burnt stones extending over 5 feet (1.52 m) of the trench may mark the position, opposite the end of a granary, of a single oven (XI). Another oven (XII) was identified at 600 ft. (183 m) opposite Barrack 42 (FIG. 52). The construction was similar to that of the ovens already described. The whole circuit of the lowest course of its wall remained in position, as also about half the hob. The internal diameter was a little over 6 ft. (1.83 m). The sandstone slabs forming the floor were heavily burnt, and there was much burning of the soil, with spreads of ash extending for some distance northwards.

At 725½ ft. (220.5 m) the outer edge of another oven was encountered: it is one of a pair (XIII–XIV) set close together opposite Barracks 38 and 39. Barely a third of each is now left (FIG. 53). At 784 ft. (238 m) a section of the rampart exposed nine courses of turf in position, but only for a width of 9 feet. A foundation of large cobbles overlaid by sand and gravel extended for a

135. Almost opposite these ovens, the gully outside the main building line was sectioned in three places where its width was found to vary between 6½ and 8 ft. (2 and 2.5 m). This unusually large width was also recorded in a section dug across the defences thereabouts in 1901. *PSAS xxxvi* (1902), fig. 7, Section A.

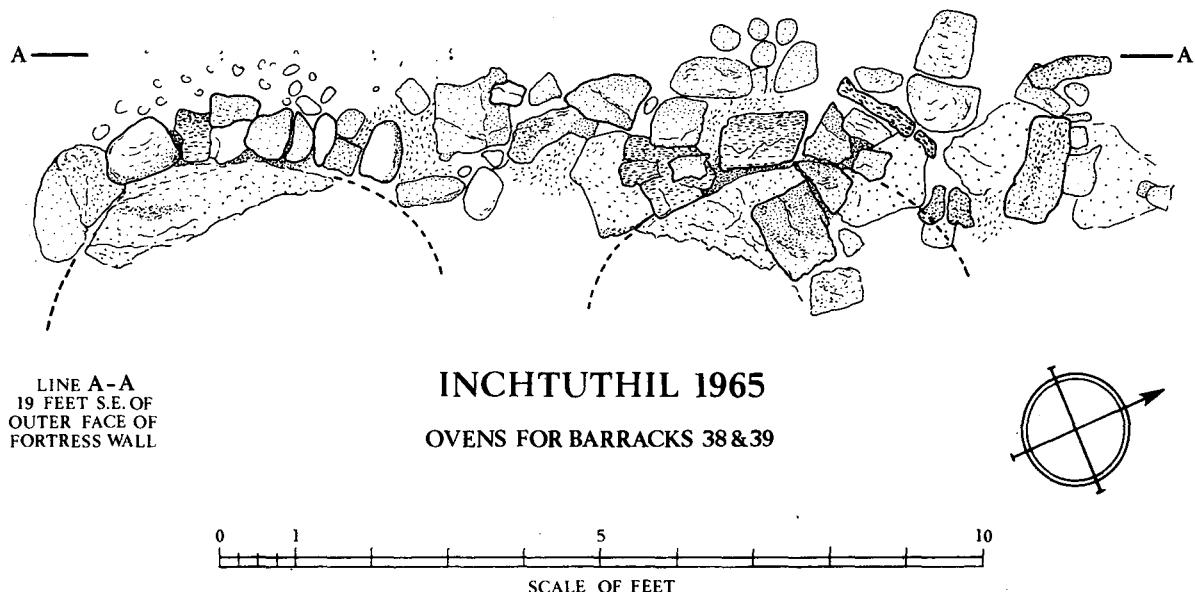


FIG. 53 Ovens 38–39, plan. Scale, 1:30.

further 4 feet. Immediately behind this and opposite the north corner of Barrack 38, were the remains of a circular platform about 5 ft. (1.52 m) in diameter which probably indicate yet another (XV). The trench was continued to 837½ feet (255 m) but no further structures were revealed.

The ovens are of a familiar type and in size closely resemble the examples excavated at Fendoch.¹²⁶ However, whereas the dome of a military oven was often built of clay, at Inchtuthil there was little sign of clay, so the walls may have been largely of stone covered with earth. The thin slabs of sandstone would be suitable for building a corbelled roof. The distribution of ovens suggests that there was generally one to a barrack, placed near the end of the streets between facing pairs of barracks. For the first cohort, where the buildings are not arranged end-on to the rampart, the ovens presumably faced the westernmost barrack. All those excavated showed evident signs of use: some of the floors were quite extensively burnt, and layers of ash and burnt gravel had accumulated. No instance was noted of an oven having been completely rebuilt on its platform. Both observations have a bearing on the length of occupation of the fortress.

CHAPTER 19

A NOTE ON THE LATIN NAME OF THE FORTRESS

The possibility of determining the ancient name of the fortress has been discussed by various scholars. As early as 1919 Macdonald referred to the association of the names mentioned in Ptolemy's *Geographia* ii 3 with the Agricolan occupation of Scotland, but he did not attempt to locate them more precisely. Richmond was the first to suggest that Ptolemy's πτερωτὸν στρατόπεδον (pterōton stratopedon: translated by Miller as *Pinnata Castra*) was in fact Inchtuthil (PSAS lvi, 1921–2: 288 f.). The Ravenna cosmographer, he pointed out, also referred to a *Pinnatis* beyond the river Tay. The word *pinnae* in Latin was used to refer to merlons associated with parapets on the rampart (Caesar B.G. v: 40). Ptolemy mistranslated the word into Greek through lack of understanding of its real significance. Richmond pointed out that the name was a good description of a fortress and that its connection with Inchtuthil was a strong possibility. Crawford (1949: 74) followed Richmond's interpretation of the name and again linked it with Inchtuthil.

Rivet (Rivet and Smith 1979: 499) has suggested that Inchtuthil should rather be associated with Ptolemy's Οὐκτωριά (referred to by the Ravenna Cosmographer 108, 11 as *Victorie*) the name deriving not from any specific victory but from the name of the occupying legion, XX Valeria Victrix. However, if the fortress had been named after the legion the name should have taken a different form, *Victricensis*, in the normal manner (cf. CIL xiv 3955 = ILS 2740 *Colonia Victricensis*, i.e. Camulodunum). Rivet's identification is, therefore, doubtful. Rivet (1979: 440) associated πτερωτὸν στρατόπεδον with the area of the Moray Firth because Ptolemy describes it as a πολὶς of the Vacomagi; he suggested that the name was derived from an unusual number of birds or was possibly connected with *pinnae*, a variety of mussel, since merely to describe a camp as 'having merlons' would not distinguish it from any other. However, merlons were rarely seen in camps save in times of great danger – as at Cicero's camp in the passage of Caesar cited; the normal camp had a simple breastwork of stakes. The merlons at Inchtuthil could well have been a matter of sufficient remark to form a place-name, being of stone – unique in Scotland at that time (cf. Frere, *Britannia* 1980: 421).

The location of Victoria and of *Pinnata Castra* cannot be certainly decided, and it is impossible to ascribe a definite Roman name to Inchtuthil.

INCHTUTHIL 1965: THE REDOUBT

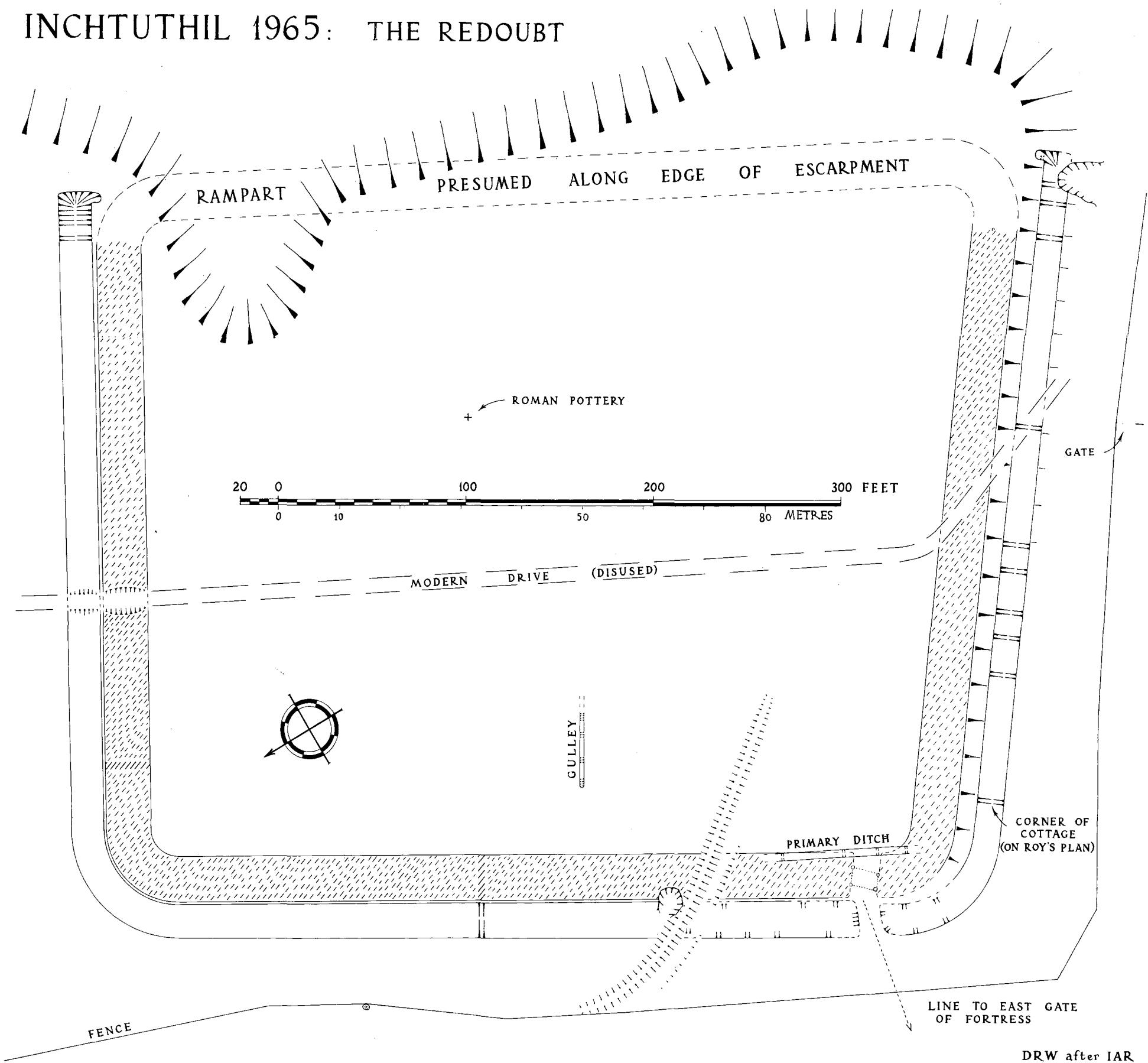


FIG. 54 'The Redoubt' (FIG. 2, 'Stores Compound'), plan. Scale, 1:720.

PART III: EXTRAMURAL FEATURES

CHAPTER 20 ‘THE REDOUBT’

‘The Redoubt’ (FIG. 2) is one of the features of the plateau mentioned in the earliest reports on Inchuthil, by Maitland, Pennant and Roy (see Chapter 1). It is so named because these early writers interpreted it as an outpost fort protecting the river-crossing. In fact, the function of the ‘Redoubt’ is unknown and the name is retained here merely for convenience. The rampart and ditch are still clearly visible on the surface for much of the circuit except on the south east, but excavation of the site is rendered extremely difficult since it is now heavily wooded. In spite of this difficulty, however, the ‘Redoubt’ was partially investigated both in 1901 and again in 1964 and 1965.

The ‘Redoubt’ is located near the north-eastern corner of the plateau, some 400 ft. (122 m) to the east of the fortress (FIG. 2). Its eastern side is bounded by the edge of the plateau and the original extent in this direction cannot be determined because of erosion. The southern side runs parallel with the main road leading from the *porta principalis sinistra* to the river, and it is this road which the early writers assumed the Redoubt was built to protect.

The ‘Redoubt’ (FIG. 54) today occupies 4.09 acres (1.65 ha) including the rampart. Of the three surviving sides two are aligned at right-angles; the third is slightly oblique. The defences were first examined in 1901, when they were found to consist of a V-shaped ditch 18 ft. (5.49 m) wide by 4 ft. (1.22 m) deep and a rampart constructed with the material dug from the ditch, measuring 24 ft. (7.3 m) across by 5 ft. (1.52 m) high. Richmond and St. Joseph cut trenches through the defences on all three sides, with somewhat different results (FIGS. 55, 56). On both the north and west (FIG. 55) the V-shaped ditch measured 13 ft. (3.96 m) across by 7 ft. (2.14 m) in depth and the rampart was 20 ft. (6.1 m) wide at its base; the rampart on the north side was preserved to a height of 5 ft. (1.53 m) while on the west it survived only to a height of 2½ ft. (0.76 m). The southern defences (FIG. 56), however, consisted of a ditch 7 ft. (2.14 m) wide and 4 ft. (1.22 m) deep; the rampart has been much eroded but, because of the natural slope of the terrain at this point, the difference between the present-day top of the rampart and the bottom of the ditch is still some 15 ft. (4.57 m). The 1964/5 excavations confirmed that the rampart was composed of material from the ditch. The V-shaped profile of all the ditches is very sharp, but in the sections of both the western and southern ditches the bottom itself was squared; this squared slot was about 1 ft. (0.305 m) wide. The scale of the ‘Redoubt’s’ defences is impressive even today; but the size of the rampart of the Officers’ temporary Compound is unknown and the relative strengths of the two enclosures cannot be estimated. In 1964 Richmond showed that the ‘Redoubt’s’ ditch ended some 20 ft. (6.1 m) from the edge of the plateau (FIG. 54); this suggests that the original eastern defences ran approximately on the line of the present escarpment.

A gateway was located near the south-west angle of the defences. Its simple plan and situation at an angle resemble the gate at the northern angle of the Officers’ temporary Compound (p. 210,

FIG. 57). A gate in this position gave easy access to the road leading to the *porta principalis sinistra*. The gateway consisted of a single portal 14 ft. (4.27 m) wide, with two post-holes on each side (compare Manning and Scott 1979: 19 f. – Type 1A, with examples at Hod Hill, Great Casterton and the Lunt). There was no sign of any guard-chamber.

Running across on a slightly oblique line beneath the gate and adjoining rampart was a small ditch of earlier date. It was traced in four sections cut in the vicinity, but was absent in sections of the rampart elsewhere. The ditch was 4 ft. (1.22 m) wide and 2 ft. 6 in. (0.76 m) deep, penetrating 1 ft. 6 in. (0.46 m) into the subsoil below the buried humus. There seems no reason to regard it as a marking-out ditch, and the work is too slight to be defensive. It may belong to the pre-Roman period.

Trial trenching within the defences, much hampered by the trees, failed to reveal any trace of timber buildings. The only internal features discovered were occasional gullies associated with Flavian pottery; these gullies are perhaps to be connected with tented accommodation.

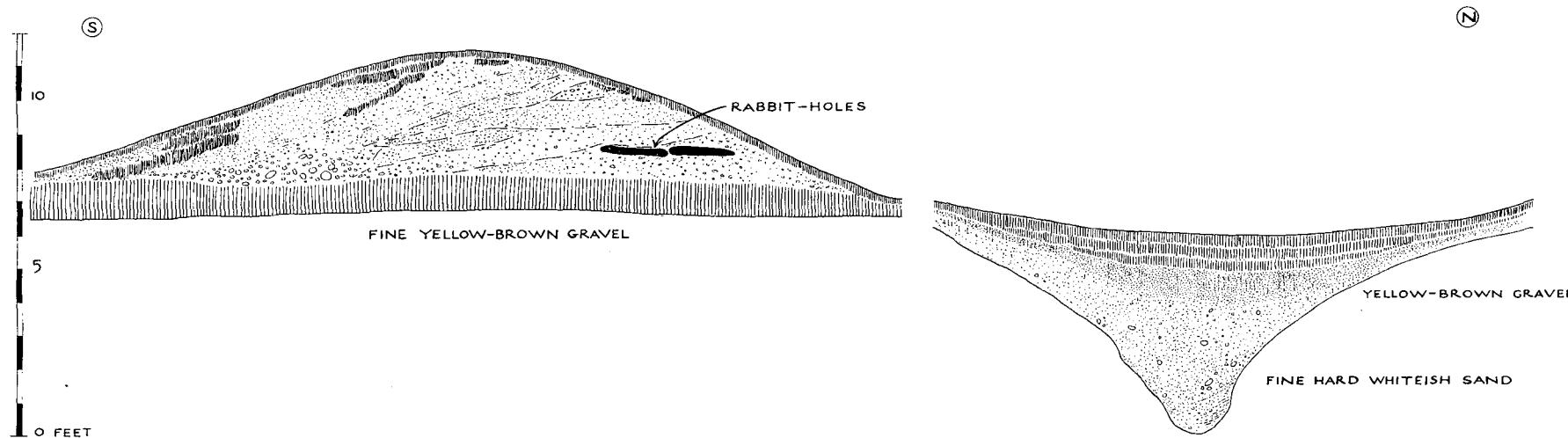
The Roman date of the 'Redoubt' is assured by the discovery of Roman pottery in association with the excavated features and by the character of the defences. The purposes of the enclosure, however, remains a problem. The 'Redoubt' is unlikely to have been a guard-post for the fortress, as once suggested. The lack of timber buildings perhaps indicates only a temporary occupation; it must, however, be borne in mind that areas of the Officers' temporary Compound were left empty throughout its occupation, and also that buildings in the 'Redoubt' could quite possibly have remained undetected as a result of the woodland. Temporary tented accommodation would suggest occupation either before the fortress was built, during the construction period, or at the time of the withdrawal by the demolition gang. The general paucity of finds from the enclosure would accord with such short-term occupation.

Richmond suggested that the 'Redoubt' was used as a temporary stores-compound (JRS 1965: 198). There was plenty of storage space available before the construction of the fortress in the large builders' camps to the south-west of the fortress (Chapter 22), but extra space may have been needed for certain supplies. On the other hand, the close relationship between the 'Redoubt' and the fortress, suggested by the position of the only identified gateway in the 'Redoubt's' defences, points to their contemporaneity. As a more permanent stores annexe the 'Redoubt' is situated conveniently near the main access route up from the river Tay and near enough to the fortress for easy transfer of supplies when necessary. All supplies, whether transported by river or by waggon, will have reached the plateau from this direction. Signs of timber structures might have been expected in a permanent stores base, and on this interpretation they must be supposed to be present but as yet undetected.

A third possible explanation of the purpose of the 'Redoubt' is as accommodation for a demolition force on the abandonment of the fortress. This would explain the impressive scale of the defences, which would perhaps not have been so necessary during the occupation of the fortress. The position of the enclosure would also have given command of the roads east and south of Inchtuthil, and of the crossing-point of the Tay (on the assumption that the river followed its present course), thereby ensuring the greater security of the demolition force. Such an interpretation, however, depends on the demolition-work being carried out by a detachment and not by the whole legion. There is no evidence to suggest this, but an orderly withdrawal from Scotland with no trouble from the natives would certainly have made it possible to leave a small force behind. Finally there is a possibility, although much less likely, that on the evacuation of the fortress an auxiliary fort was begun here but abandoned before its completion; the unusual position of the gate would then have to be related to the lesser gradient from the road at that point. However, the absence of normal gates on the north-west and north-east sides, where no difficulties of ground inhibit their placing, virtually disposes of this suggestion. It must be concluded that a firm decision on the function of the 'Redoubt' is impossible to reach because of the lack of conclusive archaeological evidence from the site.

INCHTUTHIL: THE REDOUBT

NORTH RAMPART: ALSO N. DITCH AT N-E BUTT-END



WEST RAMPART AND DITCH

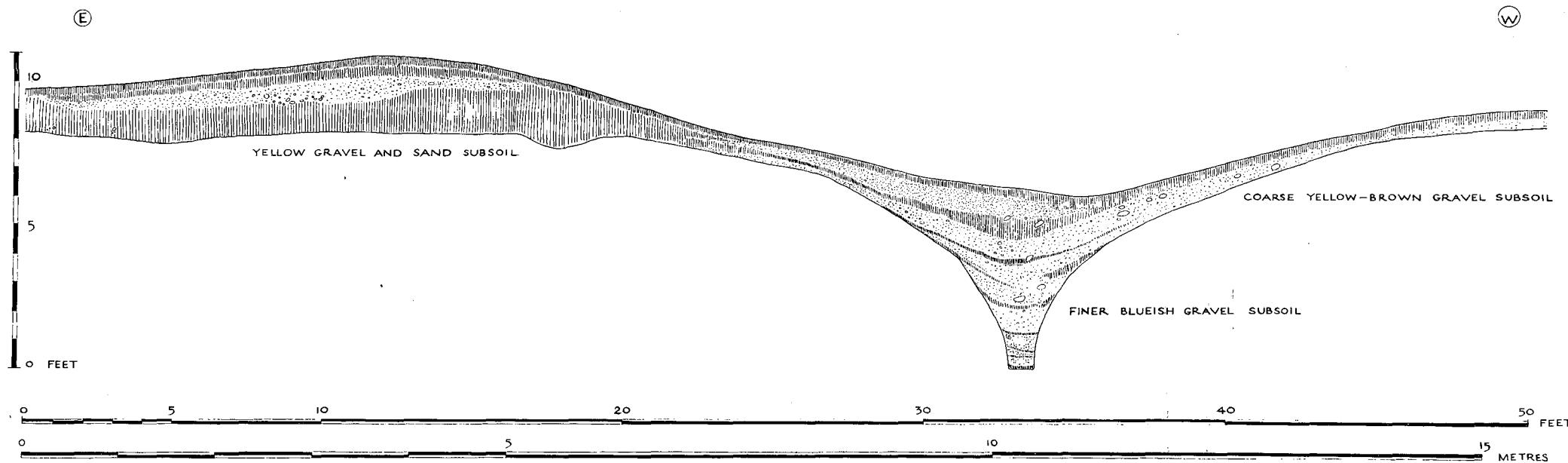


FIG. 55 'The Redoubt'. Sections of North and West Defences. Scale, 1:60.

INCHTUTHIL: THE REDOUBT, SOUTH DEFENCES

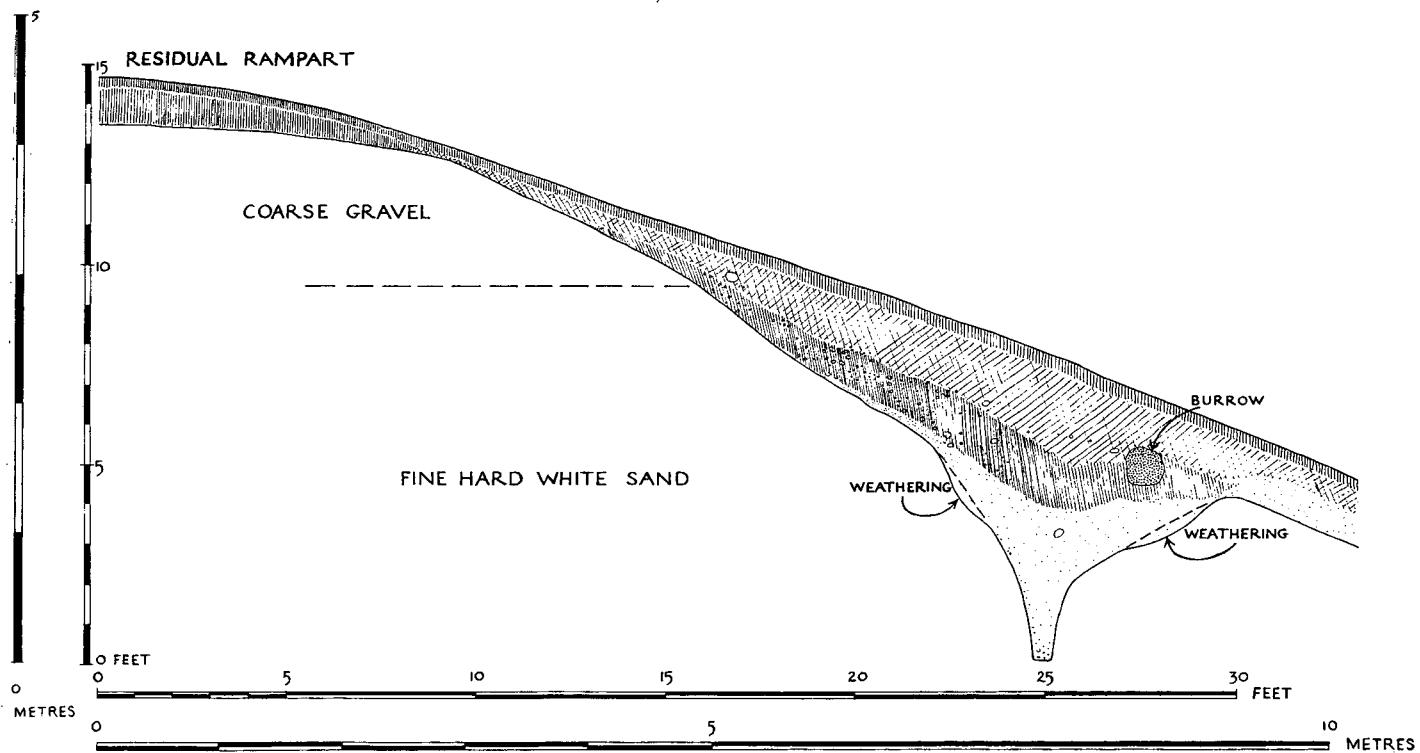


FIG. 56 'The Redoubt'. Section of South Defences. Scale, 1:60.

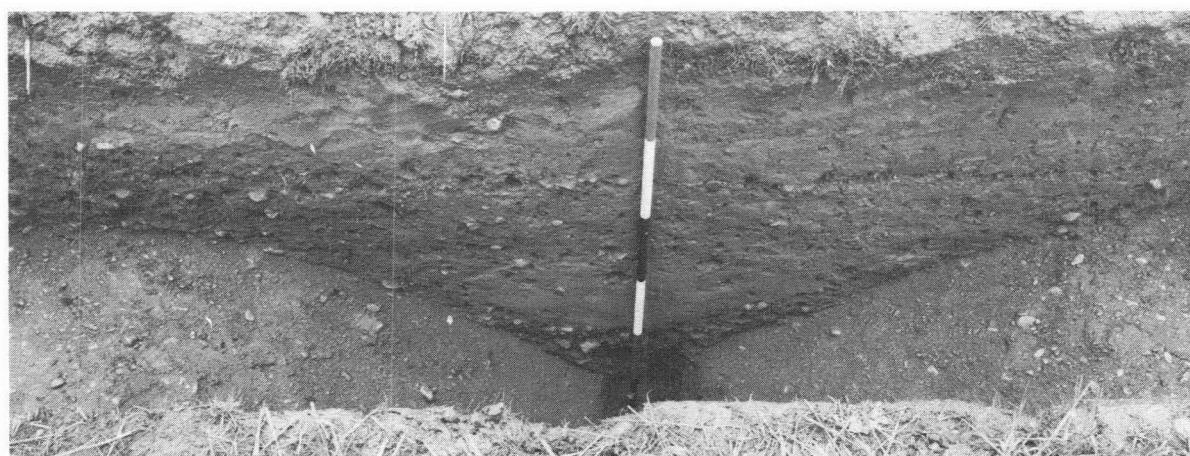
CHAPTER 21

THE TEMPORARY COMPOUND FOR OFFICERS (FIG. 57)

A. THE DEFENCES AND INTERIOR BUILDINGS

Approximately 130 ft. (40 m) from the east angle of the defences of the legionary fortress lay a defended compound; this was sited on the edge of the plateau overlooking the river Tay (FIG. 2). The compound was irregular in shape; the defences on the south and east sides followed the escarpment and enclosed an area of approximately 3.75 acres (1.5 ha). The compound was first excavated in 1901 (*PSAS* 1901/2: 214 ff.) and then by Richmond and St. Joseph in 1963 and 1964.

The defences consisted of a ditch which in 1901 was recorded as 9 ft. 6 in. (2.89 m) wide and 4 ft. 6 in. (1.37 m) deep with a V-shaped section (*PSAS* 1901/2: 214 and fig. 7 Sections G, H), and a rampart 20 ft. (6.1 m) wide; FIG. 59 shows a width for the ditch of 8 ft. 3 in. (2.51 m). At some point during the compound's occupation the ditch was filled in and cobbled (FIG. 59) and the rampart was levelled and a barrack building erected over part of it (FIG. 67). The defences have been traced only on the plateau side of the enclosure but the rampart was presumed to have continued along the top of the scarp. In 1964 an earlier ditch (FIGS. 57, 58) was discovered and traced along the escarpment; it was 4½ ft. wide by 2 ft. deep (1.4 by 0.61 m). This ditch antedates both the compound defences and the bath-house, which overlies it; it is also cut by the outfall drain from the bath-house. The rampart associated with it had a timber breastwork supported by posts set at 6-ft. (1.83 m) intervals. The original extent of this early rampart and ditch is unknown; there is no sign of them on aerial photographs since this part of the plateau is not arable land. On the east the ditch was traced for 2020 ft. (615 m) beyond the compound defences to a slightly inturned butt-end near the Roman approach-road and an old course of the Tay; towards the west it was traced for some 175 ft. (53 m) beyond the compound, where it had been ploughed



(Photo: RCAHM (Scotland): Crown copyright)

Pl. XXXIV West ditch of Officers' temporary Compound, showing gravel surface over ditch-filling.

INCHTUTHIL, 1964
SENIOR OFFICERS' TEMPORARY COMPOUND

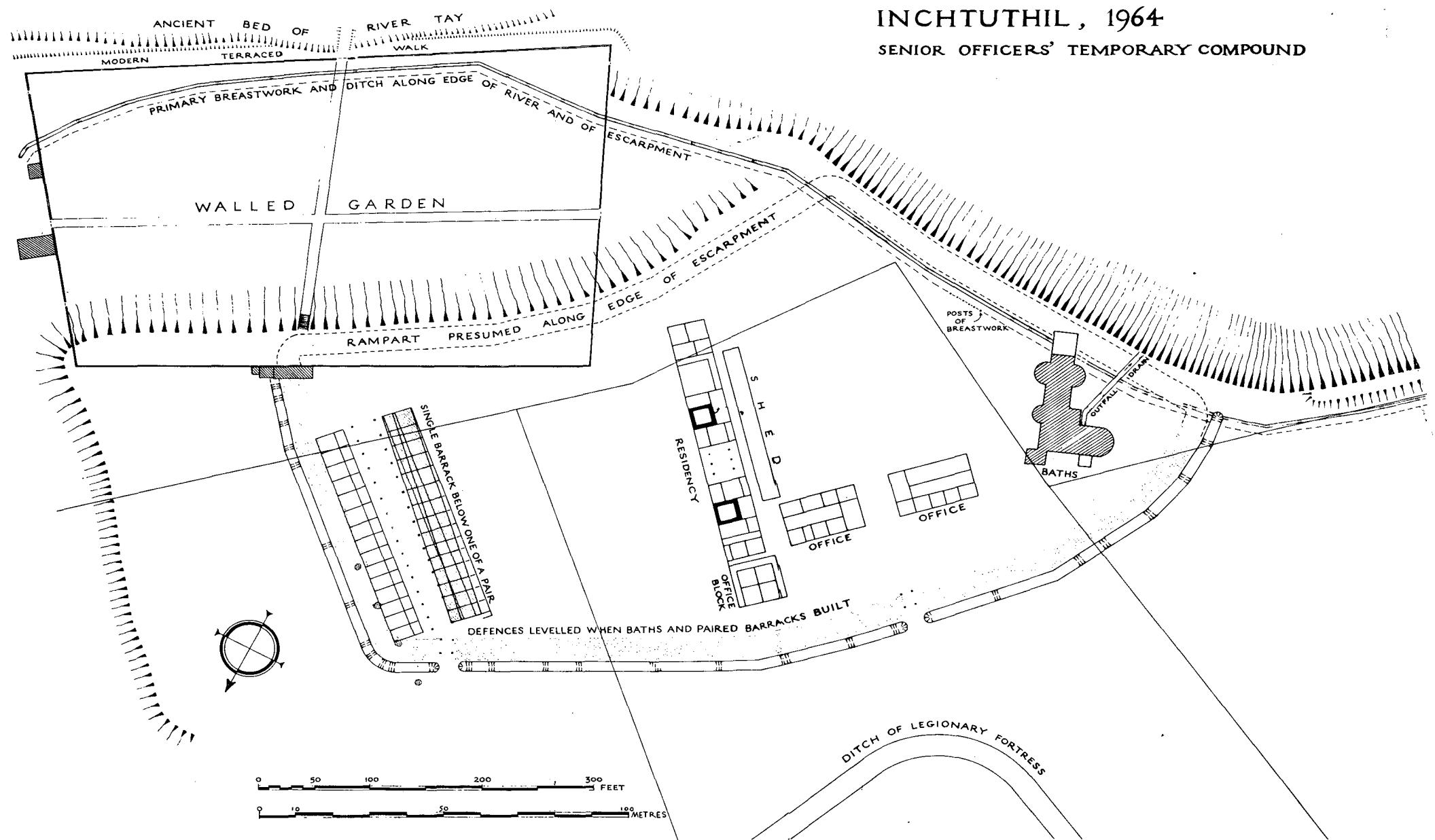


FIG. 57 The Officers' temporary Compound, plan. Scale, 1:1450.

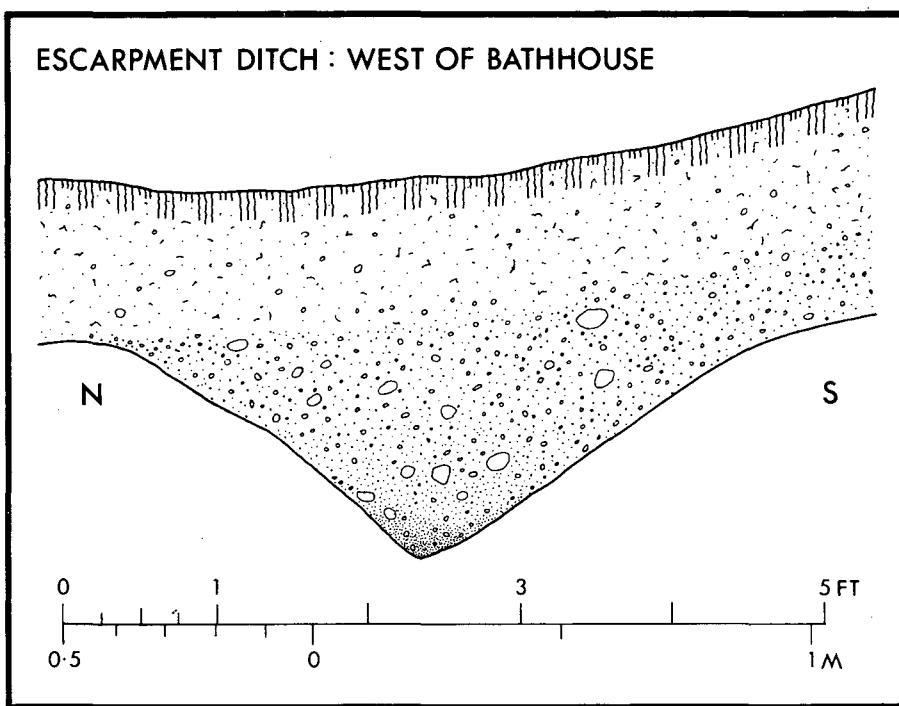


FIG. 58 Section of early ditch on the escarpment. Scale, 1:15.

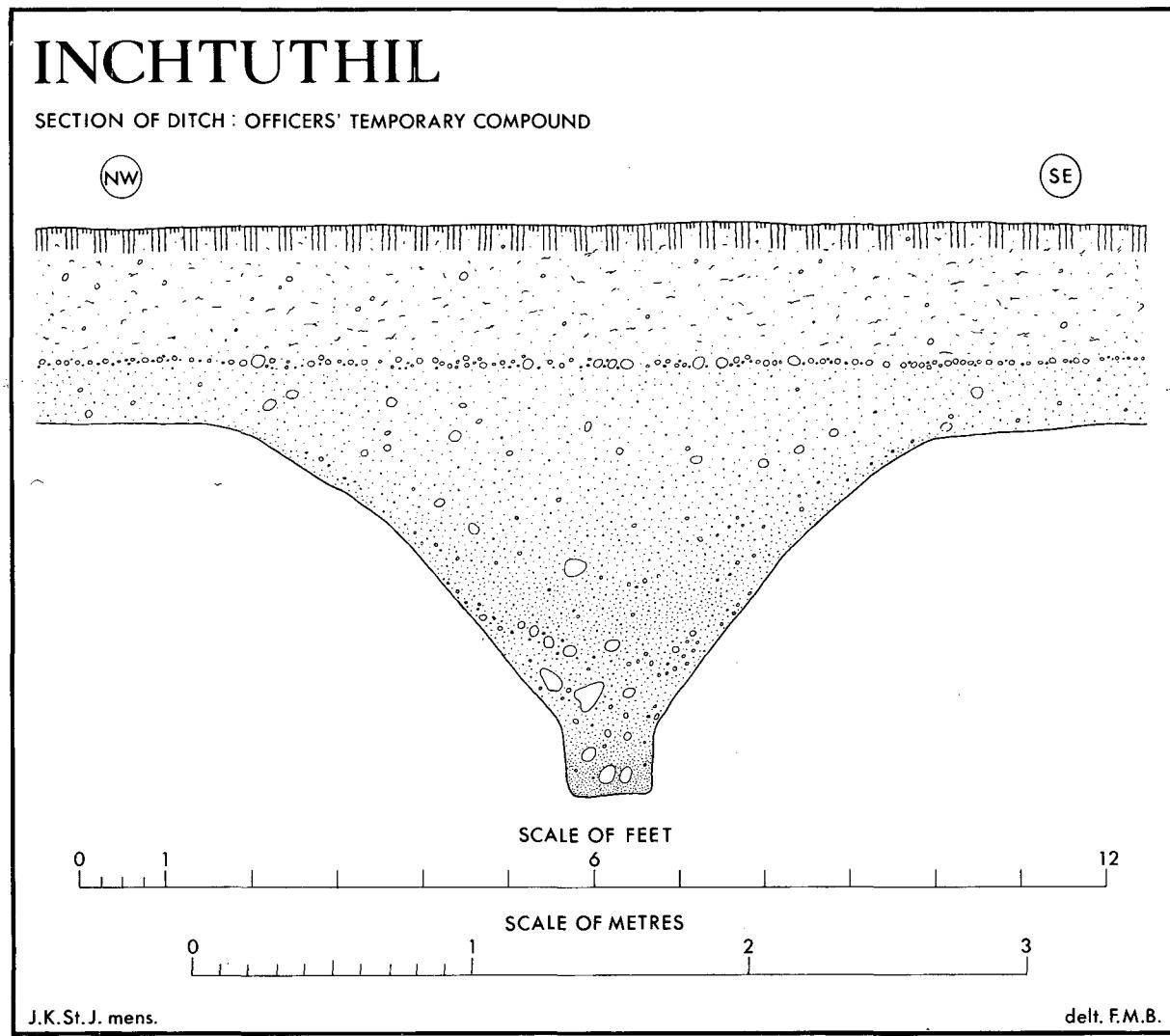


FIG. 59 The Officers' temporary Compound, Section of ditch. Scale, 1:26.

or eroded away. These defences are unlikely to have enclosed the whole plateau, nor are they likely to have a connection with the 'Western Vallum', which is too late in the sequence of works for this association. A connection with the outer masking earthwork (FIG. 2, Earthwork A) is more reasonable in terms of chronology; but so extended a circuit would be difficult to defend, and it is more probable that they continued only so far as to overlap the south side of the labour camp.

The function of these early defences is uncertain; they may possibly have been connected in some way with a landing-point on the river bank, as Richmond himself thought, or with a river-crossing. In any case, they were considered unnecessary after the initial occupation-phase and were abandoned.

There were two entrances to the compound, indicated by causeways 16 ft. (4.88 m) wide across the ditch and by single-portal gateways through the rampart, each approximately 10 ft. (3.05 m) wide. Each gateway was marked by four post-holes, two at the rear of the rampart and two inset a few feet from its front. Similar gateways are known at other first-century forts, for example Hod Hill, Great Casterton and Saalburg B (*Britannia* 1979: 19, fig. 4). The gateway situated nearest to the houses and offices within the compound was also at the point where the compound defences lay closest to the south-east corner of the fortress, thus giving access to both the *porta praetoria* and the *porta principalis sinistra*. The second gateway, adjacent to the barrack-block, lay further north-east where the rampart turned back towards the edge of the plateau. For a gate to be positioned thus, near an angle, is unusual, although at Hod Hill a gate existed at the north-west angle of the fort to facilitate access to the river, and another parallel exists at Inchtuthil itself in the 'Redoubt' (FIG. 54). The unusual siting of the present example is presumably to be explained by the easy access given by this position both to the *porta principalis sinistra* of the fortress and to the road leading from the fortress down to the river.

The enclosure contained several buildings but was not entirely built up (FIG. 57). Large open spaces existed between the buildings; the area between the 'shed' behind the large house and the baths was trial-trenched but there was no evidence of any buildings. When the compound was originally investigated in 1901, some of the buildings were excavated, namely the bath-house and one of the barrack blocks at the eastern end, together with part of one of the 'offices'. Further excavation by Richmond and St. Joseph located several other timber buildings. In addition the stone structures found in 1901 between the compound and the fortress and thought to be barracks were proved to be eighteenth-century farm buildings.

1. SENIOR OFFICERS' HOUSE

In the centre of the enclosure lay a long elaborate, timber-framed building (FIG. 60). This measured 274 ft. (83.5 m) in length (north-west to south-east) and 35 ft. (10.67 m) in width; its plan was almost symmetrical. Although basically timber-framed, the building included two rooms which had sill walls at least in masonry and hypocaust heating. A smaller room adjacent to one of these had a concrete floor (FIG. 61). Although such a linear house would be unusual for the purpose, this building is probably to be identified as a senior officer's house, or possibly as accommodation for two officers in view of the symmetry around the aisled hall. Various possibilities for the identity of the occupant(s) are discussed on pp. 220 ff.

There was an aisled hall, 36 ft. (10.97 m) by 32 ft. (9.75 m), in the centre of the building. Two rows of three wooden columns ran the length of the room; post-holes for five of these were located. On either side of this hall was a set of three rooms and then the rooms with masonry wall-foundations. The internal planning differed at the two ends of the building. The south-east end appears to have served as the private quarters of the officer. There is a large room measuring 30 ft. (9.14 m) by 28 ft. (8.53 m), enclosed on its south-west and south-east sides by an L-shaped corridor; Richmond suggested that this room served as the *triclinium*. Two smaller rooms lay beyond the dining-room. At the extreme south-eastern end of the building, facing the river, were two further rooms of which the south-eastern side was apparently demarcated by large post-holes and not by a continuous construction-trench; at least one post-hole was located in the north-eastern room and although local conditions made search for more of them impracticable

INCHTUTHIL: THE COMPOUND
PRINCIPAL OFFICERS' HOUSE ~1964

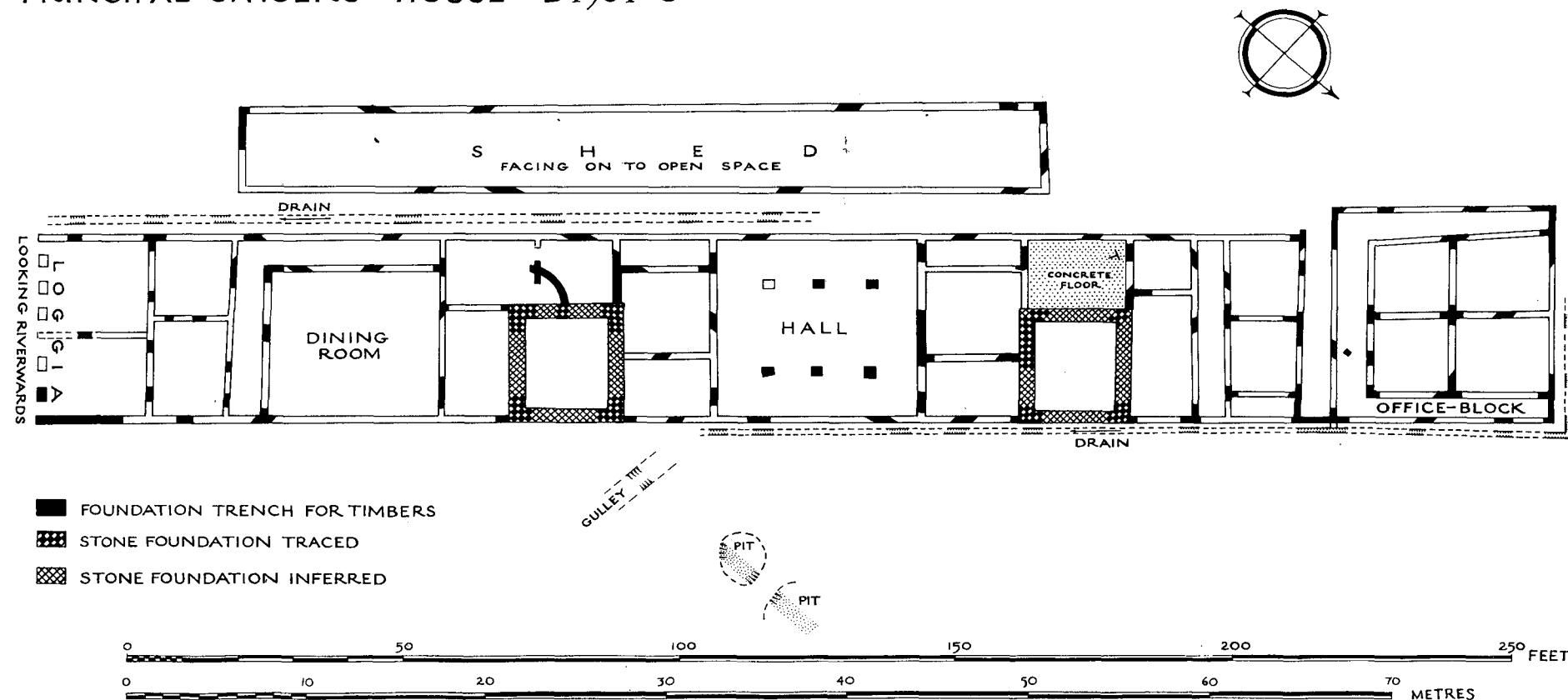


FIG. 60 The Officers' temporary Compound, plan of Officers' House. Scale, 1:363.

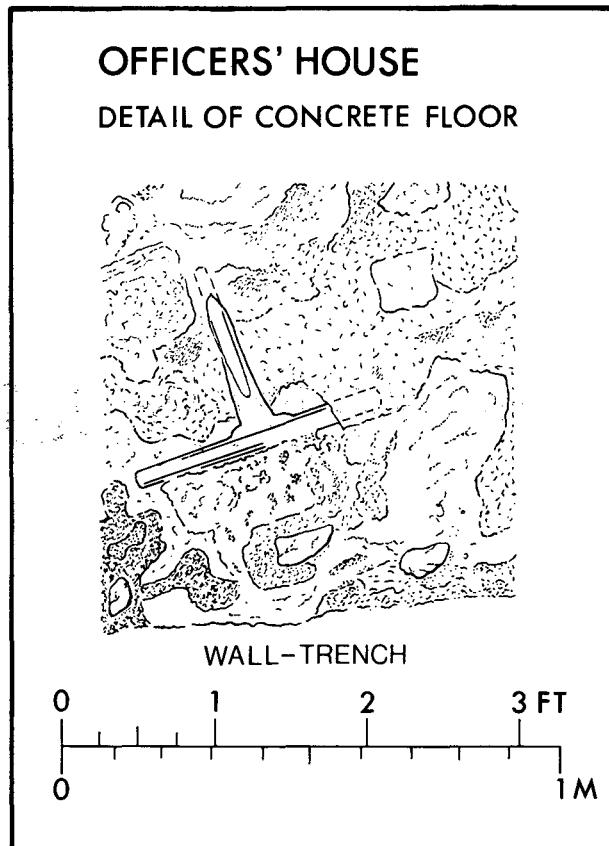


FIG. 61 The Officers' temporary Compound, plan of part of concrete floor in the Officers' House, showing impression perhaps of a metal stanchion. Scale, 1:15.

Richmond suggested that a line of such posts continued across the full width of the building. The existence of such a loggia, presumably open to the air, illustrates Roman enjoyment of scenic views; like the porticoes around gardens and courtyards, it provided a sheltered place for outdoor relaxation, with a fine view across the river to the hills; such a room would also catch the sun and could doubtless be closed by shutters during bad weather.

To the north-west of the second masonry room lay a group of rooms of varying size opening off both sides of a corridor running the width of the building. This section resembles the office blocks arranged around a corridor in the senior officers' houses within the fortress itself. At the extreme north-west end of the building lay a separate block 40 ft. (12.2 m) square. This block seems to have formed a self-contained unit; it was separated from the main body of the house by a 6-ft. (1.83 m) gap. However, the fact that it is connected to the rest of the house by a continuous construction-trench on the front (north-eastern) side, presumably creating a continuous facade, indicates that this block should be considered as forming an integral structure with the rest of the house. The drain, too, which ran along the front of the house continued to the northern corner of this block and then turned along its north-west side. The block was composed of four rooms, which probably served as offices, opening off a corridor running around three sides of the building.

The senior officers' house included an unusual structural feature: to the rear of the south-eastern masonry room there was a curved construction-trench, a feature unique in Roman timber military building. At the rear (south-west) of the house, and separated from it by a 7-ft. (2.13 m) gap with a central drainage channel, lay a long rectangular building 145 ft. (44.2 m) by 17 ft. (5.18 m). A trench along the long axis of this revealed no traces of partitions in the middle 50 ft. (15.2 m) of the building (FIG. 60). It may have served as a shed for the storage of equipment, or possibly as a stable-block.

2. BUILDINGS I AND II

Between the main residential house and the bath-house lay two almost identical buildings, each approximately 70 ft. (21.34 m) north-east to south-west by 42 ft. (12.8 m) (FIG. 62). The two were sited c. 30 ft. (9.14 m) apart. The gap between these two buildings lay on a direct line with the westward gateway and gave access to the open space at their rear (FIG. 57). The plan of Building II is virtually a mirror-image of Building I.

Building I consisted of two rooms which together occupied the full width of the building at its south-western end, and a series of rooms opening off both sides of a corridor running through the centre of the rest of the building. In Building II the internal walls dividing the area south-east of the longitudinal corridor into individual rooms were not located. A post-hole set in a large post-pit was, however, found within this section of the building, suggesting columned partitions rather than continuous walls. These two buildings were identified as offices. The dimensions of the building are, however, roughly the same as those of the ordinary centurions' houses in the fortress, and the longitudinal corridor is also reminiscent of the plans of the centurions' houses. The two buildings may, therefore, have been intended to accommodate the two centurions in charge of the men occupying the two barrack blocks at the north-eastern end of the compound (for a full consideration of the purpose of the compound and its occupants, see below). Although their small size in comparison with the senior officers' houses in the fortress makes it unlikely, these two buildings might alternatively have provided temporary accommodation for two tribunes until houses had been erected for them in the fortress itself; this arrangement would remove the shortfall in accommodation for the senior officers.

INCHTUTHIL : OFFICES IN TEMPORARY COMPOUND

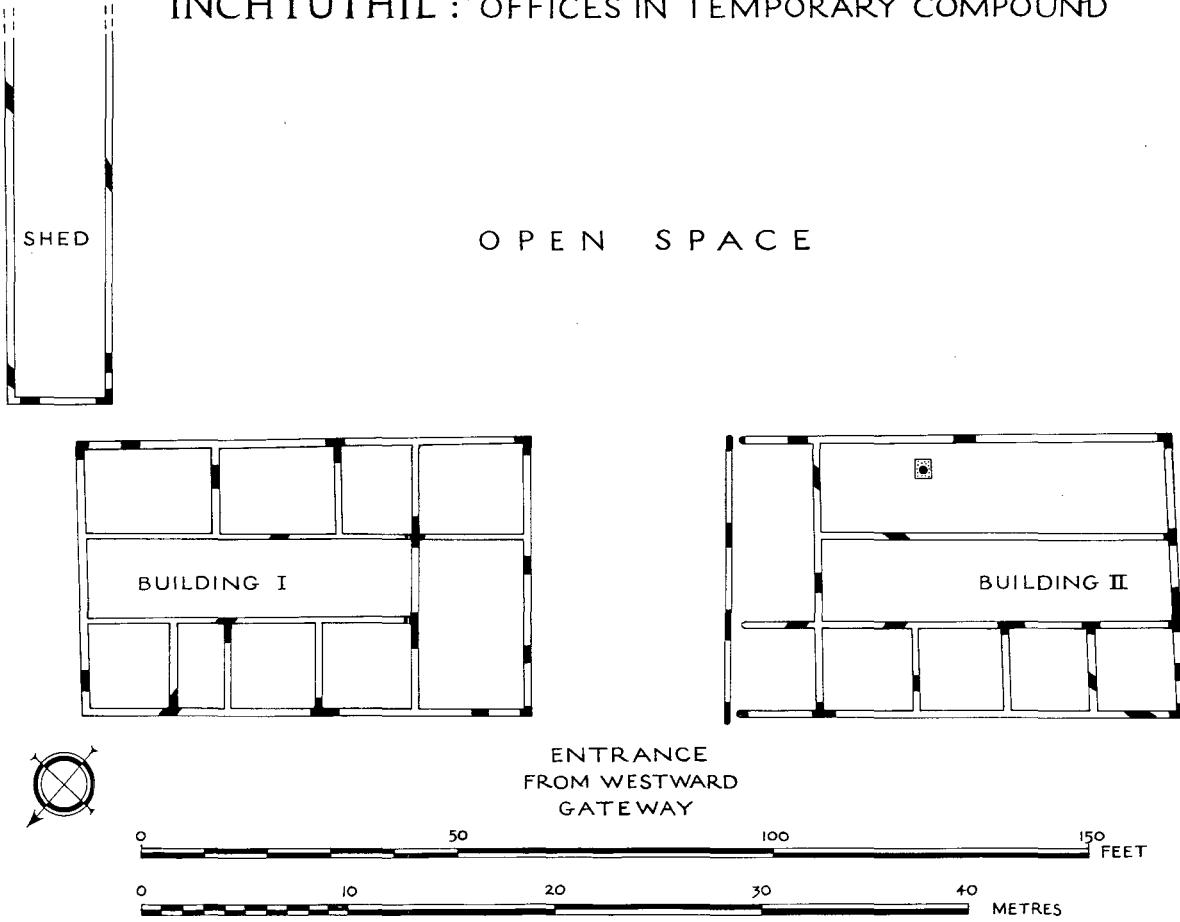


FIG. 62 The Officers' temporary Compound, plan of Offices I and II. Scale, 1:363.

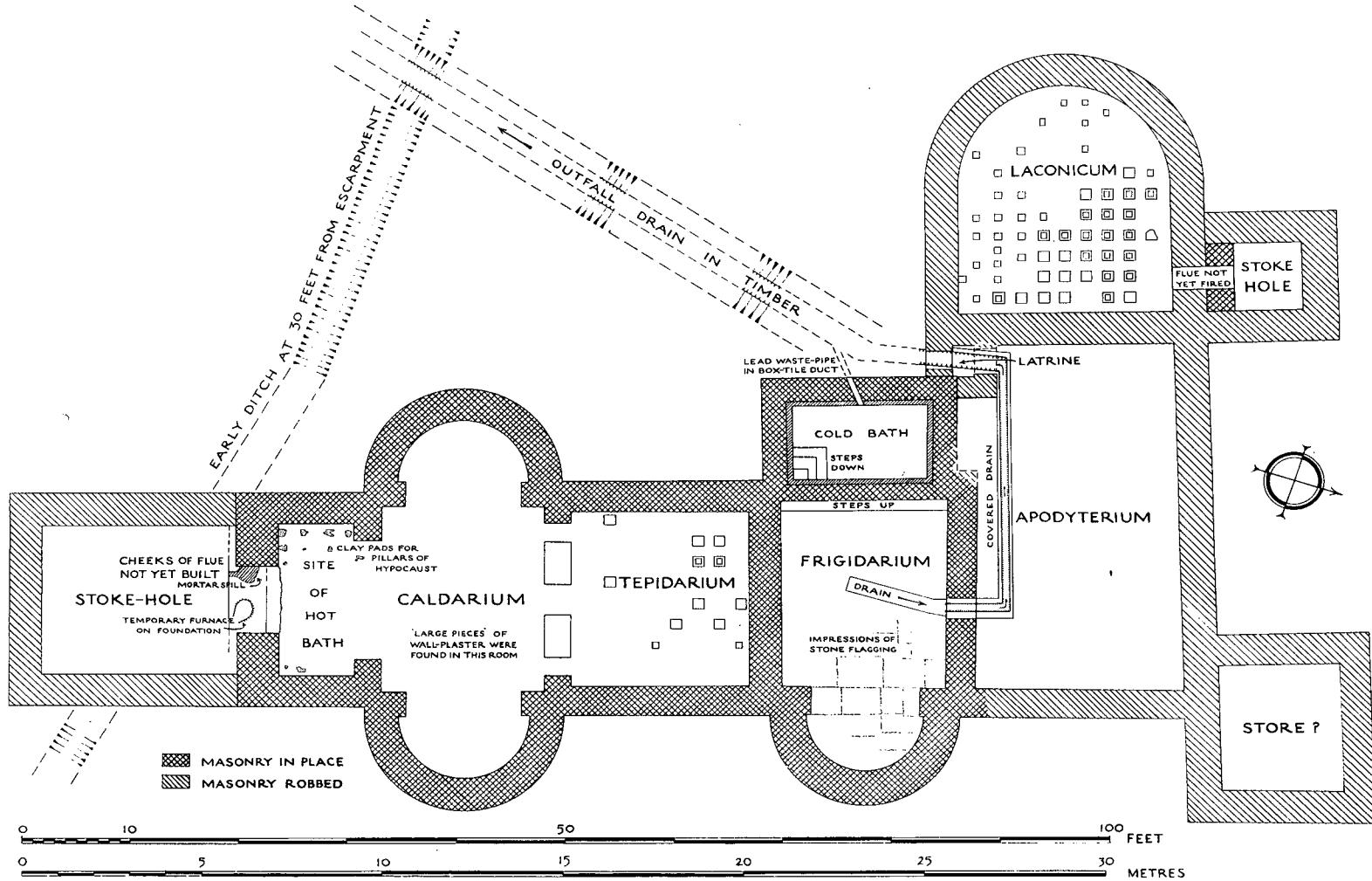


FIG. 63 The Officers' temporary Compound, plan of Bath-building. Scale, 1:190.

3. THE BATH-HOUSE

At the south-western end of the compound, near the edge of the plateau and partly overlying the early defence line, lay the bath-house. This was first excavated in 1901 (*PSAS* 1901/2: 214 f.) and was re-investigated in 1963. The baths were basically of the normal Roman military type, the *Reihentyp*, but with the addition of a *laconicum* (FIG. 63). Baths of the *Reihentyp* consisted of a single row of rooms, the bather passing in and out by the same route, that is, through the *apodyterium*, *frigidarium*, *tepidarium* and *caldarium*. Baths of this type are known in civilian contexts but are most commonly found on military sites, for example at Niederbieber or Heddernheim. The baths at Exeter followed this general pattern as did those at Wroxeter, where a *laconicum* was added as at Inchtuthil (see Collingwood and Richmond 1969: 112 f.; Nash-Williams 1969: 165 f.; Krencher and Krüger 1929: 177, 235 f.; Atkinson 1942: 25 f.). The most noticeable characteristic of baths of this type is their strict axial symmetry.

The bath-house was approached from the north where there was a roughly cobbled area. At the northern end of the building was a large entrance hall or changing-room, 33 ft. (10.06 m) by 19 ft. (5.79 m), the *apodyterium* (FIG. 63). To the west of this lay an apsidal room with a hypocausted floor, measuring c. 22 ft. (6.7 m) by 19 ft. 6 in. (5.94 m); this has been identified as the *laconicum* (the dry heat room). A small stoke-room lay to the north of the *laconicum*. The main baths lay to the south of the entrance room; these were composed of the *frigidarium*, 18 ft. (5.49 m) square with an apse projecting to the east, the *tepidarium*, 18 ft. (5.49 m) by 16 ft. 6 in. (5.03 m), and the *caldarium*, 16 ft. (4.88 m) by 18 ft. (5.49 m) with apses projecting to east and west. Beyond the *caldarium* was another stoke-room, much larger than the first.

There was a cold plunge bath to the west of the *frigidarium*; it measured 12 ft. 6 in. (3.81 m) by 7 ft. (2.13 m) and was 4 ft. (1.22 m) deep (FIG. 64). The plunge bath had a lining of cement and crushed brick 6 in. (0.15 m) thick and was entered by built-in steps. A lead waste-pipe led from



(Photo: RCAHM (Scotland): Crown copyright)

Pl. XXXV The Bath-building in the Officers' temporary Compound: stoke-hole and site of hot bath, looking west-south-west.

the bath through the wall to the main timber-lined drain outside (FIG. 63). A similar-sized hot bath projected to the south of the *caldarium*.

Much of the masonry survived to a height of 3 to 4 ft. (0.9–1.2 m). The concrete floor of the *frigidarium* revealed the impressions of lost stone flagging, and the impressions of the *pilae* for the hypocaust were found on both the *caldarium* and *tepidarium* floors. Pieces of plaster painted red, green, black and buff were discovered in the *caldarium*, indicating that the walls had been decorated (PSAS 1901/2: 227). The plan and structure of the baths thus conformed to the normal military type.

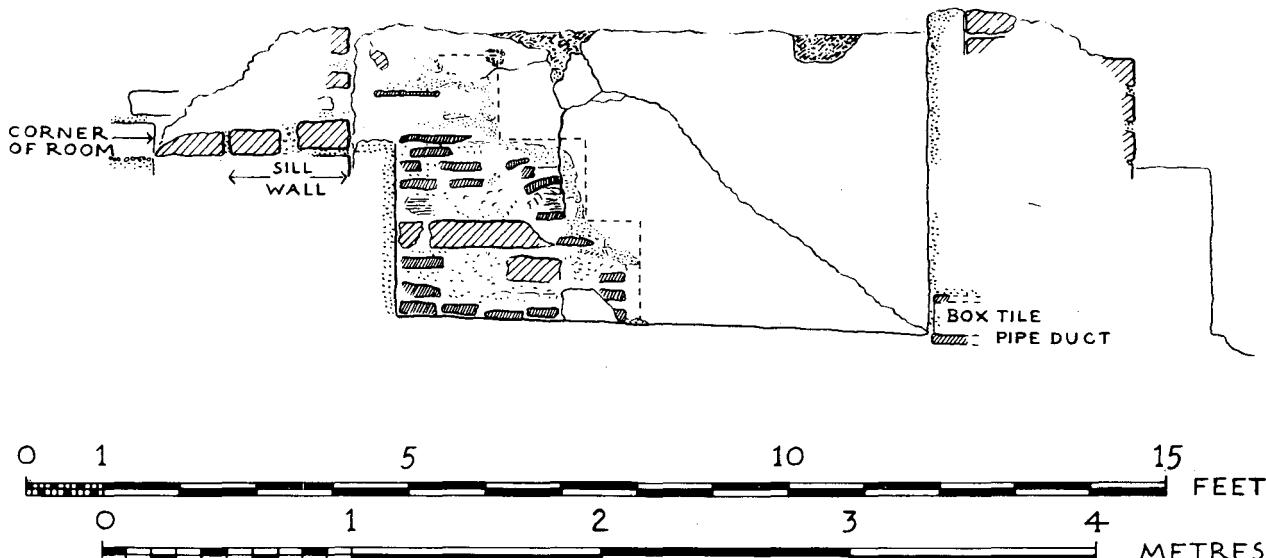


FIG. 64 The Bath-building, Section of Cold Plunge bath. Scale, 1:30.

Re-excavation of the bath-house in 1963 brought to light various features not noted in 1901 and clarified the layout, in particular the division between the *apodyterium* and *frigidarium*. The channel beneath the floors of the *frigidarium* and *apodyterium* proved to be a drain and not a flue. It was 1 ft. 3 in. (0.38 m) wide and 2 ft. 8 in. (0.8 m) deep and ran northwards out of the *frigidarium*, west through the *apodyterium* and then turned south and passed out of the building to the immediate east of the *laconicum*. At the point of exit the drain became wider and was no longer covered, here the excavators recognised the presence of a latrine (FIG. 65). The latrine was presumably flushed by the flow of excess water from the *frigidarium*. Once outside the building the drain connected with a timber-lined drain, into which the lead escape-pipe from the cold bath also debouched; the timber-lined drain was traced to the edge of the escarpment.

Neither of the two stoke-holes in the bath-house had ever been fired before the building was abandoned. In fact the stoke-hole next to the *caldarium* was not even fitted with a proper flue (FIG. 66). From these two facts it is evident that the bath-building had not come into full use before the withdrawal from Inchtuthil. The bath-house was not a temporary structure, and would almost certainly have continued in use after the full occupation of the fortress rendered the temporary structures of the construction phase obsolete.

The building is far too small for a legionary *balneum* (as it has sometimes been taken to be); its restricted size suggests a restricted clientele, and it was probably intended only for the officers. The building is more comparable with small private bath-suites than with the large legionary complexes known elsewhere, of which there is no trace at Inchtuthil (but see p. 187). Legionary baths were normally sited inside the fortress as at Caerleon, Chester, Exeter and elsewhere, while at auxiliary forts bath-houses were located either in the fort or outside in an annexe. At Inchtuthil the location is presumably to be connected with the senior officers' large house in the compound rather than with fire precautions. A small private bath-suite for the legate himself may have been included in the plans for the *praetorium* if it had ever been erected.

The problem of water-supply at Inchtuthil has already been discussed (Chapter 17). An aqueduct of some kind was necessary to bring water to the plateau and various possibilities have

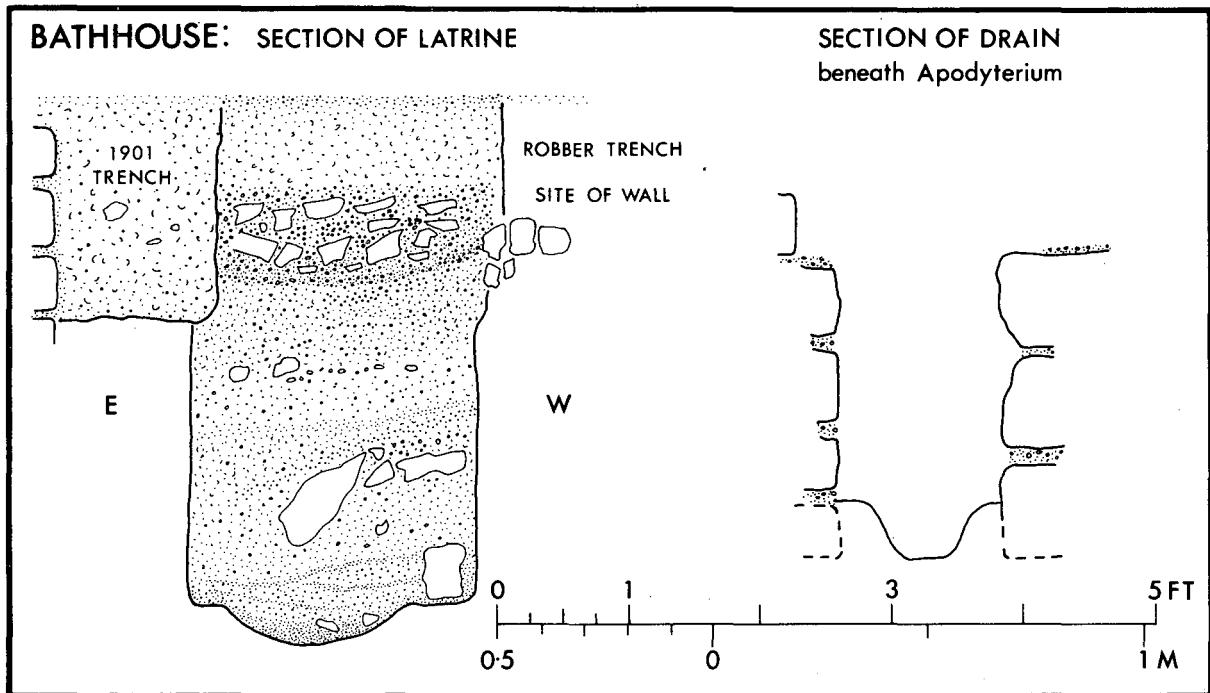


FIG. 65 The Bath-building in the Officers' temporary Compound, Sections of Latrine and Drain. Scale, 1:17.

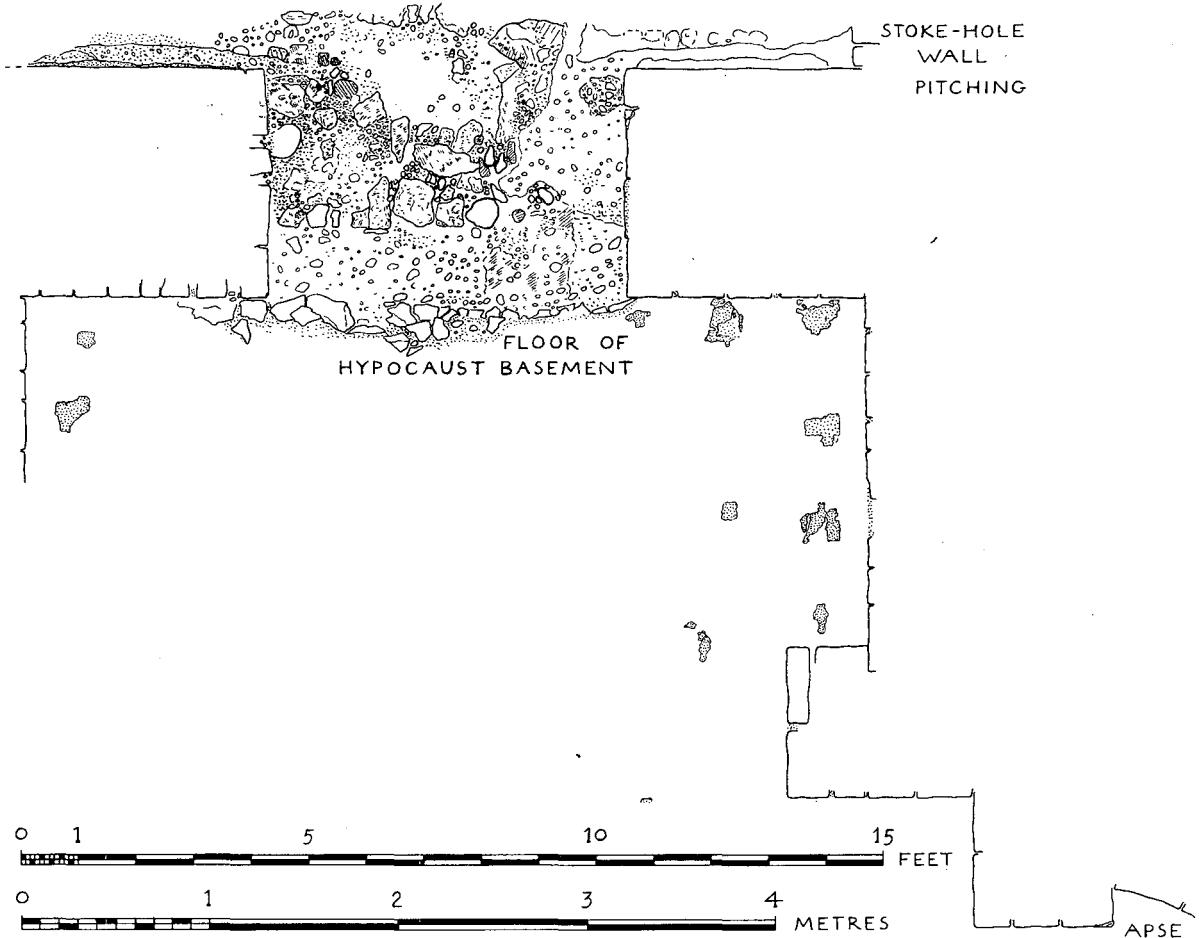


FIG. 66 The Bath-building, plan of Hot Bath, showing the absence of a built flue. Scale, 1:40.

been considered. The small bath-house is located at a local high point of the plateau and thus is likely to have been near the planned distribution-centre; if an aqueduct was planned from the south it would have probably reached the plateau near this spot. In the meantime, until a proper system of water-supply had been installed, most of the legion's water must have been carried up from the river in barrels or water-carts. The compound baths, being a permanent feature, would eventually have been connected to a piped water-supply; as a temporary measure, however, a very limited use could have been made of the bath-house using water from barrels, possibly stored in the room at the north-east corner of the building.

4. THE BARRACKS

At the north-eastern end of the compound, in close proximity to the easternmost gate, timber barrack blocks of two different periods were excavated (FIG. 67). One of these blocks had already been discovered during the 1901 excavations (*PSAS* 1901/2: 205 and fig. 5). In the first phase there was one barrack measuring 205 ft. (62.5 m) by 27 ft. (8.23 m). This block was divided into fifteen *contubernia*; each *contubernium* was approximately 12 ft. (3.66 m) wide internally and was subdivided into a front room 6 ft. (1.83 m) deep and a rear room 18 ft. (5.49 m) deep. Each *contubernium* had an area of 288 sq.ft. (26.76m²) made up thus: front room, 72 sq.ft. (6.7 m²); rear room, 216 sq.ft. (20.06 m²). The overall area of each *contubernium* differs little from those of the barracks in the fortress, which were 299 sq.ft. (27.78 m²) in area; but the internal division is very different, the front room here being much smaller in comparison with the rear. This block appears to have lacked the usual veranda since no post-holes for the supporting columns were located despite search; first-century barracks without verandas are known elsewhere, for example at Hod Hill and Strageath, but they are unusual. This original barrack block was sited c. 15 ft. (4.57 m) inside the gateway; its long axis was aligned roughly north-west to south-east, parallel with the axis of the large residence. A position so close to the gateway is unusual on Roman military sites; this barrack was presumably built there in order to protect the entrance and to have easy access through it.

While the compound was still in occupation the defences were at least partially levelled and the ditch filled in, the gates presumably being dismantled. The first barrack block was also demolished at this time. Two new barracks were then erected as a facing pair; one over the earlier barrack block but at an angle to it, the other partly over the levelled rampart. The long axes of both these buildings followed the line of the earlier north-eastern rampart. The dimensions of the two new blocks were the same as those of the earlier barrack, that is 205 ft. (62.5 m) by 27 ft. (8.23 m), with the addition of a veranda c. 10 ft. (3.05 m) deep, of which about half the post-pits were located. These two blocks also contained fifteen *contubernia* of approximately the same size as those in the earlier block. The dismantling of the defences meant that the barracks were no longer in such an awkward relationship to the gateway. The south-western block of the pair seems to have had an additional narrow room at its north-western end; the exact nature of this is uncertain as only part of its construction-trench was excavated; but its presence confirms that the gateway was no longer in existence. The construction-trench was smaller than those in the rest of the building, indicating a minor structure such as a lean-to over a privy.

The relation of the early barrack with that overlying it is clearly seen in Section A-B (FIG. 68). The fill of the construction-trenches of the two buildings was strikingly different; the Phase I trenches were filled with a dark turf soil while those of Phase II were filled with a pale sandy gravel. At the position of the Section the Phase I construction-trench was 19 in. (0.48 m) wide and 20 in. (0.51 m) deep; the Phase II trench had a width of 21 in. (0.53 m) and a depth of 15 in. (0.38 m). The internal partition-trenches between the *contubernia* were much slighter, being only c. 6 in. (0.15 m) deep.

INCHTUTHIL, 1964: BARRACKS IN TEMPORARY COMPOUND

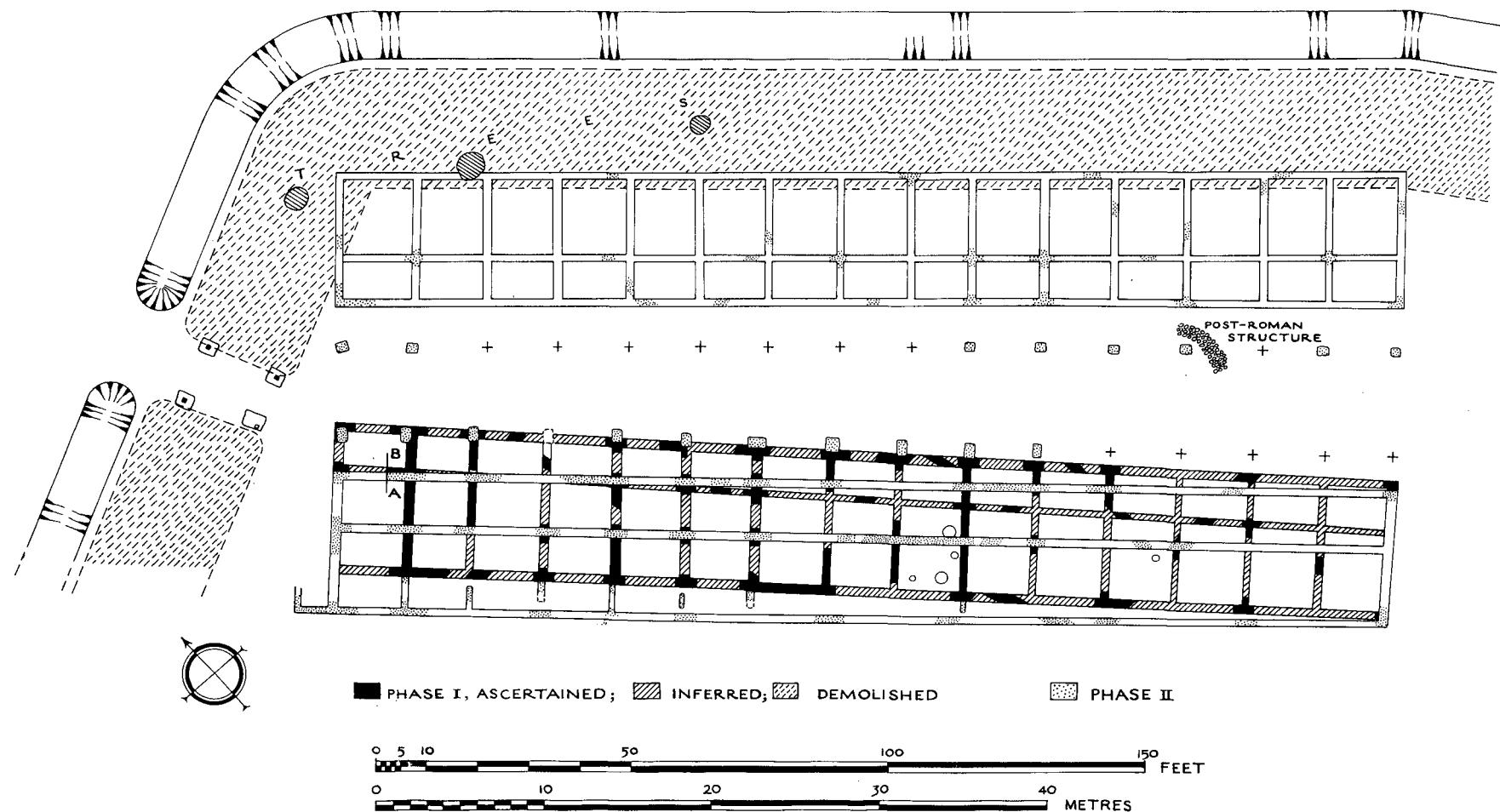


FIG. 67 The Officers' temporary Compound, plan of Barracks inside the north gate. Scale, 1:400.

INCHTUTHIL 1964
TEMPORARY COMPOUND
BARRACK FOUNDATION
TRENCHES SUPERIMPOSED

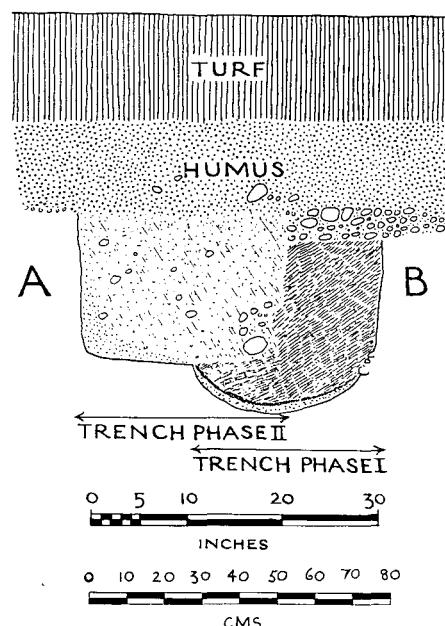


FIG. 68 The Officers' temporary Compound, Section of successive wall-trenches in the southern barracks. For position, see FIG. 67. Scale, 1:20.

B. THE COMPOUND: DISCUSSION

The rest of the area enclosed by the defences of the Compound appears to have been left empty of buildings; trial-trenches revealed no traces of any other structures. The purpose of the enclosure is uncertain, and requires discussion. The Compound was obviously connected with the construction-period of the fortress itself, and was thus probably contemporary with at least one phase of the construction-camps (see Chapter 22). That the Compound was in use for more than one season can be argued both from the two periods of barrack buildings and the use of masonry in part of the officers' house. The demolition of the Compound's defences probably followed the completion of the fortress defences. The presence of a rampart in such close proximity to the fortress would limit the effectiveness of the fortress defences in the long term, and once the fortress was laid out and partially occupied the need to protect the compound independently was greatly reduced. The bath-house, at least, was intended for long-term use; a conclusion reinforced by the fact that it had not yet been brought into commission when the whole of Inchtuthil was abandoned. We might even suppose that the well-appointed officers' house was also in use at the time of the withdrawal and had been intended to remain so for a while.

There are as yet no parallels to this residential compound, but this probably reflects only our lack of knowledge about the construction-periods at other fortresses. Only at Inchtuthil do we have clear evidence for the existence of construction-camps etc. Bath-houses and other structures found in the annexes of auxiliary forts represent a very different phenomenon, since they were intended for permanent use by the whole unit.

It is impossible on the evidence at present available to determine who lived in the Officers' temporary Compound; but various deductions can be suggested. The scale and comparative luxury of the main house indicate an occupant of some importance. The area of the building is

smaller than the area of the senior officers' houses in the fortress, being only 9590 sq. ft. (890 m²) as opposed to 13,010 sq. ft. (1209 m²); but the area of the latter included an open courtyard of some 2976 sq. ft. (227.5 m²); thus the house in the compound has roughly the same area of rooms as Houses I, II and IV in the fortress. The importance of the occupant is also demonstrated by the presence of hypocausts and masonry; within the fortress only the *primus pilus* received a hypocausted room. The superficial symmetry of the house might suggest that it was shared by two officers and was composed of two 'flats' placed end to end; if the building were divided along the south-east wall of the aisled hall, each half would contain eleven rooms, including a hypocaust apiece. Such a division would explain why the house is linear in plan rather than built around a courtyard. A single occupant, however, seems more likely, the south-eastern half of the building with the *triclinium* and 'loggia' serving as residential quarters while the rest was used as offices, a view reinforced by the resemblance of the rooms at the north-west end to the office blocks in the senior officers' houses. The possibility that the house was used by different officers consecutively must be borne in mind when considering the building in relation to the accommodation provided within the fortress.

As has already been pointed out (p. 213), the two 'residential' buildings to the rear of the main house were closer in size to the ordinary centurion-houses within the fortress than to the senior officers' houses. Accommodation of tribunes or similar-ranking officers in these buildings seems less likely than accommodation of centurions; but it remains a possibility since there is no reason why temporary accommodation should be on the same scale as permanent accommodation. It was this principle that prompted the suggestion (p. 139) that the main house may have been used for a period as the temporary residence of the legate. Another possibility is that Buildings I and II were not residential but served as drawing-offices and work-rooms for the architects, engineers and people in charge of supplies during the construction of the fortress.

Richmond (*JRS* 1965: 200) suggested that the large house was the quarters of both the *praefectus castrorum* and the *praefectus fabrum* during the construction of the fortress, their guard being accommodated in the barracks of the Compound. The existence of the *praefectus fabrum* with engineering functions at this date was later disproved by Dobson (see p. 137), and the suitability of the building for use by one occupier rather than two has been argued above. That the building accommodated the *praefectus castrorum* for at least part of the time it was in use does, however, seem very possible. The lack of a *praetorium* within the fortress also strongly suggests that this house may have been intended for the legate's use, perhaps after the *praefectus* had moved into his own house within the fortress when it became available.

The discussion of the possible occupants of the Compound's accommodation is obviously bound up with the number of houses available for senior officers within the fortress, that is four. Since there were six tribunes and a *praefectus castrorum* to be accommodated as well as the legate, there is an obvious shortfall. There is the possibility of doubling-up during the construction period, as has already been noted with reference to the main residence in the compound. The unusual layout of Tribune's House II (FIG. 31) is, however, unlikely to be the result of doubling-up, which would be only a temporary measure; a more long-term explanation is needed (pp. 140 f.). Two tribunes may have shared a normal house until a second was built; but the archaeological remains cannot provide any evidence for this.

The accommodation within the fortress is sufficient for three *tribuni angusticlavii* and either the *tribunus laticlavius* or the *praefectus* or else for the *tribunus laticlavius*, *praefectus* and two *tribuni angusticlavii*. The compound residence can be seen as the house of the senior tribune, the prefect or the legate. The two small houses in the compound might have provided temporary accommodation for two more *tribuni angusticlavii*, although, as stated above, this is unlikely. Thus as a result of doubling-up and temporary housing all the senior officers could be accommodated; on the other hand, the absence of some of the officers from Inchtuthil seems probable. The complete absence of any accommodation for the legate might be explained by the fact that the legion temporarily lacked such an officer. If the legate had died or had been recalled, a replacement might not have been made immediately and there would have been no need to provide a house at once; the legion would have been temporarily commanded by the senior tribune, or in his absence by the prefect, as epigraphically attested elsewhere. On the other hand,

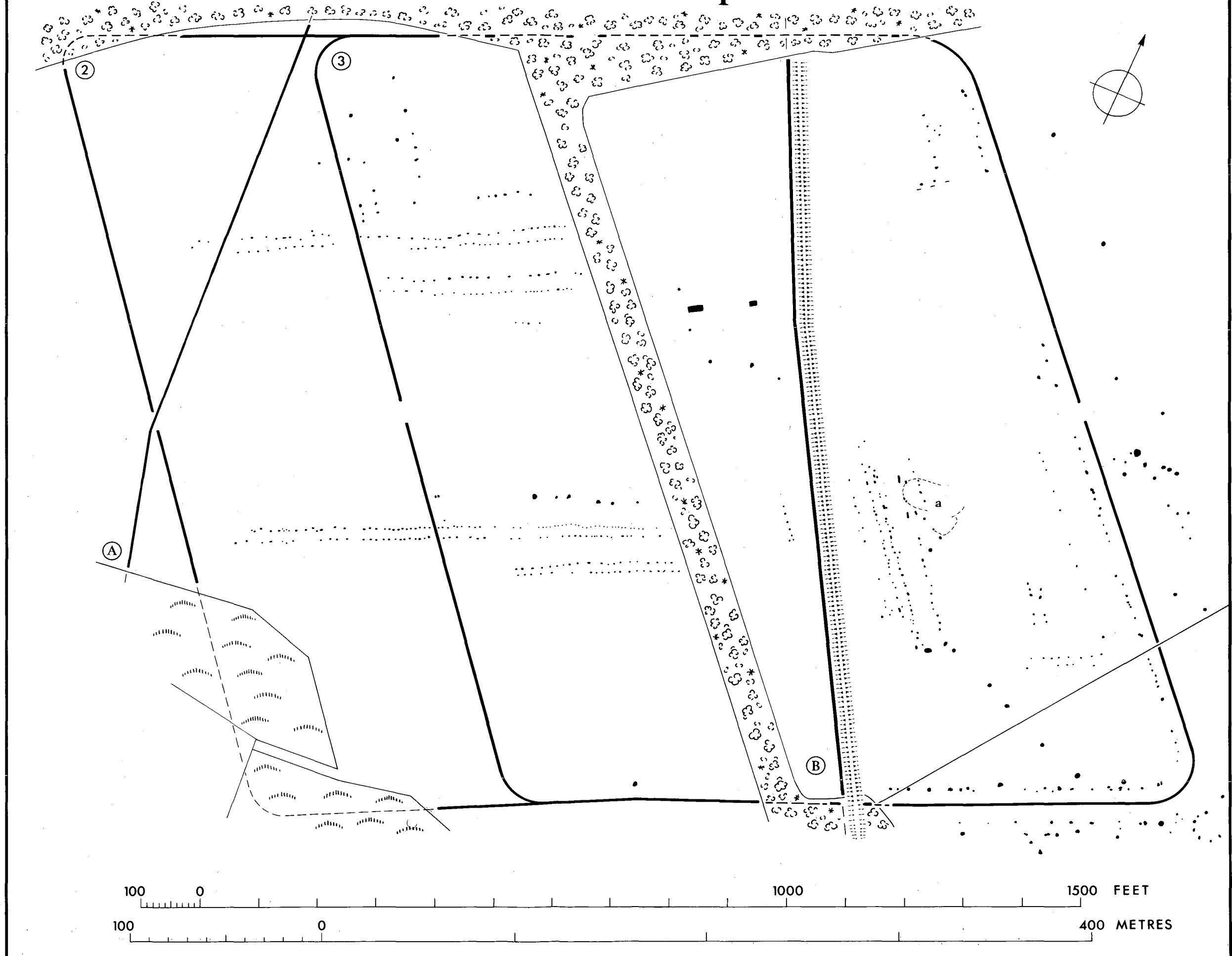
such a measure would have been only temporary and is unlikely to have continued for two or three years; the absence of the legate from Inchtuthil would require a different explanation.

On the whole, it is perhaps preferable to see the Compound residence as the house of the legate. Certainly its dimensions are much smaller than those of *praetoria* excavated elsewhere; indeed it is even smaller than the houses of the tribunes. On the other hand, the residence was an impressive building with a long frontage and a large aisled entrance-hall and audience chamber; it was also equipped with heated rooms and was sited near the small bath-house. The latter, although never used, was perhaps primarily intended as a private bath-house for the legate. The two barrack blocks in the compound could have housed the legate's guard while the two smaller houses may have belonged to the centurions of this guard. The guard consisted of the equivalent of two centuries; these may have been two ordinary centuries from the legion, placed here to protect the buildings outside the fortress defences, or the legate's own private guard. There is now some evidence, although slight, for *singulares legati legionis* in the time of Domitian; their number and duties, however, remain unknown (*A.E.* 1969/70: 583; *JRS* 1970: 142 f.; Spiedel 1978: 20). Another possibility is that the barracks temporarily housed the 120 *equites* of the legion. That these barracks housed a *vexillum veteranorum* is unlikely since such a unit does not seem to have existed after AD. 70 (Frere, *Britannia* 1980: 59–50, and p. 169 above). The fact that there were sufficient barracks in the fortress for all the legionary centuries does not preclude the temporary use of these barracks in the Compound by two of those centuries.

The two phases of barrack buildings suggest that the occupant of the larger house also changed at some point. In Phase I the residence perhaps accommodated the *praefectus* protected by a single century. On completion of his house within the fortress the *praefectus castrorum* will have moved there. In Phase II the house would then have been occupied by the legate accompanied by his larger guard. The two smaller houses, or at least one of them, were probably erected at the same time as the new barracks, two houses for centurions not being needed in Phase I. The construction of the bath-house should also perhaps be associated with Phase II; this would account for the fact that it was never completed or used. A bath-house may have been considered necessary because the legate would be living in the compound for some time while his own palace was erected. The lack of accommodation for the legate during Phase I may be explained by an interregnum consequent on the appointment of a new legate, or alternatively the legate may have remained in the south at the legion's previous base, probably Wroxeter, during the initial building-phase. The *praefectus*, in accordance with his responsibilities, would have organized the construction of the new fortress while the legate with his wider responsibilities remained based at Wroxeter with much of the clerical staff and organized the abandonment of that fortress. This need not, of course, imply that the legate was not present in Scotland during the campaigning season.

This hypothesis reintroduces a shortage of accommodation for the senior officers at Inchtuthil. Two *tribuni angusticlavii* and the *tribunus laticlavius*, or three *angusticlavii*, had not been properly catered for. This discrepancy between the number of houses and the number of officers can be accounted for in various ways. The possibility of doubling-up and of casualties among the officers during Agricola's campaigns has already been mentioned. Moreover at least one tribune will probably have remained at Wroxeter with or without the legate, to organize the move north. Indeed, if the legate's initial absence is explained by the temporary lack of such an officer, then the *tribunus laticlavius* may have remained at Wroxeter, probably with the assistance of another tribune. These officers may have remained in the south after the departure of the legate, and thus never have arrived at Inchtuthil. Another possibility, though less likely (see Chapter 25), is that some of the tribunes were despatched to the continent with a vexillation before the legion was transferred to Inchtuthil. There are then various reasons to explain the shortage of accommodation for senior officers at Inchtuthil, but the true one cannot at the moment be determined. On present evidence, the compound can best be interpreted as the residence first of the *praefectus castrorum* and then of the *legatus legionis*. It would have continued in use until the *praetorium* was completed. Houses for other senior officers would have been much quicker to erect and these could have been provided soon after the officer's arrival.

INCHTUTHIL ~ The Labour Camp



CHAPTER 22

THE LABOUR-CAMPS AND LINEAR EARTHWORKS

South-west of the fortress there extends a triangular area of the plateau which is occupied (FIG. 2) by various Roman military features, as well as by a native promontory fort of probable post-Roman date (p. 248). Apart from the so-called 'Western Vallum' (**B** on FIGS. 2 and 69) which has long been recognised as a probable Roman feature (Roy 1793), and was first investigated by Abercromby during the 1901 excavations, these features have all been discovered during the last forty years by aerial photography undertaken from Cambridge (PLS. XXXVI, XXXVIII–XLII).

A. THE EVIDENCE OF AIR PHOTOGRAPHS AND EXCAVATION

Traces of camps to south-west of the fortress are not now ordinarily visible on the ground; without aerial reconnaissance their very existence would have remained unknown. Crop marks were first observed towards the west end of the plateau in July 1945 when the south-west ditch of a large camp (FIG. 69, Camp 2) was visible, together with a later ditch (3) that reduced the size of the camp. There was also another ditch (**A**) presumably extending, like the 'Western Vallum' (**B**) from scarp to scarp (D 46–50).¹³⁷ At the time, the significance of these features was not recognised; only in 1957–9, when a length of the north-east side and the east angle were recorded, did the existence of a large camp become apparent (VY 60–4, AAD 70–7). From 1945 to 1979, the area was observed in some twenty different years, usually in July or early August, under a wide range of conditions both of weather and of crops. Most information was obtained in the dry summers of 1962, 1977 and 1978; in other years, particularly if the land happened to be under grass or roots, there was little to see. The present account is based upon the total coverage of 226 air photographs¹³⁸ of the site in the Cambridge Collection. They have been compared with oblique photographs taken in the third week of July 1977 by staff of the Royal Commission on the Ancient and Historical Monuments of Scotland.¹³⁹ The crop marks at that time were very clear.

This large camp (2) occupies the narrower, western part of the plateau: much of the north side and the south-west angle lie under trees, as do the points of intersection with the 'Western Vallum'. It is clear from the plan that a camp of the size required could only just be squeezed into the space available. The shape is almost a parallelogram: the north angle measures $107\frac{1}{2}^\circ$, the east angle $73\frac{1}{2}^\circ$, the south 102° and the west $75\frac{1}{2}^\circ$. The north side lies only just above the scarp, and the south angle extends some way down the slope, there more gentle than around most of the

137. References consisting of one or more letters followed by digits are to the negative numbers of photographs in the Cambridge University Collection.

138. Comprising 30 vertical and 196 oblique photographs.

139. These photographs (Nos. PT 5401–5, 5409, 5411 from the Commission's collection) were kindly made available by Mr. Gordon Maxwell. His analysis of the camps at Inchtuthil has been published in *Scottish Archaeological Review* 1 (1982), 105–13.

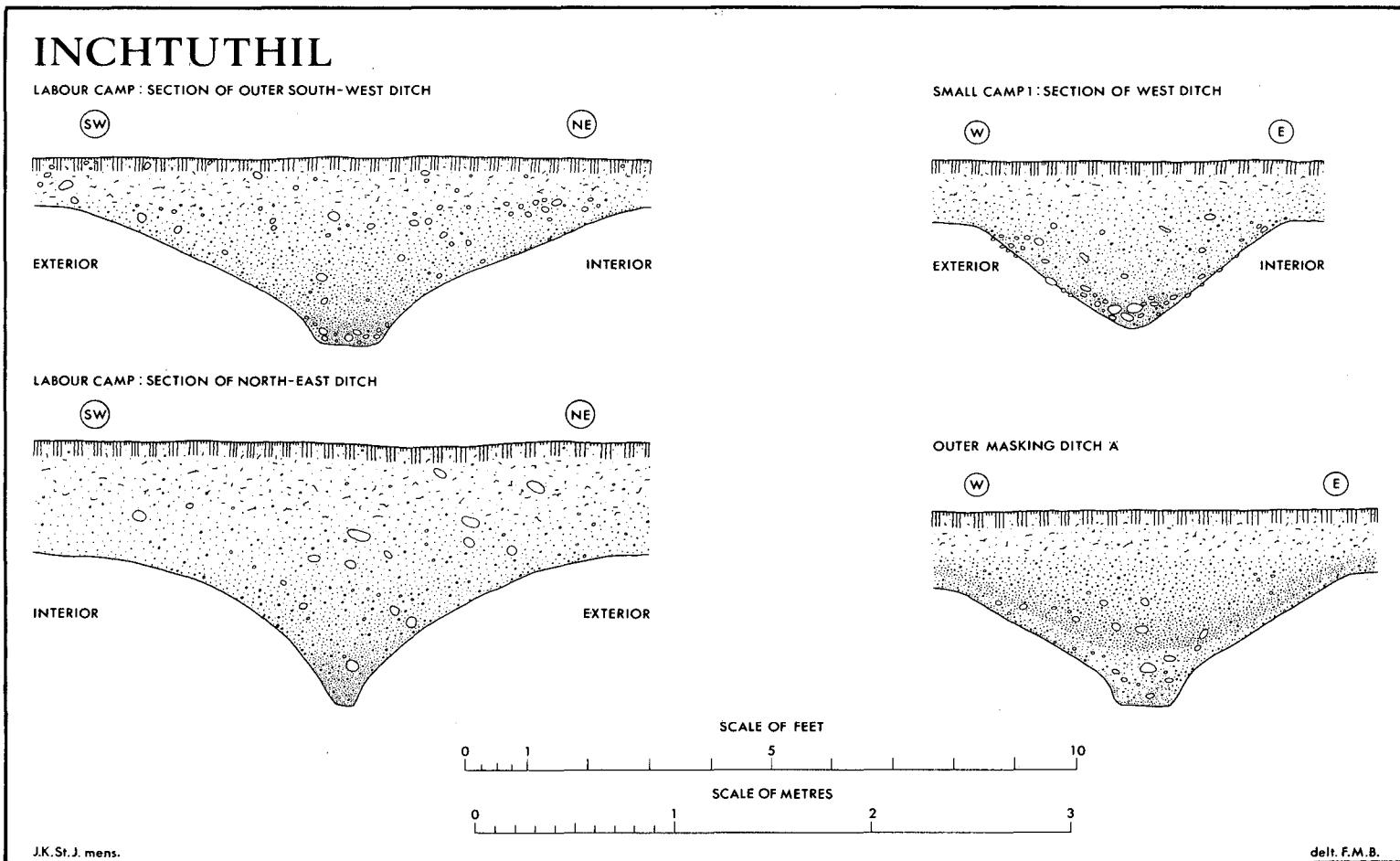


FIG. 70 Sections of Ditches of Camps 1 and 2 and first (western) Boundary Ditch (Outer Masking Earthwork). Scale, 1:36.

plateau. Apart from this slope, the area of the camp is generally level, but is crossed by slight undulations reflecting the presence of layers of gravel of differing hardness or consistency. The ground to the south-west of a narrow plantation-belt, laid out just before 1835, has been under a normal agricultural rotation at least for the last fifty years. To north-east of the plantation the ground remained in grass until 1940. On such gravel subsoil buried features show to advantage when the fields carry a cereal crop, particularly barley, and the clearest effects of all are obtained with a favourable combination of a sensitive crop and a dry summer.

On this western part of the plateau (FIGS. 2, 69), the position of all the ditches crossing open ground can be plotted without difficulty from vertical air photographs. All have been confirmed by excavation.¹⁴⁰ Of the five different features that lie here the westernmost, occupying the highest position (FIG. 2), is a small camp (1), about 390 ft. (118.8 m) from north to south, by 260 ft. (79 m), an area of 2.33 acres (0.94 ha). Its ditch, only 5 ft. (1.5 m) wide and 2 ft. 10 in. (0.86 m) deep (FIG. 70), seldom promotes distinct crop-marks, but all four sides and the rounded angles have been recorded. There were no gates in the short sides. The line of the east side is not clear except at the angles. The crop-mark on the west side appears continuous except where dark swathes of crop intervene. Consequently the position of gates is undetermined. As the section (FIG. 70) shows, the ditch was of a normal V-shape: there was little primary silt below a gathering of small pebbles that had rolled down the sides. The rest of the filling was of mixed earth and gravel that graded upwards into ploughsoil. Camp 1 is briefly discussed below (p. 243).

Camp 2 (FIG. 69), which at the nearest point lies c. 120 ft. (37 m) from the ditch of the fortress and which covers an area of 49.2 acres (19.91 ha),¹⁴¹ has at a later stage been reduced in size to 35 acres (14 ha) by a new rampart and ditch on the south-west side; these defences run c. 412 ft. (125.5 m) inside the line of their predecessor. The new gateway is displaced by some 10 ft. (3 m) to the north of the previous axis. The new ditch is not quite parallel with its predecessor, but even in Camp 2 itself no side is exactly parallel with any other.

At a first glance the plan of Camp 2 conveys a striking impression of regularity: in fact opposite sides are not of the same length, nor quite parallel. The north-west side is 1545 ft. (470.9 m) long, the north-east side 1432 ft. (436.5 m), the south-east 1620 ft. (493.8 m), and the south-west 1432 ft. (436.5 m). The south-east side changes direction through 4° about two-fifths of the distance along the side measured from the south angle, and there is another angle of 1½° at the south-east gate.

Fifteen sections were cut across the ditch, most of them on the north side, to determine the line where it is under trees. The profile varied somewhat from section to section, as the two left-hand drawings in FIG. 70 show. A width of about 9 ft. (2.7 m) and a depth of 2½ ft. (0.76 m) represent average dimensions. The variation in depth may reflect no more than differences in the amount lost to ploughing. A little fine silt, sometimes with a few small pebbles at the bottom of the ditch, was overlain by mixed gravel and earth. The north-east and south-west gates of the camp are visible on photographs: they are c. 32 ft. (9.75 m) wide, and lie some 30 ft. (9.1 m) to the north of the mid points of their respective sides. The north-west and south-east gates (40 ft. (12.2 m) wide) were determined by digging. They are not quite opposite each other; the centres of the respective causeways lie 640 ft. (195 m) from the north angle and 605 ft. (184.4 m) from the east angle. These gates divide their respective sides in the ratio of 2 to 3, so the camp faced north-east towards the fortress.

Upon reduction the proportions of the camp naturally changed, but it is still legitimate to name the south-west gateway of the reduced camp its *porta decumana*¹⁴² and the portion of the camps which lies under and south-west of the plantation-belt as the rear part or *postica* of the

140. The points where trenches were dug to identify the north side of the large camp are marked in FIG. 69 in solid black, in contrast to the broken line elsewhere.

141. This estimate corrects the figure of 48 acres = 19.5 ha given in Frere and St. Joseph 1983: 40. Maxwell's estimates (Maxwell 1982: 105) of 44 acres = 18 ha and 33 acres = 13.5 ha are also inaccurate. The axial dimensions of Camp 2 from gate to gate are 1575 by 1390 ft. (480 by 423.7 m); those of Camp 3 are 1150 by 1390 ft. (350.5 by 423.7 m).

142. This gate, at 40 ft. (12.2 m) is a little wider than its predecessor.



(Photo: Cambridge University Collection (K 17-AS 6), July 1977, copyright reserved)
Pl. XXXVI The Construction-camps, vertical air-photograph showing the south-west side of the fortress on the right. North to top right, Scale, 1:4800. Compare FIGS. 2 and 69.

respective camps.¹⁴³ The gates lack *titula*, but *claviculae* unaccompanied by ditches may once have been present.

The position of Camp 2 in relation to that of the fortress suggests that the latter was either built or projected when the camp was constructed, for the fortress occupies the more ample ground, and the camp's defences are only just accommodated in the area of the plateau remaining available – and then only by creating a parallelogram rather than a rectangle and by angling the south-west side outwards towards its western end. Since, however, the camps can be shown to be early in the constructional sequence in this part of the plateau, being cut by two presumably successive boundary earthworks, and since, as just pointed out, they face towards the fortress, it seems safe to suppose that they were labour camps, in which troops were accommodated during the earlier phases of the construction of the fortress, and that the larger camp was reduced in size when accommodation for the legionaries became available in the fortress and when some of the senior officers moved to the Officers' Compound (see p. 220). This identification is reinforced by the presence within both camps of regular rows of pits, seen in aerial photographs (PLS. XXXVI, XXXVIII–XLII); for pits are unusual in marching-camps and their presence here suggests a longer-than-normal occupation, during which rubbish-disposal or latrine-facilities became a problem.

Only rarely have pits within temporary camps been studied, and of these Cawthorn is the classic example. There Richmond excavated in the eastern pair of camps 'earth ovens', a cooking-hole sheltered by a turf mound, a latrine pit and 'dug-outs'.¹⁴⁴ In Scotland there are a few instances of temporary camps where pits have been observed and recorded on air photographs. The most notable is the 31½-acre (12.6 ha) camp lying immediately south-east of the fort at Glenlochar.¹⁴⁵ There, a line of irregularly-spaced pits along the inside of the rampart may reflect activities commonly associated with the *intervallum*: cooking-pits and latrine pits come to mind. Other small marks within the camp seem to be disposed in lines or rectangles as if related to the lay-out of tents: these marks may include rubbish-pits. Pits showing clearly on photographs have been recorded within the camps at Dalgross and Stracathro, but in numbers too small for any plan to be recognised.¹⁴⁶ At Lochlands, near Camelon, a shallow pit, filled with ashes and burnt earth, identified in 1983 in the *intervallum* on the south side of the camp, was either a cooking-place or an ash-pit perhaps associated with nearby ovens.

The pits within Camps 2 and 3 at Inchtuthil are more numerous and some of them more regularly arranged in straight lines than those recorded at any other site. The question arises as to what clues they provide to the quartering of troops in these camps. The crop-marks visible from the air are well recorded in oblique and vertical photographs (PLS. XXXVI, XXXVIII–XLII). The straight lines parallel to the sides of the camp are clear enough. There can be no doubt that the interpretation of most of these marks as pits, excavated in the subsoil, is correct. In September 1962, when the field west of the plantation-belt was in stubble, it was noticed that sunlight reflected from the short stalks revealed patches differing slightly in tone and sheen from the stubble elsewhere.¹⁴⁷ The disposition of these patches corresponded to the crop-marks recorded on air photographs the previous July.

In the preparation of the detailed plan of these camps (FIG. 69), all the air photographs of Inchtuthil in the Cambridge Collection showing marks of pits have been considered. The most useful coverage in this connection consisted of a few photographs K17–AS 3–8, exposed in a vertical survey camera in a short run over the area on 20 July 1977; the scale is about 1:4,800. These have been invaluable for positioning features appearing clearly on oblique photographs,

143. For the use of this augural term in relation to a camp lacking a *via quintana* see I.A. Richmond, *JRS* lii (1962), 148, n. 30.

144. I.A. Richmond, *Arch. Journ.* lxxxix (1933), 17–78. Besides the features specifically mentioned, 'during the search for dug-outs and ovens, many pits were identified, but few were of interest, and fewer still contained objects' (p. 68).

145. J.K. St. Joseph, *JRS* xli (1951), 60–61. Frere and St. Joseph 1983: 27, 29.

146. Dalgross: Frere and St. Joseph 1983: 130–31. Cf. Bochastle, *PSAS* 1977–8, 142.

147. Quarry pits and other features on the Spittalfield plateau could similarly be distinguished in barley stubble in September 1984.

but of which the exact position could not readily be obtained from oblique photographs alone. Should an opportunity recur, like that in 1962, of measuring features picked out as stubble marks, it should be seized as a rare chance of making an accurate plan.

The recognition from the air of pits or post-holes poses no special problem, provided the marks are sufficiently distinct and conform to some recognisable shape (a line, rectangle, circle, etc.), or are related to other archaeological features. As it is important in this instance to distinguish all the marks of pits within and around the camp, the nature of the evidence calls for some description. On a gravel subsoil as at Inchtuthil, a cereal crop responds, in the period of its most active growth, to disturbances in the ground or to differences in the depth of soil, by developing a darker colour than normal. Towards harvest, when the crop begins to yellow as it ripens, the dark marks may become bleached so that they appear lighter in tone (almost white) compared with the yellow of the ripening crop. These reversal marks may not be easy to see even under optimum conditions, but they can reveal, as happened in 1978 (photographs CHP 1–4), features not distinguished in earlier phases of growth.

Variations in the depth of soil that cause growth differences arise in different ways. On the surface of the plateau low ridges of compact gravel alternate with slight hollows where the subsoil is of looser gravel or sand. Such geological differences leave their own kind of mark. Soil tends to accumulate in the hollows, which thus appear as broad, often curving swathes of crop darker in tone than the average (PL. XXXVI). If a ditch or a line of pits happens to cross one of these hollows, the crop marks may disappear in the generally darker tone thereabouts. Not all the small marks are of archaeological significance. Some indicate where trees formerly grew, others relate to agricultural operations, either at the original clearance of the land, or subsequently. The uprooting of field-boundaries, the digging of gravel for a farm track, the burial of dead animals and such common annual operations of the farming cycle as ploughing, sowing and the spreading of manure or fertilisers are apt to cause their own characteristic marks that may complicate the picture. Archaeological features, moreover, may be of different periods, but the reaction of the vegetation makes no distinction as to date. Interpretation depends on experience and judgement: certainty cannot always be assured. However, just as rows of large veranda pits outside the *contubernia* in the barracks of the fortress may appear on air photographs as dark dots or blotches (PL. XXVI), so rows of dots aligned to defences of a camp may be accepted with reasonable certainty as an indication of pits, related to the quartering of troops or to military activities of some kind. Difficulties of interpretation arise when the pits are small, or when soil conditions are unfavourable to crop growth, as then not all the pits may promote crop marks. A decision as to what to include on a plan and what to omit may be facilitated if photographic records are available over a number of years when crops have been grown in rotation. The continued appearance of the same marks in different years, in different types of growth, rules out the possibility that the marks are a response of the crop to some agricultural process in a particular year. Such considerations have determined what features are included on FIG. 69, a detailed plan of the labour camps.

This plan is thus a result of interpretation and selection, and in such circumstances different interpreters may well reach slightly differing conclusions. FIG. 69 should be compared with Mr Maxwell's 'plot' of the same camp.¹⁴⁸ Some of the features in the figure are more certain than others. To west of the plantation-belt four rows of pits show clearly on photographs taken over many years. In the south-east quarter, two more rows about 380 ft. (115.8 m) long lie parallel to the north-east side, at about the same angle to the other rows as that between the different sides of the camp. All these identifications may be regarded as certain. Other shorter rows and partial alignments occur, for example in both halves of the *praetentura* and also in the *postica*, to north-west and south-east of the four main lines of pits first mentioned. These convey an impression of an incomplete picture in which some of the missing elements may in future be filled in as more photographs become available. Not all the space within the camp was necessarily used for the quartering of troops. There may have been dumps of stores, of building materials

148. Maxwell 1982: fig. 1, 106.

and equipment needed for day to day use, supplementary to whatever bulk supplies were held in the Stores-compound (the so-called 'Redoubt').

Other pits appear, for example those forming a line parallel to the ditch on the north-east and south-east sides of the camp, and at a distance of some 22 ft. (6.7 m) from its inner lip. These will have lain at the back of the rampart, and presumably include cooking-pits, earth-ovens, and the like. Two large rather sharply rectangular pits between the plantation-belt and the 'Western Vallum' are unmatched elsewhere in the camp. If Roman at all, they might be explained as officers' 'dug-outs', such as were excavated at Cawthorn; but their position with the western pit almost astride the *via principalis* perhaps precludes this. They are included on the plan as they reappear year after year, and under different crops. The linear marks (a) are unrelated to the camp, and more likely indicate a pre-existing native enclosure.

Photographs also show a wide scatter of pits beyond the limits of the camp, particularly in the direction of the fortress. It will be noted that a strip of ground 25 to 30 feet (7.6 to 9.1 m) wide, immediately outside the ditch of the camp, is clear of pits, but beyond this, they appear in some numbers. A number of large pits not far from the south-west side of the fortress (PL. XLII) seem to have been small gravel-quarries, as was confirmed by the excavation of one near the *porta praetoria* (p. 46).

The six air photographs (PLS. XXXVI, XXXVIII–XLII), chosen to provide reasonably complete coverage of the labour camp in different years, may be compared with each other and with the detailed plan (FIG. 69). Marks of such relatively small features as pits are not always easy to record on photographs where they may appear as slight differences in tone, difficult to reproduce well on a printed plate. For this reason, detailed discussion of such feaures is greatly assisted by reference to the original negatives or to prints made from them.

Labour camps associated with forts have long been known. Inchtuthil has provided an example of a labour camp that housed working parties engaged in the construction of a fortress. This seems, moreover, to be the first time that sufficient detail of internal features has been recorded to form a useful basis for discussing the quartering of troops in a temporary camp. Hitherto, this question could be considered only in camps with an unusually large number of gates which might provide, as at Rey Cross,¹⁴⁹ a clue to the arrangement of street-lines.

B. THE PITS: DISCUSSION By S.S. Frere

The aerial photographs show pit-like features of three different categories. First, there is quite clearly a random scatter of marks both inside and outside the camps, including two large rectangular features in the *praetentura* just west of the 'Western Vallum' and an oblique line of four large pits near the south-east angle. Many pits of this category are in all probability unrelated to the Roman occupation; some may represent the uprooting of trees; others may be of prehistoric or post-Roman date. Being random they are not susceptible of classification and most have been omitted from FIG. 69. However, it is inevitable that subjective judgment should sometimes decide what marks should be included and which omitted; FIG. 69 accordingly depicts the minimum of evidence.

The pits while lie outside the camp are concentrated in the open ground east of Camp 2 and between the camp and the fortress. Here some signs of regularity occur. The pits do not approach the ditch of the camp but tend to line up c. 30 ft. (9 m) from it. It is improbable that so wide a counterscarp bank existed, and in any case the pits are probably deep enough to have penetrated such a bank if it had formerly existed. There are several lines of pits, including one running (beyond the area depicted in FIG. 69) from the south-east angle towards the fortress (PL. XLII). Such pits may well represent a settlement of camp-followers who would in due course have erected the *canabae* (Sommer 1984: 6 ff.) and, if so, they throw valuable light upon the problems associated with the establishment of military *vici* and *canabae*.

149. I.A. Richmond and J. McIntyre 1934: 50–61. S.S. Frere and J.K. St. Joseph 1983: 24, fig. 2.

The second category is a row of pit-like marks, of varying size (sometimes quite large) but of irregular shape, which runs at a distance of c. 22 ft. (6.7 m) behind the ditch on the north-east and part of the south-east sides of the camp, with a few also along the south-west side of Camp 3. Many of these marks can provisionally be taken to indicate the position of cooking-ovens, which in permanent forts occupy this position (p. 195). Others may perhaps represent rubbish-pits. The presence of field-ovens would, like the rows of internal pits, suggest a longer-than-normal occupation, for ovens are not often seen in marching-camps. The 22-ft. space between the pits and the ditch represents the maximum width of the rampart; in many camps the rampart has a width of 12–20 ft. (3.66–6.1 m) and some are even narrower.¹⁵⁰ The south-west rampart of Camp 3, to judge by the oven positions, may have been c. 12 ft. (3.66 m) wide. Ovens may have been built by each century and might be expected to be spaced at fairly regular intervals. From the south-east gate to the north angle there are indications of some 63 pits representing possible ovens; they are spaced often at 20-ft. (6 m) intervals, but sometimes only at 12 ft. (3.6 m). Along the south-west side of the reduced camp (Camp 3) there are only 5–6 possible oven-positions visible. These figures might suggest a minimum of some 64 centuries or about one legion for Camp 2; but many more positions have probably been lost along the north-west side. The complete absence of visible ovens along the south-west side of the large camp (Camp 2) and the scarcity of them along the corresponding side of Camp 3 may be caused by soil conditions; if not it may perhaps suggest a deliberate fire-precaution on the side of the prevailing wind, but is more likely to be the result of fewer tent-lines being present in these areas of the camps.

Thirdly, there is a large number of pit-like features which are regularly arranged in lines, some double, some single; in appearance, size and spacing they resemble the pits in the barrack verandas within the fortress (PL. XXVI). Nine pits in the two south-easternmost rows in the *postica* were excavated as a sample (FIG. 71). In plan they ranged from oval to subrectangular, and in size from 6 ft. by 3 ft. 3 in. (1.83 by 0.99 m) to 4 ft. by 2 ft. (1.22 by 0.61 m). Four of the pits were cleared: as FIG. 72 shows, they had vertical sides and a flat bottom. The lower part of the filling consisted of alternating layers of earth and of gravel which had evidently subsided, perhaps as an organic content decayed. The depth from the surface varied between 4 ft. 9 in. (1.45 m) and 3 ft. 2 in. (0.96 m): the pits were cut between 37 and 24 in. (0.94 and 0.61 m) into the gravel. The only finds were two fragments of pottery, barely ¾ in. across, which probably came from an *amphora* or storage jar, and small pieces of rib-bones, probably of sheep. As far as the evidence goes these may well have been rubbish-pits related to rows of tents.

The spacing of these pits was not entirely regular, varying from c. 16 to 10 ft. (4.88 to 3 m), centre to centre; but they lie sufficiently adjacent to support the view that they are related to tent-positions. The lines were 10 ft. 6 in.–12 ft. (3.20–3.66 m) apart; this is too narrow a gap to contain two tents back to back. If tents are involved at all, it must represent a roadway between facing tents having pits in front of them.

150. Dimensions vary widely as the following selection shows:

CAMP	WIDTH OF RAMPART		REFERENCE
Arosfa Garreg	11 ft. 8 in.	3.55 m	BBCS xxi (1965), 176–7
Bootham Stray	18	5.49	RCHM: <i>Eburacum</i> (1962), 47
Chew Green III	8.5	2.59	NCH xv (1940), 75
Esgairperfedd	c. 5	c. 1.5	BBCS xxii (1967), 276
Glenmailen	c. 20	c. 6.1	PSAS 1 (1916), 41
Lintrose	20	6.1	Crawford (1949), 86
Oakwood	c. 15	c. 4.6	PSAS lxxxvi (1951–2), 85
Pen-y-Gwryd	6.5	1.98	BBCS xxiii (1969), 185
Rey Cross	21	6.4	<i>Trans. Cumb. & West. Ant. & Arch. Soc.</i> ² xxxiv (1934), 50 ff.
Raedykes	c. 20	c. 6.1	PSAS 1 (1916), 69
	c. 8.5	c. 2.6	
Troutbeck	10	3.05	<i>Trans. Cumb. & West. Ant. & Arch. Soc.</i> ² lvi (1966), 33
Ystradfellte	5.25	1.6	BBCS xxi (1965), 178, fig. 3.

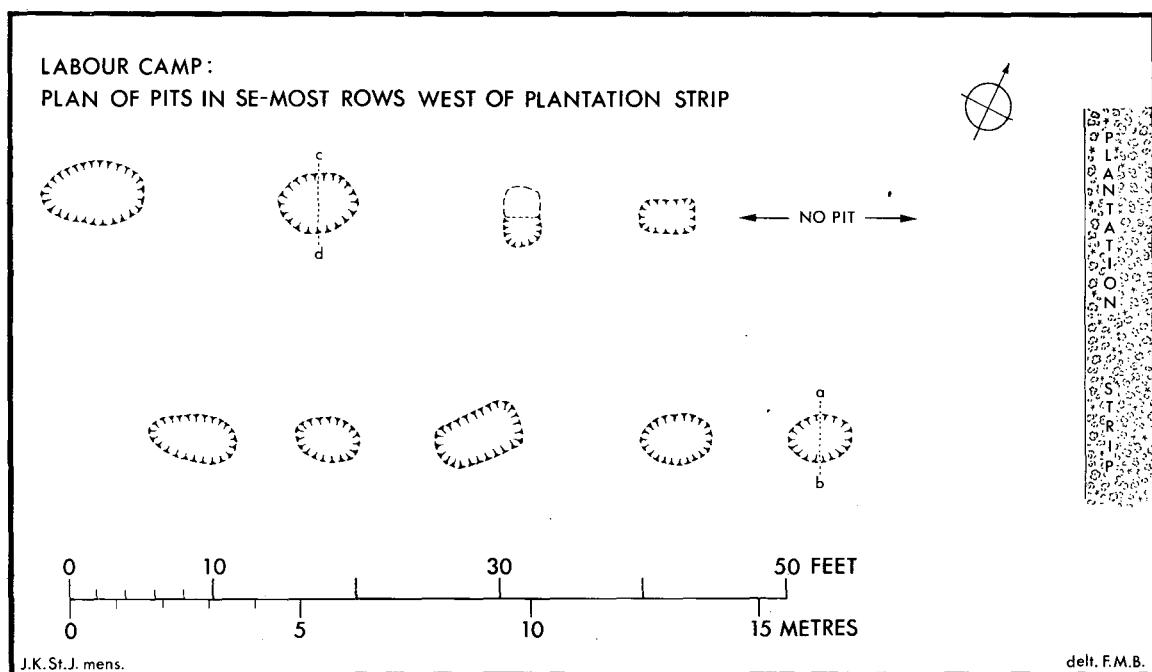


FIG. 71 The Construction-camps, plan of the excavated pits (for position on FIG. 69 see p. 230). Scale, 1:160.

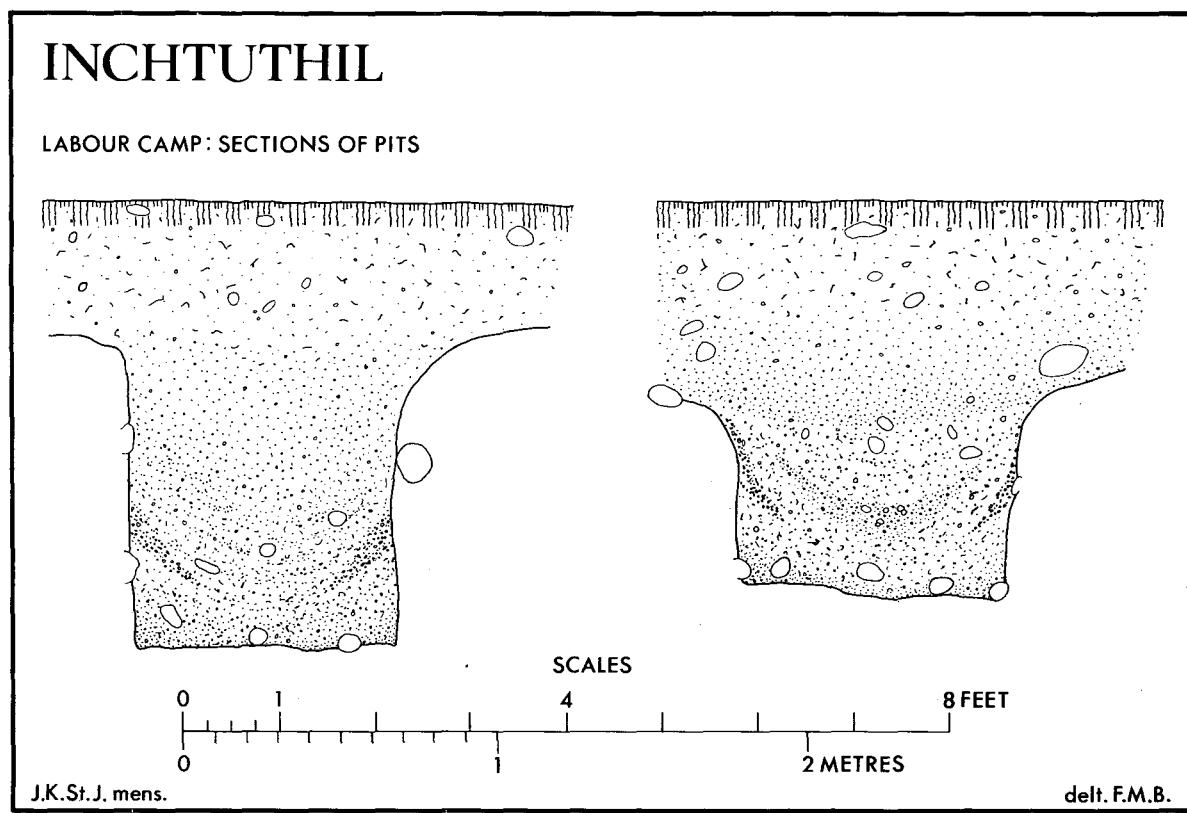
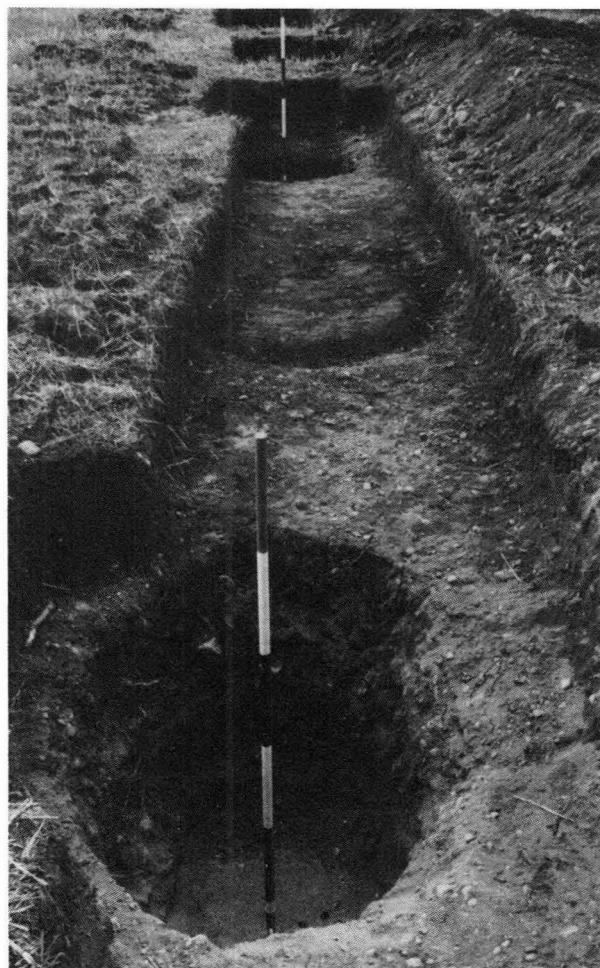


FIG. 72 The Construction-camps, Sections of two pits (for position, see FIG. 71). Scale, 1:24.



(Photo: I.A. Richmond).

Pl. XXXVII The Construction-camps (1962): the excavated pits (see FIGS. 69, 71). Scales in feet.

A glance at PL. XLI or FIG. 69 will show that in the south-western area of the camps two double rows of pits, running NE-SW, seem to relate to Camp 2 and two to Camp 3; in each case the line of a street or alley seems to be outlined, 11–15 ft. (3.3–4.5 m) wide. The *via decumana* itself, leading in from the successive SW gates, is not thus demarcated. This may be because no *via decumana* existed: in Hyginus's camp the *porta decumana* gave access only to the *via sagularis*, direct approach to the centre of the camp being blocked by the *quaestorium*. The evidence of the aerial photographs suggests a division of the rear part (*postica*) of both camps into three blocks. However, these are of uneven widths, measuring c. 270, 510 and 390 ft. (84.1, 155.5 and 118.9 m) in the larger camp, and 350, 490 and 330 ft. (106.7, 149.3 and 100.6 m) in the smaller (Camp 3). In each camp the middle block is the widest; here would lie the *praetorium*, facing the *via principalis*. Hyginus (§9) assigns to the *praetorium* a width of between 160 and 220 Roman feet (= 155.4–213.6 English feet), and it is evident that at Inchtuthil the middle block in each camp contained more than the *praetorium*. Allowing for an *intervallum* of 70 ft. (21.3 m) behind the rear rampart, the depth of the middle block of the larger camp is c. 870 ft. (265 m), measured along the axis of the camp, and in Camp 3 is c. 430 ft. (131 m). Hyginus, in whose camp (unlike Inchtuthil) a *via quintana* bounds the rear side of the central range, (FIG. 73), advises (§ 9) a depth of no more than 720 Roman feet (= 699.2 English feet = 213.1 m) for the *praetorium*, so that it can be flanked by praetorian and other cohorts extended in single lines of tents (see below, p. 237). At Inchtuthil there were no praetorians, but the *praetorium*, with the *quaestorium* behind it, may well have been flanked by protecting cohorts; but the duty of protecting the legate will hardly (*pace* Maxwell 1982: fig. 3) have been entrusted to vexillations of other legions.¹⁵¹

151. Hyginus (§5), it is true, places *vexillarii* both in the *praetentura* and in the *latera praetorii*; but in his imperial camp praetorians are present to protect the emperor. Hyginus tells us that the legate does not have the same authority over *vexillarii* as over members of his own legion; they cannot therefore have been entrusted with this duty.

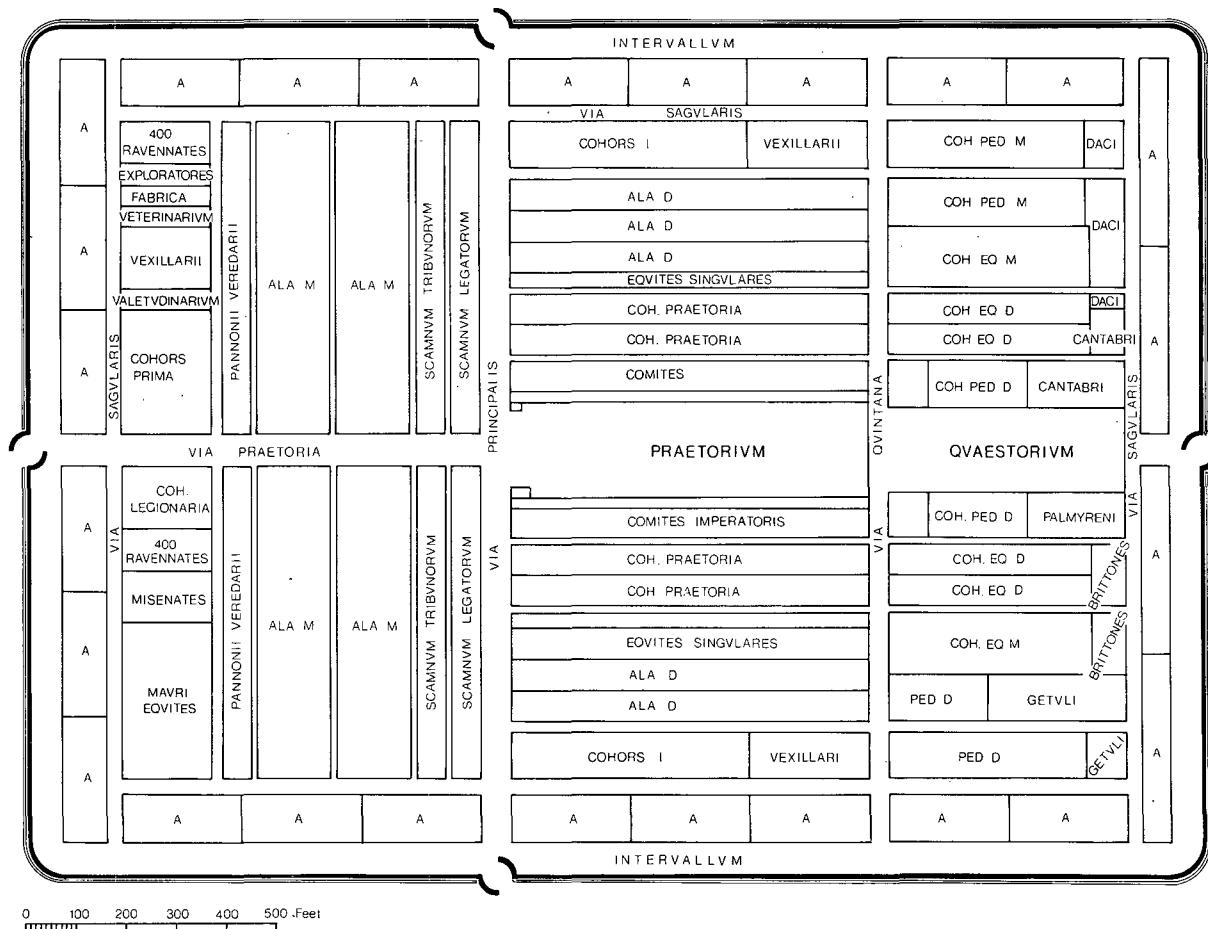


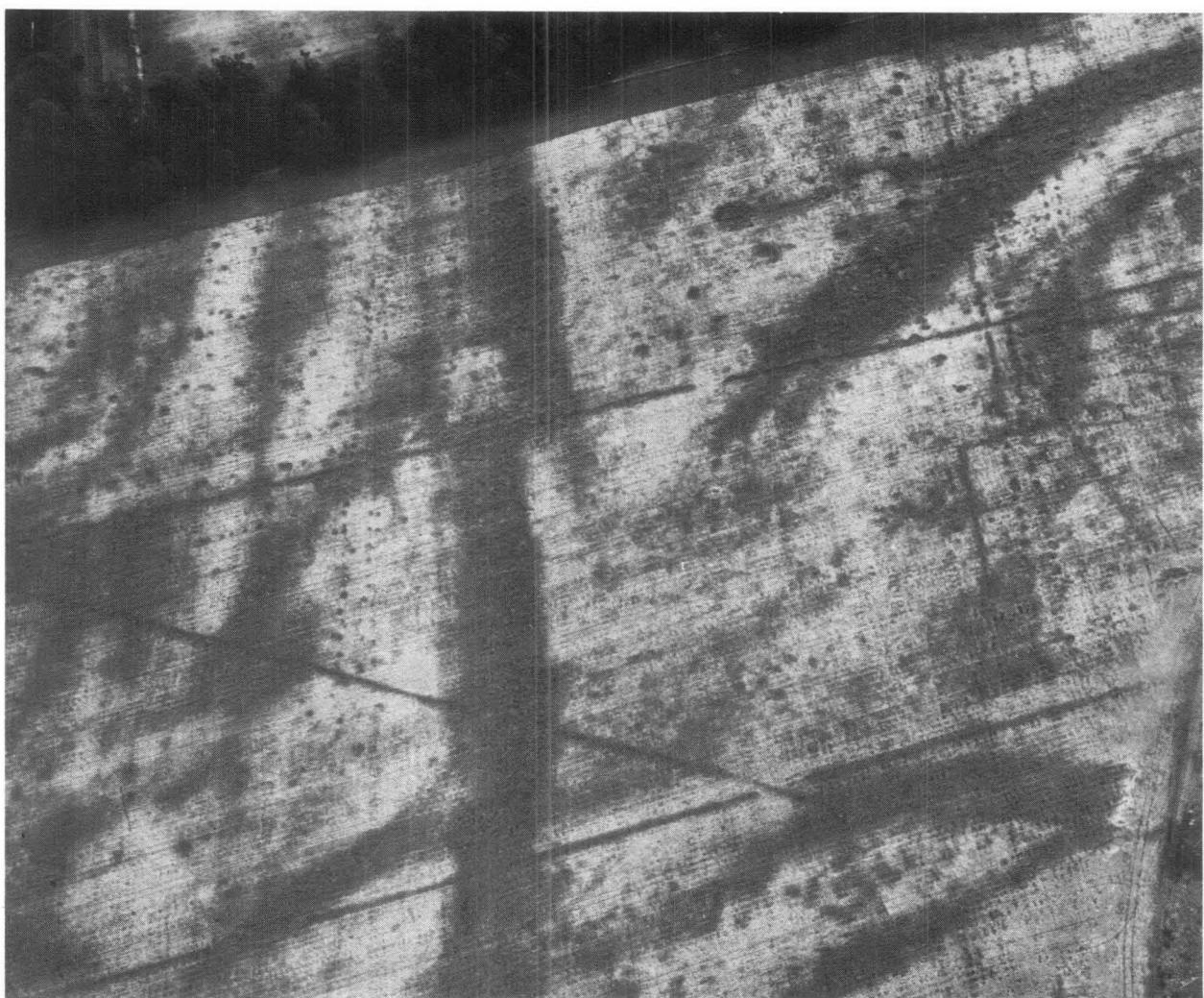
FIG. 73 Hyginus's 83-acre camp (after Lenoir). A indicates a legionary cohort. **Ala M** = Ala milliaria. **Ala D** = Ala quingenaria.

If we allow Hyginus's maximum width of 213.6 English feet for the *praetorium* itself, there would still remain a width of 296 feet in the middle block of Camp 2 – amply sufficient to accommodate nine cohorts, each occupying an area of 720 by 30 Roman feet. But this is clearly an extravagant notion: we must be careful not to assemble at Inchtuthil an impossibly large army, and there is no evidence, from rows of pits, that any large part of this area (or indeed any substantial part of the whole *postica*) was occupied by tents at all.

The first cohort of the legion, which at Inchtuthil was of milliary strength, should occupy the area to the right of the *praetorium* along the *via principalis*, that is the north-eastern part of the most southerly of the blocks in the *postica* (FIG. 74). In this area no pits are planned (although PL. XXXIX may suggest the presence of a few scattered ones); but in both periods there was clearly ample room here for its accommodation.

The lines of pits which delimit the streets in the *postica* are not as regular or as straight as suggested on Maxwell's schematic plan; this fact may be taken to mean that they were not dug in one operation by an organized working-party such as might have been ordered to erect, for instance, lines of posts for fences. Rather, they support the idea of *ad hoc* digging of pits by individual *contubernia*. There seems little reason to adopt Maxwell's suggested distinction of function between the double rows of pits and the single rows.

The longest and most complete row associated with the larger camp (Camp 2), that on the south side of the southernmost street (FIG. 74, Street 5), has a length of 730 ft. (222.5 m); and if the row of tents were extended under the modern plantation-belt for another 140 ft. (42.6 m) to the vicinity of the *via principalis*, the length would have been c. 870 ft. (265 m). Now 720 Roman feet (699 English feet = 213 m), as we shall see below, is one of the measurements given by Hyginus (§2) for the area of a cohort's accommodation: if the tents are strung out in a single long row the cohort, he tells us, will require a space of 720 by 30 feet (= 699.2 by 29.1 English feet). Is



(Photo: Cambridge University Collection (CDC 25), July 1977, copyright reserved)
 Pl. XXXVIII The Construction-camps. Rows of pits in the south-western part of Camps 2 and 3 looking east-north-east. The western masking earthwork (A on FIG. 2) passes through the gateway of Camp 2 in the foreground.

the length of the row of pits in the *postica* (730 English feet, 752 Roman) therefore significant? Or perhaps the longer measurement, 870 feet (= 896 Roman feet)?

A cohort consisted of six centuries, and Hyginus (§1) tells us that each century consisted of 80 men in ten tents; but that, since some men were always absent on guard-duty, only eight tents were actually set up, leaving what amounted to a double space where the centurion's tent could be placed as the ninth. Thus a complete cohort's erected tents would amount to 54, extending over 720 *pedes*. Maxwell (1982: 111) has reasonably suggested, however, that in camps held 'over a number of weeks', rather than for a night or two, the full complement of 10 tents would be set up and, with the centurion's (presumably larger) tent placed beyond, the area needed by each century would be increased; each would be represented by eleven tents, totalling 66 per cohort. The length required will now be 864 Roman feet (839 English).

It is clear that the figures do not allow us to decide whether a normal or a full complement of tents was erected. The pits themselves extend over 752 Roman feet, which allows a margin of 32 *pedes* over Hyginus's figure of 720 Roman feet; the 896 Roman feet gained by extending the tents to the *via principalis* gives an identical margin of 32 *pedes* over the revised Hyginan estimate of 864 Roman feet.

It is necessary to look more closely at the pits themselves. A count of those along the more southerly street (Street 5) without making allowance for gaps, gives a total of 69 in the northern line and 50 in the southern line. The figure of 69 seems very close to the revised Hyginan figure of



(Photo: Cambridge University Collection (V-BA 40), July 1962, copyright reserved)
Pl. XXXIX The Construction-camps. Vertical photograph showing the southernmost two rows of pits in the south-western part of Camps 2 and 3, east-north-east at top. Scale, c. 1:1000.

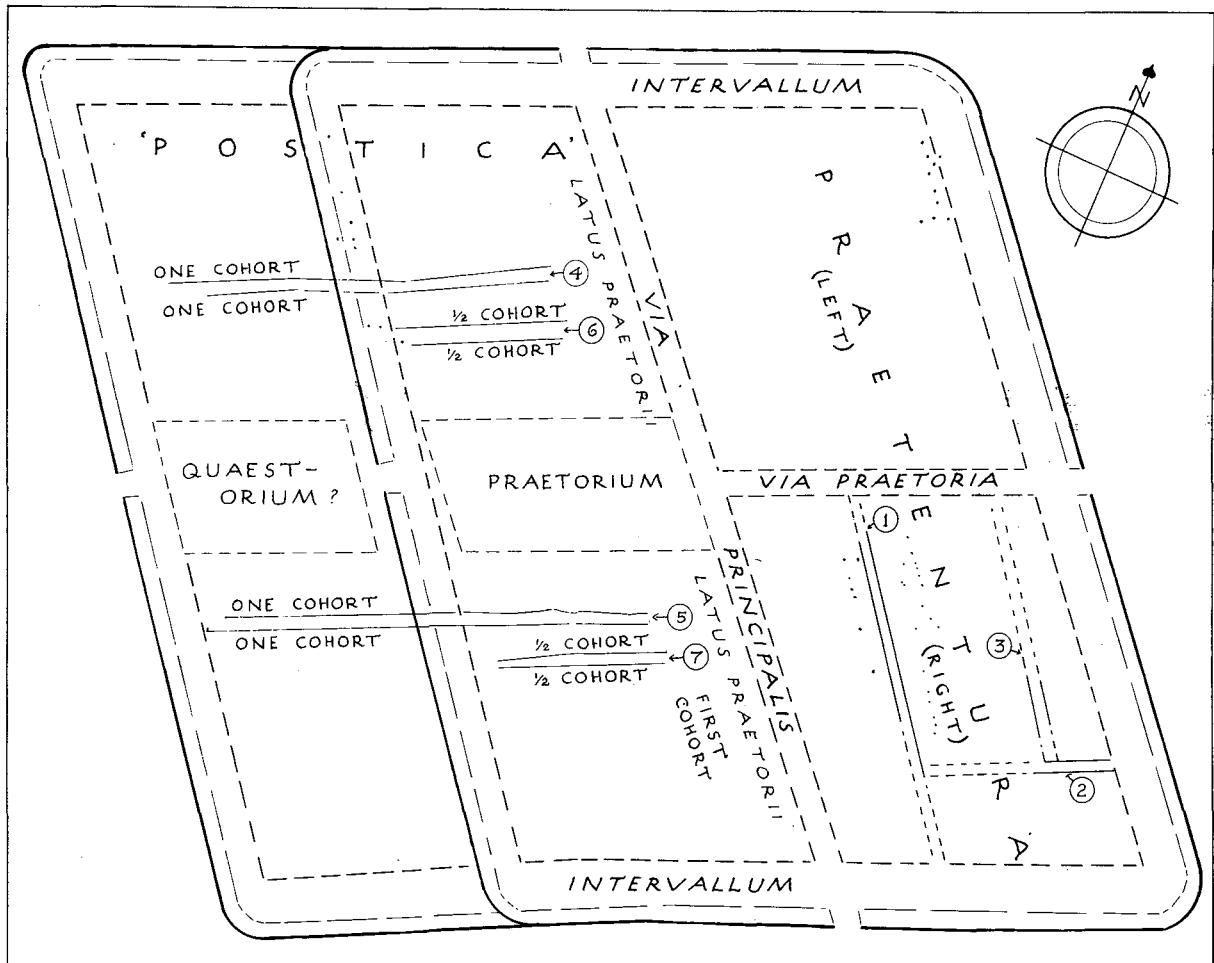


FIG. 74 The Inchtuthil Camps 2 and 3: interpretative sketch, compare FIG. 69.

66 tents, but it is worth noting, on the other hand, that these 69 pits have a length of 690 ft. (710.5 Roman feet) compared with Hyginus's actual figure of 720 Roman feet for a cohort of 54 tents. The southern line, with fewer extant pits, is longer, at 730 ft. (751.7 Roman feet).

We must remember that we have no actual tent emplacements to measure, but are dealing only with pits. Some *contubernia* may have dug two pits during the occupation, others appear to have dug none. The close proximity of many of the pits, particularly evident on the northern side of the southern street, strongly suggests duplication. An approximation is accordingly all that can be hoped for, and there is what seems a moderately satisfactory approximation here. We may assume a cohort along each side of the two streets in Camp 2. There seems no reason why the double row of pits should not appear beyond the plantation-belt if they had ever been dug there, and accordingly the 140 ft. (42.6 m) between the end of the line and the *via principalis* may give us the depth of space reserved for the *praetorium* and accompanying tents.

In Camp 3 the corresponding streets in the *postica* (FIG. 74, Streets, 6 and 7) are shorter. One inexplicably extends into the *intervallum*. According to Hyginus 360 Roman feet (349.6 English feet = 106.3 m) would be required for half a cohort on either side of a street. The longest visible pit-line in Camp 3 has a length of c. 330 English feet (100.5 m), and seems to comprise a maximum of 25 pits; allowing for gaps, there may originally have been c. 30 tent-positions each side of the street. This gives us 50–60 of the required 54 or 66 positions, and it may be that the 'standard' dimension has here been slightly compressed. We may safely place half a cohort on each side of each street.

It has so far been assumed that in the *postica* of the camps two periods of pit-digging can be distinguished through the relationship of the pit-rows to their respective defences; but no indication of a change in layout suggests two periods in the *praetentura*. An explanation of this difference could be that disturbance of accommodation was necessary only in the *postica* when this was reduced in size; there would therefore be no reason to expect it in the *praetentura* – unless

two separate seasons of occupation are in question. Yet occupation of Camp 3 in a second season seems an inevitable assumption on general grounds (p. 280). The fortress cannot have been completed in one season, and there is every reason to expect that additional forces returned to the site after the winter to assist the garrison with renewed construction. If this is accepted, and if it is conceded that only one period of pits is present in the *praetentura*, the question ought to be faced whether the two shorter streets in the *postica* really do go with Camp 3 rather than being contemporary with Camp 2 in which they ended at a *via quintana*, along which the new defences of Camp 3 were later built. In favour of this view is the fact that one of them impinges on the *intervallum* of Camp 3, approaching almost to the line of its rampart. But decisively against it is the evident continuity of pits along Camp 2's more southerly long double line (PL. XXXIX): there is clearly no gap through which a *via quintana* could have passed on the line of the defences of Camp 3 or anywhere else. Whatever the explanation of the treatment of the *intervallum*, the shorter double rows are therefore best associated with Camp 3. And as there is no sign of renewed pit-digging in the *praetentura*, it follows that Camps 2 and 3 both belong to the same season. If a force returned to Camp 3 in the following year, it dug no pits. The alternative view, that tents (with their pits) may have been located in the *praetentura* during the second season on ground occupied by stores during the first, is surely ruled out by the need to have as much as possible of the labour-force accommodated conveniently near their work, and by the need to have men inn readiness to protect the works under construction from surprise at night.

As just noted, a significant fact about the double rows of pits in the *postica* is that they all extend without interruption sufficiently close to the *via principalis* of both camps to prove the absence of a *via quintana* running parallel with the *via principalis* behind the *latera praetorii*. The absence of a *via quintana* is paralleled at Camps B and F at Masada,¹⁵² although one is present in the camp described by Hyginus (§17), and others are attested in such camps as have two gateways in each of their longer sides, for example the 63-acre and 130-acre camps in Scotland. Absence of a *via quintana* would to some extent hinder lateral movement within the camp and hence reinforces our conclusion that movement in the direction of the fortress was a principal concern of the builders.

According to Hyginus (§1) the tentage of a century occupied a space 120 Roman feet long and 30 feet wide, the width being accounted for by the tents (10 ft.), by a space for arms (5 ft.) and by a space for beasts of burden (9 ft.). Beyond this was an alleyway of 12 ft. before the area of the facing century began – the two areas combined being 60 Roman feet wide by 120 feet (= 58.2 by 116.5 English feet or 17.73 by 35.5 m).

In the right *praetentura* south of the *via praetoria* (PL. XLII) a 'street' c. 15–16 ft. wide (a dimension comparable to those in the *postica*) can be seen running NW–SE between rows of pits, on either side of which are wider spaces each also bounded by a line of pits (FIG. 74, Street 1). The space on the north-east side is c. 40 ft. (12.2 m) wide; that on the south-west c. 21–25 ft. (6.4–7.6 m). It seems likely that we see here a reflection of Hyginus's arrangement. The 'street' is the alley between tent-rows fronted by pits, and the wider spaces are sufficient to accommodate two 10-ft. tents back to back. There are at least 33 pits in the row on the north-east side of the 'street'. A second street or alley at right-angles to this seems indicated by two rows of pits (with eight pits in the northern row) which run north-eastwards c. 12–15 ft. (3.66–4.6 m) apart (FIG. 74, Street 2). The pits cease c. 75 ft. (23 m) from the row of oven-pits behind the north-east rampart, and parallel with the latter is a single line of pits running back towards the *via praetoria*. These last suggest a maximum breadth for the *intervallum* and *via sagularis* of 60 ft. (18.3 m). At the vexillation fortress of Longthorpe a width of 65 ft. (19.82 m) was recorded for this space;¹⁵³ Hyginus (§ 14) advises 60 Roman feet (= 58.2 English feet or 17.73 m). A third, but short, double line of pits runs north-westwards from the second street at a distance of 70 ft. (21.3 m) from the pits along the *intervallum* and 205 ft. (62.5 m) from the first street (FIG. 74, Street 3).

In his chapter 2 Hyginus goes on to give various alternative dimensions for the accommodation of a complete tented cohort (30 by 720, 120 by 180, 90 by 240, 60 by 360 Roman feet, each of which gives an area of 20,371 square English feet = 1892.5 m²); but he sums up that, as a

152. *JRS* lii (1962), 147, fig. 6; 149, fig. 7.

153. *Britannia* v (1974), 35.

round figure, a notional 150 by 150 Roman feet (= 21,219 square English feet, 1971 m²) is sometimes used although in practice a square shape is unsuitable for the purpose. That his figures are serviceable is suggested by the area of the smallest of the cohort blocks at Rey Cross,¹⁵⁴ which has an estimated area of 23,780 sq. ft. (2209 m²); but Rey Cross also shows us that Hyginus is giving minimum figures, which could be exceeded.

In the right *praetentura* of Camp 2 there is a space between the *via praetoria* on the north and the double line of pits marking Street 2 on the south, and between the *intervallum* on the east and Street 1 on the west; this space measures c. 430 by 290 ft. (131.06 by 88.39 m), thus covering an area of 124,700 square feet (11,585 m²). A second space, south-west of this between Street 1 and the *via principalis*, measures 430 by 170 ft. (131.06 by 51.82 m), giving an area of 73,100 square feet (6791 m²). In both areas the lines of pits run NW-SE, approximately perpendicular to, rather than parallel with, the *via praetoria*, as Hyginus (§14) lays down for tent-lines in the *praetentura*.¹⁵⁵ On Hyginus's maximum figure the first area has ample room for almost 6 cohorts and the second for almost 3½.

A second type of calculation gives a very comparable result. On the north-east side of Street 1 a line of c. 33 pits is distinguishable; but if we take account of gaps where pits do not show or never existed, there is space for c. 40 tent-positions. In terms of accommodation this means that each row could represent four centuries. Although neither of the two areas divided by the street shows evidence of being completely occupied by rows of close-set pits, there are enough pits in other lines to suggest that an even density prevailed at least in parts of these areas. East of Street 1 the spacing between three parallel rows of pits is c. 70 ft. (21.3 m); beyond is an area c. 140 ft. (42.6 m) wide which is devoid of pits until the short double row (Street 3) is reached. From this double row to the *intervallum* is 70 ft. This consistency is suggestive and may imply that the area once held nine rows of 40 tents, or c. 5½ cohorts. On the west side of the NW-SE street the spacing between pit-lines is (a) 20–25 ft. (6.4–7.6 m) and (b) 120 ft. (36.58 m). This area might thus have held either four or five rows of 40 tents, or approximately three cohorts. This allows the area as a whole a total of 8½ cohorts, equivalent to almost a complete legion.

A third and perhaps more realistic solution to the problem of the garrison of the right *praetentura* is to assign greater significance to the row with c. 33 visible pits beside Street 1, and to suppose that each row represents half a cohort. This view gains further support from the fact that the row has a length of c. 380 English feet, only 30 ft. longer than Hyginus's 360 Roman feet for a half cohort (= 349.6 English feet). With nine half-cohorts on the east side of the street and four half-cohorts on the west, we now have a population in this sector consisting of 6½ cohorts. The average area per cohort is 30,430 square feet (2827 m²), considerably larger than Hyginus's allowance of 1971 m².

The area in the south-east corner of the camp between Street 2 and the south *intervallum* shows little if any sign of regularly laid-out pits (PL. XLII); but it is not particularly convenient as a storage-area because of its remoteness from the gateway, while the accompanying oven-positions do suggest the proximity of troops. The axis of Street 2 shows that here, near the corner of the camp, the tent-lines (starting on the north side of the street) were at right-angles to those further north. Hyginus's camp also has tents aligned *per strigas* in this position. Allowing 80 ft. (24.4 m) for the rampart and *intervallum*, the area measures 490 by 165 ft. (149.3 by 50.3 m), but may of course have been divided by a prolongation of Street 1. Although the breadth, 165 ft., is sufficiently close to Hyginus's 180 Roman feet (174.8 English) – since the precise width of the southern *intervallum* is uncertain – to suggest that four cohorts may have been placed here, they would have to be arranged *per scamna* – which, as we have seen, is contrary to the evidence. Arranged *per strigas* there is room for the tents of 20 centuries or approximately 3 cohorts.

In the left (northern) *praetentura* few traces of certainly Roman pits appear. A line of 2–3 lies along the *via principalis*, and indeed encroaches on it, while near the north-east corner another line

154. The blocks (as defined by a restoration of the street-pattern) are of varying sizes here because of the irregular shape of the camp: Frere and St. Joseph 1983: 24–5, fig. 2.

155. The pit-lines in the *praetentura* are neither exactly perpendicular to the *via praetoria* nor exactly parallel with the north-east rampart. This can be attributed to the unrectangular shape of the camp itself.

of five pits, with two at right-angles, is seen. These show that at least part of this area was occupied by tents.

In the left *postica* a row of seven pits in a line running parallel with and c. 60 ft. (18.3 m) to the north-west of Street 4 probably indicates a line of tents back-to-back with those facing Street 4 of Camp 2 to the south of them. Two other lines 85 ft. (25.9 m) apart lie north-east of the row of oven-pits belonging to Camp 3. The more westerly line can hardly belong to Camp 3 for it falls within the *intervalum*, only c. 22 ft. (6.7 m) from the ovens. Presumably, therefore, these rows mark the first lines of tents behind the *latus praetorii* of Camp 2. Part of this area within Camp 3 is under grass (PL. XLI) and so is unresponsive to aerial photography. Pits are also largely absent from the northern *postica* between the defences of the two camps (PL. XXXVIII), and this is probably significant when taken with the equal absence of ovens.

In the right *postica* the area of the first cohort has already been discussed (p. 233). Behind this, FIG. 69 shows no pits, but PL. XL does reveal that a random scatter is present, sufficient perhaps to suggest that the area did contain some tents.

C. THE GARRISONS OF THE CAMPS

It is time to consider what evidence there is for the size of the occupying force. One approach to this problem is to use estimates based upon the plan of Rey Cross,¹⁵⁶ which agree that a tented legion would require a camp of 15–16 acres (6–6.5 ha). On this reckoning Camp 2, of 49.2 acres, has room for almost exactly three legions. Roy's calculations of the accommodation required by the smaller Polybian legion of 4500 men (1793: 52) suggested that 23.5 acres were needed, giving a mean density of 192 men per acre (not 240, *pace* Hanson, PSAS 1977–8: 142), and this figure would give Camp 2 a garrison of 9446, or say one legion and about 8 auxiliary cohorts. On the dimensions suggested by Lenoir in his commentary on *Pseudo-Hygin* (1979), on the other hand, Hyginus's camp of 83 acres (33.59 ha) had a density of 495 men to the acre (FIG. 73, p. 233). The figure given above for the right *praetentura* of Camp 2 (9½ cohorts – 4560 men – occupying 9.4 acres) suggests 485 men per acre. But before a direct comparison can be made, Hyginus's figure has to be adjusted, for his acreage includes the substantial but thinly occupied areas of the *praetorium* and *quaestorium*. After subtraction of 5.5 acres from the 83, Hyginus's density becomes 530. To estimate the force accommodated in Camp 2 we must subtract 4.2 acres for the same buildings from the total of 49.2 acres and multiply the result by 485. This gives 21,825, the equivalent of four legions. These types of estimate contain too many variables for reliability and tend to produce a larger force than is historically possible.

A second approach is to look more closely at the figures already deduced in the discussion above. In Camp 2 the following have been suggested:

Camp 2

- a) The First Cohort, known to be milliary, in the block south of the *praetorium* but by no means filling it.
- b) Four cohorts along the streets in the *postica*, with an indication of further troops encamped north of the more northerly street there (? a minimum of 1 cohort).
- c) The right (southern) *postica* seems also to have held some tents, but the evidence is sparse and there may not have been many.
- d) Six-and-a-half cohorts in the right (southern) *praetentura*, with room for three further cohorts to south of them.
- e) There is little information about the left (northern) *praetentura*; but its proximity to the fortress under construction suggests that it would be occupied by troops. As a maximum we may assign the same number as in the southern *praetentura*, namely 9½ cohorts.

This tabulation suggests a total of between 25 and 27 cohorts, equivalent to rather under three legions (although many of the cohorts in fact would of course be auxiliary).

156. Frere and St. Joseph 1983: 24. W.S. Hanson, PSAS cix (1977–8), 142.



(Photo: Cambridge University Collection (CDC 24), July 1977, *copyright reserved*)
Pl. XL The south-east part of Camps 2 and 3, looking north-east.



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(Photo: Cambridge University Collection (AGJ 6), July 1962, copyright reserved)

Pl. XLI The north-western part of Camp 3 between the western masking earthwork and the plantation-belt, with the 'Western Vallum' beyond. Looking east.

A third approach would be to argue that this figure should be greatly increased on the supposition that, despite the lack of pits in much of the *postica*, this area of the camp was nevertheless occupied to the same density as the right *praetentura*. Such occupation would call for at least another three cohorts on the left of the *praetorium* block to balance the First Cohort on the right; while areas each side of the *quaestorium* (FIG. 74), near the rear rampart, would accommodate at least another 11 cohorts. If full of troops, then, Camp 2 could have held c. 39 cohorts, the equivalent of almost 4 legions.

This last conclusion must be rejected out of hand. The army of Britain was not large enough to hold all its commitments and at the same time to concentrate so great a force at Inchtuthil over several months. Nor can the camp be regarded as the winter quarters to which Agricola retired after Mons Graupius, for it is inconceivable that he would have intended to subject his army to a Scottish winter in tents. Lastly, if an army equal to almost four legions could occupy a camp of 49.2 acres, what force can we imagine for the occupation of the Agricolan camps at Dunning and Abernethy (113–116 acres) or at Durno (144 acres)?



(Photo: Cambridge University Collection (CDB 69), July 1977, copyright reserved)

Pl. XLII The south-east part of Camps 2 and 3, looking NW, showing relationship to the fortress (right). The 'Western Vallum' runs just to the right of the plantation-belt (left).

The estimate of 25–27 cohorts is more reasonable : if the left *praetentura* held less troops than assumed, this estimate could be reduced by 4 or 5. The legion which was intended as the eventual garrison of the fortress might well have been assisted by a vexillation of another during the construction-period, accounting for, say, 13–15 legionary cohorts in all; while a corresponding or slightly greater number of auxiliaries may well have been in attendance before dispersing to their own *castella* for the winter. We may certainly suppose that a force of cavalry was present for protection, perhaps as many as 2–3 *alae*. Camp 1, situated near the extremity of the promontory, far from the scene of operations, has the appearance of representing a late arrival, additional to the original complement, and encamped on the only available ground once Camp 2 had been set up.¹⁵⁷ The camp's area, 2.33 acres (0.94 ha) perhaps suggests the presence of an *ala*: Hyginus allows an *ala* an area of 3880 m², and the occupiable area of the camp within the *intervallum* is c. 4445 m².

It seems clear that, as the aerial photographs themselves suggest, quite sizeable areas within the camp were not occupied with tents. The construction of a legionary fortress required collection of a massive amount of material of many kinds. Some figures for the requirement of timber for the barracks have already been given (p. 45). We may well believe that much of the camp was used to house and protect stockpiles of food and timber, as well as baggage animals, wagons and stores of tools, nails and other equipment. In turn this consideration will diminish our expectation of being able to match the internal layout at all closely with those either of Hyginus's *de munitione castrorum* or of the great majority of marching-camps, whose function was quite different.

Hobley's experiments at the Lunt showed the remarkable speed with which the turf defences of a fort or fortress could be erected.¹⁵⁸ He estimated that under ideal conditions it would have taken 3000 men 12–14 days to build the rampart at Chester, a fortress 6 acres larger than Inchtuthil. Certainly the fortress rampart at Inchtuthil could have been built in a month; nor would this work have impeded the simultaneous construction of timber-framed buildings inside it by other working-parties.

The most dangerous period was naturally that preceding the completion of the defences; the maximum number of troops would be assembled during that time for the protection of the site and its building-parties, as well as to provide the maximum useful number of builders.

Turf is much more readily cut when the earth is damp than in the often dry conditions of summer. We may suppose that fort-building was normally undertaken before the campaigning season began, or more probably after it had ended in the early autumn. Reasons have been given elsewhere¹⁵⁹ for suggesting that Inchtuthil was begun in 83, a year before the battle of Mons Graupius, for one of its purposes was to protect Roman lines of communication up Strathmore from Caledonian attack through the Dunkeld gorge. In that first autumn it would be necessary not only to build the fortress's rampart but also to install sufficient accommodation for at least a large part of the legion, so that the fortress could be held through the winter. The reduction in size of the labour-camp has been shown very probably to have occurred during this work, as stocks of building-materials were used up and when barracks were ready for their garrison within the fortress. Conceivably Camp 3 was re-occupied in 84, perhaps in the early spring, when extra forces could be brought back to continue the programme of construction; but if so it seems that no pits were dug. During the winter the garrison could have continued with internal work, but may not have been in sufficient strength to undertake extensive tasks outside.

Camp 3

For the garrison of Camp 3 we have fairly firm evidence for two cohorts in the rearranged *postica*; the *praetentura* may have continued to hold up to 19 cohorts, giving a possible maximum of 21. It

157. That Camp 1 could represent a preliminary reconnaissance of the plateau seems unlikely. The defences are too slight and the location peripheral, although it must be admitted that the camp occupies the highest part of the plateau, whence the whole could be overlooked. However, it is difficult to see the need for such a preliminary seizure.

158. B. Hobley 1971b: 21–33; idem, *Trans. Birmingham and Warwickshire Arch. Soc.* lxxxvii (1975), 19–33.

159. S.S. Frere, *Scottish Archaeological Forum* No. 12 (Edinburgh, 1981), 91; and see Chapter 25.

seems probable that Camp 3 reflects the situation when the men of Legion XX had been moved into the fortress, reducing the force in the camps by 10 cohorts. This movement occurred towards the end of the first season.

Modules

The measurements given in this Chapter do not support Maxwell's brave attempt to identify modules at Inchtuthil. Hyginus's modules form a useful basis for work; but the evidence, such as it is, at Inchtuthil suggests that the cohort-areas there provided were rather more ample than Hyginus specifies.

TABLE XII
TABLE OF DIMENSIONS WITHIN THE CAMPS

<i>Camp 2</i>	<i>English feet</i>	<i>Roman feet</i>	<i>metres</i>
North, east and south <i>intervalla</i> and rampart	c. 80	82	24.2
West <i>intervallum</i> and rampart	c. 70	72	21.3
<i>Camp 3</i>			
West <i>intervallum</i> and rampart	c. 70(?)	72	21.3
<i>Camp 2: postica</i>			
North block	805 × 270	829 × 278	245.3 × 84.1
Central block	850 × 510	875 × 525	259 × 155.5
South block	890 × 390	916 × 402	271.3 × 118.9
<i>Camp 3: postica</i>			
North block	400 × 350	412 × 360	121.9 × 106.7
Central block	420 × 490	432 × 505	128 × 149.3
South block	460 × 330	474 × 340	140.2 × 100.6
<i>Both camps: south praetentura</i>			
NE block	290 × 430	297 × 443	88.4 × 131.1
NW block	170 × 430	175 × 443	51.8 × 131.1
SE block	490 × 165	505 × 170	149.3 × 50.3
possibly divided thus	a) 310 × 165 b) 150 × 165	319 × 170 154 × 170	94.5 × 50.3 45.7 × 50.3

Note also the recurrence of the length 70 ft. (72 *pedes*) (p. 238).

D. THE LINEAR EARTHWORKS

The site of Camp 2 is crossed by two linear earthworks, both facing away from the fortress. The more easterly still survives in visible form on the ground although much degraded by cultivation during the last 25 years; it is known in the literature as 'The Western Vallum' (p. 34). The other linear feature was discovered by aerial photography (PLS. XXXVI, XXXVIII), and is here referred to

as the 'Outer Masking Earthwork'. This crosses the south-western end of the plateau without any break for a passageway in the visible stretch; it starts at the northern escarpment and presumably once reached the southern. The visible length is 1020 ft. (311 m). The earthwork passes through the south-west gateway of Camp 2 and there makes a slight angle through about $8\frac{1}{2}^\circ$. This behaviour shows that the earthwork is later than this side of Camp 2, while the relationship of the respective ditches suggests that the former bank of the earthwork lay on the east side of its ditch. A Section revealed a V-shaped ditch (FIG. 70, bottom right) with somewhat oblique sides, presumably thus cut because of the crumbly nature of the subsoil. The width is 6 ft. 4 in. (1.93 m) and the depth 2 ft. 1 in. (0.63 m), measured from the surface of the natural subsoil. The sides are unweathered, and the silting suggests that the ditch may have been filled deliberately. The character and course of the earthwork give no room for doubt about its Roman date. In function it serves as a boundary through which there was no passageway, and its relationship with the large camp shows that it was constructed after that camp had been reduced in size and presumably also after Camp 1 had been evacuated. On the assumption that this earthwork and the 'Western Vallum' are successive lines of defence, there can be little doubt that the Outer Masking Earthwork is contemporary with the occupation of Camp 3.

The 'Western Vallum' runs about 1000 ft. (300 m) east of the Outer Masking Earthwork, and traverses the eastern third of Camp 3 somewhat obliquely, on a line that takes its ditch through the south-east gate of the camp,¹⁶⁰ and it changes direction through 5° almost opposite the west angle of the fortress. A section (FIG. 3, bottom right) shows the remains of the rampart of the earthwork overlying the weathered south-east ditch of the camp just east of its butt-end at the *porta principalis dextra*, thus proving their relative dates. A second Section (FIG. 3, bottom left) near the northern end showed the spread remains of the rampart surviving to a height of 2 ft. 3 in. (0.68 m). It was c. 22 ft. (6.7 m) wide and had been provided with turf cheeks each side of the gravel core. Richmond noted that the amount of turf silt in the ditch suggested that it had also been capped with turf. The ditch is V-shaped and has comparatively unweathered sides, 17 ft. (5.18 m) wide and 5 ft. 6 in. (1.68 m) deep, with a well-formed square channel at the bottom, 2 ft. 9 in. (0.84 m) wide. The dimensions of the work are comparable with those of the first phase of the fortress (p. 62).

The 'Western Vallum' crosses the plateau from escarpment to escarpment (a distance of 1390 ft. = 423.6 m) without a gateway through it. In function, therefore, the two linear earthworks are identical, and there can therefore be little doubt that they are successive, the outer one being built at the same time as Camp 3, and the 'Western Vallum' after Camp 3 itself had been evacuated.

A contrast may be noted between the filling of the ditches of Camps 1 to 3 and the filling of the ditch accompanying the 'Western Vallum'. In the ditches of the labour camp, overlying a small amount of primary silt with which were pebbles weathered out from the side, the main body of the filling extending to the level of the top of the subsoil consisted of a mixture of earth and gravel. The ditch of the 'Western Vallum' showed a different sequence. Its bottom channel contained up to 18 in. (0.45 m) of silt, again with pebbles such as occur in the gravel subsoil; above this, the rest of the filling consisted of turf material mixed with gravel and a little earth apparently derived from the natural weathering of the rampart, for the filling was faintly layered. The 1962 section showed the rampart to be only c. 2 ft. 3 in. (0.68 m) high (FIG. 3). In 1901, the northern of the two sections through the vallum recorded a rampart height of nearly 5 ft. (1.5 m), with the ditch marked by a hollow on the surface that was 2 ft. (0.61 m) deep.¹⁶¹ This was confirmed in 1965 by observation of the northernmost 100 feet of the rampart which, having

160. There is a marked similarity between the relation of the Outer Masking Earthwork (A) and the south-west gate of Camp 2, and the relation of the 'Western Vallum' (B) and the south-east gate, originally of Camp 2, but also serving Camp 3. The ditches (A) and (B) both go through gates just avoiding an end of the camp ditch, respectively on the north or west side of the gates. The accompanying rampart of (B) continued across the causeway of the gate, slightly overlapping the end of the ditch on the east side. The rampart that presumably accompanied (A) seems to have had a similar relationship to the end of the camp ditch on its south side.

161. Abercromby 1902: 208, Section D.

escaped ploughing, then stood 5 ft. high. The 'Western Vallum' is the only feature of all those just described that remains in relief. The impression conveyed by these differences is that the defences of Camps 2 and 3, and probably also of Camp 1, had been levelled, and presumably the interior tidied up, when troops moved to occupy barracks within the fortress; but that the 'Western Vallum' remained in full relief at the time of the evacuation of the fortress.

The 'Western Vallum' passes only 440 ft. (134 m) from the south-west corner of the fortress. It would be unwise to interpret either earthwork in terms of the *prata* or *territorium legionis*; they both represent tactical measures to protect the area of the fortress and its construction-parties from hostile distraction during the early days, by denying approach from open areas in which enemy tribesmen might assemble. There can be little doubt that the 'Western Vallum' (and the Outer Masking Earthwork too, if not already flattened) would have been demolished once the garrison had had time to settle down to normal fortress life. But events moved too soon.

The sequence of these various features is now established. Camp 2 of 49.2 acres (19.7 ha) was subsequently reduced in size (Camp 3). This will have involved a rearrangement of at least part of the plan of the camp, as is reflected in the change to shorter rows of pits in the *postica*. After the reduction had been made, the Outer Masking Earthwork (A) was dug on a line that passed through the causeway at the south-west gate of Camp 2, but avoided the west angle of the reduced camp (3). The 'Western Vallum' (B) must similarly follow the abandonment of Camp 3 in view of the structural relations at the south-east gate. Camp 3 is also earlier than the stage of construction of the fortress involving the laying out of drains, since the outfall from the gullies at the building-line on the *via sagularis* emerges from the angle of the fortress and continues westwards towards the scarp (FIG. 2), taking advantage of a fall in the ground. As it does so it crosses the interior of Camp 3.

CHAPTER 23

SUMMARY OF THE NON-ROMAN FEATURES ON THE PLATEAU

A. TUMULI (PSAS 1901/2: 197 f.)

a) *The 'Womens Know'*

This tumulus is a prominent feature of the plateau today. It lies c. 150 ft. (45.7 m) east of the eastern defences of the fortress; it measures 93 ft. (28.35 m) in diameter and stands 6 ft. (1.83 m) high. Its proximity to the fortress might suggest that it was a post-Roman feature, on the grounds that the Romans would be unlikely to allow such a mound to remain standing so close to the defences where it could create cover for an attacker; the tumulus does, however, lie beyond the range of missiles from the fortress and may have been respected by the Romans as a prominent grave since it did not inconvenience them greatly.

The tumulus is the largest now surviving in the district and somewhat resembles a Bronze Age Bell-barrow; but it is outside the distribution area of these. A trench was cut across the tumulus in 1901 and a half-section of the ditch was dug in 1965. The burial was in the form of an extended skeleton in a stone-capped cist. There were no datable finds. Several of the features are consistent with a post-Roman date: the use of Gourdie stone in the cist capping, the orientation of the skeleton with the head to the west and the discovery of a small fragment of red brick, possibly Roman, in the earth of the barrow; but at present our knowledge of Pictish burials is very slight and this tumulus cannot be paralleled in that period. There is, therefore, a strong possibility that the 'Womens Know' tumulus is pre-Roman, and of Bronze Age date. The larger cairns known in Scotland all appear to date to the Bronze Age¹⁶² and several extended burials have been excavated in these cairns.¹⁶³ The smaller tumulus on the counterscarp bank is obviously post-Roman, but that has a different character and the two are not necessarily contemporary. The pre-Roman dating of the 'Womens Know' is given further support by the presence of Bronze Age cinerary urns on the plateau (see below).

b) *The Small Tumulus on the East Counterscarp Bank*

The position of this tumulus is sufficient in itself to indicate a post-Roman date. The tumulus measures 35 ft. (10.67 m) in diameter and 4½ ft. (1.37 m) in height; it stands on top of the counterscarp bank itself. It too was excavated in 1901/2 and a cist, but no skeleton, was found. Again there were no datable finds. There was, however, evidence to suggest an extended burial.

162. R. Feachem, *A Guide to Prehistoric Scotland* (1963), 69.

163. V. Gordon Childe, *Scotland Before the Scots* (1946), 119 f.

B. THE PROMONTORY FORT

(*PSAS* 1901/2: 230 f.; with figs. 6 and 17)

The promontory fort is located at the south-west corner of the plateau, the highest point. It covers an area of c. $2\frac{1}{4}$ acres (0.91 ha). On three sides it was protected by the steep scarp, but on the side facing the rest of the plateau there was an impressive multivallate defence system. This consists of a series of five ditches and banks creating a field of defence 200 ft. (61 m) deep; the four outer banks were of gravel but the inner was reinforced with Gourdie stone. A ditch and palisade belonging to an earlier phase were traced within these defences.

The only feature excavated within the fort was a rough hearth of stone slabs. The only find from the fort was part of a quern stone. There is, then, no dating evidence for the fort; but it is unlikely to have been contemporary with the Roman occupation of the plateau. On the whole, a post-Roman date seems the most likely in view of the various small tumuli presumably of later date recorded on the plateau by Pennant and others, and of the large quantity of Gourdie stone employed, which was probably derived from the remains of the fortress wall.

C. THE PREHISTORIC ENCLOSURE (FIGS. 75, 76)

In the east *praetentura* of the fortress a pre-Roman enclosure was encountered below the north-eastern ends of Barracks 3–5; it was defined by a fairly wide trench, the filling of which was cut by the construction-trenches of the Roman buildings. A series of undulating folds of the surface run across this part of the fortress, diagonally to the barracks, and the enclosure lies along one of these ridges (PL. XXVI, p. 153).

The length of the enclosure was 177 ft. (53.9 m); the width diminished from 33 ft. (10.06 m) at the east end to 27 ft. 6 in. (8.38 m) at the west (FIG. 75). The outline of the enclosure, which is clearly indicated as a cropmark on aerial photographs (PL. XXVI), was easily determined during excavation by tracing the east end and the two rounded corners at the west. Only on the south side and at the north-west angle was any considerable length of filling taken out. The trench had slightly irregular, steeply sloping sides and a flat bottom. The depth from the surface varied between 3 and 4 ft. (0.9 to 1.2 m), and the width at the level of the top of the subsoil between $4\frac{1}{4}$ and $5\frac{1}{4}$ ft. (1.3 to 1.6 m).

The infilling of the trench varied in detail, as the sections show (FIG. 76). The lowest 12 to 15 inches consisted of sand and fine gravel, which seem to have been washed in as the trench lay open. In Sections **a**, **b** and **c**, stratified layers of fine sand alternating with coarse sand and grit could be distinguished. In **c** and **d** the first part of the filling was a fine grit with tiny pebbles: in **c** it came from the interior, in **d** from both sides but especially the exterior. All this seems to represent natural weathering as the trench stood open. The upper part of the filling was remarkable for the presence of charcoal and fragments of heavily charred wood (see especially Sections **a**, **b** and **d**) which seem to have collapsed into, or have been thrown into, the trench when it was nearly half silted up. The wood and charcoal may possibly represent the collapse of some as yet unidentified timber superstructure into the ditch when it was already half-filled.

At the time of excavation this feature was difficult to interpret because of the absence of analogies. With the increase of comparative material partly the result of excavation in Scotland, but mainly in the wake of aerial reconnaissance in SE England during the intervening period (see R. Loveday and M. Petley, 'Oblong Ditches: a Discussion and Some New Evidence' *Aerial Archaeology* 8 (1983), 17–24), it now seems likely to have been a Neolithic ritual or funerary structure. A full discussion of the problems is inappropriate here, and indeed more excavation is required. This further study is to be undertaken by Mr. G.S. Maxwell and Mr. Gordon Barclay, to whom thanks are extended for a discussion of the significance of the structure.

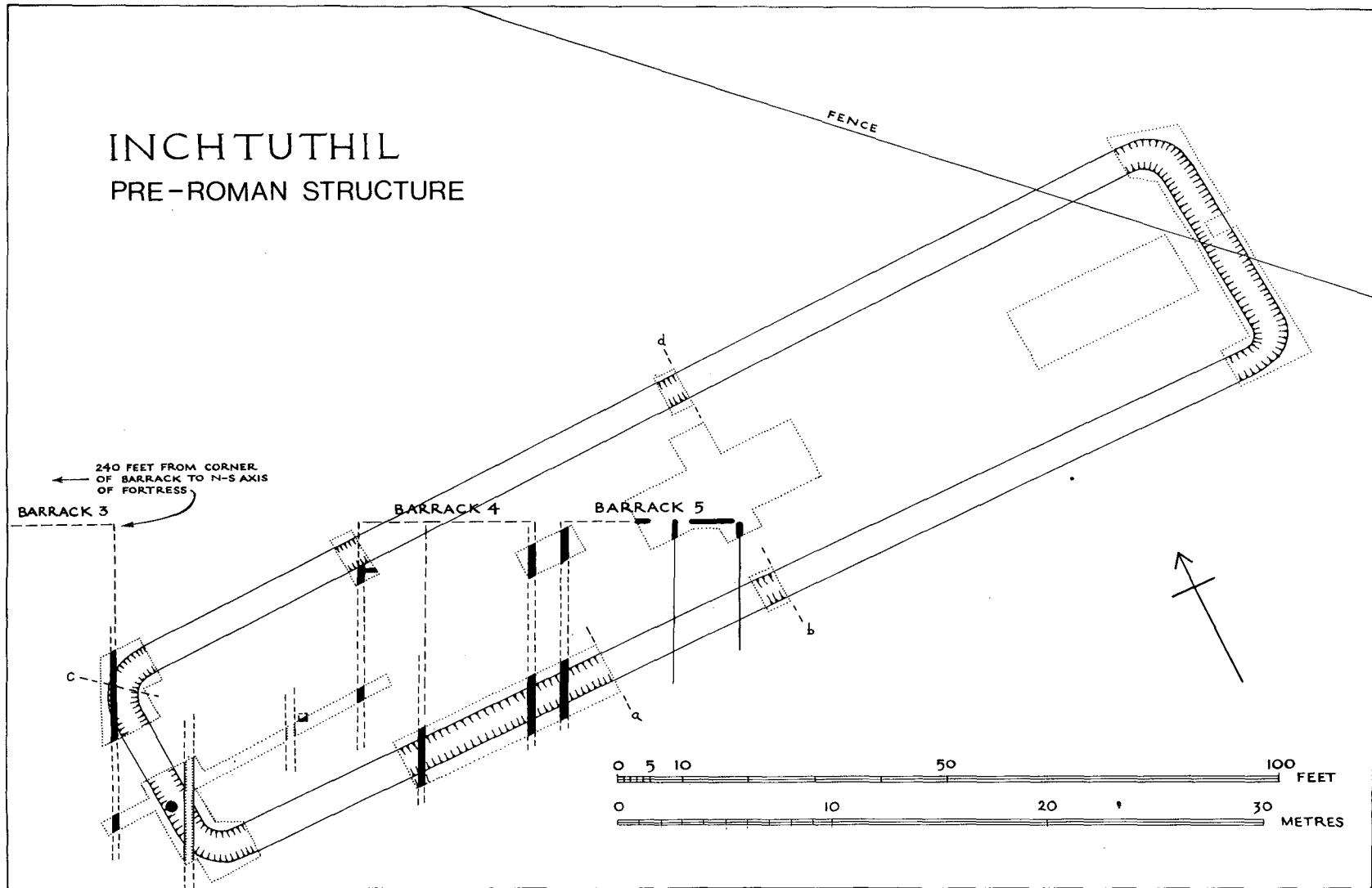


FIG. 75 The Prehistoric ritual enclosure beneath the left *praetentura*, plan. Scale, 1:300.

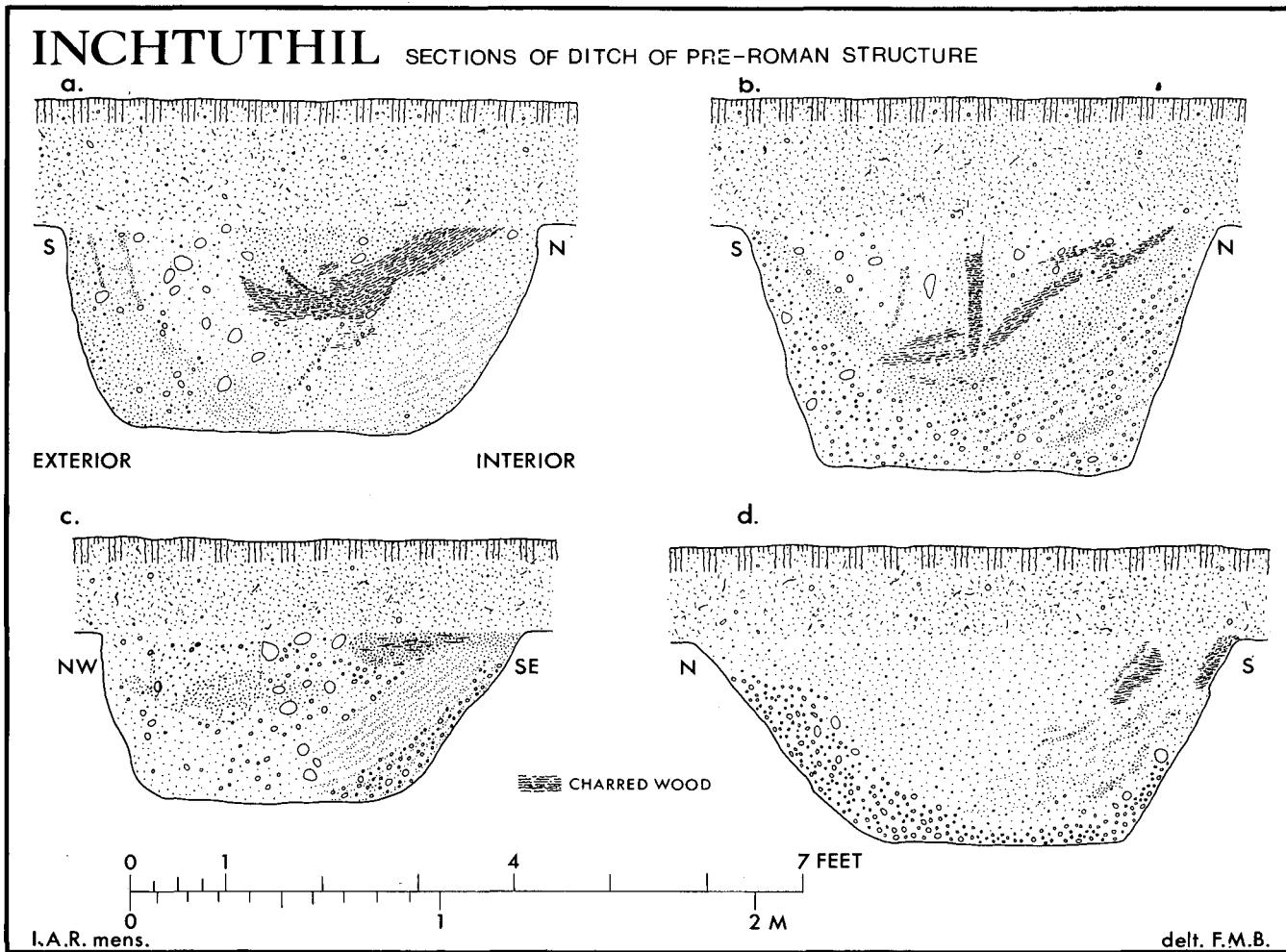


FIG. 76 The Prehistoric ritual enclosure. Sections of ditch. Scale, 1:24. In Section c the foundation-trench of the Barrack can be seen near the NW side.



(Photos: RCAHM (Scotland); Crown copyright)

Pl. XLIII A The prehistoric ritual earthwork: Section of ditch on north side looking south, with wall-trench of Barrack 4 to right of the ranging-rod (p. 248). Scale in feet.



Pl. XLIII B The prehistoric ritual earthwork: Section at north-west corner, looking east. Scale in feet.

D. BRONZE AGE BURIALS AND OTHER FEATURES IN OR NEAR THE FORTRESS

As noted on p. 58, two Bronze Age cinery urns were found buried in an inverted position beneath the centurion's house of Barrack 30 close to the northern *intervallum*. Their lower parts had been removed during Roman levelling of the site. Fragments of only one of these urns survives in NMA; it is described on p. 313. The discovery of a bronze axe in the left *praetentura* is recorded on p. 261.

As noted on p. 261, a ring-ditch is seen on aerial photographs beneath the left *praetentura* of the fortress, and nearby is an elongated clustering of pits on an alignment oblique to that of the building-lines of the fortress. Beneath the right *praetentura* of Camps 2 and 3 a curvilinear enclosure (FIG. 69, a) must also be a native work (p. 229).

PART IV: GENERAL DISCUSSION

CHAPTER 24

INCHTUTHIL AND ITS NEIGHBOURHOOD: THE CONTRIBUTION OF AERIAL RECONNAISSANCE

A. THE FORTRESS

The contribution made by aerial reconnaissance to the study of Inchtuthil has been noted in Chapter 3, while the first part of Chapter 22 describes the discovery and interpretation of features on the western part of the Inchtuthil plateau. In this chapter are brought together other results of this reconnaissance which has increased our understanding of the geographical setting of the fortress and has widened our knowledge of Roman and native remains on the plateau and in its neighbourhood.

Today the steep slopes round almost the whole circuit of the plateau are covered in trees which obscure long-distance views and mask the surface from the aerial observer. Such military considerations as the need to have a commanding field of view, not to mention the requirements of signalling, will have meant that conditions were very different when the fortress was in occupation: obstructing vegetation would have been cleared and trees felled. Panoramic air photographs are of particular value for demonstrating the situation of the plateau with the surrounding flood-plain of the Tay, and for relating the fortress to features in a wider geographical setting, such as the Highland front and the opening of the Dunkeld gorge above Caputh (PL. III). The flood-plain is seamed with old river courses: the channels most recently abandoned are usually waterlogged and marked by marshy growth readily distinguished on photographs, while ancient channels may remain visible as differences in the soil or vegetation. The behaviour of a river is not static but ever-changing, and the relation of the Tay to its flood-plain can be observed and recorded in repeated reconnaissance. In the short period of thirty-seven years spanned by the writer's observation of this neighbourhood from the air, channels have been abandoned and erosion of new lengths of gravel scarps begun. That much of the east side of the fortress has been lost since the Roman age need occasion no surprise.

The area of the fortress seems to have been rough pasture since the latter part of the eighteenth century. It was so at the time of the excavations of 1901, and when excavations were resumed in 1952. Aerial reconnaissance in 1943 picked out the line of the 'Western Vallum', for the turfwork showed clearly as a soil-mark, but no more detail of the fortress could be seen than was visible on the ground. A summer's drought was needed to cause the rough pasture to respond to buried structures; otherwise the best chance of recording archaeological details was provided by photography in bright sunlight with the sun at a low altitude, so that features in relief were emphasised by shadows (PL. IV). Between 1945 and 1980, 336 air photographs were taken of the fortress, all in the months of July and August. Buried remains were recorded for the first time in the drought of 1949 (PL. XXV, p. 152), and it was not until 1962 and 1977–8 that the rough grass responded again to exceptionally dry conditions. By 1961 ploughing had spread over much of the east *praetentura*, and thereafter crop-marks were observed within that corner of the fortress whenever the field was under a cereal crop.

Over parts of the area the soil is so shallow that ploughing inevitably cuts into construction-

trenches (stratified levels within buildings have long since been lost), and it is ironical that the agricultural treatment most likely to promote crop-marks is the very same that causes greatest damage to archaeological features. Cereal crops do not always give the best rendering of different types of buried structures. The crop-marks of 1961 and 1978 showed very clearly the numerous large pits within the verandas of Barracks 1 to 12 in the left *praetentura* and along the adjoining *intervallum*, the wide construction-trenches of Granary No. 1 and the gully beside the *via sagularis* at the south-west building-line (PL. XXVI, p. 153). By contrast, the construction-trenches of Barracks 1–12 appeared very faintly, if at all: the photographs of 1949,¹⁶⁴ taken when that area was still under rough grass, provide the best rendering of the plan of these barracks, including such details as the veranda post-holes (PL. XXV). However, Granary No. 1 did not then appear. The explanation seems to be that at its climax the 1949 drought caused the grass to respond to quite minor differences in the gravel, provided they were not covered by too much plough-soil. The depth of tilth over the granary is rather greater than elsewhere. Roots of a cereal crop penetrate deeper than those of grass, so that large disturbances like granary trenches produce responses in the crop (as in PL. XXVI), whereas walls of barracks were mostly founded in trenches too shallow to cause growth differences, at least in the prevailing conditions. Some understanding of these crop effects and their limitations is essential to an analysis of the air photographs.

The southern quarter of the fortress was recorded in fourteen oblique photographs taken on 3 July 1949. The area over which parch marks were seen includes most of Barracks 1 to 6, the men's quarters of Barracks 7 to 12, half the length of the *intervallum* between the *porta praetoria* and the south angle, and a space about 180 ft. (55 m) wide spanning ten *tabernae* facing the *via principalis*. The special interest of the photographs arises from the details they record of the barracks (FIG. 82). Of the Centurions' Houses 1–6 enough of the main walls is visible to restore the outline. Houses 1, 2 and 4 show most internal divisions: each has a central passage on its long axis, while Houses 1 and 2 appear to be a matching pair. Of the men's quarters most detail appears in Barrack 4, but the full length of the blocks is seldom recorded. More detail of the *contubernia* is to be seen in Barracks 6 to 12. Considerable lengths of the three long walls of each of these six barracks can be traced. Partitions between the *contubernia* are only occasionally seen, but many pits for veranda posts are clear, and likewise many rubbish-pits within the verandas. Thus, in Barrack 8, some fifteen consecutive post-pits can be counted towards the south-east of the men's quarters, and a further five at the north-west end. Lines of post-pits are similarly visible in Barracks 9 to 12. Of rubbish-pits within the space of the verandas, there are six in Barrack 7, eight in Barrack 8, at least seven in Barrack 9, perhaps eight in Barrack 10, seven consecutive pits towards the north-west end of Barrack 11, and three or four pits in Barrack 12. This area is crossed by a swathe of dark green grass where parching has not taken place, so that not all the post-holes and pits are visible. The north-west ends of the longitudinal walls of nearly all these barracks show clearly; however no trace of an end wall appears. Evidently these had a shallow construction-trench like most of the partition-walls, and not enough may have survived ploughing to cause any response in the vegetation. The veranda pits do not, on the evidence of these photographs alone, seem to have formed continuous rows. This is misleading, since later coverage when the ground was under barley, shows continuous rows of veranda pits (PL. XXVI), an important conclusion indicating that all the mess-units were in fact occupied.

Large pits at the back of the rampart opposite the ends of Barracks 1 to 6 may have been cooking-pits, or ash-pits dug in relation to ovens (PL. XXVI). Other pits varying in size and shape appear at random over the area: there are at least eight within the centurions' quarters of Barracks 1 to 6, four more lie in the passageways between those quarters and the first *contubernium* of the barrack, others are found within the men's quarters; sometimes, as occurs with a very large pit in Barrack 10, they cut across building-lines. These must be 'demolition pits'. Excavation revealed examples of all these types, but only aerial reconnaissance can establish their distribution, short of stripping large areas of the fortress.

The photographs also show details of the Roman drainage-system. A wide drain or gully,

164. J.K. St. Joseph, *JRS* xli (1951), 63–4, pl. viii, 2.

visible beyond the ends of Barracks 1 to 6, continues beside the *via sagularis* round the entire circuit, and was evidently a main part of the drainage-system. Two outlets are known: first the large sewer from the hospital, running between Barracks 27 and 28, after its junction with the gully continues beneath the *intervallum* to discharge outside the fortress. The second outlet was revealed by air photographs (CDC 26, 28) of the west angle, which happens to stand on relatively low-lying ground (PL. XLII). From the right-angle junction of the gullies on the north-west and south-west sides a drain or conduit is seen to pass beneath the *intervallum* and rampart (FIG. 2), and to continue beyond the fortress ditch for some 330 ft. (100 m), taking advantage of a fold in the ground that leads to a convenient point of discharge down the scarp near the north end of the 'Western Vallum'. The means of crossing the ditch cannot now be seen, but a wooden conduit might have served. In the left *praetentura* the main gully is seen to be interrupted opposite the ends of streets between Barracks 3 and 4, and 5 and 6; also at the end of the street separating the barracks of this cohort from those of the next (Barracks 7 to 12). No interruption is visible, however, at the junction of the street between Barracks 1 and 2 with the *via sagularis*, nor at the approach from this road to Granary No. 1. Presumably at such intersections the main gully was continued underground in a culvert.

Subsequent photographs also taken in dry summers show similar effects of grass parching, though not in as much detail. In the western half of the fortress the line of the *via principalis* with its drainage gullies, the *via quintana*, the parallel street to north of the *fabrica*, and a short length of the *via decumana* have all been recorded on photographs (AGI 61-2, AGJ 3-4, 20-1) taken in July 1962. On the north-west side, the entire length of the *via sagularis* together with the large gully on the main building-line were visible. Whenever the left (east) *praetentura* is under barley, crop-marks appear, nearly always adding a little new information, and often astonishing in their detail (PL. XXVI), which is enhanced by use of colour film (KX 39-45). The crop usually responds best to structures of such a size as the foundation-trenches of the granary, the main gully, and veranda pits in the barracks. The area of the centurions' houses in Barracks 7 to 12 which lay beneath the small enclosures of the eighteenth-century village has never yielded crop-marks. Intensive cultivation there may have led to development of a great depth of soil masking Roman features.

B. GOURDIE HILL, SPITTALFIELD AND CARGILL

Air reconnaissance has also added much to our knowledge of neighbouring Roman sites: 3100 yards (2835 m) to the north a temporary camp was observed in 1941¹⁶⁵ towards the north-east end of the Hill of Gourdie (at NO 116426) and rather below the crest-line. The greater part of the perimeter, including all four angles, has since been recorded. The camp, which stands on a little knoll, has axial dimensions of 465 ft. (142 m) from north-west to south-east, by 470 ft. (143 m), an area of 4 acres (1.6 ha). This was probably the temporary quarters of a unit engaged in quarrying. Both north-east and south-east sides are interrupted near their centre for a gate. The camp is divided by a cross-ditch: within the northern part lie the earthworks known as 'Steed Stalls', six parallel delves driven into the sloping ground. They were presumably made to test for solid rock, as if this were exploratory work for a quarry.¹⁶⁶ The row of 'stalls' originally turned round to the south-east, for air reconnaissance has revealed the former existence of at least five more such delves. The position of the Roman quarry on the south face of Gourdie Hill (at NO 109423), 800 yards (732 m) south-west of the camp, was noticed in 1970. An amphitheatre-like hollow at the foot of the steep, tree-covered slope that forms the upper part of the south face of the hill, attracted attention (see p. 61) because it interrupted the natural slope of the ground without there being any apparent reason. This hollow could not have had its origin as an area of

165. By Mr. Eric Bradley: I.A. Richmond, *JRS* xxxiii (1943), 47-8, fig. 9.

166. Mr. G.S. Maxwell (*Scottish Archaeological Forum* xii (1980), 44 with pl. 7) has suggested that the Steed Stalls may be explained 'as the individual quarries worked by the legionary craftsmen'. No great quantity of rock can have come from these delves, and what rock there was would probably have been somewhat weathered. The Gourdie sandstone is quarried most easily from a large working-face.

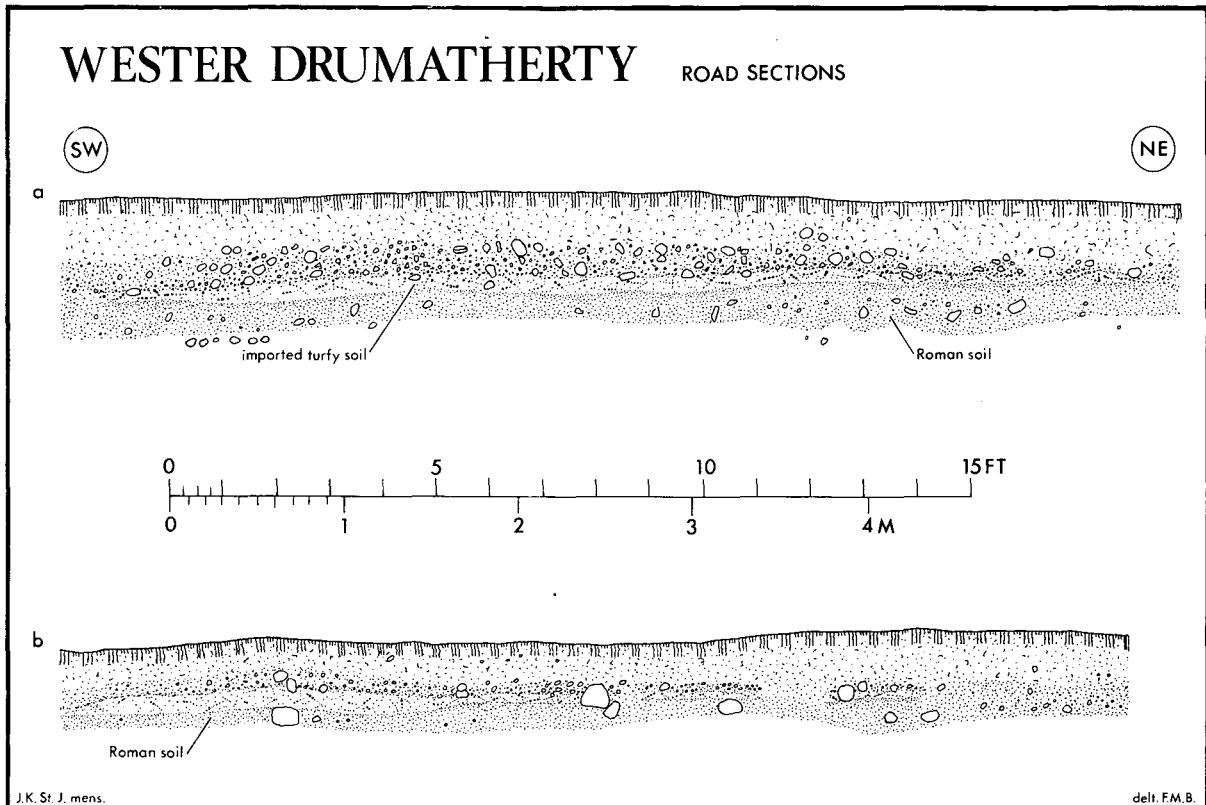


FIG. 77 Road-sections on the Spittalfield plateau in the fields of Wester Drumatherty, c. 1.6 km NNW of the fortress (see FIG. 1): (a) of the right-hand (eastern) fork of the road, leading to the quarry, at NO 1139 4121; (b) of the left-hand fork at NO 1136 4121. Scale, 1:43.

soft rock sapped by water erosion, as no channel leaves the hollow; indeed, Gourdie Hill seems to give rise to very few springs.

Crop-marks on the Spittalfield plateau, first observed in 1957, included a series of large pits. It was not, however, until 1980, when the results of several seasons' photographs had been compared, that the line of a metalled road was recognised. A short excavation undertaken jointly with Mr G.S. Maxwell in 1983 confirmed the identification (FIGS. 1, 77). The line of the road could be traced as a parch-mark from the edge of the plateau, at NO 115410, north-westwards for c. 750 ft. (228 m). It then forks; the right-hand fork inclines to the east through about 22° continuing as far as the north-east margin of the plateau, 900 ft. (274 m) away, where it takes advantage of an indentation in the scarp to descend on a causeway towards the valley of the Millhole Burn. It is then aiming at the quarry on Gourdie Hill 1000 yards (915 m) further on. The left-hand fork could be traced as a crop-mark only for a distance of a few hundred feet. A series of large quarry-pits, from which gravel had been dug, accompanied the road, mainly on its north side. The line of these pits continued beside the left-hand (western) fork as far as that was visible, and for a considerable distance further towards the north-west end of the plateau, providing a general guide to the line that the road had taken for some 850 yards (777 m) from the junction.¹⁶⁷

Downstream from Inchtuthil, and at 2½ miles (4.2 km) distance in a straight line, reconnaissance has identified two Roman military works at Cargill (FIG. 1), overlooking the confluence of the Tay with the Isla, the largest tributary in the lower part of its course. One, a fortlet discovered in 1941 by Mr Eric Bradley, then a flying-instructor at Scone airfield, lies on a terrace at the point (NO 1632 3761) some 400 ft. (122 m) south of the Isla, almost exactly as its junction with the Tay.¹⁶⁸ Photographs taken in subsequent years when crop-marks appeared clearly, show the straight sides and rounded angles of the fortlet, which was defended by two ditches each interrupted for a gate near the mid-point of both the long north-west and south-east

167. A narrow crop-mark caused by a small ditch or channel followed much the same line as this road, see p. 191 note 132.

168. I.A. Richmond, *JRS* xxxiii (1943), 47, fig. 8.

sides. On both sides of each gate the outer ditch curves to join the inner, in a sharp 'beak-like' outline. The dimensions within the ditches are 235 ft. (71.6 m) from north-west to south-east by 183 ft. (55.8 m), an area of about 1 acre (0.4 ha). In a brief examination of the site in 1963, a section across the defences on the north-west side identified two V-shaped ditches dug in gravel. The outer ditch was 5 ft. (1.52 m) wide and 4½ ft. (1.45 m) deep from the surface, and the inner ditch 8¼ ft. (2.51 m) wide and nearly 4½ ft. (1.37 m) deep. In the filling of the inner ditch, a few inches of primary silt were overlain by clods of earth and turf material, suggesting that this ditch had been deliberately obliterated. A diagonal trench 100 ft. (30 m) long across the interior encountered no structures and yielded no objects.

The second site, a fort, was identified from the air in 1977. Photographs taken then and in subsequent years served as a guide for brief exploratory excavations, conducted jointly with Mr Gordon Maxwell in 1980–1. The fort (centre at NO 1665 3792) stands some 630 ft. (192 m) north-east of the fortlet, on rather higher ground in a more commanding position above the Isla. The dimensions within the ditches are c. 575 ft. (174.30 m) from north-west to south-east, by 395 ft. (120.40 m), an area of 5.2 acres (2.1 ha). The gates in the long, north-east and south-west sides lie about 10 ft. (3.05 m) to north-west of the mid-points of their sides. Various elements of the street-system have been recorded on photographs: in particular a broad street that extends uninterrupted between the north-east and south-west gates. The position of these gates, taken together with the plan of the streets, shows that the fort faced north-west towards the Isla. A section across the north-east defences identified the position of three ditches and showed that the rampart, 20 ft. (6.1 m) wide, was built of turf laid upon timber strapping. The same conditions were found on the south-west; but on the north-west side the sequence was more complicated. The front of the rampart had been rebuilt in clay and turf, perhaps after a collapse. The section was taken 20 ft. (6.1 m) forward of the rampart: no ditch was encountered, but there were three construction-trenches all parallel to the rampart. Two of them were dug through demolished rampart material. In the *retentura* a short exploration identified parallel construction-trenches of a timber granary 80 ft. (24.4 m) long, by 30 ft. (9.1 m) wide. In one of these trenches some replacement of timbers seemed to have taken place; but the limited amount of work produced no evidence that the building was of more than one period. As to date, a mortarium rim from the section of the north-west defences is of characteristically Flavian type. Sometime after the excavations had been completed, a chance find of pottery, including decorated samian, confirmed the evidence of the mortarium.

From the north angle of the fort triple ditches descend north-westwards obliquely down the slope for 550 ft. (168 m) nearly to the river. That a road was planned from Cargill north-west to Meikleour and thence to Inchtuthil seems very likely. However, the crossing of the Isla at Cargill is not as easy as it might seem at first sight. When the river is in spate a great volume of water comes down; the flood-plain narrows towards the Tay, causing a 'bottle-neck' near the fort with ponding of flood-water upstream, to such an extent that a wooden bridge at the narrows might easily be swept away by the current.¹⁶⁹

C. THE CLEAVEN DYKE

Some two miles north of Cargill a well-known earthwork, the Cleaven Dyke, aligned north-west to south-east, crosses level ground extending between the Tay on the south-west and a much smaller stream, the Lunan Burn (FIG. 1). The Dyke was examined at the time of the 1901 excavations at Inchtuthil, and again in 1939 by Professor Richmond.¹⁷⁰ Agriculture and afforestation have dealt hardly with this earthwork and it is not now easy to study. The principal feature is a turf-revetted and probably turf-capped mound about 30 ft. (9.14 m) across, that lies

169. The existing stone bridge, just below the fort, was badly damaged by flood-water in 1981.

170. *PSAS* xxxvi (1902), 234–6; I.A. Richmond, *ibid* lxxiv (1940), 40–8. The first of these reports mentions that for a distance of about 2000 yards through a fir wood the Dyke 'is quite clear and distinct . . . the ground probably never having been under the plough'.

between two wide and shallow ditches 150 ft. (45.7 m) apart: the space between mound and ditches had been carefully levelled. Richmond supposed that the Dyke extended beyond its known limits in both directions. Arguing from the construction of the mound, and from its neutral profile offering advantage to neither side, he considered it to be a Roman line of demarcation, designed to regulate traffic approaching the Inchtuthil neighbourhood from the east across the level ground between the Isla and the hills to the north.

The Dyke can be traced from about the point NO 1760 3972, where a small ring of the 175-foot contour crosses the Couper Angus to Meikleour road, to the far end of North Wood at NO 1564 4086, where the ground is at an altitude of about 155 ft. (47.2 m) above Ordnance Datum. This distance is 2450 yards (2240 m).¹⁷¹ The first 550 yards (503 m) lie within fields frequently ploughed, the remainder within conifer plantations which are felled at intervals and the land then replanted. To establish a negative by aerial reconnaissance is difficult, but it must be said that, in spite of thirty years' observation from the air, no trace has been seen of any extension of the Dyke beyond the limits just mentioned, though much of the land that would have been crossed is often ploughed and under cereal crops. The Dyke is not absolutely straight; at about two-fifths of the distance from the south-east end there are two broad gaps some 380 yards (347 m) apart where both the mound and ditches were apparently interrupted.¹⁷² Richmond considered that the main function of the Roman signal-tower on the Black Hill (NO 176391), a glacial hummock a mile north-east of Cargill (FIG. 1), was to watch over these gaps, which may have provided access through the Dyke for native forest trails.¹⁷³

As the map (FIG. 1) shows, the Cleaven Dyke has been laid out on ground that is almost level: the difference in altitude over the whole 1½ miles (2.4 km) of its length is hardly more than 20 ft. (6.1 m). This is the only area in the neighbourhood where there is such a wide expanse of level, well-drained ground. If the Dyke were designed as a boundary, why does it not extend from the Isla to the edge of the hills, instead of leaving a space at either end? Would such a powerful military unit as the legion in garrison at Inchtuthil, with its strong natural defences, have anything to gain from the construction of a line of demarcation such as the Cleaven Dyke? The signal-station on the Black Hill is not well placed to watch the two gaps in the Dyke 1400 yards (1280 m) distant; indeed it is closer to the wide space between the south-east end of the Dyke and the river Isla; what really is its function? These are among the questions that call for answers.

A length of about 550 yards (503 m) at the south-east end of the Dyke lies, as Richmond recognised, within an arable field where crop-marks are to be seen from time to time. Although in the light sand and gravel of this area continued ploughing would soon spread the material of the mound and fill up the ditches, nevertheless the features can still be traced in terms of crop-marks. As PL. XLIV shows, the lines of ditch are clear enough. Even the mound, which in this photograph appears as a shadowy dark discolouration, is sometimes more apparent (photos: CDB 52-4). The Dyke continues to the curve of the tree-lined road at the bottom of the plate where traces are lost in the glacially-disturbed subsoil. Half way across the field the Dyke changes direction through about 5°.

It is the character of the ditches that immediately catches attention: their irregular outline can hardly be explained in terms of continued collapse of the subsoil, for where sectioned, they were found to be shallow, flat-bottomed and with gently sloping sides.¹⁷⁴ Nor do the traces resemble the marks of Roman military ditches of uniform width and regular profile. Since Richmond wrote, much more information has become available about different types of prehistoric

171. Richmond gave the known length of the Cleaven Dyke as 2970 yards, for he considered on the evidence of an aerial photograph that the Dyke crossed the first field beyond the north-west end of the plantations (*op. cit.* (note 170), 42). Photographs (e.g. DD 59-60 taken in 1949) do, indeed, show short lengths of crop-mark in that field, but these are misleading as they do not correspond in character to the ditches of the Cleaven Dyke; they are closer together and on a different alignment. For details of a section at the north-west end of the wood see *Britannia* vii (1976), 299-300.

172. For the changes in direction and the gaps see Richmond, *op. cit.* (note 170), 42. These are not shown on the small-scale map, FIG. 1.

173. Richmond, *op. cit.* (note 170), 47.

174. No detailed section of the ditches showing the character of the filling seems to have been published.



(Photo: Cambridge University Collection (CDB 54), July 1977, copyright reserved)
Pl. XLIV The Cleaven Dyke, looking NW from the south-east end. A length of c. 450 m is visible as crop-marks.

earthworks. The marks suggest quarry-ditches, as if there had been long lines of contiguous delves from which material had been obtained for the central mound. Such a method of working would yield linear excavations varying in width and in profile from point to point.¹⁷⁵ The irregularly-shaped (but much larger) quarry-ditches of Neolithic long barrows, and some of the ditches that outline cursuses come to mind. Nor need the turf kerbs and turf capping of the mound necessarily imply Roman work, for the widespread use of turf in the construction not only of barrows but of other prehistoric earthworks has now come to be recognised.

The suggestion has been made that the Dyke ran along a broad swathe of country cleared from woodland. However, the natural vegetation on this fluvio-glacial gravel may not have been so very different anciently from that of the Inchtuthil plateau – scattered trees with patches of thicker growth and scrub perhaps, but not necessarily dense woodland.

The principal points to have in mind in considering possible explanations of the Cleaven Dyke are these: the choice of site, namely the only expanse of level ground hereabouts,¹⁷⁶ the details of construction, a turf-capped central mound composed of material obtained from two long lines of delves forming continuous quarry-ditches, and the lack of any direct relationship to Roman schemes for the military occupation of Strathmore. In character, there is at least a superficial resemblance to ritual long mounds and cursuses of the British Neolithic. A possible parallel may be mentioned: the cursus about 2100 yards (1920 m) long, at Scorton¹⁷⁷ near Catterick in Yorkshire, where air photographs indicate the existence of a central mound or bank between rather irregular ditches about 125 ft. (38 m) apart, seems to have been not very different from the Cleaven Dyke; but excavation rather than a search for parallels is needed to settle its origin.¹⁷⁸ If the prehistoric structure (see p. 248) beneath the *praetentura* of the fortress should prove to be of the same period, this would hardly be chance. The small stone circle at NO 160439 beyond the Lunan Burn, two miles north of the Cleaven Dyke, also calls for consideration. Evidence is increasing for the existence of scattered pockets of Iron Age occupation in the area, as discussed below, and reconnaissance may have much more to reveal about earlier periods.

D. THE BLACK HILL TOWER

What then is the function of the signal-tower on the Black Hill? Amongst a small group of scattered hummocks of glacial gravel on the north bank of the Isla, Black Hill is the most prominent: its summit is a little below 175 ft. (53.3 m) above Ordnance Datum. If to this height 30 ft. (9.1 m) be added for the tower, the result would be a remarkable point of vantage commanding wide views. From Cargill, only 1575 yards (1440 m) distant, the Black Hill is clearly visible. Towards Inchtuthil, just over 3 miles (4.9 km) away, the line of sight has to cross ground rising to 170 ft. (51.82 m) in altitude about half a mile from the signal-tower. At the east angle of the fortress, the ground is at about 158 ft. (48 m) above Ordnance Datum, so that the height of the wall platform there is likely to have been at least 171 ft. (52.1 m), with the possibility that an angle-tower would afford even greater height. At Black Hill, the signalling platform is unlikely to have been less than 20 ft. (6.1 m) above ground, so that the two positions would be visible from one another. The direct line of sight from Cargill to Inchtuthil passes so close to the bluff on the south-west bank of the Tay at Kinclaven that only from the north rampart of the fort could even the east angle of the fortress be kept in view, and that by a narrow margin. The tower on the Black Hill would thus be an important intermediate point from which to relay messages.

Black Hill also has a long-distance view north-eastwards up the valley of the Isla to Cardean,

175. Some of the material for the mound may have come from the levelling of the space between the ditches.

176. The area of Meikleour Wood a mile south of Blairgowrie is more undulating and is surrounded by marshy hollows and small lochs, filling kettleholes. The marshy flood-plain of the Tay is hardly comparable.

177. Photographs DQ 68–76. The Scorton *cursus* was discovered in 1949. For excavations, see *Yorkshire Archaeological Journal* liv (1982), 7–21.

178. The gaps in the ditches can be matched in other ritual monuments, for example the *cursus* at Dorchester (Oxon).

9½ miles (15.3 km) away. Cardean at 150 ft. (45.7 m) is invisible from Cargill, about 120 ft. (36.5 m) in altitude, because high ground near Bankhead of Kinloch cuts off the view. However, messages between these forts could be exchanged using the Black Hill signal-tower.¹⁷⁹ The position of the signal-tower has been carefully chosen, since the small summit rising to the slightly greater height of 175 ft., by the end of the Cleaven Dyke and only 500 ft. (152 m) further from Cargill, is out of sight of Cardean as the view is blocked by the south slope of Bendochy Hill (NO 216419) north of Knowhead. The need to establish a signalling-system between Inchtuthil and the neighbouring forts is a matter that might well be assigned high priority amongst the many works of construction. It would be difficult to find a site better placed than the Black Hill to serve this purpose.

E. OTHER SITES OF NON-ROMAN DATE

The density of occupation in Roman and prehistoric times is not to be inferred from Ordnance Maps, since most of the contemporary structural remains were so slight in character that they have been long since levelled by agriculture. Areas thought to have been archaeologically blank may turn out to have supported an appreciable population. In the study of Roman military campaigns and of their impact upon the indigenous population, the native side of the picture is just as important as the Roman. Aerial reconnaissance is the best means of identifying ancient sites, and it is in the nature of reconnaissance to yield surprises. However, the photographs record all visible sites, without distinction as to date. The range of native sites is so wide, and gives rise to such variety of crop-marks, that accurate interpretation may be impossible without the information that excavation alone can provide.

Air photographs of the fortress taken in 1961 revealed in the left *praetentura* a long, narrow enclosure, set on the crest of one of the low gravel ridges crossing the blank area between the *via principalis* and the ends of Barracks 1 to 6. This has been described above in Chapter 23 (p. 248). The few photographs (ADW73, AZJ 17-19, K17-R176, KX 39-45) that record in detail the crop-marks in proximity to this enclosure show at about 150 ft. (45.7 m) further west a ring-ditch some 60 ft. (18.3 m) in diameter. It is overlapped by two construction-trenches at the north corner of Granary No 1. Beside the ring-ditch some forty or fifty pits appear in a remarkable concentration, strung out in an east-north-east to west-south-west alignment along the crest of a minor ridge where the crop has parched. Further pits may be hidden in the darker crop on either side. Scattered demolition-pits have been recognised in many parts of the fortress, but such a concentration as this has been found nowhere else. They more likely belong to the prehistoric occupation of the area. The long, narrow enclosure invites comparison with Neolithic ritual monuments. If this is valid, Inchtuthil has provided the first example of such a structure in this part of Scotland. Further evidence of activity in the pre-Roman period is provided by two Bronze Age cinerary urns found beneath Barrack 30, and by the chance find in ploughsoil in the left *praetentura* of an early Bronze Age axe, probably of local manufacture.¹⁸⁰

The Inchtuthil plateau is not likely to have remained uninhabited up to the time of the Roman invasion. Besides the evidence of the prehistoric structures below the *praetentura* of the fortress, crop-marks recorded within the area of the labour camp probably indicate an Iron Age enclosure (FIG. 69, a). Photographs of the neighbouring Spittalfield plateau, taken over several years, provide ample evidence of settlement. A number of circular or lunate crop-marks indicate the sunken floors of Iron Age houses, to judge from excavated sites in the valley of the Lunan Water in Angus. Five or six such houses occur towards the east end of the plateau (NO 116411): the largest is surrounded by a narrow ring-ditch 50 to 60 feet (15 to 18 m) in diameter. Another group lies further north-west above the steep scarp at NO 109415; a floor of trampled earth

179. In view of the distance, an intermediate tower might be needed in conditions of poor visibility.

180. Analysis by optical spectroscopy at the Oxford Laboratory for Archaeology and the History of Art gave the following result (as percentages): Cu 88.6, Sn 10.6, Pb 0.071, As 0.367, Sb 0.145, Ni 0.014, Bi nil, Fe 0.013, Zn 0.097, Ag 0.151.

encountered in tracing a channel across the plateau (p. 191) may be a further example. Similar marks have been recorded near Rosemount (NO 197438) south-east of Blairgowrie, together with ring-ditches and a small defended enclosure with double or triple ditches cutting off a corner of a terrace above an old river-scarp. Two more defended sites of the same kind lie close together perched above the edge of a scarp near Kercock (NO 135389) on another fragment of the same gravel plateau, but south of the Tay. Again, houses with sunken floors seem to be present. At Cargill, three penannular ditches, between 60 and 90 ft. (18 and 27 m) in diameter, have been recorded near the south angle of the fortlet, and another example lies about 100 ft. (30 m) beyond the north-west rampart of the fort. A further cluster of such ditches has been seen near Hallhole (NO 178393), a mile north-east of Cargill, to north of the Isla. Lastly, north-east of Meikleour, an intriguing subrectangular enclosure some 40 by 60 ft. (12 by 18 m) in size with rounded angles, accompanied by a penannular ditch, shows what variety of structures are to be found.¹⁸¹ These scattered sites will not have existed in isolation. Others will surely be found filling in the local distribution-pattern, and perhaps linking it to larger centres of population on the high-grade soils elsewhere in Strathmore and in the valley of the Lunan Water in Angus. The presence of other structures on these gravels may be expected, as is shown by two examples of palisade lines, or 'pit alignments', recorded east of Hallhole (NO 156390) and at Tay Farm (NO 152404). This catalogue is only a beginning: knowledge of settlement-patterns will undoubtedly be increased by continuing reconnaissance.

181. See *Britannia* xiii (1982), 336.

CHAPTER 25

THE FORTRESS OF INCHTUTHIL IN ITS HISTORICAL CONTEXT

A. GENERAL CONSIDERATIONS: By S.S. Frere and L.F.P.

In order to assess its full strategic importance and the role which it played in the first-century Roman occupation of Scotland, Inchtuthil must be considered in the wider context of Agricola's campaigns and the frontier policy of Domitian. Numerous questions are raised by such a study; these include the dates of the foundation of the fortress and of its abandonment, the identity of the legion for which it was intended and the extent to which that legion had actually taken up residence, the relationship of the fortress to the contemporary forts in the area, its position in any long-term plans and, finally, the reason for its abandonment. A further important question is whether the fortress was intended as the focus of a defensive line blocking off the mountainous and inhospitable area of the Highlands from the Roman province, or whether it was to serve as a springboard for further advance into those mountains. Although, by its very nature, the evidence available cannot always provide clear-cut answers, a discussion of the problems should result in a better understanding of the role of Inchtuthil in Roman Scotland.

There is more literary evidence available for this period than for any other in the history of Roman Scotland. In the *De Vita Iulii Agricolae* Tacitus gives an account of Agricola's governorship and his campaigns in Scotland. This is not, however, as helpful as might be hoped. The information provided is selective, since Tacitus's primary aim was to demonstrate the qualities and achievements of Agricola. Advances and victories are described but little information is given on the organization of the newly-conquered area. There are only a few brief mentions of the complex system of military control which is known from the archaeological evidence;¹⁸² these references tend to raise questions rather than answer them, for instance that of the nature and location of the *praesidia* on the Forth-Clyde isthmus. Furthermore there is no mention of the establishment of a fortress.

The obvious hostility of Tacitus towards Domitian makes it difficult to determine that emperor's policy towards Scotland; this hostility is also reflected in Cassius Dio's account (lxvi.20 and lxvii.3 f.). The distortion which this bias caused is revealed by a comparison with surviving accounts of Domitian's German campaigns; for here the hostile narratives of Tacitus and Pliny belittling any achievement are partly balanced by Frontinus, from whom it can be seen (*Stratagems* ii. 11.7)¹⁸³ that there was at least a limited success and that the triumph was not '*falsum*', as Tacitus describes it. Tacitus did not include any information on Agricola's successor or on

182. Tacitus *Agricola* 22 . . . *ponendisque insuper castellis spatium fuit* . . . ('there was even time for establishing forts'); 23 . . . *namque Clota et Bodotria diversi maris aestibus per immensum revectae angusto terrarum spatio dirimuntur: quod tum praesidiis firmabatur* . . . ('for Clyde and Forth, carried far inland by the tides of opposite seas, are separated by only a narrow isthmus; this was now secured with garrison-posts'); 25 (*Caledonii*) *oppugnare ultro castella adorti* ('the Caledonians took the initiative to attack some forts'); 38 . . . *ipse peditem atque equites lento itinere . . . in hibernis locavit* ('he himself marched slowly back . . . to place his infantry and cavalry in their winter-quarters').

183. *Imperator Caesar Augustus Germanicus eo bello, quo victis hostibus cognomen Germanici meruit, cum in finibus Cubiorum*

events in Scotland after Agricola's recall. His brief dismissal of the post-Agricolan period and his often-quoted phrase (*Histories* i, 2), *perdomita Britannia et statim missa* ('Britain conquered and at once let go'), are misleading, as the archaeological evidence has revealed.

However, once its shortcomings have been taken into account, the *Agricola* does provide an outline of the campaigns necessary to an historical appreciation of Inchtuthil. Although some have supposed that the fortress was first established only under Agricola's successor (Breeze and Dobson 1976: 128–9), it will be argued below that Inchtuthil formed an integral part of Agricola's own strategy, and that its establishment was first put in hand during the last two years of his governorship; its location makes a foundation by the following governor inconceivable in strategic terms. This dating forms the underlying assumption in what follows.

Before a summary of Agricola's campaigns is given, the problem of dating must be considered. The actual sequence of events is clear in Tacitus, but at no point is the internal chronology (which he bases on the year of campaign or governorship) related to any fixed external date. As a result, it is not certain whether the campaigns took place in the years 77 to 83 or in 78 to 84. This ambiguity arises because, although Agricola is thought by most authorities to have held the consulship in 77, the precise months are unrecorded, and he may have arrived in Britain in either 77 or 78. In order to arrive in Britain by midsummer in the year 77,¹⁸⁴ in time to arrange his unexpected late-summer campaign in north Wales, Agricola would need to have been consul in March and April, after which there was a delay caused by his daughter's wedding, which presumably took place in late June since May and early June was considered unlucky.

A final decision between the dates is impossible on present evidence; both are supported by arguments which are internally coherent, but in none can all the premises be established beyond doubt. The later sequence (78–84) was favoured by most scholars until recent years, when there has been a movement of opinion in favour of 77–83.¹⁸⁵

Arguments for the earlier chronology

The grounds for choosing the earlier bracket are as follows:

(i) Consulship in 77 followed by the marriage of his daughter, immediately after which (*statim*, *Agricola*, 9) he received the governorship of Britain; he arrived in midsummer, late enough for the general assumption that there would be no campaigning that year. If he were consul in 77, but later in the year, it is still hard to see why his arrival in Britain should be delayed until midsummer 78.

(ii) Gsell (1893: 164 f.), noting Cassius Dio's association (lxvi: 20) of the fifteenth imperatorial salutation of Titus, which occurred in 79, with successes in Britain, argued that the third year of the campaign, culminating in the advance to the Tay, was more suited to this event than the less spectacular second year, which saw merely consolidation in Brigantia.

(iii) Domitian's triumph after the Chattan War is generally agreed to have been celebrated in late 83. The news of the battle of Mons Graupius arrived when this triumph was 'recent' – *nuper* (*Agricola*, 39) – and thus the battle could have been fought in the autumn of 83, for the news would take 3–4 weeks at the minimum to reach Rome.

On these arguments only the first is strong; but even this depends on two assumptions, the first that the consulship was in 77, which is probable but not proven, and the second that the consulship was held in March–April of that year and not later.

Salutation as *imperator* need not signify a great victory; there was some annexation of new territory in the second year (*nova pars*: *Agricola*, 20) and the final pacification of the Brigantes may

castella poneret pro fructibus locorum quae vallo comprehendebat pretium solvi iussit; ita iustitiae fama omnium fidem adstrinxit ('When the emperor Domitian, during the war in which he earned his title Germanicus by conquering the enemy, was building forts in the territory of the Cubii, he ordered compensation to be paid for the crops which he had included within his fortifications. Thus the renown of his justice won the allegiance of all').

184. *Agricola* 18: . . . media iam aestate transgressus.

185. The later dating has been generally favoured: e.g. E. Birley 1953, 10 f.; Ogilvie and Richmond 1967, 317; A.R. Birley, *Epig. Stud.* 4 (1967), 63; Frere 1974, 123; P. Salway, *Roman Britain* (1981), 138. A.R. Birley has more recently argued for the earlier dating: 1981, 77 f.; *Liverpool Classical Monthly* 1976, 11–14.

have been considered sufficient cause for celebration. However, Titus's next two salutations did not occur until 81 and, although there is no evidence to connect either of them positively with Britain, it is not easy to explain why the conquest of southern Scotland and the advance to the Tay should have failed to result in one, as would be the case if the third campaign took place in 80 rather than 79 (see TABLE XIII). On the earlier chronology 81 would be the year of campaigning in Ayrshire, a possible context for a salutation, whereas on the later chronology (78–84) the year 81 would be that in which no advance took place, but consolidation of gains was undertaken.

The chronological relationship of the battle of Mons Graupius with Domitian's triumph has often been stressed. Tacitus merely states that the triumph was *nuper* ('recently') when the news of the victory arrived (*Agricola*, 39): Domitian 'was aware that his recent sham triumph over Germany (*falsum triumphum*) had been a matter for derision'. This statement gives the relative order of events: the triumph, celebrated almost certainly late in 83, took place before the news arrived from Britain; but it gives no justification for assuming a close relationship. In the context, *nuper* might mean anything up to a year or even 18 months previously,¹⁸⁶ and the battle could well have been fought late in 84.

TABLE XIII
ALTERNATIVE DATINGS OF AGRICOLA'S GOVERNORSHIP

A. A.D. 77–83	B. YEARS AND KNOWN EVENTS	C. A.D. 78–84
Year		Year
1. Arrival in Britain: campaign in N. Wales	77 Consulship (?)	1. Arrival in Britain: campaign in N. Wales
2. Consolidation of Brigantia to Tyne-Solway line	78	2. Consolidation of Brigantia to Tyne-Solway line
3. Conquest of S. Scotland: advance to Tay	79 Accession of Titus (June). Titus <i>imp. xv</i> Verulam inscription	3. Conquest of S. Scotland: advance to Tay
4. Consolidation: fort-building	80	4. Consolidation: fort-building
5. Conquest of SW Scotland	81 Titus <i>imp. xvi, xvii</i> . Death of Titus. Accession of Domitian	5. Conquest of SW Scotland
6. Advance north of Forth. First building-season at Inchtuthil	82	6. Advance north of Forth. First building-season at Inchtuthil
7. Mons Graupius. Second building-season at Inchtuthil	83 Domitian's Chattan War and Triumph	7. Mons Graupius. Second building-season at Inchtuthil
8. Recall of Agricola late 83 or very early 84	84	8. Recall of Agricola late 84 or very early 85
	85	

Arguments for the later chronology

The grounds for preferring the later chronology (78–84) are as follows:

(i) It can be more easily related to Domitian's Chattan War, which began in the spring of 83 (H. Braunert, *BJ* 1953: 97 ff.). If Agricola's sixth year fell in 83 rather than in 82, the weakness of his forces in that season may be explained by the despatch of troops to Germany. Tacitus

186. Just as in 1985 one may still speak of 'the recent Falklands War'.

indicates¹⁸⁷ that Legion IX had less strength than the others in the sixth season, and we know of a vexillation of that legion which was operating in Germany almost certainly in 83 (*ILS* 1025: see Appendix to this Chapter, p. 280). Since it was Roman practice at this time for all legions in a province to contribute vexillations to any expedition sent on active service elsewhere (p. 281), it must be assumed that the vexillation of the Ninth did not go alone; accordingly other factors may also have contributed to the legion's particular weakness, such as the effect of heavy casualties or the leaving behind of a large detachment at York to control the Brigantes and the lines of communication.

Further evidence for the presence of vexillations of all four British legions, this time serving with several others on the Continent, is provided by *ILS* 9200 (see p. 281); but there is no certainty that this expedition was connected with the Chattan War of 83; Kennedy (*Britannia* 1983: 96) has made a persuasive case for 89.

(ii) The question of vexillations absent at the Chattan War has a further relevance. Barracks for a full legion were built at Inchtuthil, which should imply that any vexillation sent to that war had returned by the time of building – which in turn would imply a date in late 83 for the first season of construction. For, if we adopt the earlier chronology and suppose that the first season was in late 82, it is hard to see why all the barracks were built at a time when, if it was to arrive for the opening of the campaign, orders must already have been received to despatch a vexillation. And if, to avoid this difficulty, we assume that the barracks in question were built only when the vexillation returned after the war, a year later, this would mean leaving the fortress with a garrison seriously under strength during the first winter of its occupation, at the period of maximum risk (p. 243).

(iii) The presence of a cohort of Usipi in Agricola's army in the sixth year of his governorship (*Agricola*: 28) also favours the later dating, since the territory of the Usipi, who were at this time close neighbours of the Chatti, was not annexed until 83. Their lands admittedly lay close to Roman territory and it has been claimed that recruitment might have taken place before annexation; but this is improbable.¹⁸⁸

(iv) A further support for the later dating is that it provides a striking coincidence between the halts and advances in north Britain and the accessions of new emperors in 79 and 81: the advances in years 3 and 5 have been connected with the accessions of Titus and Domitian respectively, and with consequent changes in frontier policy.¹⁸⁹ Although not a decisive argument, this does add to the cumulative weight of evidence.

(v) The inscription from the forum of Verulamium, dated to 79, also supports the later chronology, since Tacitus (*Agricola*: 21) refers to Agricola assisting the construction of temples and *fora* in his second year.¹⁹⁰ This context for the policy can be presumed to be based on information from Agricola, and the dedication of by far the largest forum in the province provides a reason for the context.

(vi) Kraay (*American Num. Soc. Museum Notes* 1960: 109) placed both the triumph and the British victory in 84. He argued that a *sestertius* struck in 84 with an unusual reverse type (a horseman riding down a barbarian, while a second lies dead beneath the horse – clearly a reference to victory¹⁹¹), and bearing the legend GERM COS X TRIB P III IMP VII PP, should be associated with Mons Graupius. In an internally coherent and persuasive discussion he linked IMP V (Domitian's fifth imperial salutation) on the earliest coinage of 84 with the Chattan

187. *Agricola*, 26 . . . universi nonam legionem ut maxime invalidam nocte adgressi . . . ('they made a concerted night attack on the ninth legion, judging it to be the weakest').

188. The suggestion of A.R. Birley (1981: 79, n. 43) that the Usipan cohort might have been enrolled in 70 takes no account of the fact (*Agricola*: 28) that these soldiers were still being taught discipline and basic training at the time of their mutiny.

189. For similar waiting for confirmation of policy by a new emperor, see Josephus, *Antiquities* xviii 124 (death of Tiberius) and *Bell. Jud.* iv 497–8 (death of Nero).

190. Although W. Eck (*Vestigia* 13 (1970): 48 f. and 127) has proposed a reading of the inscription giving the date 81, Frere (*Verulamium Excavations* ii (1983): 69, n. 1) has shown that this reading would upset the balance of the lettering and is therefore to be rejected.

191. On this see Ogilvie and Richmond 1967: 319–20.

triumph, and IMP VII (a salutation gained by September 84 when it appeared on a diploma at Carnuntum (*ILS* 1997 = *CIL* xvi 30)) with Mons Graupius. As already mentioned, it is difficult to relate imperatorial salutations to specific events, and A.R. Birley (1976: 11–14) has pointed out that Kraay's argument rests on several doubtful premises. Neither IMP IV nor IMP V can be precisely dated because of the lack of coinage issued in the second half of 83; but both occurred between March 83 and January 84 and both could be associated with either war. Kraay placed the battle of Mons Graupius in midsummer 84, thus allowing time for the seventh salutation to be used in Carnuntum in September; but Tacitus explicitly states *exacta iam aestate* ('summer was at an end'; *Agricola* 38), indicative of late August or September rather than late June.¹⁹² Thus association of this coin with Mons Graupius is fraught with difficulty; but what other context it might have is so far unexplained.

Both sets of arguments can be seen to rest on assumptions which cannot be proved, and upon circumstantial evidence. Those for the period 78–84 are perhaps slightly more substantial, and they would be further supported if it could be shown that Agricola's consulship dated to later in the year 77 than is usually assumed. Tacitus tells us that Agricola was governor of Aquitania for less than three years and was recalled with the immediate prospect of the consulship.¹⁹³ This should mean that he returned to Rome in January or February 77, having been designated as one of the *consules suffecti* for that year on 9 January;¹⁹⁴ but the words need not mean that the office itself was assumed in the early months. Indeed, it would be unusual for a man of undistinguished family and (so far) no great military reputation to be granted the distinction of immediate succession to two imperial *consules ordinarii* (cf. Syme, *ZPE* 58 (1985), 236). The date of his departure for Britain would depend upon that of the recall of his predecessor, which is unknown. Tacitus's narrative is very compressed at this point, as if to hasten the opening of the British episode; it is not impossible that the consulship was held in the second half of 77, that his daughter's wedding was celebrated in the spring of 78, and that his appointment to Britain which immediately followed that event led to a departure somewhat delayed by his simultaneous appointment as a *pontifex*.

In what follows the dates 78–84 will be used without repeated qualification, and the context of the establishment of the fortress at Inchtuthil will be taken as autumn 83, continued in at least a second season during the following year. Although the fortress remained in occupation at least until the summer of 86 (p. 279), the momentum of construction may have slowed down after Agricola's recall: certainly much remained to be done when the order for evacuation arrived.

B. AGRICOLA AND ROMAN SCOTLAND (By J.K. ST J.)

Agricola was responsible for one of the most remarkable series of campaigns ever conducted in these islands. After completing the conquest of the Brigantes, his forces in the next five years advanced two hundred and fifty miles to the Moray Firth. The archaeological expression of these operations is seen in both the permanent and temporary works of the Roman army, its roads, its fortifications and its buildings. To determine with certainty which forts were built in relation to events in successive seasons may not always be possible, for in the absence of inscriptions or of an abundance of coins, the dating of a site to a particular year cannot be achieved. With temporary camps the difficulty is even greater as artefacts of any kind are seldom found there. A marriage of the historical and archaeological evidence is the most that may be possible.¹⁹⁵

192. A.R. Birley (1981: 77) is imposing too much precision on this phrase when he writes 'this should mean that it was already after 22 September, the end of the summer'. An earlier date than this must be indicated by the fact that there was time after the battle for the fleet to circumnavigate Scotland and for Agricola's own slow and circuitous return to base.

193. *Agricola*, 9.5: *minus triennium in ea legatione detentus ac statim ad spem consulatus revocatus est*.

194. Ogilvie and Richmond 1967, 162.

195. For a study of Agricola and his achievements in Britain, see I.A. Richmond, *JRS* xxxiv (1944), 34–45.

How much the planning and execution of the campaigns reflected Agricola's own skill and military genius and how much that of his staff can never be known. The driving force must surely have been his, and his the overall strategic planning. Agricola's previous experience in Britain will have given him a broad understanding of the native peoples, and have enabled him to assess the likely reaction of different tribes to threats of invasion of their territory. He must have devoted much care to the mastery of detail in military operations, and to many other aspects of campaigning such as logistics, supplies,, the gathering of intelligence and appreciation of geography. That the area of Britain under Roman control was half as much again by the end of his governorship is testimony to his qualities as a general.

A summary of Agricola's seven campaigns reads like the prelude to a great event. In the late summer of the year of his arrival in Britain he suppressed a rebellion among the Ordovices in north Wales and captured Anglesey. Thenceforward Agricola was able to concentrate his attention upon the north of Britain. In his second season, advancing by both east and west coast routes, he completed the conquest of Brigantian territory and overran the north at least as far as the Tyne-Solway line. Consolidation of Roman control over ground newly won followed a long-established pattern, namely the building of forts at strategic points, linked by a system of military roads. The construction of a minimum of 28 forts seems to have been involved.¹⁹⁶

The third season saw continued northward advance into the territory of new tribes. The distribution of known camps and forts suggests that this was achieved by a parallel movement along valleys later to be followed by main lines of road: on the east from the Tyne at Corbridge by way of Redesdale to the watershed, and thence past the Tweed at Newstead, by Lauderdale and across the Lammermuirs to the lower valley of the Esk. On the west, advance was by Annandale and upper Clydesdale, whence the Esk could be reached by a march along the foot of the Pentlands, or the Clyde estuary by an advance down that valley, so securing the western end of the isthmus. A probing expedition harried the tribes as far north as the Tay estuary. Garrisons were placed throughout the occupied territory: large forts were built near Corbridge, which may have served as a supply base, at Newstead, Dalswinton and Castledykes, with other forts or fortlets at High Rochester, Learchild, Chew Green, Cappuck, Elginhaugh, Birrens, Milton, Crawford, Broomholm, Oakwood, Easter Happrew and Castle Greg. As well as these sixteen sites there are probably more to be discovered. It will be noted that the left flank remained exposed as south-west Scotland was by-passed, just as the Lake District had been by-passed the year before:

The fourth season was spent in consolidating territory already overrun. Besides the completion of some of the forts just listed, garrisons were established on the line of the Forth-Clyde isthmus. One of these will have been at the well-known site at Camelon, on the main road extending northwards, while in the west Barochan overlooks the Clyde estuary. Other forts no doubt occupied strategic points between the two, either about the line later followed by the Antonine Wall, or to the north of it. The Forth-Clyde isthmus is a great natural divide separating Scotland into two parts: the geographical break does not follow the shortest line across the isthmus by way of the lower Carron and the Kelvin valleys, but lies further north beyond the Campsie Fells. There, the wide flat valley of the Forth, formerly an expanse of treacherous peat mosses, extends westwards from Stirling to the Flanders Mosses south of the Lake of Menteith, where the low ground curves southwards, towards the valley of the Endrick Water and the south end of Loch Lomond. It is surely this belt of country that inspired Tacitus's phrases *inventus in ipsa Britannia terminus* and *summotis velut in aliam insulam hostibus*.¹⁹⁷

At the end of this fourth campaigning season Agricola would have held the governorship for a normal span. The extension of Roman control over the whole of Britain as far north as this natural divide may have been seen by him as the primary military objective of his governorship, whether or not it was the charge assigned to him on appointment or later by the new emperor Titus. Whether or not Rome had counted the cost in terms of manpower or had considered the

196. Ogilvie and Richmond 1967, 55-7.

197. 'A place for halting was found within Britain itself, and 'the enemy had been removed into virtually a different island': *Agricola*, ch. 23.

slender economic value of the territory next to be overrun, Agricola's command was to continue for another three years, making his tenure the longest of any known governor of Britain.

What judgement may be made of Agricola's military achievements after his first four years in office? The context of his first campaign in north Wales was perhaps a minor revolt, but continued rumblings of discontent or insurrection may have led him to take prompt and incisive action: there is no record of further trouble from the Ordovices. The operations of the next two seasons are of a pattern: a northward advance by way of both the main east and west routes, first to the Tyne-Solway line and thence to the Forth-Clyde isthmus. The lines of advance were in due course followed by Roman trunk roads and the country was divided by cross routes to achieve 'cordon control', a network of roads with forts at strategic points. These operations involved a risk of attack on the left flank from within the mountainous mass of the Lake District or from the wild country of south-west Scotland. This was perhaps a carefully calculated risk. Compared with the extent of territory overrun, the Lake District is not large, and may not have been as densely populated as the rest of Brigantian territory. South-west Scotland is a much larger area: there, the risk from the Novantae was proportionately greater and had to be removed in due course. On the eastern flank, the territory of the Votadini, which extended from the Northumberland plain to the Forth, was densely populated. The absence from their lands, so far as is known, of military installations in both Flavian and Antonine periods, and the continued occupation of their principal *oppidum* at Traprain Law, have been taken to indicate that this tribe was friendly to Rome, and that their territory might be safely by-passed. That the army had pushed forward to the estuary of the Tay suggests that Agricola was not content with the achievement of the main military objective of reaching the Forth-Clyde line.¹⁹⁸ A raid as far as the next estuary would have provided intelligence useful for a further advance; but the plan may also have included the creation of a system of outpost forts as in the Antonine period and, possibly the establishment of an alliance with, or protectorate over, the peoples of Fife (Frere 1981: 89–91). In the fourth year the army completed the consolidation of the territory so rapidly overrun. This involved the construction of more forts, amongst them some intended to garrison the narrows between Forth and Clyde.

The discovery in 1983, during a programme of aerial reconnaissance undertaken by staff of the Royal Commission, of a fort at Doune has been followed by a brief examination of the site by Mr G.S. Maxwell, who has shown that it is almost certainly of the Flavian period.¹⁹⁹ He has argued that the ring of forts Drumquhassle, Malling, Bochastle, Doune, an unknown site near Stirling, and Camelon was designed to control the valley of the Forth, in fact that they are the *praesidia* mentioned by Tacitus. This suggestion, which has much to commend it, would mean that the forts holding the isthmus were placed on the northern side of the great geographical divide between southern Scotland and the Highlands. A more secure line would run farther south, from the north end of Strath Blane along the edge of the Campsie Fells and then by the escarpment of the Fintry and Gargunnock Hills to Stirling. The crest of these hills commands not only the valley of the Forth but a wide sweep of country as far as the Highlands, in the same way as the fortlet on Lurg Moor looks far across the Clyde valley. By contrast, none of the forts on the proposed line has a comparable command of the country northwards. Malling looks southward over the great expanse of Flanders Moss; Bochastle stands in a hollow surrounded by hills, so that the outlook is most circumscribed; Doune is in a strong position above the Teith, but its northward view is limited. On military grounds a more serious objection might be raised that the three forts in the centre of the line seem hostages to fortune. They stand on the further side of the Forth valley, cut off from the south by extensive peat mosses. A route from Drumquhassle to Malling must go round the west end of Flanders Moss: in the east, communication between Doune and Stirling was probably by a narrow strip of land on the south bank of the Teith between the mosses of Blairdrummond and Lecroft.

198. That the expedition to the Tay was by a large army is indicated by the size of the camps at Dunning (47.3 ha) and Abernethy (45.9 ha) which may reasonably be associated with it; and if so the purpose was more than a mere reconnaissance, which could have been achieved quicker and more economically by a small force of cavalry.

199. G.S. Maxwell, *Britannia* xv (1984), 217–23.

The suggestion that this outpost line represents Agricola's scheme for garrisoning the isthmus may, however, be regarded in a different light. Would not such a bold step forward to embrace the whole belt of low-lying country in the isthmus be very much in character with Agricola's overall military strategy, as far as we can judge it? The succession of events in the continually changing military situation of these few years conveys a sense of his determination to press on to a main objective, namely the seizure of the Forth-Clyde line, even if the work of consolidation had to be left till later. To have a secure hold on the north side of the Forth-Teith valley would provide an invaluable springboard for further advance, and might indicate to the native tribes that further advance was intended. The fort at Doune is in a tactically strong position, guarding an important crossing of the Teith. Whether Bochastle belongs to this advanced circuit is more questionable. The fort is hidden amongst the hills in no position to serve as a base for further operations, since every move could be watched. Moreover it introduces into the circuit an awkward salient that actually crosses the Highland front (FIG. 78). Would not Drumquhassle – Malling – Doune – an unknown site near Stirling – Camelon be a shorter and more effective line? The distance from Malling to Doune by Bochastle is 15 miles (24 km), while in a direct line it is but 10 miles (16 km), the same distance as the other intervals between the forts in this circuit.²⁰⁰

Whether the operations of the next three seasons followed specific instructions from the new emperor is not known, but taken together they form a coherent pattern. A further northward advance would have been rash until the possible threat from the Novantae to the exposed left flank had been removed. The fifth campaign is most easily interpreted as involving operations in Galloway and Ayrshire: *eamque partem Britanniae quae Hiberniam aspicit copiis instruxit.*²⁰¹ From the large base at Dalswinton in Nithsdale, communications extended to Glenlochar by the Dee where an Agricolan fort is suspected, and so to the small Agricolan fort at Gatehouse of Fleet. Such a small fort is unlikely to have formed the end of the system; moreover, the Fleet estuary is narrow, lacking natural facilities for a harbour. The recent discovery²⁰² of a Roman road leading down the east bank of the Fleet to a crossing-point implies that the system continued at least to the Cree, and very probably to Loch Ryan, the best sheltered anchorage on this part of the west coast. Further north a Roman road from Clydesdale to the fort at Loudoun Hill, at the head of the Irvine valley in Ayrshire, has long been known. Its ultimate destination may well have been a fort near the mouth of that river. Two temporary camps have been traced at Girvan.²⁰³ These discoveries seem to be fragments of a system that may prove to have been just as carefully planned as the military network elsewhere. About this time, as Tacitus records,²⁰⁴ Agricola seems to have had thoughts of the conquest of Ireland. Even if his estimate that a legion and a contingent of auxiliaries would have been an adequate force for such an operation was correct, it may well be doubted whether it would have been large enough to garrison that island.

In the sixth season, Agricola, anticipating tribal movements, resumed his northward advance. He was evidently aware of the limitations imposed by geography, which dictated that the easiest route lay outside the Highlands by way of the valleys between the Highland front and the Ochil and Sidlaw Hills, from which there is easy access to the coastal plain and the sea. Progress along the western seaboard would have encountered great difficulties because of the numerous indentations in the coastline, and the mountainous nature of the terrain. The swift moves of the next two seasons' campaigns would have been possible only outside the Highlands.

The forts established two years earlier to guard the isthmus may be presumed to have provided a secure line from which to advance. Near the fort at Camelon, then possibly supplied by sea, there are two early camps.²⁰⁵ From the crossing of the Carron, the country towards Stirling

200. Maxwell, *ibid.*, table on p. 220.

201. 'That part of Britain which faces Ireland was occupied by his forces': *Agricola*, ch. 24.

202. The line of the road was revealed by aerial reconnaissance. It was confirmed by excavation in 1984. *Britannia* xvi (1985), forthcoming.

203. *Britannia* xv (1984), 276. The larger camp of 36.5 acres (14.8 ha) is square; from the ditch of the other a 'fragment of Roman glass, probably from a jug or bottle, is more likely to be first-century in date than later' in the opinion of Dr. D.B. Harden who kindly examined it.

204. *Agricola*, ch. 24.

205. They occupy in part the same ground and so cannot be contemporary. One, about 30 acres (12 ha) in size, has

presents no difficulties, indeed the construction of a road leading northwards may already have been begun. Beyond Stirling the route perhaps followed the south bank of the Teith, crossing at Doune. Thereafter the general advance was by way of Strathallan and Strathearn to Strathmore. Fife seems to have been by-passed: the inhabitants had numerous links southwards across the Forth with the Votadini and like them may not have been hostile; friendly relations may have been established two years earlier. Away from the hills the advance would not have encountered difficult campaigning country: it was a region of scattered woodland with peat mosses on the lower undrained ground. The better land was occupied, it may be supposed, by a long-established population, their settlements of round houses and their cultivations spread over the lighter soils where land could most easily be cleared from waste. In this campaign Tacitus mentions for the first time combined operations with the fleet, the war being carried forward by both land and sea. There was fear that the tribes would storm Roman forts and an attack in considerable numbers was indeed mounted on a camp of the ninth legion.²⁰⁶

How far north operations extended in the sixth season is not known, but scouts at least must surely have reached the point near Stonehaven where the front of the Highlands meets the sea. The essential facts of geography would be readily grasped from summits of the Ochil and Sidlaw Hills, which in clear weather afford comprehensive views south-eastwards over Fife or over the coastal plain, and north-westwards to a long mountainous skyline. No very deep penetration into the Highlands would be needed to show the character of the terrain there or the difficulties that lay ahead. If the army's advance had to continue under the shadow of the Highlands, this would expose essential and lengthening lines of communication to the risk of attack throughout a long, narrow strip of territory. The mountainous area was too large for continued surveillance of all the valleys where large bands of hostile tribesmen could assemble. Yet another season's campaign would lengthen still further the line of advance, making the position even more dangerous.

From the legionary bases at York and Chester as far as the Forth-Clyde isthmus, different contingents in Agricola's army could operate simultaneously to east and west of the main hills, so that an enemy could be harried from both sides. If assistance were needed, there were cross-routes by which reinforcements could be sent. In Scotland, the south-west flank had remained vulnerable throughout the third and fourth campaigning seasons, but the region of Galloway and Ayrshire is not too vast for swift action to be taken if an attack threatened. Beyond the isthmus geography had created a different situation where northward advance was possible on one side of the island only, while almost anywhere within the seemingly unending succession of Highland mountains enemies might be concealed, their numbers difficult to determine. There was only one acceptable solution, namely to cordon off the Highlands in such a way as to prevent a flank attack while the northward advance was continued with the intention of bringing the main force of the Caledonians to battle.

The decision to build a line of forts along the Highland front from Loch Lomond to the Mearns may well have been taken as soon as adequate intelligence had been gained about the country ahead (TABLE XV, p. 275). Two such forts may already have existed (Drumquhassle and Malling); what better positions could be found for the others than the points where the main rivers emerge from the Highlands? These valleys offer the easiest routes both for large bands of raiding tribesmen and for Roman forces despatched in pursuit. Nine valleys are involved altogether, of which the Tay, by far the largest river of all, is half way along the line. If garrisons were to be deployed in relation to the size and importance of the valleys, clearly the Tay should be allocated the largest force.

The territory overrun in the sixth campaign seemingly lay between the Highland front and the sea, an extent of country much smaller than that embraced in any one of the second, third or fifth seasons. For part of this campaign Agricola's forces operated in three divisions. No pitched battles are recorded; nevertheless the army may well have encountered difficulties in moving

gates of Stracathro type, in the other the one gate so far traced is furnished with an external *clavicaula*. For Camelon as a port, see T. Tatton-Brown, *Britannia* xi (1980), 340–3; Frere and St. Joseph 1983, 129.

206. *Agricola*, ch. 26.

through populated country. It is a measure of our limited knowledge of these activities that, within the whole area from the Forth to the Mearns, not more than nineteen camps have been identified that are reasonably attributable to Agricola's operations, and of these a number (perhaps five) are probably labour-camps housing construction-parties engaged in fort-building or the like. This leaves fourteen camps at most that held troops actually engaged in operations, a number that must be far short of the total. Mr Maxwell's suggestion²⁰⁷ that some Stracathro-type camps served as temporary bases for units in the field may provide part of the answer. Can there be a second reason, namely that the period of campaigning was short? Agricola may have perceived that no safe advance could be made beyond the Mearns without first securing his western flank: if so units would have been assigned to the construction of forts along the Highland front. At the time this work may have been regarded as a response to a temporary need only, in that successful operations further north leading to a defeat of the Caledonians might bring much of the Highlands under Roman control. It is true that Tacitus makes no mention of fort-building in either the sixth or seventh years of Agricola's governorship, but as may be judged from the map (FIG. 78), the number of forts involved (or at least those known to have been built) was only thirteen, considerably fewer than the number built after the second and third years of campaigning. The site of Inchtuthil was surely chosen and construction begun this year.

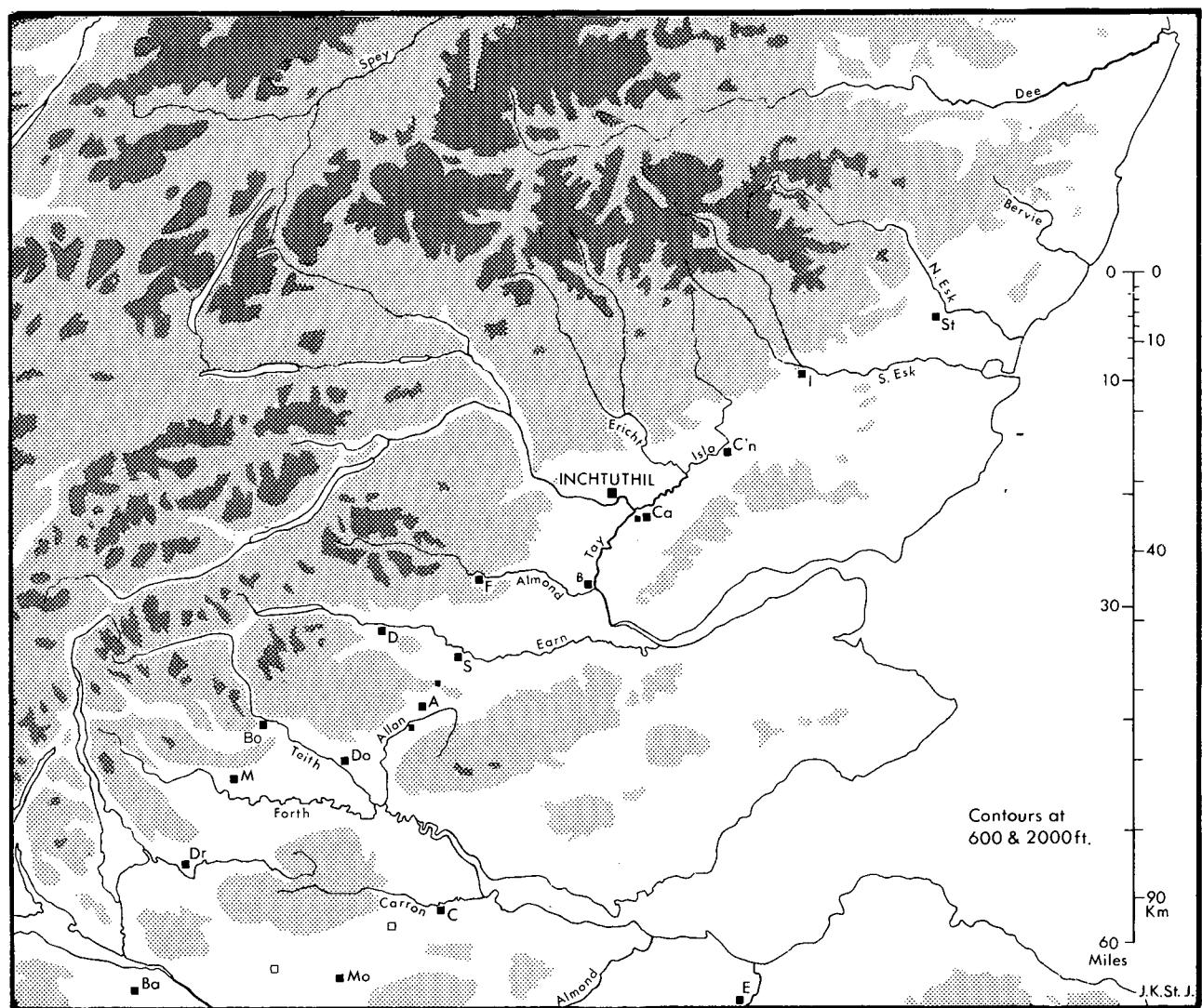


FIG. 78 Flavian forts from the Forth-Clyde isthmus to Strathmore: A, Ardoch; B, Bertha; Ba, Barrochan; Bo, Bochastle; C, Camelon; Ca, Cargill; Cn, Cardean; D, Dalginross; Do, Doune; Dr, Drumquhassle; E, Elginhaugh; F, Fendoch; I, Inverquharity; M, Malling; Mo, Mollins; S, Strageath; St. Stracathro. The two squares in outline mark possible fort-sites at Cadder and Castlecary.

207. G.S. Maxwell, *Scottish Archaeological Forum* xii (1981), 42–3.

In the seventh season, knowing that his left flank had been secured, Agricola would have been able to advance past the narrows where the Highland front approaches the sea at Stonehaven. To make this campaign possible, contingency planning must already have allowed for the extension of the trunk road, with appropriate supporting forts, from Camelon first to the Tay (if this part had not already been built), and thence along a direct route through Strathmore to the Mearns. This would have been essential for maintaining the flow of supplies needed for a continued advance. Once the Caledonians had been conclusively defeated, an advance along the coast of Moray towards the Beauly Firth would mean that the Highlands were outflanked. Most of the forts along the front of the mountains could then be given up and perhaps replaced by a fortified road traversing the Highlands. The control of such country would have appeared no more difficult than operations in the Alpine heights or in northern Dacia.

Beyond the Mounth, Buchan is entered: to an advancing army, the main natural obstacles, apart from a single large river (the Dee), would have been the waterlogged low ground with its spreading peat bogs and mosses. Much of Buchan was poor farming country, but the Garioch and the coastal plain of Moray contain some of the best agricultural land in the north of Scotland. The evidence of aerial reconnaissance shows that in Moray there were scattered groups of houses of Iron Age type and more discoveries are to be expected; their distribution will probably relate to high-quality land. If the Caledonians did not make a stand before the Roman army reached Moray, there would be little land of value left to fight for, a consideration to be taken into account when seeking the site of the battle that formed the climax of Agricola's seventh campaign.²⁰⁸ The battle took place towards the end of the summer, but not too late for the fleet to be ordered to circumnavigate Britain. The army marched slowly *quo novarum gentium animi ipsa transitus mora terrorentur* ('to terrorize fresh tribes by the very slowness of his passage') until the cavalry and infantry reached their winter quarters. After the battle was over it may have seemed likely enough to those on the spot that the success would in due course be followed up by further campaigning.

How does the evidence from Inchtuthil fit this picture? That the construction of the fortress was planned from the time of the first reconnaissance of the Highland front seems clear enough. The marking-out of the site of the fortress, and of the ground to be occupied by the labour camp, by the stores' depot (the 'Redoubt') and by the Officers' temporary Compound, if that were envisaged at so early a stage, would have been essential preliminaries to building. No doubt work of clearance and tree-felling, and the preparation of a track for a road (presumably to Cargill) might also have been started. In the late summer, once the objectives of the sixth campaign had been attained, work on the fortress itself and the other tasks already decided upon to prepare for the next year's operations could be begun. This meant the completion of the line of forts along the Highland front, and the building of a road – in continuation of the northward road from Camelon – through Strathmore to the Mearns. In view of the not negligible native population, this road would require its own series of forts. These circumstances explain why the forts between the river Teith and the head of Strathmore are disposed in two almost straight lines, one sixty, the other seventy miles long (FIG. 78). The forts on the road are all close to rivers, at fairly normal intervals, though the distance between Ardoch and Strageath is unusually short (TABLE XVI, p. 277). Presumably a fort was intended at the crossing of the South Esk between Cardean and Stracathro.²⁰⁹

Geography dictated where the forts on the Highland front were to be placed, and the symmetry of the river valleys suggests that the hub of the system was to be at the Tay. There are five forts to the south-west of this river, of which the most distant two at least (Drumquhassle

208. J.K. St. Joseph, *Britannia* ix (1978), 271–87; cf. L. Keppie, *Scottish Archaeological Forum* xii (1981), 79–87, and J.K. St. Joseph in A.W.M. Whiteley (editor), *Bennachie Again* (1983), 78–91. The fact that the decisive battle did not take place until the seventh season and at a location north of Stonehaven is hard to match with J.F. Hind's recent suggestion (*PSAS* cxiii (1983), 373–8) that the chief centre of Caledonian strength lay in Perthshire and Strathmore, an area already overrun without excessive difficulty in the sixth season.

209. Probably in the neighbourhood of Finavon. The small fort (1.2 acres = 0.49 ha) at Inverquharity perched on the top of a glacial ridge at the lower end of Glen Clova is not in a position to have guarded the crossing, though only 5½ miles (8.4 km) further up the Esk.

and Malling) may already have been built in 81. In the spring or autumn of 83 the construction of Fendoch, Dalginross and probably Bochastle would have had to be undertaken (TABLE XV, p. 275). Northwards one fort only, namely Inverquaharity, – and that a small one – is known on the Highland front, but there is some evidence to suggest that others were built or at least intended.

The close relationship between the forts and the river system is apparent from the map, FIG. 78. It goes without saying that forts need an adequate water-supply, and also that broad river valleys may offer the easiest passage for troops; nevertheless the choice of sites shows remarkable skill. As examples of this, one may mention Doune in a position with strong natural defences, and Bertha at the watersmeet of the Tay and the Almond. Fendoch stands on a flat-topped moraine, almost the only level ground in the neighbourhood, opposite the opening of the Sma' Glen, of which the floor, out of view from the fort, can be scanned from a watch-tower carefully sited for the purpose. Inchtuthil and Inverquaharity both occupy 'islands' of high ground, surrounded by steep slopes rising from a river's flood-plain. Only Bochastle, lying on an alluvial plain liable to flood and overlooked from higher ground on three sides, has less than its share of natural defences.

The need, already emphasised, to control the openings of the Highland valleys is clear from a study of the river system (FIG. 78). There are well-established routes along nearly all the large valleys leading by convenient passes far into the Highlands. From Bochastle the Leny leads to Lochearnhead, whence both Crianlarich and the upper valley of the Tay at Aberfeldy may easily be reached. From Dalginross, the Earn similarly leads to Lochearnhead. From Fendoch, the Sma' Glen provides an easy route to Amulree and Aberfeldy, a line that was followed by an eighteenth-century military road to Dalnacardoch.²¹⁰ From Inchtuthil, the Tay provides one of the principal routes through the Highlands to Pitlochry and Kingussie. This was followed by the eighteenth-century military road from Dunkeld to Inverness. By way of the Ericht, roads lead either through Strath Ardle to Pitlochry and the Tummel valley, or by Glen Shee to Ballater and Deeside. Glen Shee may also be reached by way of the Isla. From Inverquaharity the South Esk may be followed to the head of Glen Clova, whence an ancient moss troopers' trail over ground rising steeply to an altitude of 2250 ft. (686 m) above Ordnance Datum affords a rough route to the head of Glen Muick, and so to Deeside. The North Esk provides no through route.

Besides the geography of the valleys, the volume of the rivers is important when considering military communications. The only river large enough to be a serious obstacle is the Tay, which in full flood can be nearly half a mile wide at Inchtuthil. Flow records have not been maintained for all the rivers in question at the points where they leave the Highland front, but the statistics available are as set out in TABLE XIV.²¹¹

Changes in climate, in the régime of the rivers, in land-use, afforestation and hydro-electric schemes mean that the rates of flow in the first century will have been somewhat different from those now prevailing, but the relative rates are unlikely to have changed significantly. The figures for the Tay stand out from all the others; after that the Teith with a much greater volume than the Forth; then the Ericht, notably greater than the Isla or the South Esk. The volume of a river reflects in a general way the size of the catchment area though there are other factors, such as the height of the watershed, to be taken into account. The maximum rate of flow will determine the extent of flooding in the lower reaches. When these figures are considered together with the suitability of the valleys as through routes of passage, interest centres on the Ericht. Its rate of flow is about equal to that of the Teith, the next highest after the Tay. Its valley leads to two passes through the mountains; the more important by Glen Shee, the only convenient route from the south to upper Deeside, is also followed by the eighteenth-century military road from Coupar Angus to Fort George. As the map (FIG. 78) shows, there is no known provision for watching the Ericht where it leaves the hills, as both Inchtuthil and Cargill are too distant. Whether provision was intended for watching the Isla is also unknown.

210. For the eighteenth-century military roads see W. Taylor, *The Military roads in Scotland* (1976).

211. Gratitude is expressed to Dr. A. Werritty of the University of St. Andrews, who has kindly supplied details about the flow of these rivers.

TABLE XIV

FORTS AND RIVERS

Fort	Area (acres)	River	Point of observation	Average flow	FA	F10	F100
Bochastle	c. 6.0	Leny	nr. Bochastle	12.4	87.2	117.7	156.1
Doune	6.3	Teith	Doune	22.9	177.9	222.4	258
Dalginross	3.3	Earn	nr. Dalginross	c. 6.0	155.1	75.5	96.4
Fendoch	4.3	Almond	Almondbank*	5.2	101.8	151.7	193
Inchtuthil	53.7	Tay	Caputh	127.6	803.1	1084.2	1550
?		Ericht	Blairgowrie	c. 22.0			
?		Isla	Wester Cardean*	7.6	100.0	134	157
Inverquaharity	1.2	South Esk	Brechin*	11.4			

The figures are in cubic metres a second. The columns FA, F10 and F100 give the rates of flow at the mean annual flood and the estimated maximum ten-year and hundred-year floods. *Almondbank is 10 miles (16 km) downstream from Fendoch; Wester Cardean is 4 miles (6.4 km) downstream from a possible fort-site near Airlie; Brechin is 14 miles (22.5 km) downstream from Inverquaharity.

The spacing of the forts on the Highland front is shown in TABLE XV.

If forts were built, or were intended, to watch the valleys of the Ericht, the Isla and the North Esk, a site at Blairgowrie, one south of Airlie, and another near Edzell seem to be the most likely positions. The interval of 22½ miles (35.6 km) between Inchtuthil and Inverquaharity contrasts with 11 miles (17.6 km) – the average spacing of the forts between Drumquhassle and Inchtuthil (TABLE XV). The likelihood seems strong that it was intended to build a fort, even if only a small one, in relation to the Ericht; indeed the system seems incomplete without it.

TABLE XV

SPACING OF FORTS ALONG THE HIGHLAND FRONT

Fort	River	miles	km
Drumquhassle	—	10	16
Malling	—	6	9.6
Bochastle	Leny	13	20.8
Dalginross	Earn	10½	16.8
Fendoch	Almond	14½	23.2
Inchtuthil	Tay	5	8
?	Ericht	8¼	13.2
?	Isla	9	14.4
Inverquaharity	South Esk	14	22.4
	North Esk		

Whether a series of forts such as those noted above will have been considered in themselves a sufficient protection for the flank of the advance may be doubtful. In addition to preventing contact between the population already conquered with their kinsmen in the glens, the problem

was one of dealing with large numbers of tribesmen, with trysting places deep in the hills, having the advantage of knowing the ground so well that raiders could appear out of the mountains with little warning and disappear just as easily. Much of the terrain in the Highlands is unsuitable for cavalry. An enemy that vanishes down narrow passes and into wooded glens has to be flushed out by hand-to-hand fighting. Adequate defence of the flank must have depended on three factors: the line of forts controlling the openings of the valleys, a series of forward posts whence watch could be kept and intelligence sent back, and thorough knowledge of the country so that a unit engaged in pursuit would know where an enemy might turn for shelter, and where to cut him off. In the short time that the main forts were in service, outposts may not have been built: none have been observed in spite of repeated reconnaissance of likely localities such as the confluence of the Tay and the Tummel, or of the country round Amulree, or of upper Tayside near Aberfeldy.²¹² The neighbourhood of the medieval earthwork at Fortingall, by tradition long associated with the Romans, has been equally unresponsive. That there were dangerous routes is acknowledged in the *Agricola* (ch. 25): *et infesta hostili exercitu itinera timebantur* ('fearing routes made unsafe by hostile forces'): this might apply to Glen Devon or Glen Eagles, but equally to the Pass of Leny or the Sma' Glen. Knowledge of the country was clearly essential. The contrast, in *ac modo silvarum ac montium profunda, modo tempestatum ac fluctuum adversa compararentur*²¹³ aptly pictures the hazards on each flank of the advance.

The building of the fortress has already been described (pp. 58 f.). Earth and timber forts for auxiliaries could be constructed in what time remained after a summer's campaigning was finished,²¹⁴ but building a fortress would take longer. That a temporary compound was laid out for senior officers, with special accommodation, offices and bath-house, not to mention barracks for a guard unit, suggests that some delay, a year or two perhaps, was foreseen before permanent quarters would be completely ready. Construction of defences would have priority, as also of quarters for the ten cohorts of the legion and their centurions. These buildings, together with a temporary *principia*, and appropriate store-rooms and granaries, probably represent the work of a first year, after the end of field operations. In a second year, the replacement of the front of the turf rampart by a stone wall must have made large demands on man-power, but there may have been time for completion of most of the remaining major buildings. In the first year as many as eight forts may also have been under construction for which Inchtuthil would be the natural supply-base, and more may have been planned for the next year; this may provide a clue to the nature of the so-called 'Redoubt'. Supplies could be brought by sea up the Tay estuary at least as far as Perth, even if the fort at Bertha could not be reached. Whatever the precise trans-shipment point, transport by road to Inchtuthil would follow. Inchtuthil would be the logical place for a principal Stores' depot to supply material to forts under construction, at least for those lying north-east of it. The level space of 3 acres (1.2 ha) within the 'Redoubt' would have provided ample room for bulk stores; more specialised small items needed in great numbers might have been held in some of the *tabernae* or in the *fabrica*. There, the very quantity (nearly 10 tons)^{214a} of nails recovered from a demolition-pit is of special interest as evidence that the programme of fort-building had not been finished; for this supply (over 875,000 nails) would have far exceeded what was needed for the completion of the fortress. Requisitions of nails would be determined by the size of a fort, but the stock may have been enough for five forts for auxiliary units.

The sequence of forts (TABLE XVI) extending in a line²¹⁵ from Doune to Stracathro guards a

212. Within the Highlands the extent of arable land is very limited even on the floors of the main valleys, with correspondingly fewer chances of identifying crop-marks. Reconnaissance here has been less frequent than over Strathmore, though the large valleys and principal river-confluences in the southern Highlands have been observed in about half the number of years that Inchtuthil was reconnoitred. This incidentally answers a question posed by Professor Frere a few years ago, *Scottish Archaeological Forum* xii (1981), 95.

213. *Agricola*, ch. 25; 'the perils of woods and mountains were compared with the hazards of storms and waves'.

214. Hobley 1971b, 21–33.

214a. This weight corrects that given in *JRS* li (1961) 160, where the figure of 12 tons inadvertently included the weight of the crates used to transport the nails.

215. The distance from Doune to Stracathro is seventy miles (112 km). The forts at Doune, Ardoch, Bertha and Stracathro are almost in alignment. None of the seven forts lie more than 2300 yards (1920 m) from a median

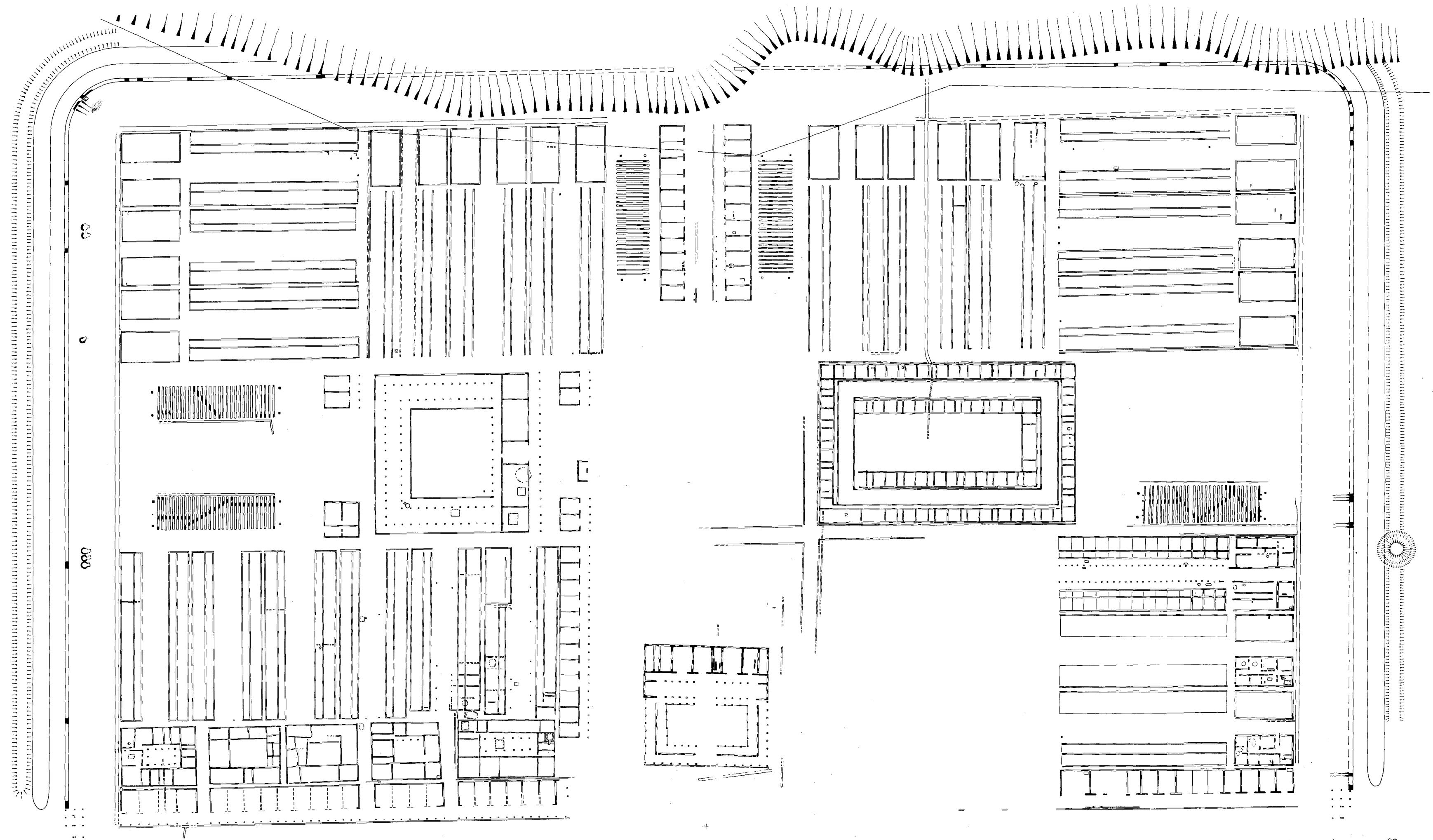
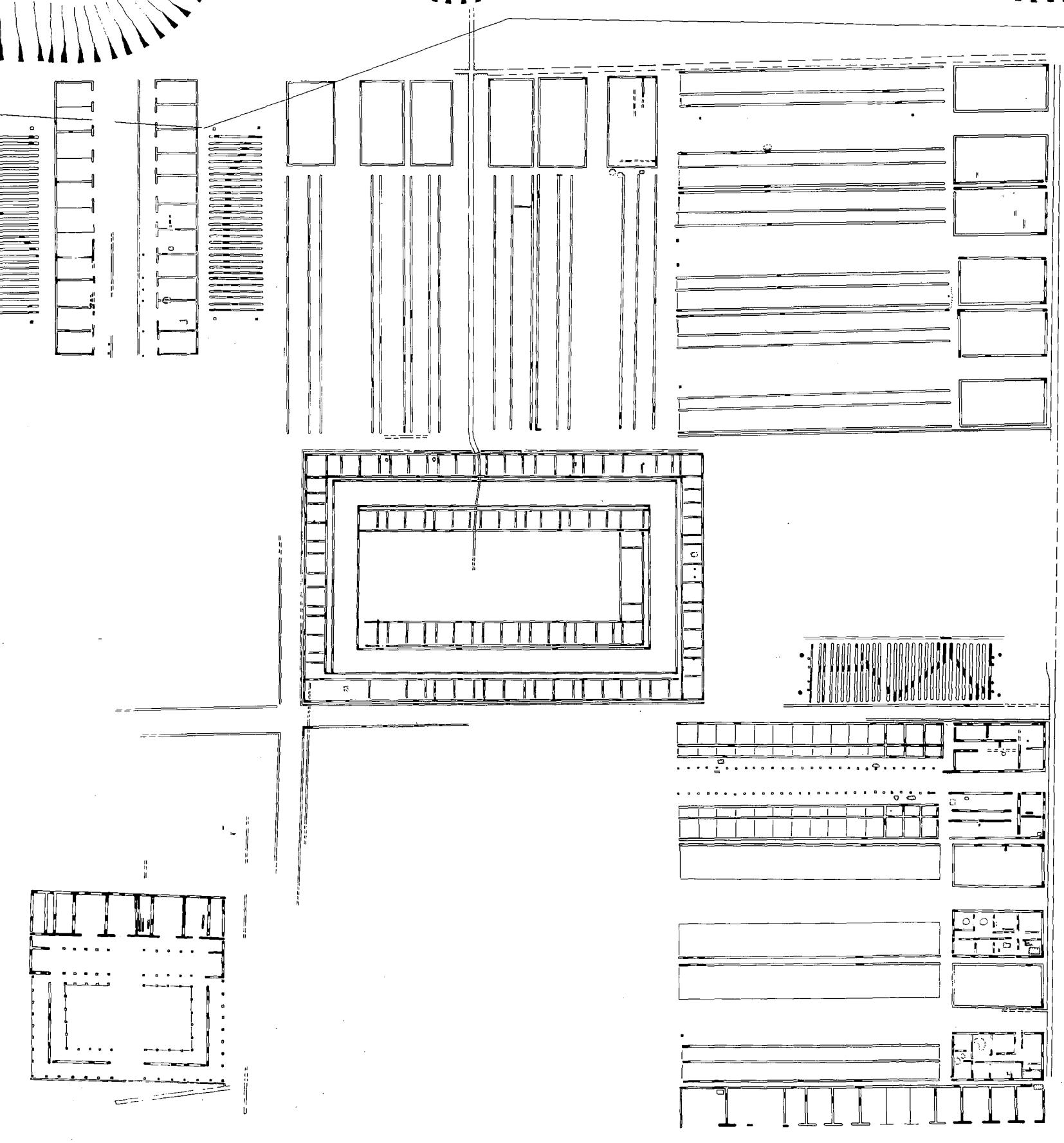
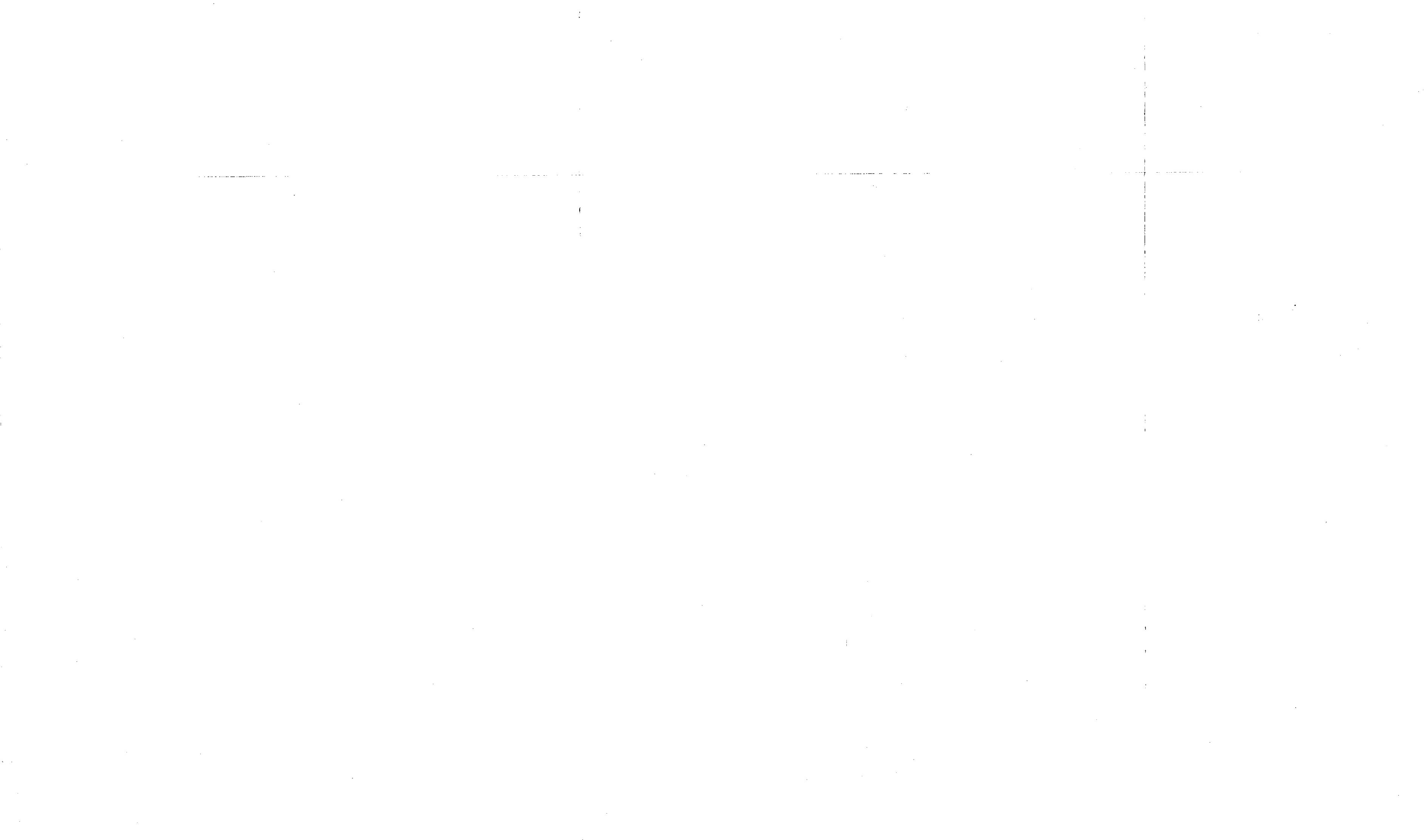


FIG. 79 Inchtuthil: plan of the north-west quarter. Scale, 1:1160. For drawn scale, see FIG. 82.

FIG. 80 Inchtuthil: plan of the north-east quarter. Scale, 1:1160. For drawn scale, see FIG. 82.





military road, an essential supply-route to support operations further north. If the sequence was planned to continue towards Stonehaven, the spacing would seem to require a fort between Cardean and Stracathro and one near the Bervie Water.

TABLE XVI
SPACING OF FORTS ALONG THE DOUNE – STRACATHRO ROAD

<i>Fort</i>	<i>acres</i>	<i>ha</i>	<i>River</i>	<i>miles</i>
Doune	6.3	2.5	Teith	
Ardoch	c. 7.0	c. 2.8	Knaik	9½
Strageath	4.0	1.7	Earn	6½
Bertha	?	?	Tay	13¾
Cargill	5.2	2.1	Isla	8½
Cardean	8.0	3.2	Isla	9¼
?			South Esk	
Stracathro	7.9	3.2	North Esk	23½

The distribution of Flavian forts north of the isthmus is unusual. All lie on two almost straight lines that converge as they go northwards, until, opposite Inverquaherty, they are barely three miles (4.8 km) apart. That no other forts are known in the whole area may be due to the chances affecting discovery, or to the unevenness of reconnaissance. There is no hint whatever of the customary pattern of roads and forts so often established in occupied territory. None are known in relation to harbours or to likely centres of population such as the valley of the Lunan Water. Can this be because the natives in the northern lands of the Venicones were not hostile – like their southern neighbours in Fife?

The two lines of forts seem to have been constructed in response to a particular military situation involving operations intended ultimately to bring under Roman control the country as far north as the Moray Firth, and so outflank the southern Highlands. The apparent absence of sites elsewhere, and the unusually large size of the forts along the road, emphasise the importance of the whole building-project. How much of the planned work of construction remained uncompleted is not apparent. An engineered road may have reached Cardean at least, for a large cambered mound extends out from the north-east gate of that fort.

The known forts were presumably all built in the last two years of Agricola's governorship. The clear intention implied by these extensive series of military works was that in the following year the momentum of operations should be maintained. To the army-command in Britain the time for continued advance must have seemed most propitious, after so conclusive a victory as the battle of Mons Graupius. Meanwhile a march of 60 miles (96 km) to the Beauly Firth would by no means have been out of scale with Agricola's orders to the fleet. The circumnavigation of the northern part of Britain was no small undertaking. To reach even the Clyde involved a voyage of some 500 miles (800 km), including the passage of the treacherous waters of the Pentland Firth. Caution would dictate that the voyage should be completed before the equinoctial gales began.

In the winter following this last campaign Agricola was recalled. His successor was soon faced

line. Structural remains of a Flavian fort at Bertha are still to seek, but the fact that the road from Ardoch and Strageath to Cargill crosses the Tay at Bertha implies the existence of a Flavian fort beneath the visible earthworks which probably belong to the Antonine period. Part of the site has been eroded by the Almond.

with a very different situation, brought about by the withdrawal from Britain of a significant proportion of the army for the war in Dacia. The fortress at Inchtuthil was abandoned before it had even been completed. This meant not only that there could be no further advance, but also that the whole system of military establishments north of the Forth-Clyde isthmus must have become virtually inoperable. The territory between the front of the Highlands and the sea could not be retained without its protecting screen of forts, which in the new situation was too expensive in manpower and resources. The two lines of forts are too close together for those on the road-line to represent a retreat from the positions in front, as Breeze and Dobson (1976) have suggested; nor, if the front line was built perceptibly before the other, is it easy to understand the lack of a road in association. The two lines stand together, and the existing road with its protecting forts was integral to the supply-route of the advance. The idea that the chain of watch-towers between Ardoch and the Tay may represent a last attempt to maintain some degree of regulation over tribesmen seeking to enter Fife from the north-west cannot be maintained: the system has been shown to be composed of two different series, probably not exactly contemporary in construction (Frere and St. Joseph 1983: 136). The forces needed to support the cordon were too weak once the front line had been evacuated and the Romans known to be in retreat, and there are not even any fortlets on the long Gask ridge sector. Finally the time available for such a measure, between the moment when evacuation of the lands beyond the Tay had been decided upon and that when the decision was taken to extend evacuation back to the Forth (if they were really separate decisions, which the evidence does not support)²¹⁶ is too short.

The question arises whether the construction of such extensive military works at the furthest bounds of the province would not have strained to the limit the military supply and support services. In fact the scale of the works appears to have been by no means beyond what the army had been accustomed to achieve, given the legionary and auxiliary manpower available to Agricola.²¹⁷ It has been estimated (p. 268) that on his second campaign a minimum of 28 forts were constructed in the northern territory of the Brigantes. In the following year, when the south of Scotland was overrun, the number of new forts cannot have been much less. No doubt some may only have been completed during the next season, when there was a pause for consolidation and for the building of forts to garrison the isthmus. In the country between the valleys of the Clyde and the (W. Lothian) Almond in the south and the Teith in the north, some ten forts alone would have been needed. To impose the same tight control upon south-west Scotland would have required hardly less than ten forts and an extensive road-system. Compared with what had been accomplished already, thirteen forts and three fortlets do not seem an excessive construction-programme for the two years in which Agricola was operating beyond the isthmus.²¹⁸

All this work received but passing mention by Tacitus. There is a reference to the disposition of garrisons and forts in the second campaign, to the time found for the planting of forts in the third year, to the securing in the fourth year of ground hastily traversed, together with the fortifying of the territory between Forth and Clyde, and in the fifth campaign to the manning with troops of the part of the coast that faces Ireland. There is mention that in the sixth campaign Caledonian tribes undertook to storm Roman forts. Too much weight should not be attached to the fact that there is no further reference to fort-building. The narrative of the last two years of Agricola's governorship seems to be leading up to the crowning achievement of his military operations, namely the crushing defeat of the Caledonians at Mons Graupius. Compared with this, the details of military routine were of little interest to his readers.

Operational planning no doubt evolved during the years of campaigning, but the essential facts

- 216. See Frere 1981: *contra* Breeze and Dobson 1976. The latest coins at Cardean, Stracathro and Inchtuthil are Asses of 86, just as at Strageath south of the Tay.
- 217. During the campaigning season some, perhaps many, of the garrison-forts in the rear will have been held only by detachments, small or large according to the estimated danger. The forts along the Highland line – the so-called 'glen-blocking' forts – will no doubt have been held at full strength since they served a vital purpose in the current campaign. For '*vacua castella*' see *Agricola* 32, 3.
- 218. The programme may have included as many as five more forts, whether they were actually built or only intended.

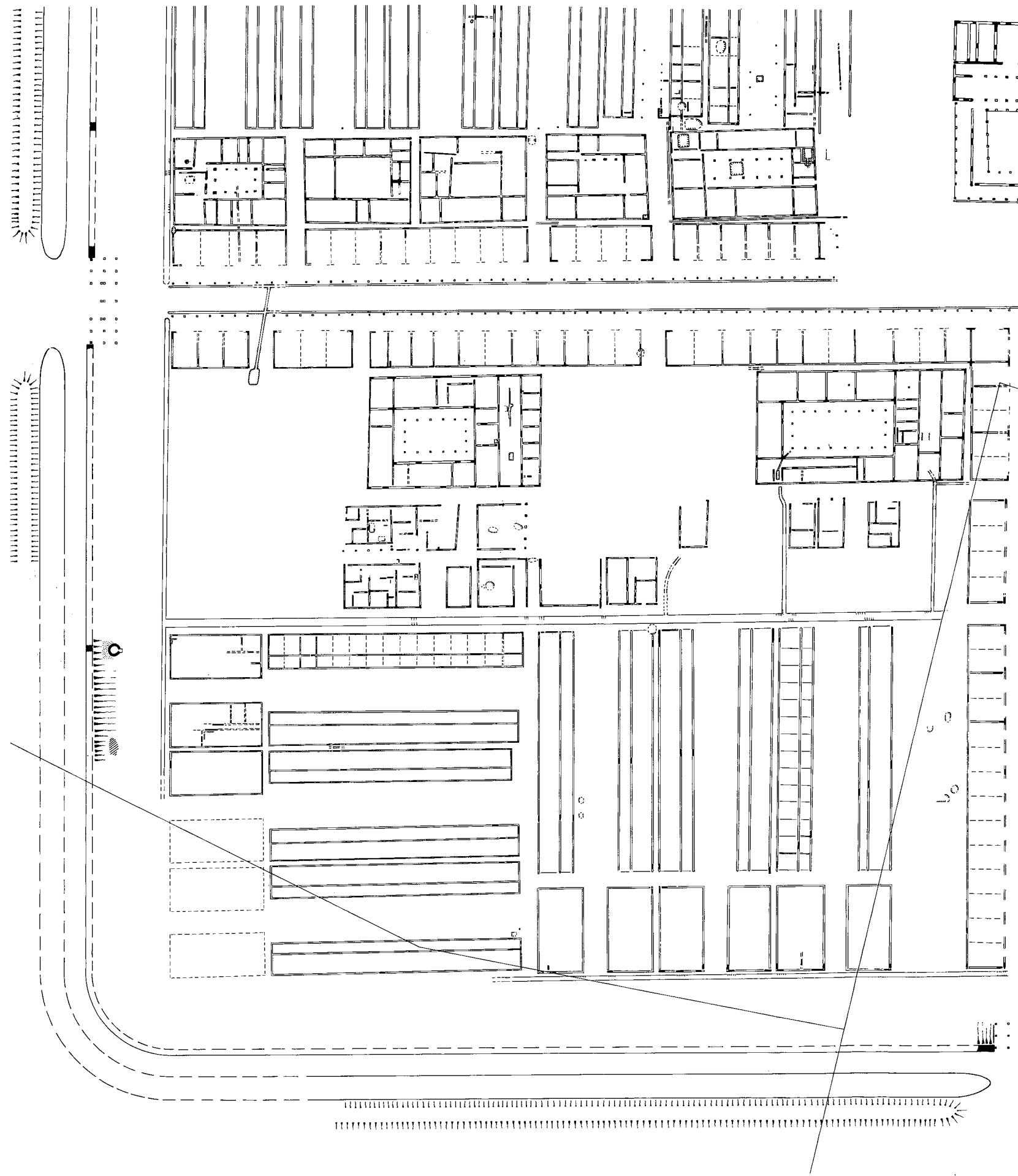


FIG. 81 Inchtuthil: plan of the south-west quarter. Scale, 1:1160. For drawn scale, see FIG. 82.

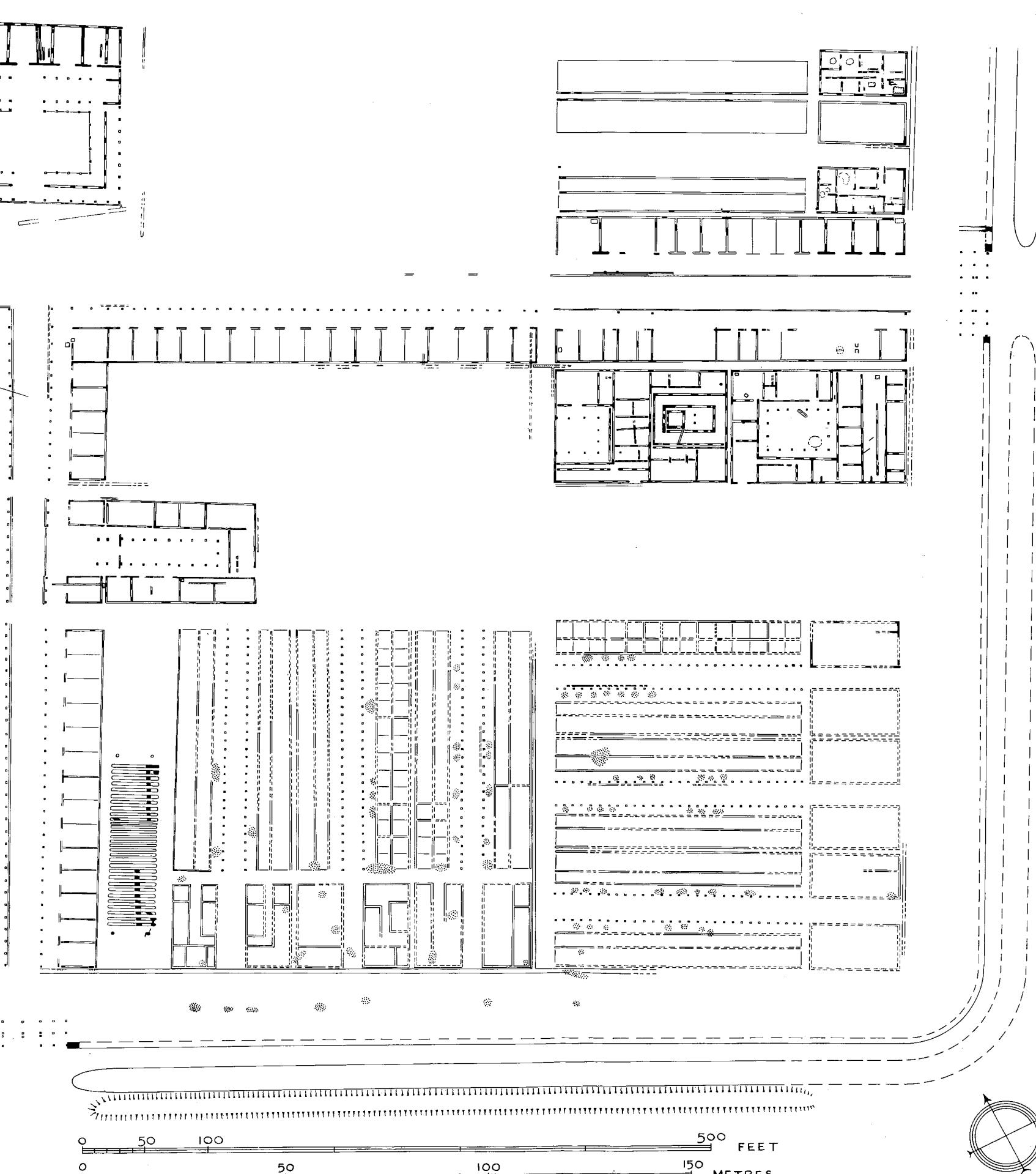


FIG. 82 Inchtuthil: plan of the south-east quarter. Scale, 1:1160.

of geography must have been appreciated at the start. The decision to build a series of forts on the Highland line and to engineer a supply road will then have followed. Construction must have begun in the sixth season so that the territory already won could be protected, and have continued the next year. In the year following the battle, the *status quo* may have been maintained; there was to be no further campaigning in the north, only consolidation and necessary building-work at forts already begun.

As to which legion was in occupation, there is no direct evidence. It would be natural if for a key assignment Agricola had chosen to honour Legion XX Valeria Victrix, which he himself had formerly commanded, just as Petilius Cerealis a few years earlier had singled out his own former legion, IX Hispana, for the new fortress thrust forward to York. The Twentieth Legion had previously been stationed at Wroxeter; but this position was no longer so vital now that Legion II Adiutrix had been established in a new fortress not far off at Chester, and now that the Welsh wars were over. Moreover, when after Agricola's recall Legion II Adiutrix was transferred to the Danube, it was Legion XX which took its place at Chester; the Ninth Legion remained at York and II Augusta at Caerleon. Thus the Twentieth may be assumed to be the garrison of Inchtuthil.

The thorough demolition that took place at the evacuation of the fortress makes the length of the occupation difficult to determine. The barracks had been occupied. Air photographs demonstrate that in some of the blocks each *contubernium* had its rubbish pit in the veranda. Of the ovens that were excavated, all had been fired: beside some of them were heaps of mixed earth and ash. No oven appeared to have been rebuilt: in one instance the presence of burnt clay suggested that an oven dome had been mended or reshaped. Metal-working had taken place in the *fabrica* and at a small bowl-hearth on the *intervallum*. In the bath-house within the temporary compound neither of the two stoke-holes had been fired, so that the building cannot have come into proper use before evacuation took place. It seems unlikely that even a temporary supply of running water had been provided for the fortress: for cooking, washing and the cleansing of latrines the lack must have been felt acutely. The legate's quarters, houses for three tribunes, the legionary bath-building and other minor structures were still unbuilt. The legionary administration made do with a 'temporary' *principia*. All these factors point to an evacuation at the earliest date consonant with the other evidence.

Professor Anne Robertson shows (p. 285) that the latest coins at the site date to 86, as did those at other forts north of the Forth. The coins seem to have come in bulk direct from the Rome mint for payment of the troops, and consignments were probably despatched each year since asses of 85 are recorded from Strageath and Newstead, while Newstead (situated south of the Forth-Clyde line) has also yielded two of 87.

The reason for the evacuation of Inchtuthil is perhaps most probably to be associated with the transfer of II Adiutrix to the Danube. This move left Chester unoccupied, a more vital Roman interest than Inchtuthil; Legion XX was therefore recalled to hold Chester. On the lower Danube Oppius Sabinus, governor of Moesia, had met a disaster at the hands of the Dacians in 85; in 86 or possibly 87 the praetorian prefect, Cornelius Fuscus, suffered the same fate. At length in 88 a Roman victory was won at Tapae. This sequence, taken with the fact that Inchtuthil was still receiving coins in 86, suggests that it was after the defeat of Fuscus that II Adiutrix was sent for to reinforce the army on the Danube. Accordingly we may assume that the evacuation of Inchtuthil occurred either in the late summer of 86 or at the latest in the spring of 87.

A second possibility has been suggested by Professor Frere (1967, 117 n. 2; 1974, 139 n. 20), namely that the evacuation of northern Scotland may not have been directly caused by the removal of Legion II Adiutrix, which may not have been ordered from Britain before 89 or 90; but that Agricola's extended conquests had resulted in an acute shortage of auxiliary units required for garrisoning the new territories. Some auxiliary forces may already have been sent to the Danube even before the departure of II Adiutrix (Bogaers 1967, 66–7; Saxon 1967, 24). In this event the new governor may have had good reason to re-assess policy, whether or not Domitian himself had lost interest in Scotland now that a decisive victory had been achieved, and had realized that the returns of occupation were not likely to balance its expenses.

The command to withdraw from Inchtuthil meant the demolition of the fortress. The wall was

thrown down, the gates and buildings dismantled. Flagstones flooring rooms in the bath-house in the Compound were lifted; those covering the outfall sewer from the hospital were removed and the channel filled with gravel. Two earthworks alone seem to have escaped the general demolition, namely the 'Western Vallum' and the defences of the 'Redoubt'. They may have been left till last and, in the time-table for evacuation, escaped destruction. Such timber work as was not removed was burnt, and the ashes used to fill holes where posts had been dug out. Surplus stores of samian and glass from some of the *tabernae* were thrown into gutters and trodden underfoot. Nearly ten tons of iron (chiefly unused nails) were buried in a pit beneath six feet (1.8 m) of earth, so that they should not be discovered. The work of the demolition-parties was thorough: nothing of possible use to an enemy was to be left. An empty plateau the army found when it came, a *tabula rasa* the army left when it went.

CONCLUSION (S.S.F.)

It has been shown that Inchtuthil was an integral part of the system devised by Agricola for the security of his advance to the north while he sought a decisive battle, and that it was in the late summer of 83, after the close of the sixth campaign, that the construction of the fortress was most probably begun. The fortress was placed near the point where the Tay leaves the Highlands, a position of twofold value. The Tay valley was the most likely route for any large force of Caledonians to take if it wished to attack the Roman lines of communication and supply behind Agricola's front; at the same time the valley would offer the best route later on for a Roman advance through the Highlands in the direction of Inverness once the expected battle had been won.

Tactically, therefore, the site occupies a good position in relation to immediate tasks, although one which differs markedly from the normal positioning of a legionary fortress. In the rest of the Empire fortresses are usually seen to serve long-term strategic as well as immediate tactical needs; they were often placed on navigable rivers for ease of supply and were better related to the whole area under control. A fortress at Carpow or Perth would have been more suited to serve long-term strategic needs. Furthermore, in relation even to the service and reinforcement of existing forts in Scotland Inchtuthil lies strangely far north. The location only makes proper sense if there had been an intention to extend the fort-system beyond Stonehaven to hold territory yet to be conquered between there and Inverness, and ultimately to penetrate the 'Highland line.'

There was no time to build these forts at the end of the next season in the weeks following Mons Graupius; and after that it was too late. The recall of Agricola in late 84 removed the mainspring of momentum. His successor, arriving in the early months of 85, had at the most two years before the removal of one of his legions compelled retreat. A shortage of auxiliary troops may have been felt even sooner. Thus construction-work at Inchtuthil and in northern Scotland as a whole may well have slowed down pending consultation with Rome and a final decision. In the summer of 86, or in early 87 at the latest, demolition of the fortress took place.

APPENDIX TO CHAPTER 25

1. ILS 1025 = CIL xiv 3612 (from Tivoli A.D. 118)

L. Roscio M.f. Qui. Aeliano Maecio Celéri cos., procos. provinc. Africae, pr., tr. pl., quaest. Aug., Xvir. stlitib: iudic., trib. mil. leg. IX Hispan. vexillarior. eiusdem in expeditione Germanica, donato ab imp. Aug. militarib. donis corona vallari et murali, vexillis argenteis II, hastis puris II, salio, C. Vecilius C.f. Pal. Probus amico optimo. L.d.s.c.

L. Roscius Aelianus had been *tribunus laticlavius* in Legion IX Hispana and had commanded a vexillation of that legion in the German expedition, where he was decorated by Domitian.

Most commentators have taken the context of the German expedition to be the Chattan War of 83, and indeed it must be different from the context of ILS 9200 (No. 2, below); for a senatorial tribune would hardly be serving as a subordinate in the large force assembled

under Velius Rufus who though a distinguished soldier was only of equestrian rank. It is established by R. Saxon (*Epig. Stud.* i (1967), 5–62, 118 f.) that when a vexillationary force of legionaries was despatched from a provincial army in time of war all the legions in that army contributed; and it therefore seems probable that on this occasion there was no exception. Saxon (p. 24), however, thinks that an officer as senior as Roscius would have been in charge of the whole expedition, had other vexillations been involved, and not merely of the vexillation of his own legion; and that it follows that (since no other vexillations are mentioned) this case is an exception to the general rule. In this way the recorded weakness of Legion IX in Scotland (*Agricola*: 26) can be accounted for. However, special pleading in face of a well-authenticated general rule is dangerous, and there may easily have been reasons why the vexillation of IX Hispana was separated from the others when the campaign started, or why, indeed, it may have arrived independently.

2. ILS 9200 = IGLS vi, 2796 (from Heliopolis (Baalbek))

C. Velio Salvi f. Rufo p.p. leg XII Fulm., praef. vexillariorum leg VIII: I Adiut., II Adiut., II Aug., VII Aug., VIII Hisp., XIII Gem., XX Vic., XXI Rapac., trib. coh. XIII urb., duci exercitus Africi et Mauretanici ad nationes quae sunt in Mauretania conprimendas, donis donato ab imp. Vespasiano et imp. Tito bello Iudaico corona vallar. torquibus faleris armillis, item donis donato corona murali hastis duabus vexillis duobus, et bello Marcommannorum Quadorum Sarmatorum adversus quos expeditionem fecit per regnum Decebali regis Dacorum corona murali hastis duabus vexillis duobus, proc. imp. Caesaris Aug. Germanici provinciae Pannoniae et Dalmatiae, item proc. provinciae Raetiae ius gladi. Hic missus in Parthiam Epiphanen et Callinicum regis Antiochi filios ad imp. Vespasianum cum ampla manu tributariorum reduxit. M. Alfius M. f. Fab. Olympiacus aquilifer vet. leg XV Apollinaris.

C. Velius Rufus had risen to be *primus pilus* in Legion XII Fulminata and later was placed in command of vexillations of 8 or possibly 9 legions. The orthodox view has been that this was in 83 and that the occasion was the Chattan War (Dobson, *Die Primipilares* (Bonn, 1978), No. 94, pp. 216–17). In the most recent discussion of the inscription, however, Kennedy (*Britannia* xiv (1983), 183–96) has shown the probability that this expedition occurred a little later, in 89 or not long after, and that Velius Rufus was now holding the rank of tribune. Wilkes (in Hartley and Wacher 1983: 270) also proposes the same context. Rufus was, however, of equestrian status, and (as pointed out above) Roscius Aelianus, a senatorial tribune and second in command of his legion, is unlikely to have served under him on this expedition. If so, 83 remains a likely context for the German expedition of Roscius.

INCHTUTHIL : GENERAL PLAN OF THE LEGIONARY FORTRESS

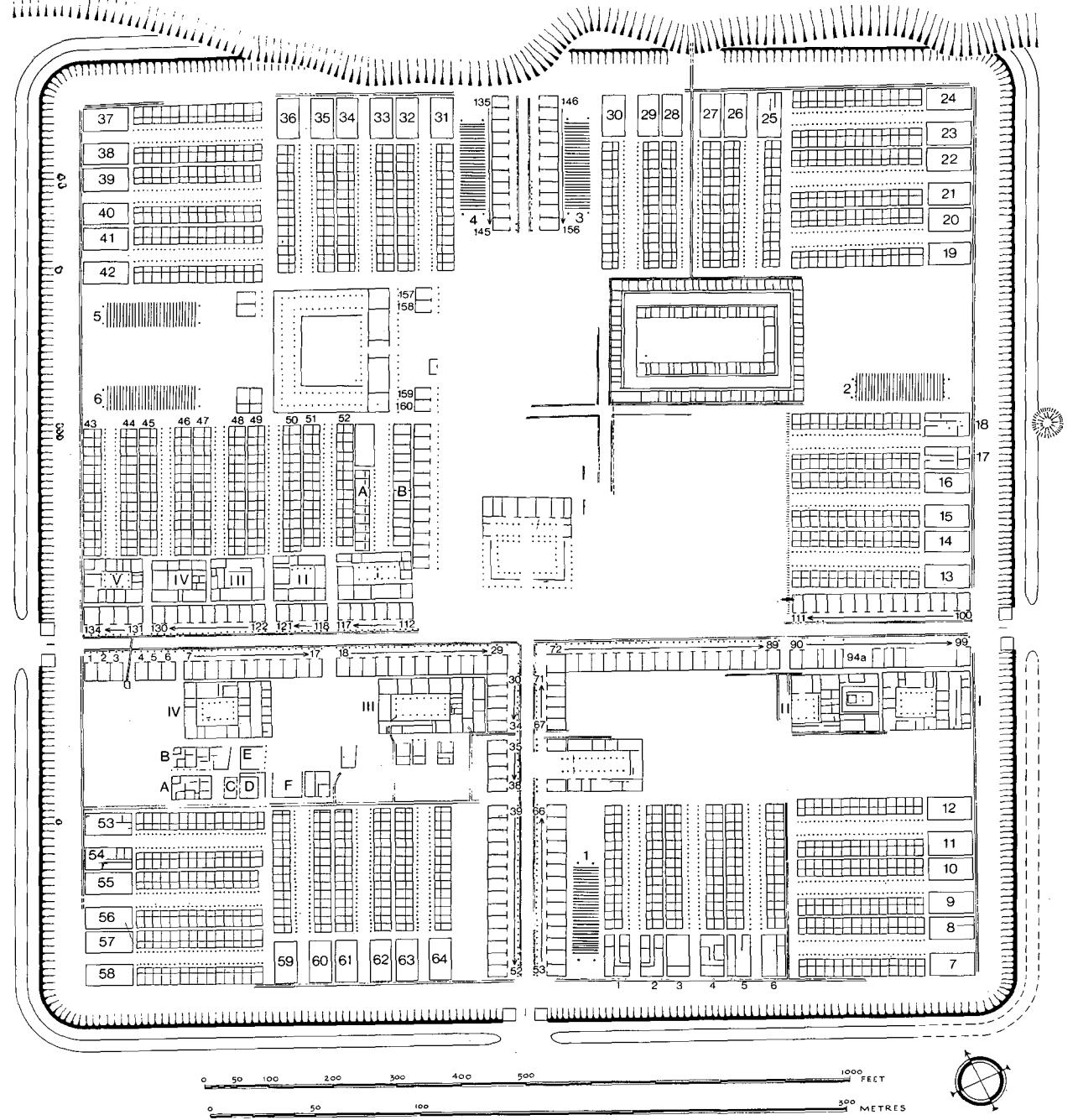


FIG. 83 Inchtuthil: plan showing position of numbered buildings.

INCHTUTHIL : GENERAL PLAN OF THE LEGIONARY FORTRESS

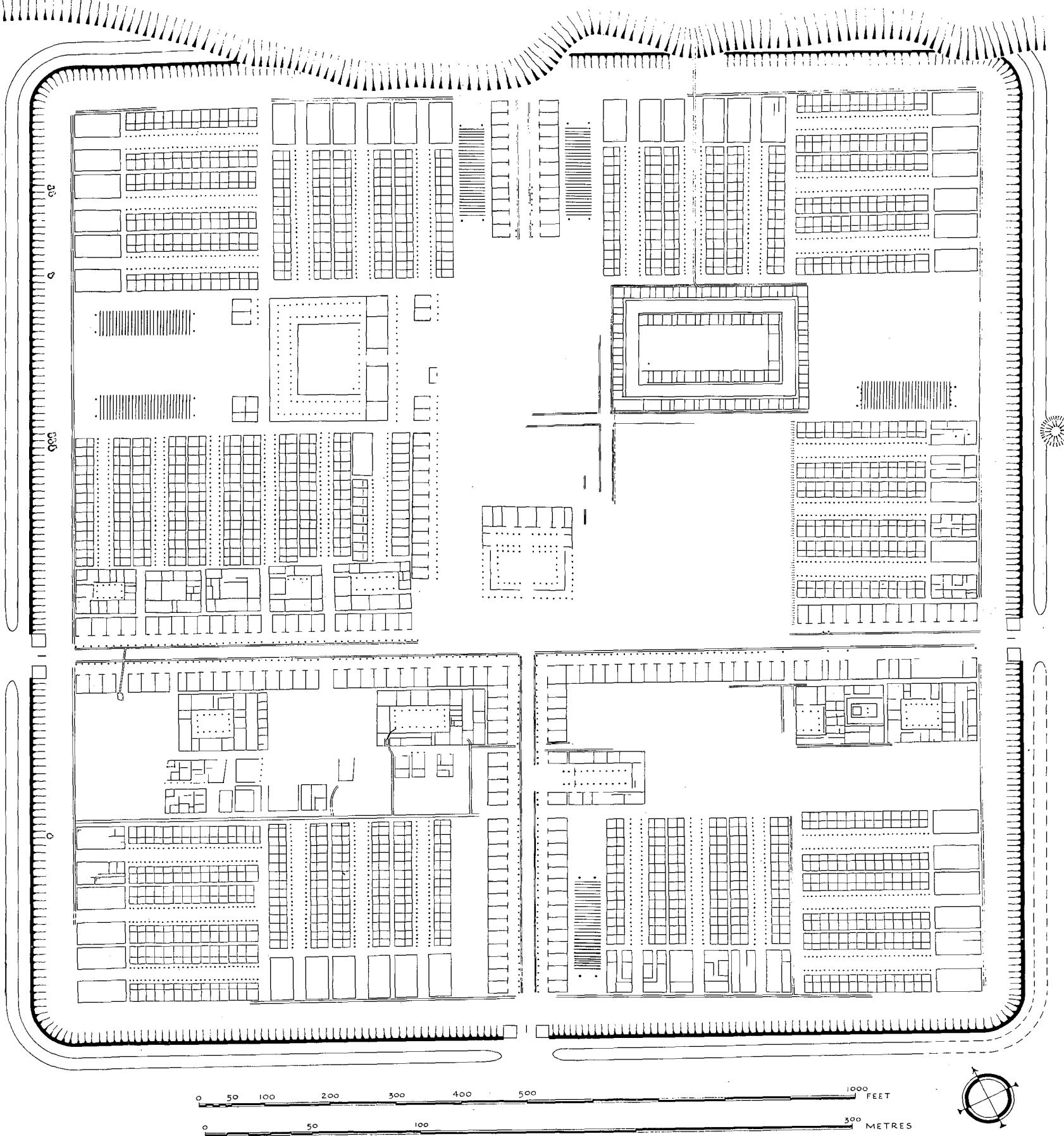


FIG. 84 Inchtuthil: restored plan of the fortress. Scale, 1:2307.

PART V: THE FINDS

CHAPTER 26 THE COINS²¹⁹ By ANNE S. ROBERTSON

A. FOUND DURING THE EXCAVATIONS OF 1952–1965 (Cp Robertson 1968, revised)

1. (1965) As of Vespasian (A.D. 69–79) Wt. 6.24 g. Diam. 27 mm. Axis ↓
Obv. [IMP CAES] VESPASIAN [AVG COS III]
Head of Vespasian, laureate, r.
Rev. Legend illegible S C
Female figure, draped, standing l. (Aequitas or Felicitas?)
Cp *RIC* 482, 485 A.D. 71 Badly corroded, very slightly worn?

2–7. Asses of Domitian (A.D. 81–96)

2. (1958) Wt. 10.59 g. Diam. 29 mm. Axis ↓
Obv. IMP CAES DOMIT AVG GERM COS XII CENS PER P P
Head of Domitian, laureate, bearded, r., with aegis
Rev. FIDEI PVBLICAE S C
Fides, draped, standing r., holding corn-ears and poppy downwards in r. hand,
dish of fruit in l. hand
Cp *RIC* 332 (but rev. FIDEI) A.D. 86 Unworn, mint condition (Possibly from
same obv. die as As found at Crawford)
3. (1960) Wt. 7.09 g. Diam. 27 mm. Axis ↓
Obv. [IMP CAES DOMIT AVG] GERM COS XII CENS PER P P
Head of Domitian, laureate, bearded, r., with aegis
Rev. MO[NE]TA AVGVS[TI] S C
Moneta, draped, standing l., holding scales and cornucopiae. *RIC* 335 A.D. 86.
Corroded, but unworn. (Possibly from same obv. die as As found at Stracathro)
4. (1955) In pill-box marked ‘Inchtuthil Barrack 26, Surface’ (shown to A.S.R. by
Margaret Darling, 1978)
Wt. 7.16 g. Diam. 27 mm. Axis ↓
Obv. [IMP CAES] DOMIT AVG GERM COS XII CENS PER P P
Head of Domitian, laureate, bearded, r., with aegis
Rev. [MONETA] AVGVSTI S C
Moneta, draped, standing l., holding scales and cornucopiae.
RIC 335 A.D. 86. Corroded, but unworn.
5. (1957) Wt. 7.83 g. Diam. 27 mm. Axis ↓
Obv. IMP CAES DOMIT AVG GERM COS XII (?) [CENS PER P P]

219. References are to *Roman Imperial Coinage*, vol. 2 (1926).

- Rev. Head of Domitian, laureate, bearded, r., probably with aegis
[VIRTVTI] AVGVSTI S C
 Virtus, helmeted, draped, standing r., l. foot on helmet, holding spear reversed
 and parazonium
 Cp RIC 340. A.D. 86 (?) Badly corroded, not worn.
6. (1958) Wt. 5.96 g. Diam. 17 mm. Axis ↓
Obv. **[IMP CAES] DOMIT AVG GERM [COS XI(I) CENS PER P P]**
 Head of Domitian, laureate, bearded, r., with aegis
Rev. **[MONETA AVGVSTI] S C**
 Moneta, draped, standing 1., holding scales and cornucopiae
or just possibly
 Fortuna, draped, standing 1., holding rudder and cornucopiae
 Cp RIC 335 (Moneta), or RIC 333 (Fortuna). Badly corroded, not worn.
- On Nos. 5 and 6, the position of **GERM** above Domitian's head on the *obv.* suggests **COS XI** (A.D. 85, late), or **COS XII** (A.D. 86), or less probably **COS XIII** (A.D. 87), as the most appropriate readings.
7. (1954) Wt. 5.96 g. Diam. 28 mm. Axis ↓
Obv. **[IMP CAES DOMIT AVG] GERM COS XII(I?) [CENS PER P P]**
 Head of Domitian, laureate, bearded, r., possibly with aegis
Rev. **[FORTV]NAE (?) [AVGVSTI] S C**
 Fortuna, draped, standing 1., holding rudder and cornucopiae
or just possibly
 Moneta, draped, standing 1., holding scales and cornucopiae
 Cp RIC 333, 353 (Fortuna), or RIC 335, 354 (Moneta). Badly corroded, very little
 worn.

A Ms note by Professor Richmond about this coin, just after cleaning, said that 'on the obverse there appear to be three strokes after COS X, which would yield COS XIII (= A.D. 87).'

B. FOUND DURING EARLIER EXCAVATIONS, 1901

(Cp Macdonald 1917–18, 233 f.)

8. (1901) *Obv.* **[IMP CAES DOMIT AVG GERM COS XI . . .] CENS POT or PER [P P]**
 Head of Domitian, laureate, bearded, r., possibly with aegis
Rev. **[MONETA] AVGVSTI S C**
 Moneta, draped, standing 1., holding scales and cornucopiae
 Late A.D. 85, or later. Corroded, not worn.

The As of Vespasian, of A.D. 71 (No. 1), minted either at Rome or in Gaul (Lyons), is one of a series of bronze coins of Vespasian's reign, issued in 70 – early 73, and 77–78, usually from the Lyons mint. Other examples, all from the Lyons mint, have been recorded from Cardean, Strageath, Camelon, Crawford, Easter Happrew and Newstead (Robertson, 1983, 418 f.) It seems probable that the Inchtuthil As of 71 also came from the Lyons mint, but its badly-corroded state makes it impossible to decide with certainty whether or not the portrait of Vespasian on the obverse had a globe at the point of the bust. The globe is regarded by numismatists as an indication of Lyons mintage.

The Asses of Domitian from the 1952–1965 excavations at Inchtuthil were all minted at Rome. They form part of a series of sestertii (rare), dupondii and Asses, of late 85, or more often of 86 (or later?), almost all in unworn or hardly worn condition, which reached Roman sites in Scotland (Robertson 1983, 419).

Three of the Inchtuthil Asses (Nos. 2–4) have an *obv.* legend whose ending reads clearly **COS**

XII CENS PER P P, and certainly date to 86. Two other Asses (Nos. 5–6) have a less clearly legible end to the *obv.* legend IMP CAES DOMIT AVG GERM COS XII(?) [CENS PER P P], but the position of GERM above the head of Domitian, and the presence of the aegis on his chest suggest a date not later than 86, after which the aegis occurred less often. The *obv.* legend would then have ended either in COS XI CENS POT or PER P P (i.e. late 85), or in COS XII CENS PER P P (A.D. 86). The As found in the 1901 excavations also ended with CENS POT or PER P P, and must have been issued in late 85, or in 86, or just possibly later.

The other Inchtuthil As which has to be given consideration as an issue possibly later than 86 is that found in 1954 (No. 7). It seemed to Professor Richmond to have three strokes after COS X (i.e. COS XIII = A.D. 87) The three strokes have not been confirmed with certainty in recent re-examination (ASR).

Nevertheless, in order to establish either A.D. 86, or possibly 87, as a *terminus post quem* for the evacuation of Inchtuthil and related Roman sites, the other Domitianic Asses found in Scotland have been re-scrutinised. Those which certainly date to 86 (the *obv.* legend ending unequivocally in COS XII CENS PER P P) comprise one from Stracathro, one from Dalginross, two from Strageath, two from Camelon, one from Cramond (dupondius or As), one from Crawford, at least three from Newstead, besides one from the native site at Traprain Law.

In addition, there are Domitianic Asses, probably of 86, from Strageath and Barochan (1 each), and possibles from Camelon, Castledykes (1 each), and from Newstead (7 or 8). Recent re-examination of these has given no encouragement for a reading of COS XIII CENS PER P P at the end of the *obv.* legend.

The probables from Strageath and Barochan, and the possible from Castledykes each have the *rev.* legend MONETA AVGSTI S C, and the Camelon possible has the *rev.* legend FORTVNAE AVGSTI S C. The 7 or 8 possibles from Newstead have *rev.* FIDEI PVBLICAE S C, FORTVNAE AVGSTI S C, and MONETA AVGSTI S C (3), besides two or three with *rev.* uncertain.

The same reverses feature on those Domitianic Asses found in Scotland, which are firmly dated to 86:

FIDEI PVBLICAE S C	Inchtuthil 1	Total 1
FORTVNAE AVGSTI S C		Camelon 1 Cramond 1
		Crawford 1 Newstead 1 Total 4
MONETA AVGSTI S C	Inchtuthil 2	Stracathro 1
		Dalginross 1
		Strageath 2
		Cameron 1
		Newstead 2
		Traprain Law 1 Total 10

The prevailing reverse, MONETA AVGSTI S C, Moneta, draped, standing l., holding scales and cornucopiae, first appeared on Asses of Domitian minted in late 84, or in 85, and continued in use to the end of his reign, although becoming less dominant. Its introduction may have commemorated increased activity at the Roman mint (Robertson 1971, 132).

The search for Domitianic Asses other than those of A.D. 86 (found in Scotland) has not been entirely fruitless. Newstead has produced, besides the Asses listed above, two of A.D. 84, two of 85, and two of 87, plus three sestertii and some dupondii/Asses of 85–96 (Curle 1911, 405–6). Newstead, however, remained in Roman occupation for a decade or more after 86.

The failure to identify any Domitianic Asses datable with certainty to A.D. 87 from Roman sites in Scotland, other than Newstead, leaves in isolation the Inchtuthil As found in 1954, and thought by Professor Richmond to include COS XIII in its *obv.* legend. This As, and other Domitianic Asses of c. 85–86 from Scotland show little or no traces of wear. They had not made a laborious, long-drawn-out journey to North Britain through hand-to-hand circulation, but arrived swiftly in bulk, one staging-post on the journey being possibly Corbridge (Robertson 1983, 420). They carry the life of the legionary fortress at Inchtuthil down to at least the end of 86, and possibly to 87. The absence of wear on these Asses suggests a terminal date very shortly thereafter.

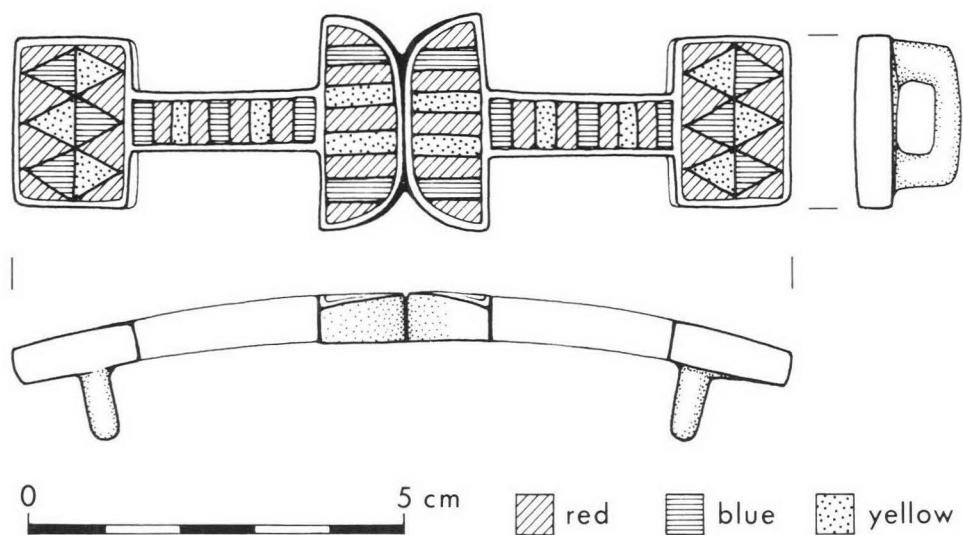
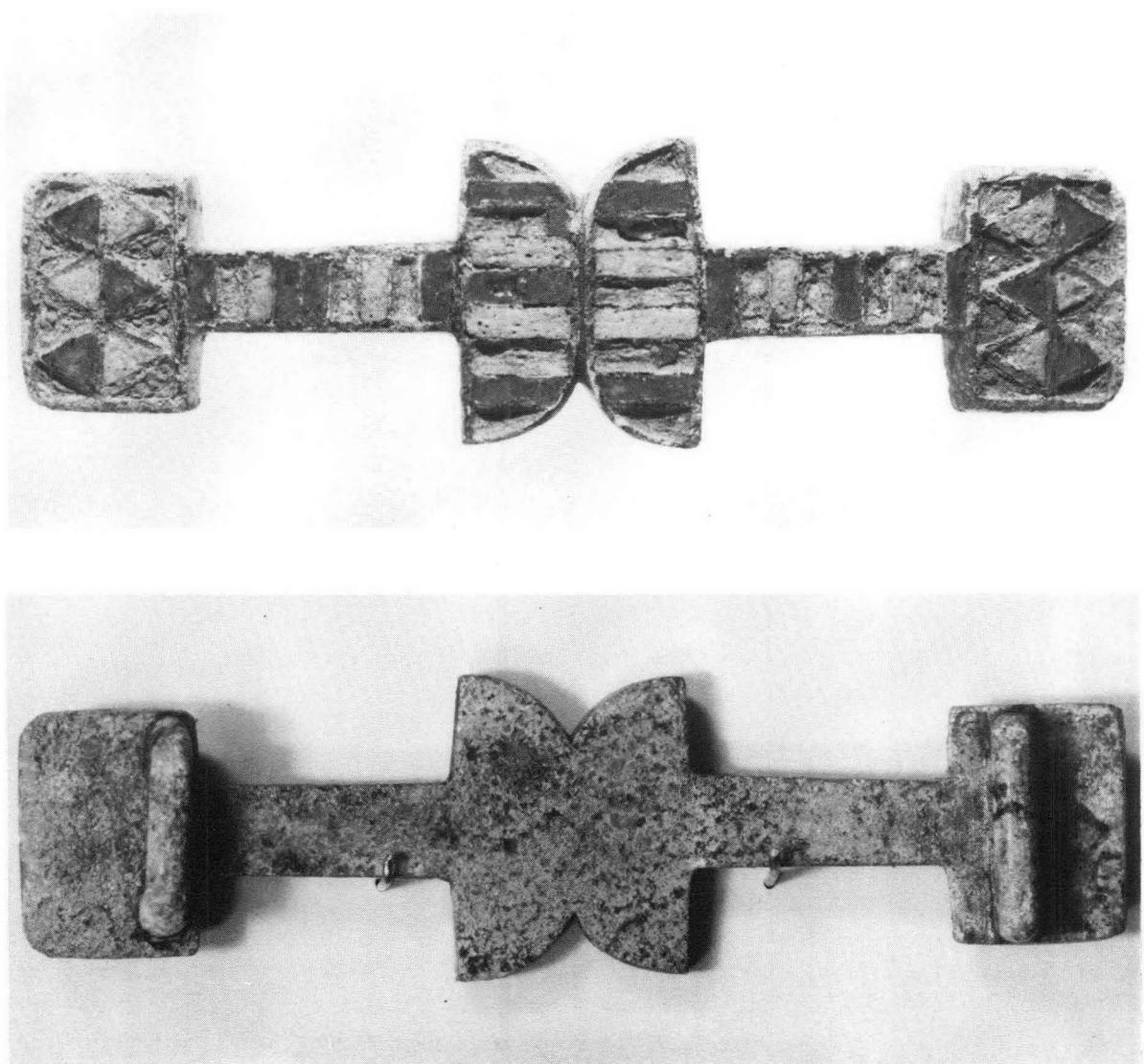


FIG. 85 Enamelled bronze harness attachment. Scale, 1:1.



(Photo: National Museum of Antiquities, Edinburgh, copyright reserved)

Pl. XLV Enamelled bronze harness-fitting.

CHAPTER 27

OBJECT OF BRONZE (FIG. 85)

Enamelled attachment, probably from horse-harness (PL. XLV), drawn by Miss Helen Jackson. The object, an old surface-find preserved at Delvine House, was presented to NMA (Accession No. FY 168) in 1959 by Captain R.E. Stevenson (*PSAS* xciii (1959–60), 252–3, with pl. XV 3). It has been previously published also by Morna Macgregor, *Early Celtic Art in North Britain* ii (Leicester, 1976) No. 32, who classified it as one of a small group of *Elongated Strap-Junctions*.

The object is of cast leaded bronze, consisting of a bar with central opposed crescentic panels and rectangular terminals, with a pair of strap-holders below the latter. The profile is faintly bowed. The bronze has a green patina and the surface carries a series of cells containing different-coloured enamels. It was examined by Dr. J. Tate in the Research Laboratory of the NMA; his report is as follows:

X-RAY FLUORESCENCE ANALYSIS R7951

(Analysis Number: F1404B to 1409B)

Object Description

Roman bronze harness-mount inlaid with blue, red and yellow ochre enamel. 103 × 28 mm.

Results

Bare metal (F1408B): leaded bronze. The grey areas on the surface could be the remains of a tinned surface finish.

Red (F1406B). This is a high-lead enamel coloured by copper. There is some antimony acting as an opacifier. The decayed red material has a similar composition and is most likely the remains of a red enamel frit used to fill the bottom of the cells.

Blue (F1414B). The colourant here is almost certainly cobalt; the most interesting feature is the very large amount of antimony. It is likely to be the opacifying effect of the antimony which stops the fairly pale blue being translucent.

Yellow Ochre (F1405B). This has been described as white (MacGregor), pink (*PSAS*) or buff (catalogue). The composition is high lead with both tin and antimony. Yellow is formed by both tin and antimony combined with lead, whites more often from calcium and antimony. It may be that yellow was intended but an excess of antimony was added, or that the firing was incorrect. In any case it seems that the present colour is close to the original, whatever the original intention. There is no indication of a corroded surface layer with a different colour beneath.

There are several other features. The reds exist as porous, dull-coloured material below the surface of the cells or else as good-quality, flat-surfaced enamel. The latter lie above the duller red material as can be seen in the damaged cells. The blues have good-quality surfaces and fit very well into the edges of the cells, too well to be glass rectangles cut and stuck into place since they follow the non-uniform edges of the cells. The yellow ochres have less well preserved surfaces and seem generally more full of bubbles. Both the red and blue show polishing scratches, but

these scratches do not all line up: for the rectangular cells the scratches are always parallel to the shortest edge. The yellow ochre does not show a similar regularity of marks.

A possible explanation is that the red and blue panels were made by setting thin pieces of opaque glass into each cell above a frit of slightly lower melting point, while the yellow ochre was prepared as a frit directly in each cell. The piece was then fired to form the yellow-ochre enamel, at the same time fusing the red and blue panels into place in the cells and to the cell walls. It can be seen that where the red panel is missing the remaining material is not always red, suggesting the use of any suitable spare frit. The nature of the brownish material visible particularly in the triangular cells containing dull red enamel is not clear. It seems to remain in ridges, presumably what were cracks in the overlying enamel. Perhaps simply the least viscous phase of the molten frit? Further examination requires the use of a scanning electron microscope and removal of small samples.

The analysis graphs are not published here, but are preserved in the laboratory archive.

CHAPTER 28

THE IRON OBJECTS

By W.H. MANNING

A. NAILS

The hoard of ironwork discovered in 1960 buried in a deep pit in the *fabrica* (p. 109) is by far the largest metalwork hoard recorded as having been found in Britain. The circumstances of its discovery are given elsewhere in this volume (pp. 109–13); here we need only note that it contained nine wheel-tyres and nearly ten tons of nails. Although Richmond himself stated that the nails were unused (*JRS* li (1961), 160) it is clear from many of the surviving examples and from the examination made by Dr. Henry Cleere and his associates that a large proportion had the bent stem which is characteristic of nails which have been levered out of timber. The hoard, therefore, probably contained both unused nails in stock at the time of the demolition and used nails collected during the demolition.

The total number of nails in the hoard probably exceeded one million. The original examination estimated the totals for each group by sorting them into their basic types, weighing the entire bulk of each type, and then counting out a weighed sample, from which the total number in the main group could be calculated. The overall total thus obtained was 875,428; but this was felt to be low by between 5% and 10% as only whole nails were classified and no account was taken of the large number of broken nails, nor of those corroded together. As Cleere and his associates record that at least two tons (over 16%) of corroded nails had to be discarded, the original total may safely be assumed to have been in excess of one million.

The nails, but not the tyres, were examined and reported on by N.S. Angus, G.T. Brown and H.F. Cleere in *The Journal of the Iron and Steel Institute* (Vol. 200 (November 1962), 956–68) in which there is a full report on the metallographic examination of a sample of the nails. Cleere and his collaborators were able to divide them into six groups (A–F), defined on the form of the stems, their overall length, the diameter, shape and thickness of the head, the section of the stem 0.5 inches below the head, and the weight; a degree of precision made possible by the exceptional preservation of the examples chosen for examination (TABLE XVII, p. 292).

In **Group A** (FIG. 86) were large robust nails with square-sectioned tapering stems and pyramidal heads. Their lengths ranged between 8 $\frac{7}{8}$ in. and 15 $\frac{5}{8}$ in. (22.5–37.2 cm). They were divided by the contour of the head into (i) Those with heads with an apex angle of 120°. (ii) Those with heads with an apex angle of 150°. In Type Aii the flatter head was matched by shorter and thinner stems.

Groups B–E formed a continuous series of nails with overall lengths ranging from 9 $\frac{1}{2}$ in. (24.1 cm) at one extreme to 1 $\frac{1}{2}$ in. (3.8 cm) at the other. Group B: 6 $\frac{3}{4}$ in. to 9 $\frac{1}{2}$ in. (17.1–24.1 cm). Group C: 4 in. to 6 $\frac{1}{8}$ in. (10.2–15.5 cm). Group D: 2 $\frac{7}{8}$ in. to 4 in. (7.3–10.2 cm). Group E: 1 $\frac{1}{2}$ in. to 2 $\frac{3}{4}$ in. (3.8–7 cm). All had square-sectioned, tapering stems and discoidal heads. A

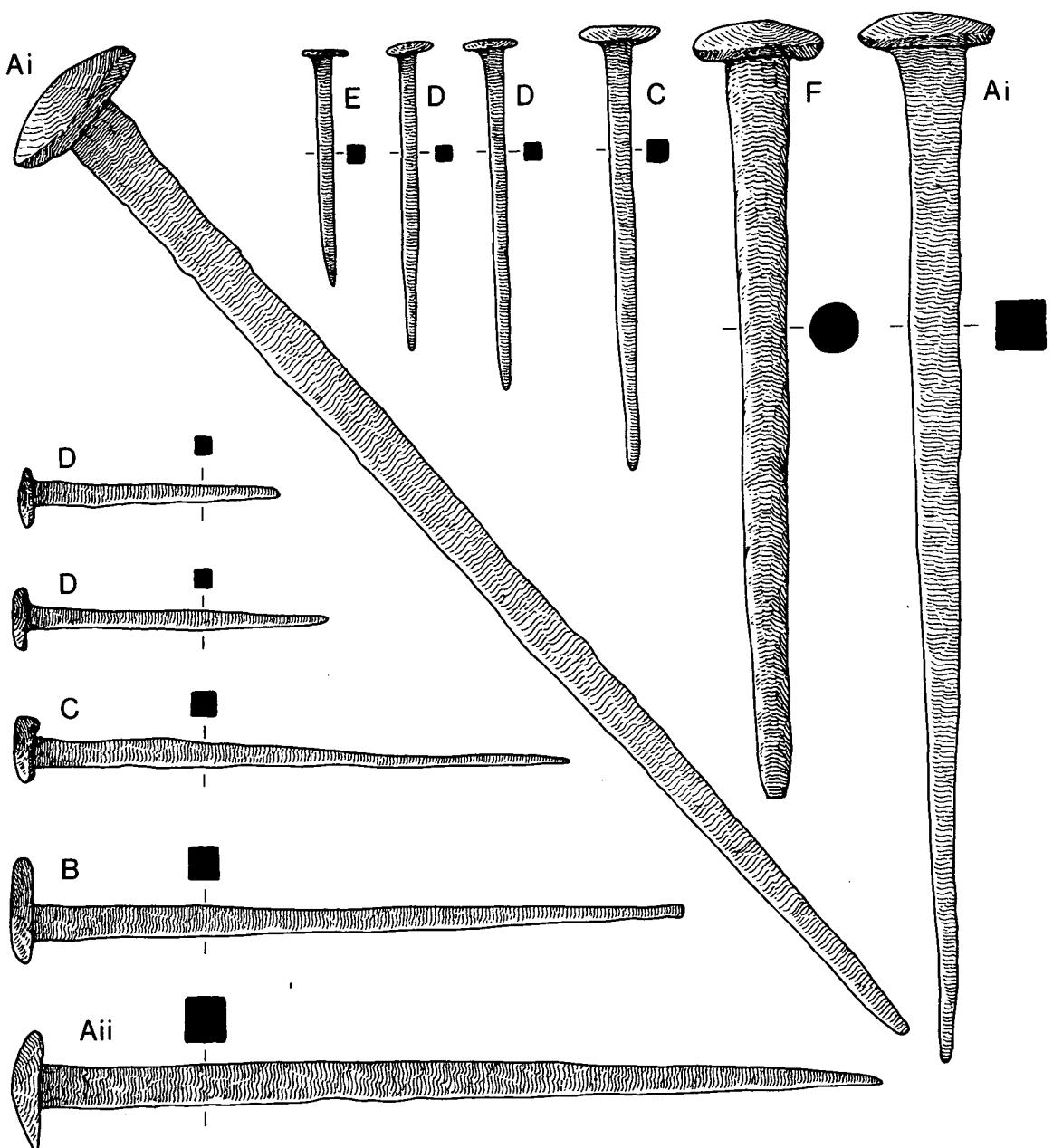


FIG. 86 Iron Nails from Pit in Fabrica. Scale, 1:2.

number, especially in the larger sizes (Group B) had rather rectangular heads, but this was felt to have been the result of bad workmanship rather than of design. The uniformity of the smaller nails was remarkable. Of those examined in Group E more than 60% had lengths of $2\frac{1}{4}$ in. to $2\frac{1}{2}$ in. (5.7–6.3 cm), and over 80% had head-diameters within the range $\frac{1}{2}$ in.– $\frac{7}{16}$ in. (1.3–1.1 cm), and all had a stem section of precisely $\frac{1}{8}$ in. (0.3 cm).

Group F was a very small group of stout nails, which were most unusual in having tapering, round-sectioned stems with chisel edges. In length they ranged from $8\frac{1}{2}$ in. to $8\frac{3}{4}$ in. (21.6–22.2 cm). Examinations of the shank showed that they had been made from square-sectioned stock and then forged into a round section apparently after the head had been formed. Cleere noted that they were generally more robust than the square-sectioned ones of the same length and suggested that they might have been intended to fasten wood to masonry, perhaps being driven into the mortared joints between the blocks.

The excellent preservation of many of these nails enabled an accurate measurement to be taken of the cross-section of the stem $\frac{1}{2}$ in. (1.3 cm) below the head, a point which is significant as it

indicates the size of the die in which the stem was held when the head was forged. As can be seen from TABLE XVII (p. 292) there was a high degree of correlation between length (as indicated by the Group) and die size (TABLE XVIII). Only the largest nails of Group A, which had the greatest variation in length, showed any substantial range of die sizes. In a few cases embossed lines were observed on the underside of the head running diagonally from the corners of the stem, suggesting either that they had been made in a four-piece die or that the dies had tended to split at the corners during prolonged use.

A number of the nails was metallographically examined and subjected to hardness tests. These showed that there was considerable variation in the carbon content (which controls the hardness of the metal) within individual nails. "There was a tendency for high-carbon material to be associated more with the larger sizes of nails than with the smaller, and there is just a trace of a suggestion that it is concentrated towards the upper part of the nail . . . Concentration of such material in the head and shank would result in a stronger nail and would also be of value in preventing the head from spreading" (Angus, Brown and Cleere 1972, 966). However, a note of caution was sounded by the observation that the Group F nails, which were postulated as masonry nails, had a lower average carbon content than did the square-sectioned ones of equal size (a maximum of 0.2% as against 0.9%), although the reverse would have been expected if they were masonry nails and if the Roman smith was choosing incipiently harder metal for those nails which would receive the heaviest usage.

The proportions of the various groups (TABLE XVII) is of some interest in showing the great preponderance of Group E nails, which formed some 87% of the total. But this is not surprising, for it would be nails of this size (1.5–2.75 in. (3.8–7.0 cm)) which would have been used to attach cladding to frames and which would have been needed in immense quantities in a timber fortress. However, it would be unwise to assume that these percentages precisely reflect the original proportions of nails at Inchtuthil, for it must be remembered that they were intentionally discarded and that the larger ones, which might weigh as much as one hundred of the smaller ones, had a considerable scrap value and many may have been removed from the group before they were buried. The smaller nails would have had to be welded together before they could be reused, a tedious and time-consuming process which would make them less attractive as a source of raw material to the Roman smith, although probably not to the natives of the area who lacked the resources of the Roman army, and to whom iron was as valuable as gold, according to Herodian a century later (*Histories* iii, 14, 7), as Richmond himself pointed out.

Work on other groups of nails since the Inchtuthil material was published has tended to emphasise the essential similarity of Types A–E, and the present writer would regard them all as representing a single basic type divisible into two sub-types on the form of the head; this is the classification used in the report on the ironwork from Verulamium (Manning in Frere 1972) and more recently in the Catalogue of Romano-British Ironwork in the British Museum (Manning 1985). In this scheme Cleere's Groups Ai and Aii become Type 1A, and his Groups B–E become Type 1B. Group F remains as rare today as when Cleere wrote in 1962, when no other examples could be found; even now the writer is aware of only one other nail of this general type, from the Gadebridge Park villa (Manning 1974: 173, fig. 74, 486), although even that is smaller than the Inchtuthil ones. Whether they were intended as masonry nails must remain an open question, but it may be significant that they do not occur on the many Roman sites, both military and civilian, where masonry buildings are common.

The basic form of nail found at Inchtuthil accounts for the vast majority of Roman nails, and examples could be cited from innumerable sites both from Britain and abroad; a short list is given in the British Museum Catalogue and need not be repeated here. Other nail forms, with one exception, are generally rare and many of them were intended as decorative studs on upholstered furniture. The exception to this is a form with a flat, rectangular-sectioned tapering stem and a triangular or diamond-shaped head of the same thickness as the stem (Type 2 of the Verulamium Report and British Museum Catalogue Type Series). In use the head could have been hammered into the grain of the wood thus making it invisible from a distance. Although rarer than Type 1, and rarely found in the smaller sizes, it is by no means an uncommon type (for instance Manning in Frere 1972, 186, fig. 69 for examples from Verulamium), and its complete absence from

Inchtuthil is surprising. Perhaps the explanation is that in a fortress of that date it was not thought necessary to conceal the heads of the larger nails.

TABLE XVII
CLASSIFICATION OF ROMAN NAILS FROM INCHTUTHIL

Group	Overall length (inches)	Dia. of head (inches)	Shape of head	Thickness of head (inches)	Section of shank $\frac{1}{2}$ in. below head (inches)	Weight (grammes)	Total found	No. examined
A(i)	9 $\frac{3}{4}$ –14 $\frac{5}{8}$	1 $\frac{1}{4}$ –2 $\frac{1}{8}$	Pyramidal	5/16–3/4	7/16–11/16	152–416	1344	16
A(ii)	8 $\frac{7}{8}$ –10 $\frac{3}{4}$	1 $\frac{1}{16}$ –1 $\frac{1}{16}$	Flattened pyramid	1/4–5/16	3/8–1/2	92–178		
B	6 $\frac{3}{4}$ –9 $\frac{1}{2}$	3/4–1 $\frac{1}{8}$	Disk	1/8–1/4	5/16–3/8	46–75	25088	31
C	4–6 $\frac{1}{8}$	5/8–3/16	Disk	1/16–3/16	3/16–5/16	13–37		
D	2 $\frac{7}{8}$ –4	9/16–3/4	Disk	1/16–3/16	1/8–1/4	5–17	85128	79
E	1 $\frac{1}{2}$ –2 $\frac{3}{4}$	3/8–5/8	Disk	1/16–1/8	1/8	2–6	763840	57
F	8 $\frac{1}{2}$ –8 $\frac{3}{4}$	1 $\frac{1}{2}$	Flattened cone	1/2	3/4	225–256	28	4

(After Angus, Brown and Cleere Table I)

Note: to convert inches to millimetres, multiply by 25.4.

TABLE XVIII
CLASSIFICATION OF NAILS ACCORDING TO DIE SIZE

Group	Die sizes in inches									
	1 $\frac{1}{16}$	5/8	9/16	1/2	7/16	3/8	5/16	1/4	3/16	1/8
A(i)	4	5	3	2	2					
A(ii)				2	5	1				
B						9	22			
C							2	29	2	
D								5	71	3
E										57

(After Angus, Brown and Cleere Table II)

Note: to convert inches to millimetres, multiply by 25.4.

B. TYRES

Although the greater part of the hoard was formed of nails it also contained nine large cart tyres, by far the largest group of Roman tyres to have been found in Britain.²²⁰ All appear to have been used and four had been broken; in one case only part of the tyre had been thrown into the pit (No.9). It is most unlikely that any of them were still attached to the wheel when they were deposited.

Although the number of complete tyres known from Roman Britain is fairly small it is clear that they varied considerably in diameter, ranging from extremes of c. 87.5 cm to 113 cm (34.5–44.5 in.), with the Inchtuthil ones falling at or near the upper limit.

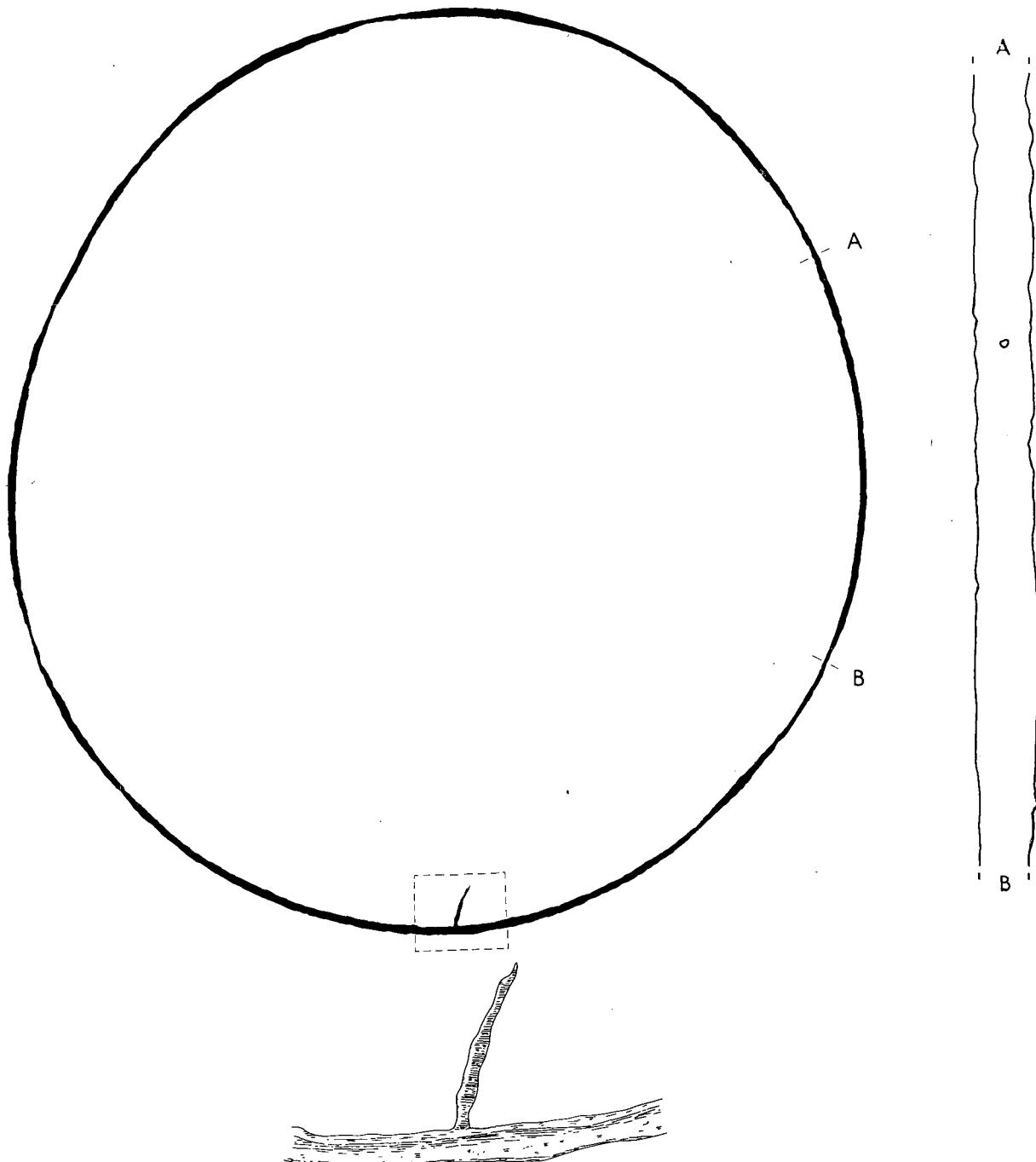


FIG. 87 Iron tyre No. 1. Scales, tyre, 1:8; length of surface, 1:4; detail of nail, 1:2.

220. In his brief initial report on the hoard Richmond referred to ten tyres (*JRS* li (1961), 160), whereas there are only nine in the National Museum of Antiquities of Scotland. As it is highly unlikely that one of them disappeared between discovery and accession by the museum, we must assume that Richmond believed that the fragments came from five tyres and not four as is now thought to be the case.

COMPLETE TYRES

Bar Hill, Dumbarton (Antonine). Diameter 87.5 cm (34.5 in.). (On wheel). (Macdonald and Park: 1906, 496, fig. 34)

London. Diameter 87.5 cm (34.5 in.). (Fox 1946: 95)

Newstead, Roxburgh (Antonine). Diameter 91.5 cm (36 in.). (Two, both on wheels). (Curle 1911: 292, pl. LXIX, 2 and 2a-c)

Loudoun Hill, Ayr (Antonine). Diameter 101 cm (40 in.). (Two). (Hunterian Museum, Glasgow)

Great Chesterford, Essex (Fourth century). Diameter 109 cm (43 in.). (Four). (Neville 1856: 7)

Silchester, Hants. Diameter 109 cm (43 in.). (Two). (*Archaeologia* lviii (1902), 32)

WHEELS WITHOUT TYRES

Bar Hill, Dumbarton (Antonine). Diameter 96 cm (38 in.). (Macdonald and Park 1906: 501, fig. 33)

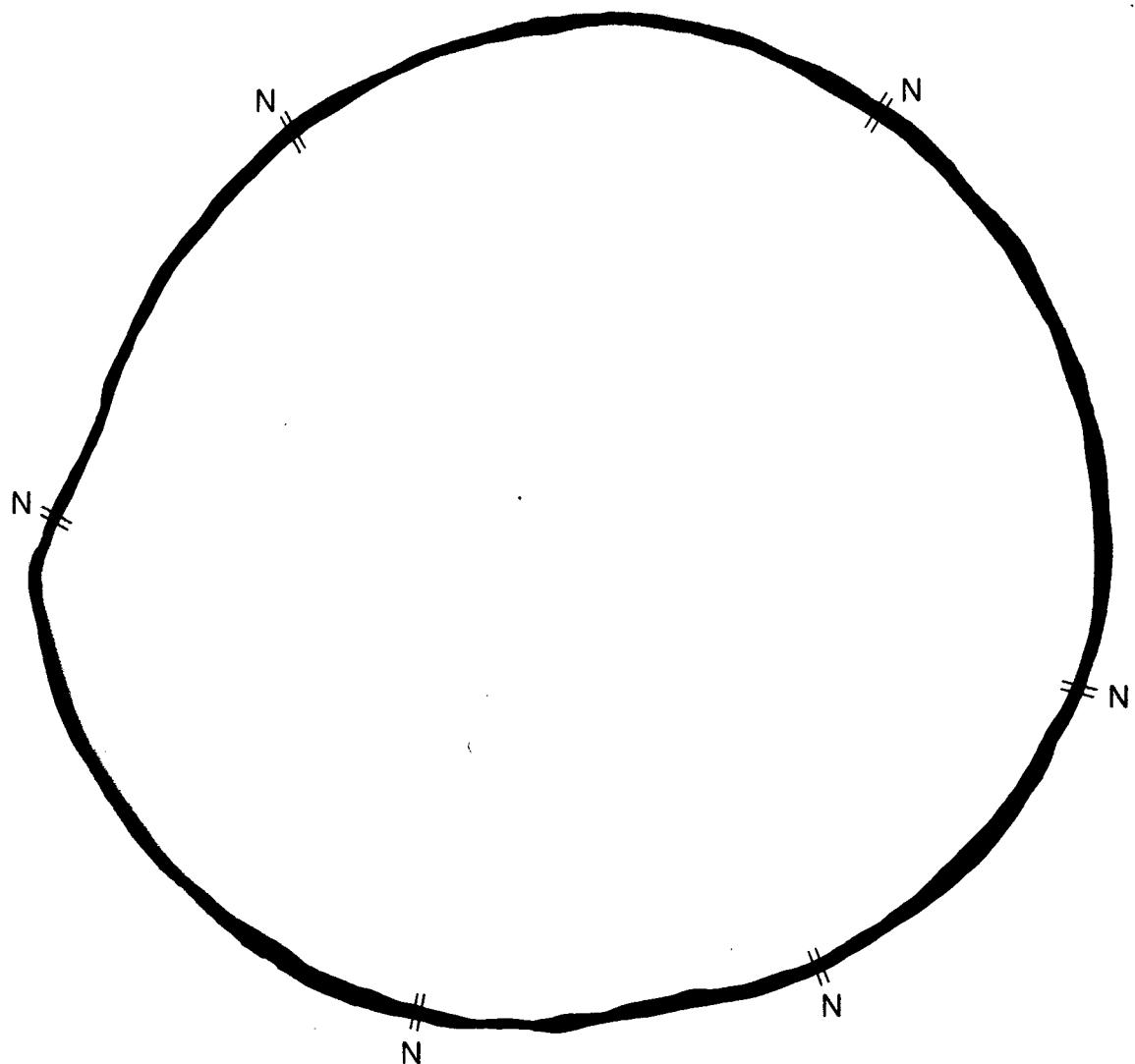


FIG. 88 Iron tyre No. 3. Scale, 1:8.

Newstead, Roxburgh (Antonine). Diameter 104 cm (41 in.). (Curle 1911: 294; *PSAS* xlvii (1912-13), 385, fig. 1)

WHEEL POSSIBLY OF ROMAN DATE

Ryton, County Durham. Diameter 98.5 cm (38.8 in.). (*PPS* xv (1949), 191, pl. XXVI)

Although the Inchtuthil tyres vary in diameter by some 10 cm, the great majority fall within the smaller range of 106 cm to 113 cm, which is probably too slight a difference for any emphasis to be placed on it, particularly when it is remembered that all are slightly distorted. But although large it is clear that they are not abnormally so, for the groups from Great Chesterford and Silchester are all of much the same size. More significant is the fact that all but one had been nailed to the felloe of the wheel, a fact which makes them unusual; for the others from Roman Britain appear to have been shrunk into place. However the number of nails used in each tyre was small, six at most and more often three or four, suggesting that they were used as additional security on a tyre which had been shrunk on to the wheel rather than as the sole method of fastening it in place. As has been noted on a number of occasions, Iron Age tyres from Britain lack nail-holes and were presumably only shrunk on, whereas Continental tyres of similar date,

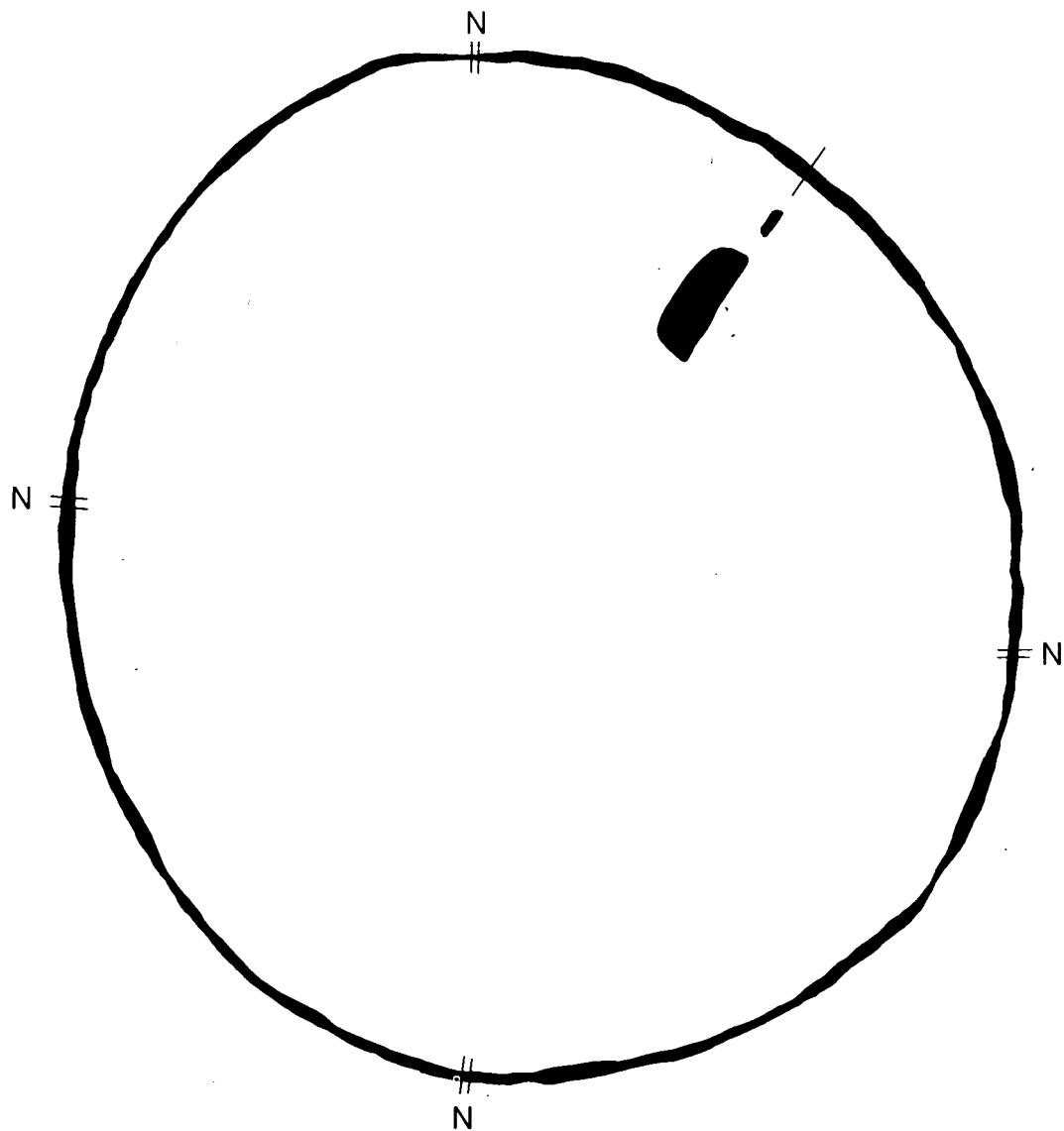


FIG. 89 Iron tyre No. 4. Scales, tyre, 1:8; Section, 1:4.

although generally of much the same size, were held with nails (Stead 1979: 42).²²¹ However, the diameter of these tyres is relatively small when compared with the Inchtuthil tyres (70 cm to 89 cm (Stead 1979: 41)), and they come from lighter vehicles, which must have been among the finest productions of the Iron Age wheelwright, rather than from working carts. To argue from this that the Inchtuthil tyres reflect a 'Continental' rather than 'British' tradition would be unwise, for they were clearly intended for larger and heavier vehicles than their predecessors. It may be significant that these tyres are the earliest complete ones from Roman Britain, and it is possible that they reflect an interim stage when it was felt that large but relatively narrow tyres needed some additional security when they were attached to the wheel. Certainly by the middle of the following century we find a number of only slightly smaller tyres without nail-holes; nor should it be forgotten that one of those from Inchtuthil itself (No. 8), although damaged, lacks nail-holes.

With widths of between 3 and 4 cm these tyres appear unusually narrow for their size; but in this they accord with both Roman and Iron Age practice. The tyres from the Yorkshire vehicle-burials vary in width from 3.5 to 4.4 cm (Stead 1979, 40), those from the Llyn Cerrig

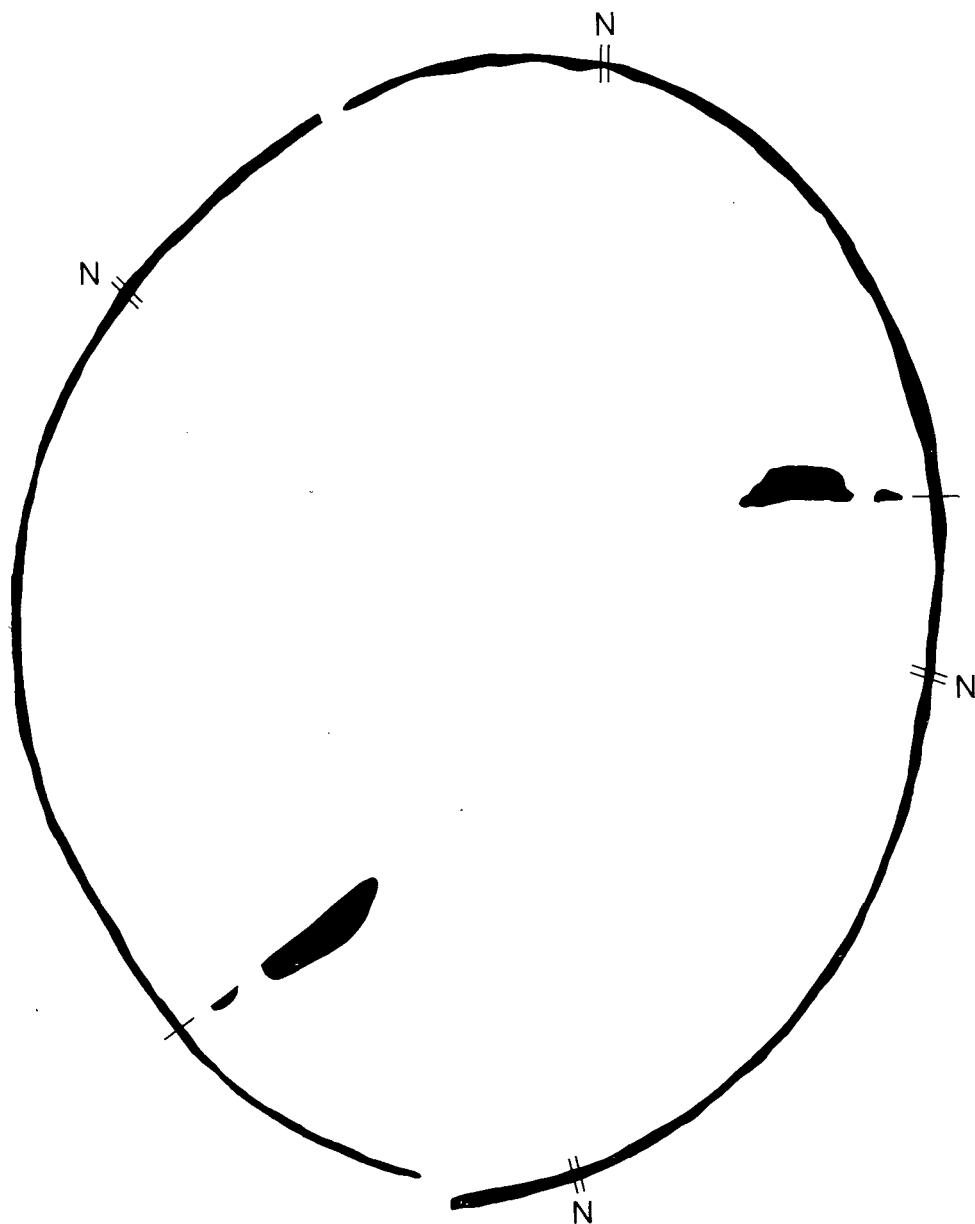


FIG. 90 Iron tyre No. 6. Scales, tyre 1:8; Sections, 1:4.

221. In Champagne 5 or 6 nails were normal, but on the Middle Rhine 15 or more might be used (Stead 1979: 42).

Bach hoard from 2.5 to 4.6 cm (Fox 1946: 11), while Roman tyres range from 2.8 cm in the Blackburn Mill hoard (Piggott 1953: 41) to 4.4 cm at Newstead (Curle 1911: 292), with an average of 3.6 cm which is very similar to the average for the Inchtuthil tyres.

Unfortunately the tyres tell us nothing of the construction of the wheels themselves. In the Antonine period in Scotland we find wheels with single-piece felloes at the forts at Bar Hill and Newstead, but the same sites have also produced large wheels with multi-piece felloes, and our tyres could have come from wheels of either type.

The complete tyres known from other sites have been listed above; fragments are more common, and almost contemporary pieces may be mentioned from the Blackburn Mill, Berwicks., hoard (Piggott 1953: 41, fig. 11, B3), the Carlingwark Loch, Kirkcudbright, hoard (Piggott 1953: fig. 8, C6), the Eckford, Roxburgh, hoard (Piggott 1953: 23, fig. 5, E5), the Brampton, Cumbs., hoard (Manning 1966: 22, No. 22), all of which probably had a military origin.

Cross-sections

In his study of the Iron Age tyres from the Llyn Cerrig Bach hoard Sir Cyril Fox divided their cross-sections into 4 types (A-D). Of these A and B differed only slightly, A having curved sides and B angular – usually bevelled – ones; in both, the faces were flat (Fox 1946: 11, pl. XVII). Using this scheme, all of the Inchtuthil tyres fall into either Type A or Type B, but it is probable that the differences between them are of no real significance, and may, in part at least, be the result of wear.

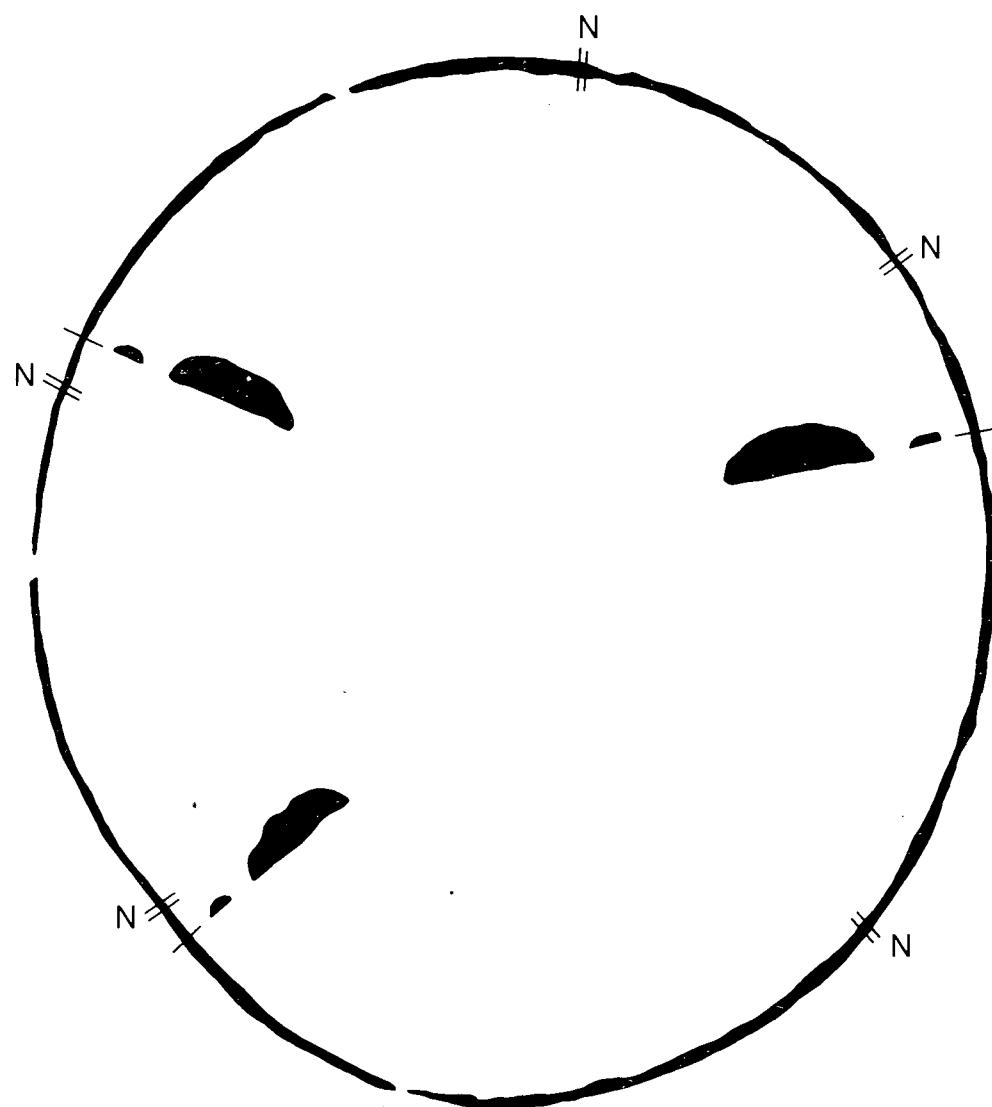


FIG. 91 Iron tyre No. 7. Scales, tyre 1:8; Sections, 1:4.

CATALOGUE OF TYRES

1. Tyre (FIG. 87). Diameter 111.0 cm (43.7 in.), width 3.5 cm (1.4 in.), thickness 1.3 cm (0.5 in.). Cross-section, Fox Type A. It has 3 nail-holes spaced at almost equal intervals around the circumference, each being set in a groove in the outer face. One nail (*c.* 6 cm (2.4 in.) long) remains in place. An overlapping (scarf) weld is visible. (FY 183).
2. Tyre. Diameter 112.4 cm (44.3 ins.), width 3.8 cm (1.5 in.), thickness 1.1 cm (0.4 in.). Cross-section Fox Type A. It has 3 nail-holes, all in one half of the circumference, two being set in shallow grooves. A scarf weld is visible. (FY 184).
3. Tyre (FIG. 88). Diameter 102.2 cm (40.3 in.), width 3.5–4.0 cm (1.4–1.6 in.), thickness 1.3 cm (0.5 in.). Cross-section Fox Type A. It has 5 irregularly-spaced nail-holes set in shallow grooves, and the possible remains of a sixth. Two cracks, quite close together, may indicate the position of a scarf weld. Now distorted. (FY 185).
4. Tyre (FIG. 89). Diameter 106.7 cm (42.0 in.), width 3.2 cm (1.3 in.), thickness 1.1 cm (0.4 in.). Cross-section Fox Type B. It has 4 irregularly-spaced nail-holes set in shallow grooves. A split probably indicates the position of a scarf weld. (FY 186).
5. Tyre. Diameter 113.0 cm (44.5 in.), width 3.0 cm (1.2 in.), thickness 1.2 cm (0.5 in.). Cross-section almost rectangular, an extreme form of Fox Type B. It has 6 nail-holes, one still retaining a nail. A scarf weld is visible. (FY 187).
6. Tyre (FIG. 90). Diameter *c.* 110 cm (43 in.), width 2.7–3.7 cm (1.1–1.5 in.), thickness 0.8–1.0 cm (0.3–0.4 in.). Cross-section Fox Type A. It has 4 irregularly-spaced nail-holes. A scarf weld is visible. Now broken in two. (FY 188).
7. Tyre (FIG. 91). Diameter 106.2 cm (41.8 in.), width 3.3–3.9 cm (1.3–1.5 in.), thickness 0.9–1.1 cm (0.35–0.43 in.). Cross-section Fox Type A. It has 5 irregularly-spaced nail-holes, one retaining a nail. Now broken in two. (FY 189).
8. Tyre. Diameter *c.* 108 cm (42.5 in.), width 3.7 cm (1.5 in.), thickness 1.2–1.4 cm (0.5–0.55 in.). Cross-section Fox Type B, with a slightly curved outer face. There are no nail-holes. Now broken in two. (FY 190).
9. Tyre. Diameter 100–110 cm (39–43 in.), width 3.0–3.5 cm (1.2–1.4 in.), thickness 1.2–1.4 cm (0.5–0.55 in.). Cross-section Fox Type A. It has 3 nail-holes. A scarf weld is visible. Now broken in two and incomplete, some 58 cm (23 in.) being lost. (FY 191).

C. DOOR PIVOT BINDING (FIG. 92)

Binding consisting of a cylindrical socket with a tapering round-ended plate, pierced by two nail holes, running from one edge; length 20.8 cm. From the *Fabrica*, pit with nails and tyres.

This could have functioned in one of two ways, either as the binding on a wooden tenon at the corner of the door which fitted into a pivot-hole in either the jamb or lintel, or as the lining of such a pivot-hole. In either case the strap will have been nailed in place to hold it in position. On the whole the probability is firmly in favour of the first hypothesis, for when pivot-linings are found *in situ* they are usually simple cylinders without plates of the type seen here. It is a rare type, but a very similar piece is known from the *limes* fort of Feldberg in Germany (O.R.L. Band II i, Kastell 10 (1937): 37 E143, Taf. III, 23).

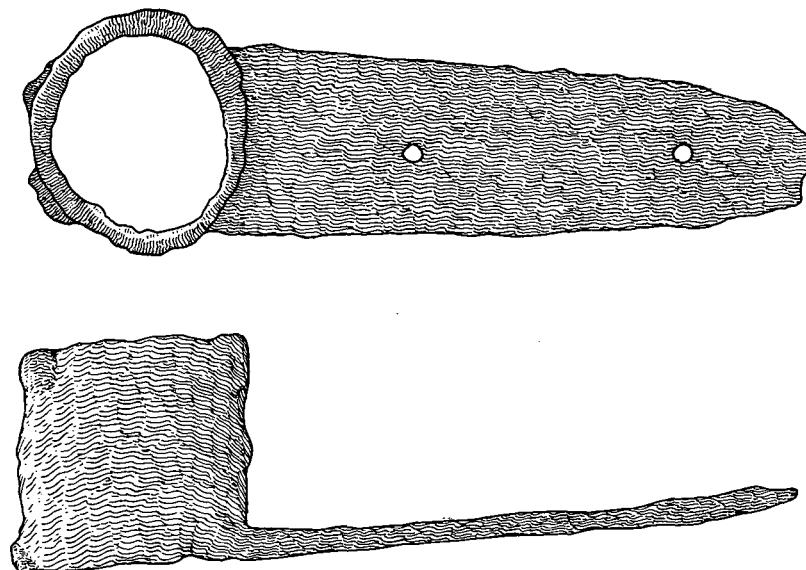


FIG. 92 Iron Door Pivot Binding. Scale, 1:2.

ACKNOWLEDGEMENTS

The discussion of the nails is almost entirely based upon the published work of N.S. Angus, G.T. Brown and H.F. Cleere, and I am greatly indebted to Dr. Cleere for his permission to use their work in this way. The original drawings and notes on the tyres were supplied by Mr. Colin Wallace through the kind agency of Mr. Trevor Cowie of the National Museum of Antiquities of Scotland, and I am most grateful to them both for their invaluable help in this matter; the published drawings are by Mrs. A. Wilkins of the Institute of Archaeology at Oxford.

CHAPTER 29

MATERIAL CONNECTED WITH IRON-MAKING AND IRON-WORKING OPERATIONS

By H.F. CLEERE

A. SLAGS AND ASSOCIATED MATERIAL

Four groups of iron-making or iron-working refuse were submitted for examination.

- 1 Scoriae from pit containing furnace linings, *decumana* N
- 2 Iron furnace linings from Pit D, *decumana* N
- 3 Scoriae from Hearth C, south of *via principalis* E
- 4 Scoriae from pit in *decumana* S

1. Material from pit in *decumana* N

This comprised 35 pieces of slag, one piece of hard baked clay with adherent slag, and a piece of very heavily corroded iron.

The slag was of a dense, heavy blue-black type, with a characteristic wrinkled surface, resulting from contraction on cooling, and showing a heterogeneous structure resulting from the solidification of numerous successive runnels of molten material. It is an iron bloomery tap slag, principally fayalite ($\text{FeO} \cdot 2\text{SiO}_2$), containing some entrapped particles of iron ore and charcoal, swept out of the interior of the furnace when the molten slag was allowed to run out.

The baked clay, which was a rich red in colour, betokened fairly prolonged exposure to temperatures in excess of 800°C . Cracks resulting from the drying out of the clay had been permeated by slag, and a coating 2–5 mm thick had built up on the permeated surface. This is a portion of the clay lining of a furnace: the type of slag would suggest that it was from the lower (hotter) part of a bloomery (smelting) furnace. There was a slight curvature on the interior, but the small size ($c. 6 \times 10$ cm) and fragmentary condition made it difficult to calculate the interior diameter with any degree of confidence.

The piece of iron was too severely corroded to permit identification or interpretation.

2. Baked clay from Pit D

Three fragments of clay, baked rich red and with slag adhering, but not permeating the clay, were examined. The slag was glassy and vesicular, but with a relatively smooth surface: it averaged 3 mm thick. In view of the lack of penetration into the clay body, it would seem likely that two of the fragments came from the upper part of a bloomery (smelting) furnace: comparable material was observed in smelting experiments on a reconstructed Roman furnace (Cleere 1971).

The third fragment had a very small-diameter internal curvature ($c. 20$ mm diam.), and is most probably part of the nose of a tuyere (the clay nozzle used to direct the air blast from bellows into the interior of a smelting furnace).

3. Slag from Hearth C

Of the 35 pieces of slag examined, 29 were forging slag (the material that collects at the base of a forging hearth and which is formed by the remelting and fusion of slag that runs out of the raw bloom during repeated reheating in the process of consolidating it into a worked bloom, together

with the magnetite scale that forms during heating on the exterior of iron in a forge, and which is usually tapped off into the hearth by the smith as he withdraws it for hammering).

The remaining six specimens were of compacted hammerscale (the thin platelets of slag extruded when the raw bloom is hammered for consolidation). These collect around the anvil and tend to coalesce as a result of weathering and pressure from passing feet.

4. Slag from pit in decumana S

This sample consisted of 13 fragments, all of bloomery tap slag.

B. THE FURNACE IN THE CONSTRUCTION SHOP

The drawing of this feature (FIG. 22) is not easy to identify. The size of the pit containing patches of burnt clay rules out the possibility of this being a smelting furnace: the maximum diameter of the pre-Roman smelting furnaces from the Weald (eg Money 1974) is about 0.80 m, whilst the Inchtuthil furnace is almost twice this diameter. It would be safer to identify this feature as a smithing or forging hearth. Most of the examples known from the Roman period are smaller than the Inchtuthil feature (e.g. Bestwick and Cleland 1974). However, since the production of the large number of nails found on the site would require the services of several smiths, it is not unreasonable to postulate the existence of a large communal forging hearth.

The channel alongside the hearth is problematical. It may represent an extension of the forging hearth for more specialized work, such as carburization (for weapons, edge tools, etc), where implements would need to remain for longer periods, under relatively controlled conditions which might be obtained in a less amorphous structure than the round pit. It is possible even that the channel was originally roofed in some way, so as to permit greater control of air-ingress.

C. INTERPRETATION

The presence of smelting tap slag is conclusive evidence that iron ore was being reduced in the fortress. Apart from the specialized transportation of slag for use in road metallurgy in major iron-producing regions such as the Weald (Cleere 1974: 175–6), this waste product seems invariably to have been tipped very close to the furnaces from which it was a by-product.

However, the volume of slag reported from the fortress is very small, and can in no way be adduced as evidence to support the view that the iron from which the nails were produced was smelted from a nearby ore-deposit by legionary smiths. The production of 7 tonnes of iron would result in the simultaneous production of over 20 tonnes of slag (Cleere 1976: 235, based on Gilles 1961: 1072 and Bielenin 1974: 265), a far from negligible quantity which was not in evidence during the excavations.

Professor Richmond postulated (pers. comm.) that the iron from which the nails were made was in all probability produced in the Weald, in view of the possible connections between the Wealden iron industry and the Classis Britannica. Recent work (Cleere 1974) would appear to substantiate this view, and so the limited iron-smelting activity at Inchtuthil must be attributed to the need to produce a small amount of metal urgently for a specific purpose when stocks of semi-products had temporarily run out – perhaps awaiting the next delivery from the Fleet.

Forging produces considerably less slag, especially when relatively small objects such as nails were being produced. The furnace from the construction shop seems to represent a forging hearth for multiple use: its size would suggest that six or more smiths could use it simultaneously. On the assumption that one nail could be produced in, say, 3 minutes (a not impossible time, especially when working to standard dimensions), the approximately 1 million nails found at Inchtuthil would have needed 50,000 man-hours. Assuming a 10-hour day, this means 5000 man-days. A working year of 350 days would mean that the whole stock of nails could have been produced in a year by two groups of seven smiths each working from a hearth of the dimensions of that found in the construction shop. In other terms, each smith could probably have produced 0.5 tonne of hand-forged nails in a year. These figures do not seem unreasonable in the light of what is known of the productivity of nailmakers in Shropshire in the present century.

CHAPTER 30

THE ROMAN GLASS

By JENNIFER PRICE

One frit or faience melon bead and seventy-five fragments of Roman glass were found during the excavations. Seventy-four of the fragments came from vessels and one was part of a matt/glossy window-pane.

Only a very small number of vessels with a limited range of forms occurred in this assemblage, which has been divided into two groups: table-wares and containers. The table-wares are represented by a minimum number of seven vessels, one pillar-moulded bowl, one hemispherical drinking-cup and five jugs; and the containers by a minimum number of nine vessels, one unguent bottle or flask, one square bottle, one bottle of unidentified body-form, and six cylindrical bottles.

The table-wares were all of fairly good-quality bluish-green glass except for two pale yellowish-green vessels (Nos. 2 and 9); it is noteworthy that no polychrome, brightly coloured or colourless glass was found at Inchtuthil. Considerable changes in fine tablewares took place around A.D. 65–70 and most polychrome and brightly coloured cast and blown glass went out of production at this time, being replaced by colourless glass.²²² Nonetheless, some polychrome and coloured vessel fragments have been found in military establishments in northern Britain, as at Blackfriars (Carlisle),²²³ Red House (Corbridge),²²⁴ and Newstead,²²⁵ where their presence may be due to the prolonged survival of prized personal possessions. Both cast and blown colourless vessels have frequently been recorded on early military sites in northern Britain; cast plates with overhanging rims are known from Birrens, Cadder and Castle Cary,²²⁶ and blown facet-cut drinking cups have been recorded at Blackfriars (Carlisle) (see note 223), Red House (Corbridge) (see note 224), Newstead (see note 225), Birrens,²²⁷ Cardean,²²⁸ and Strageath.²²⁹

None of the table-wares is of great luxury or rarity. The hemispherical drinking-cup (No.2) is a most unusual find from a site in northern Britain, and was probably quite old when it was broken, but the pillar-moulded bowl (No.1) and jugs (Nos. 3–9) were in production during the last quarter of the first century; the bowl is likely to have reached Britain from Italy or southern Gaul, while the jugs were produced in the Rhineland or northern Gaul.

The preponderance of fragments of cylindrical bottles among the containers is interesting, as both cylindrical and square bottles were in very common use during the later first century, in Britain as elsewhere in the western provinces. The dominance of cylindrical bottles in Flavian contexts has been noted on other sites in Roman Britain, as at Caerleon²³⁰ and Blackfriars

222. Harden and Price, 1971, 320–3.

223. Price, forthcoming (a).

224. Charlesworth, 1979.

225. Curle, 1911, 272.

226. Charlesworth, 1959, 38–40.

227. Robertson, 1975b, 135 and fig. 47, 4.

228. *JRS* lix (1969), 202 and pl. XIV, 1.

229. Unpublished: from excavations directed by Professor S.S. Frere and Professor J.J. Wilkes.

230. Boon, n.d. (1969), 95.

(Carlisle). However, the most significant glass fragment in this assemblage is perhaps the fragment of matt/glossy window-pane (No. 14), as it points to the presence of at least one building with a glazed window at Inchtuthil.

Twenty-four of the vessel-glass fragments were visibly affected by heat, and it is probable that these were mis-shapen during the demolition and destruction of the site. Furthermore, there is a strong suggestion that much of the glass had either only recently been broken when the decision to abandon Inchtuthil was taken or that the fragments had been saved in a group for re-use, because forty-six pieces (out of the total of seventy-five) were found (together with pottery sherds) in a deposit 'trampled or beaten in to' the east wall-trench to *Taberna 112, via principalis* west.²³¹

Previous excavations at Inchtuthil in 1901 produced about thirty pieces of glass, all from vessels except for one fragment of window-glass and about half of a dark blue glass melon bead.²³² The vessel glass was described as 'either flat-sided with rounded corners or with curved sides' and it was thought that some might be modern. Among the pieces of vessel glass surviving in the National Museum of Antiquities in Edinburgh there are a fragment of a yellow-green jug-handle with a pinched trail (cf. Nos. 3–6), a fragment of square bottle (cf. No. 12), and a fragment mis-shapen by heat.

Nine bluish-green pillar-moulded bowl fragments were found (No. 1) and, although most of them were severely distorted by heat, it is clear that they come from one vessel – a deep bowl with prominent vertical ribs and one or more (probably two) wheel-cut grooves on the inside surface of the lower body.

Pillar-moulded bowls were manufactured during the first century A.D., probably at several centres as they are found throughout the Roman world and were sometimes traded far beyond the frontiers of the empire, as to Espe in Denmark and Storedal in Norway,²³³ or Timnā in Aden,²³⁴ Begram in Afghanistan,²³⁵ and Arikamedu in south-east India.²³⁶

The method of manufacture of pillar-moulded bowls is obscure. Until recently it was widely accepted that they were made either by placing melted glass or chips of glass in an open ribbed mould with a plunger mould to form the interior, or by 'lost wax' casting in an investment mould which was broken away after the process had been completed.²³⁷ But Cummings has now suggested that they were made by forming a thick flat glass disc and pressing it while it was hot with a disc-shaped tool which had gaps radiating from the centre at regular intervals so that the glass squeezed through the gaps to form raised ribs, and then by sagging the ribbed disc over a mould; and he has pointed out that this sagging method was an attempt to produce larger quantities of vessels than could be achieved by casting.²³⁸

Pillar-moulded bowls are usually either shallow or deep with vertical ribs reaching to the bottom of the vessel, though a shallow version with short close-set ribs on the side only also occurs sometimes.²³⁹ All three types are found in early and mid first-century contexts and have been recorded in large numbers on many sites occupied during this period, such as the Magdalensberg,²⁴⁰ Camulodunum,²⁴¹ and Vindonissa;²⁴² but only the deep bowls are at all common on Flavian sites. The evidence from Hedernheim (a fort near to Mainz established between A.D. 75 and 83/5) indicates that these bowls, which were often rather carelessly made, continued to be produced after the shallow versions had disappeared,²⁴³ and this is supported by

- 231. *JRS*, xlviii (1958), 133.
- 232. Anderson, 1902, 241.
- 233. Norling-Christensen, 1940, 141, figs. 1–2.
- 234. Comfort, 1958, 207, pls. 146–7.
- 235. Hamelin, 1953, pl. xi.
- 236. Wheeler, 1946, 102 and fig. 42, 2.
- 237. Schuler, 1959.
- 238. Cummings, 1980, 26–9.
- 239. Isings, 1957, Form 3 (a, b, c).
- 240. Czurda, 1979, 26–34, and pls. 1, 12 and 18–19.
- 241. Harden, 1947, 301–2 and pls. LXXXVII–LXXXVIII.
- 242. Berger, 1960, 9–23 and pls. 1–2 and 18.
- 243. Welker, 1974, 18–24.

finds of many fragments of deep bowls which were collected in pits in the *canabae legionis* at Nijmegen around the end of the first century.²⁴⁴

In the early and mid first century polychrome and brightly-coloured monochrome glass were used to make pillar-moulded bowls, though the bluish-green specimens were always the most plentiful. Claudian and Neronian sites in Britain almost invariably produce fragments of these vessels and they often appear to be the commonest type of glass table-ware in use although, as Harden has pointed out in connection with the finds at Camulodunum, this may be because even very small fragments of pillar-moulded bowls are easily recognised and they are likely to be preserved and recorded because the glass is thicker than blown glass.²⁴⁵ Polychrome and coloured monochrome bowls are quite rare in Flavian contexts and it is clear that they went out of production sometime in the middle of the first century, whereas bluish-green bowls continue in use in diminishing quantities until the end of the century.²⁴⁶ They have been found on several military sites in northern Britain which were established after c. 75, as at Blackfriars (Carlisle), Red House (Corbridge), Newstead, Cappuck, Closeburn (Dumfriesshire) and Bertha.²⁴⁷ There is no doubt that production of pillar-moulded bowls had ceased by the end of the Flavian period, and pieces are only rarely found in later contexts, though there is one fragment from the Hadrianic fort at Benwell.²⁴⁸

Two fragments of a small yellow-green hemispherical drinking-cup, with an inturned rim, the edge being cracked-off and ground, and with a flat base, were found quite close together, and although there is no join between the pieces they have been treated as one vessel (No. 2). Cups of this form²⁴⁹ were nearly always decorated with horizontal bands of wheel-cutting or abrasion and sometimes have a deep pointed kick at the centre of the base. They are first recorded in late Augustan contexts at the Magdalensberg,²⁵⁰ and occur in large numbers during the second and third quarters of the first century. They are often found in the east Mediterranean region as well as in the western provinces, and were probably made at several centres. They are very common in Claudian and Neronian contexts at sites in the Rhineland and in Britain, as at Hofheim,²⁵¹ Valkenburg,²⁵² Vindonissa,²⁵³ Camulodunum,²⁵⁴ and Fishbourne,²⁵⁵ but disappear during the last quarter of the first century; however, fragments are known from contexts dated to 90–120 at Oberstimm,²⁵⁶ and from around the end of the first century in the *canabae legionis* at Nijmegen.²⁵⁷

Very few fragments are known from sites in Roman Britain which were established in the Flavian period. A few pieces were found during excavations in the extramural sites at Caerleon in 1954 and 1962²⁵⁸ and one has come from excavation in the garden of Alstone Cottage there in 1970,²⁵⁹ which is on the site of the end building in the Prysg Field range of barracks (Insula XXIII), where there is some evidence for industrial use in Flavian times,²⁶⁰ but no other pieces have been recorded from Flavian sites in Wales, and none is known from northern Britain apart

244. Isings, 1980, 281–3.

245. Harden, 1947, 288.

246. Harden and Price, 1971, 328–9; and see note 226

247. Fragments in the National Museum of Antiquities, Edinburgh. For Carlisle see note 223, Red House note 224 and Newstead note 225.

248. Petch, 1927, 175.

249. Isings, 1957, Form 12.

250. Czurda, 1979, 37–43, Nos. 324–418.

251. Ritterling, 1913, 365–6, Forms 1 and 2.

252. van Lith, 1978–79, 38–49, Nos. 139–88.

253. Berger, 1960, 43–5, Nos. 98–104.

254. Harden, 1947, 302–3, Nos. 68–76.

255. Harden and Price, 1971, 344–6, Nos. 46–8 and 50–1.

256. Garbsch, 1978, 280 and 283, pl. 108, E 17–19.

257. Isings, 1980, 281.

258. Unpublished: from manuscript catalogue of *Roman Glass from the Extramural sites at Caerleon*, Nos. 37–8, through the kindness of Mr. G.C. Boon.

259. Price, forthcoming (b).

260. *Britannia*, ii (1971), 246.

from the Inchtuthil fragments and two small scraps of rim and body from the native settlement at Hetha Burn, Hethpool, Northumberland.²⁶¹

Numbers 3–9 come from jugs with folded rims, long cylindrical necks, angular handles with a central rib and a vertical pinched trail extending down the body from the lower attachment, and either conical or discoid bodies with simple concave bases or open pushed-in base-rings and domed bases. Long-necked jugs with conical, globular and discoid bodies,²⁶² and jars with collar-rims and globular bodies,²⁶³ are frequently found at sites in the Rhineland, central and northern France, Belgium, Holland and Britain in contexts ranging in date from c. 65 to 125. They are also found occasionally in later deposits, as in the latrine drain of the Commandant's house at Housesteads, thought to date from c. 139–42,²⁶⁴ and in Pit 176 at Park St., Towcester, dated c. 155–65.²⁶⁵ They do not occur anywhere else in the Roman empire, and it is very probable that they were produced at one or more centres in the north-west provinces.²⁶⁶ All these jug and jar forms sometimes have vertical or spiral ribs decorating the body, though undecorated specimens are also known.

Number 3 is a conical jug with optic blown spiral ribs on the lower neck and body; the base does not survive but it is likely that it was concave, as the body does not appear to expand out sufficiently to allow for a carination above an open pushed-in base-ring and domed base. Conical jugs with concave bases have been studied in connection with one from a Flavian burial at Grange Road, Winchester,²⁶⁷ and it is clear that there is considerable variation in the details of the neck and body of these jugs. The upper body and spiral ribbing of the Inchtuthil fragment may be compared with that of a bluish-green jug from Barnwell,²⁶⁸ though the neck is rather wider than is normal and is somewhat similar to that on a dark blue jug from a pit dating from c. 60–90 in Wroxeter.²⁶⁹ It is noteworthy that there is a series of horizontal marks on the neck below the rim and above the handle attachment which may perhaps suggest that some kind of stopper for the jug was attached on a cord or thong.

Number 4 is from the body of an undecorated conical jug; nothing is known of the forms of Nos. 5–7; and No. 8 comes from a conical jug with vertical ribs on the lower body and a concave base. This is rather like the lower body and base of jugs such as the yellow-brown one from a Flavian burial at Radnage, Bucks.,²⁷⁰ or the green one with a Medusa mask opposite the handle from Bexhill, Sittingbourne, Kent.²⁷¹

The last jug (No.9), which is represented by five body and base fragments, has a wide discoid or globular body with spiral ribs and an open pushed-in base-ring with domed base. Discoid and globular jugs have recently been studied in connection with one from a pit at Enfield;²⁷² they are not found as frequently as conical jugs, though they have been noted on sites in the lower Rhineland, northern France and Belgium, as well as in Britain. Many of the discoid and globular jugs in Britain have vertical ribbing on the body, and one or two are undecorated; the only pieces known to me with spiral ribbing on the upper body come from Enfield and Colchester,²⁷³ but on both of these the spiral decoration is arrested and changes to S-shapes and vertical ribbing, which does not occur on the Inchtuthil fragments. The discoid jugs from Blicquy, Belgium²⁷⁴ and Vieil-Atre, Boulogne²⁷⁵ have more or less vertical ribbing with a slightly spiral twist on

261. Burgess, 1970, 24 and fig. 13, 2–3.

262. Isings, 1957, Forms 52 and 55.

263. Isings, 1957, Form 67 c.

264. Charlesworth, 1971, 35 and fig. 9.

265. Price, 1980, 65–6 and fig. 15.

266. Price, 1978, 74 and figs. 56–7.

267. Harden, 1967.

268. Harden *et al.*, 1968, No. 73.

269. Atkinson, 1942, 232 and pl. 63 A.

270. Harden, 1967, pl. XLII b.

271. Brailsford, 1958, 44, 10 and pl. XII.

272. Price, 1977, 155–8.

273. Register No. 875–30: 'From the Union grounds, now St. Mary's Hospital, just west of Balkerne Gate'.

274. de Laet *et al.*, 1972, 99, 15 and pl. 37.

275. Morin Jean, 1913, 117 and fig. 143.

the upper body, but the nearest parallels for the spiral ribbing on the Inchtuthil pieces occur on a bluish-green globular jug from a late first-century burial in a stone sarcophagus at Kretz, Kr. Mayen,²⁷⁶ and on a fragmentary dark blue jug from excavations in Berkeley St., Gloucester.²⁷⁷

Number 10 is a fragment from the neck and upper body of a thick-walled ovoid-bodied vessel. It might perhaps come from a jug, but is more likely to be part of a large unguent bottle or flask.²⁷⁸ These vessels were presumably used as containers for liquids, and fragments of them are found quite frequently in mid first-century contexts, as at Hofheim,²⁷⁹ Valkenburg,²⁸⁰ and Camulodunum,²⁸¹ and probably from late first-century burials at Vindonissa.²⁸² Comparatively few specimens have been noted on Romano-British sites, probably because they are rarely found complete and fragments may have been interpreted as different vessel-forms. There is one from a burial in the East cemetery at Wroxeter,²⁸³ and another, presumably from a burial, was found at Little Walden, Essex.²⁸⁴

Of the six cylindrical bottles represented by fragments at Inchtuthil, only No. 11 could be reconstructed. Cylindrical bottles were in common use during the later first century A.D.; fragments have been found in a late Augustan or Tiberian context at the Magdalensberg,²⁸⁵ but otherwise these bottles do not occur until around the middle of the first century, as at Velsen,²⁸⁶ Camulodunum²⁸⁷ and Fishbourne,²⁸⁸ and they are most frequently noted in Flavian and early second-century contexts, disappearing very rapidly thereafter. Two main types of cylindrical bottles are known: one has a squat body which is often quite wide, and the other has a tall body.²⁸⁹

The former type has been found on many sites in Roman Britain, and large specimens have sometimes been re-used as cinerary urns, as at York,²⁹⁰ Colchester,²⁹¹ Boxmoor, Herts.,²⁹² Caerleon²⁹³ and the Bartlow barrows, Ashdon, Essex.²⁹⁴ Fragments of many low wide cylindrical bottles, including one nearly complete specimen, were recorded in Flavian/Trajanic contexts at Blackfriars (Carlisle), but the type has not been recognised at Inchtuthil.

Cylindrical bottles with tall bodies are also frequent in late first-century contexts in Britain, as at Caerleon, where one was re-used as a cinerary urn,²⁹⁵ Richborough,²⁹⁶ and Newstead,²⁹⁷ and No. 10 is a fragmentary specimen of this type. It had clearly been in use for some time before breakage as the base was very worn, the sides were considerably scratched from the continued removal and replacement of the bottle in a closely-fitting case, and there was a pronounced horizontal band of scratches on the neck where the stopper had been attached.

There is only one fragment from a square bottle (No. 12), a fact which is most interesting as

- 276. Haberey, 1938–39, 404, 14 and fig. 36.
- 277. Allen, 1978, No. 45.
- 278. Isings, 1957, Form 16.
- 279. Ritterling, 1913, Form 16, 375 and pl. XXXVIII.
- 280. van Lith, 1978–79, 50–2.
- 281. Harden, 1947, 304, Nos. 83–4, and pl. LXXXVIII.
- 282. Berger, 1960, 76, Nos. 192–5 and pls. 12 and 20.
- 283. Haverfield and Taylor, 1908, 240 and fig. 32.
- 284. Displayed in Saffron Walden Museum.
- 285. Czurda, 1979, 135–6.
- 286. van Lith, 1977, 41, No. 115 and pl. 3.
- 287. Harden, 1947, 306, No. 98 c.
- 288. Harden and Price, 1971, 363–5, Nos. 91 and 93 and fig. 143.
- 289. Isings, 1957, Form 51 (a and b).
- 290. Harden, 1962, 136 and pl. 66 (H.G. 53).
- 291. Brailsford, 1958, 42, No. 4 and pl. XII.
- 292. Charlesworth, 1974–76, 103 and fig. LIX E.
- 293. Lee, 1862, 48 and pl. XXVII, 1.
- 294. Gage, 1934, 7 and pl. III, 5 and 7.
- 295. See notes 230 and 293.
- 296. Bushe Fox, 1949, 158, No. 371 and pl. LXVIII.
- 297. See note 225.

these vessels were first produced at about the same time as cylindrical bottles, and were extremely common in the late first century throughout the Roman empire.²⁹⁸

The earliest dated pieces are known in an Augustan context with Claudian material in the top levels at the Magdalensberg;²⁹⁹ but otherwise the earliest dated contexts containing square-bottle fragments are in a deposit sealed in c. 40–45 at Cosa in central Italy,³⁰⁰ and in a shipwreck of about the same date off Port Vendres, in the Gulf of Lyons.³⁰¹ They appear in Britain soon after the initial conquest and small quantities of fragments were noted in Claudian and Neronian contexts at Camulodunum,³⁰² and in Period 1 contexts at Fishbourne;³⁰³ but the great popularity of these vessels seems to develop early in the Flavian period and they become the dominant form of glass container in the second century, occurring on virtually all sites in Britain during that period.

Nonetheless, several military sites in Britain occupied during the Flavian period appear to have been supplied with goods in cylindrical rather than square bottles, and Inchtuthil may well have been one of these, to judge by the limited evidence available at present.

The small fragment of window-glass (No. 14) comes from a matt/glossy pane. The method of manufacture of this type of window-glass, which occurs on sites in Roman Britain from the first to the early third century, has been the subject of much consideration; but it now seems generally agreed that it was produced by casting molten glass in a flat tray of wood or stone which made the pane flat and dull on the underside and uneven and glossy on the top surface.³⁰⁴ These panes have rounded edges at the corners and were sometimes shaped by grozing to fit window apertures smaller than the pieces cast in the trays. Matt/glossy window-glass is recorded at Camulodunum in Claudio-Neronian contexts,³⁰⁵ but is not often found on military sites in Britain before the Flavian period, perhaps because it was carefully removed from buildings before the demolition and abandonment of sites occupied for only a short period.

The frit or faience melon bead (No. 15) is a bead type often found in first- and second-century contexts in Roman Britain, especially on military sites; they become less common in later contexts, but seem to have been used throughout the Roman period. Several sizes of these beads are known and they were all probably imported, for very similar specimens occur throughout the western provinces.

CATALOGUE OF THE GLASS

1. Nine fragments, three joining, body and base of pillar-moulded bowl. Bluish-green. Distorted by heat, no visible weathering. Part of deep convex curving side from just below tops of ribs, lower body and concave base; vertical ribs continue to base. One shallow wheel-cut groove survives on inside surface of lower body. Cast, fire- and wheel-polished, some grinding marks visible on inside surface. Thin walls between ribs.
Present height c. 55 mm, thickness c. 1–5 mm.
1957: E wall-trench of *Taberna* 112, *via principalis* west.

2. a) Fragment, rim of hemispherical bowl or cup. Pale yellow-green. No visible weathering. Part of slightly incurved rim, edge cracked off and ground smooth, slightly convex curved upper body expanding out. Narrow horizontal band of abraded lines below rim, two similar bands on upper body. Blown.
Present height 18 mm; rim diameter c. 80 mm; thickness 1–1.25 mm.
1955: *Decumana tabernae* (east side), front wall, last junction south (*Taberna* 156).
b) Fragment, lower body and base of hemispherical bowl or cup (?). Yellow-green. No visible

298. Isings, 1957, Form 50.

299. See note 285.

300. Grose, 1974, 51, No. 39.

301. Parker and Price, 1981.

302. Harden, 1947, 306, No. 98 D–E.

303. Harden and Price, 1971, 361 and 3.

304. Boon, 1966a; Harden, 1974.

305. Harden, 1947, 306.

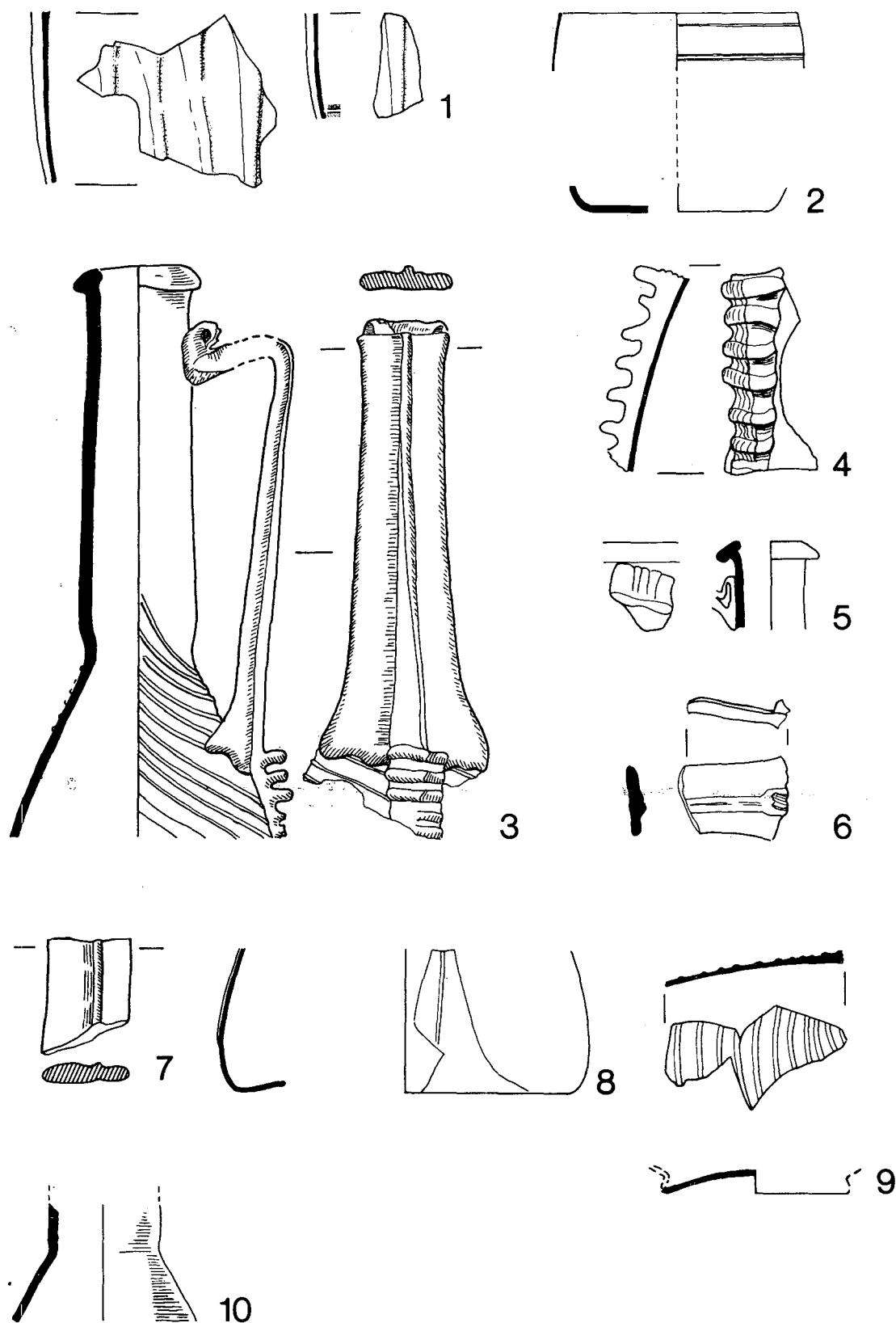


FIG. 93 The Glass. Scale, 1:2.

weathering. Small part of convex curved lower body and flat base (centre missing). Blown. Present height 8 mm; base diameter c. 60 mm; thickness 1.5–2 mm.
1955: Pit north of Granary 3.

3. Two joining fragments, rim, neck, handle and upper body of conical jug. Bluish-green. No visible weathering: elongated bubbles in spirals on body and vertical on neck. Folded rim, edge bent out, up and in and flattened diagonally, long wide cylindrical neck, constriction at junction with straight-sided upper body expanding out. Optic blown spiral ribs on lower neck and body. Angular ribbon handle, with central ridge and claw attachment with vertical pinched trail, applied to upper body and attached to neck below rim. Blown. Note: horizontal marks on neck below rim and above handle attachment *may* suggest the use of a stopper.
Present height 18.5 mm; rim diameter 42 mm; maximum neck diameter 32 mm; thickness (body) 3 mm.
1957: Blank area east of north end of Barrack 43.
4. Fragment, body and handle trail of conical jug. Bluish-green. Bubbles and black streaks in trail. Part of slightly convex curving undecorated side expanding out, and applied vertical trail with parts of 7 pinched projections. Blown.
Present height c. 65 mm; thickness (body) 1.5 mm.
Probably from area of first cohort (1957).
5. Two joined fragments, rim, neck and handle of jug. Bluish-green. Some elongated bubbles in handle; surfaces slightly affected by heat. Part of folded rim, edge bent out, up and in and flattened diagonally, cylindrical neck with upper handle attachment. Blown.
Present height 32 mm; rim diameter 36 mm; neck diameter 24 mm; thickness 3 mm.
1957: East wall-trench of *Taberna* 112, *via principalis* west.
6. Fragment, handle of jug. Bluish-green. Very bubbly with yellow-green and black streaks. Horizontal upper part of angular ribbon handle with central ridge, from upper attachment on neck to change of angle.
Present length 36 mm; width 22–25 mm.
1957: as No. 5.
7. Fragment, handle of jug. Bluish-green. Elongated bubbles; very distorted by heat. Part of straight ribbon handle with central ridge.
Present length 45 mm; width 27–29 mm.
1957: as No. 5.
8. Seven fragments, three joining, body and base of conical jug. Bluish-green. No visible weathering; very few bubbles; one fragment distorted by heat. Small part of straight side of upper body expanding out, and lower body curving in to concave base. Vertical ribs on body, optic blown.
Present height 45 mm; base diameter 110 mm; thickness 0.75–3 mm.
1957: as No. 5.
Also (*unfigured*) One very distorted lower body-fragment with vertical rib.
9. Five fragments, two joining, body and base of discoid jug. Pale yellowish-green. No visible weathering; very few bubbles. Part of wide slightly convex curved upper body with spiral ribs, optic blown, and part of open pushed-in base-ring with domed base.
Base diameter c. 60 mm; thickness 1–3 mm.
1957: as No. 5.
Also (*unfigured*) One very distorted body-fragment with spiral ribs.
10. Fragment, neck and body, ovoid-bodied flask or unguent bottle (?). Bluish-green. No visible weathering. Lower part of cylindrical neck, tooling marks at junction with slightly convex curving upper body expanding out. Blown.
Present height c. 42 mm; neck diameter 30 mm; thickness 2 mm.
1957: as No. 5.

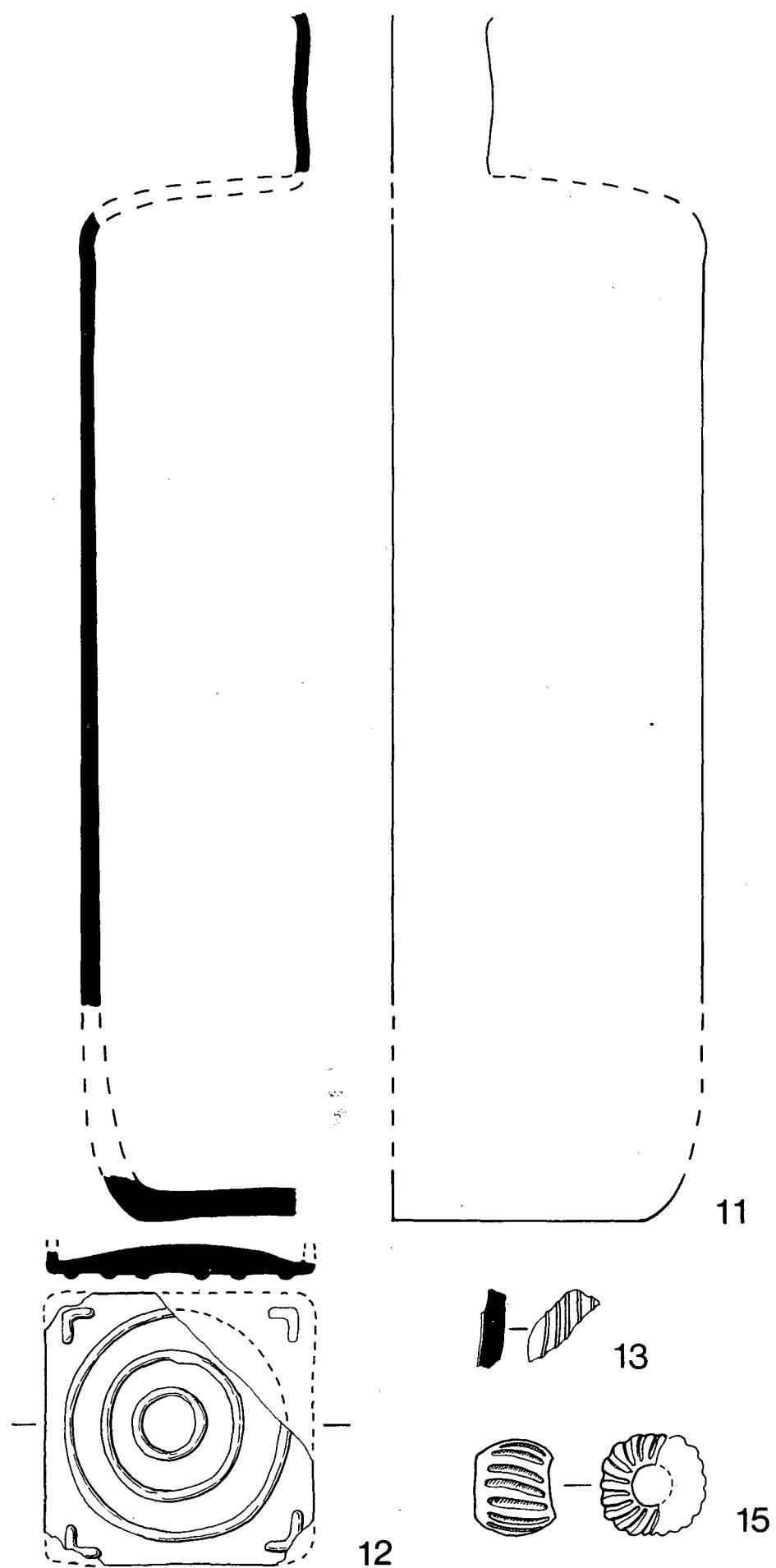


FIG. 94 The Glass. Scale, 1:2.

11. Fifteen fragments, some joining; neck, shoulder, body and base of cylindrical bottle. Bluish-green. No visible weathering. Part of short neck, shoulder, tall vertical side and slightly concave base. Glass thick in lower body and base. Blown. Note the wear on base, vertical scratches on body with very worn patch at shoulder, horizontal scratches on neck.
 Present height of body 24.5 mm; height of neck 47 mm.
 Reconstructed height 310 mm; body diameter 200 mm; base diameter 160 mm; thickness 3–9 mm.
 1961: Barrack 3, veranda gutter near north end.
 Also (*unfigured*)
 a) 2 frs, body, as No. 11
 1954: Tribune's House I, west wall-trench of dining-room.
 b) 12 frs, body and base, as No. 11 – some distorted by heat.
 c) Fr, base, as No. 11.
 1957: (b) and (c) from same context as No. 5.
 d) 2 frs, body and base, perhaps same bottle as No. 11 – distorted by heat.
 1957: probably as No. 5.
 e) 2 frs, body, as No. 11.
 1961: Gutter A, north side of *via principalis* east.
 f) Fr, body, as No. 11.
 Pit, Building D (south of Tribune's House IV).
12. Fragment, base of square bottle. Bluish-green. No visible weathering. Small part of lower body and concave base with angle pieces at corners and three concentric circles in raised relief. Wear on angle pieces. Blown in mould.
 Present height 13 mm; width of base 85 × 85 mm; thickness 2–7 mm.
 1957: SW corner of third centurion's house in first cohort.
13. Fragment, handle of bottle. Bluish-green. No visible weathering. Small part of broad angular ribbon-handle with multiple reeding, from near shoulder of bottle.
 Dimensions 20 × 25 mm; thickness 5–8 mm.
 1957: E wall-trench of *Taberna* 112, *via principalis* west.
14. (*unillustrated*) Small fragment, matt/glossy window-glass. Bluish-green. Flat and ground on under side, smooth and bright on upper side. Cast.
 Dimensions 33 × 17 mm; thickness 3 mm.
 Exact context unrecorded.
15. Fragment, frit or faience melon bead. Bright blue, especially in grooves.
 Height 14.5–16.5 mm; maximum diameter 19 mm.
 1957: Barrack B west of *principia*, east of 20th posthole from north.

CHAPTER 31

BRONZE AGE COLLARED URNS

By AUDREY HENSHALL and TREVOR COWIE

In 1955 parts of two cinerary urns were found within the area of the centurion's house of Barrack 30 near the northern edge of the fortress. Both were inverted and had been damaged by the Roman builders. Only one of these appears to have been deposited in the National Museum of Antiquities, where there are about fifteen sherds and small fragments of a collared urn (Longworth 1984, No. 1988). Only parts of the rim and neck are represented, an expected reflection of the vessel's inverted burial position. The collar, 7.5–8 cm deep, bears a deeply incised lattice pattern bordered by a single horizontal line above and below. Much of the surface is worn and the decoration has become indistinct in places. There is no trace of ornament on the portion of neck that survives. The fabric is very friable and heavily gritted, with a tendency to laminate. The core is orange-brown, the surfaces a darker brown in colour. No accurate estimate of the size of vessel is now possible, but the diameter of rim may have been in the region of 30 cm (FIG. 95).

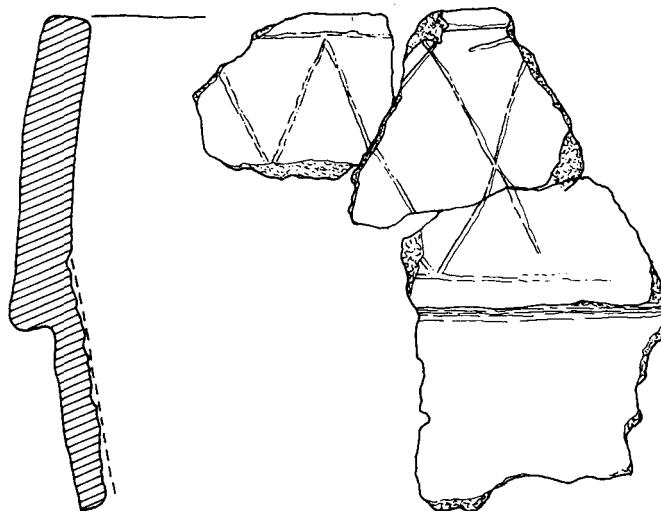


FIG. 95 The Bronze Age Urn. Scale, 1:2.

CHAPTER 32

THE SAMIAN WARE

By B.R. HARTLEY

The prime importance of the Inchtuthil samian ware is simply that it must all have reached the site within a very brief time-span, c. A.D. 83–7. In other words the site, itself dated by a combination of literary and numismatic evidence, dates the samian. It follows that no detailed discussion of the dates of the material is required, though parallels are quoted for the decorated ware wherever appropriate. Significantly-dated contexts for identical potters' stamps are noted.

Secondly, the deposit of smashed samian found in the gutter bordering the north side of the western *via principalis* (p. 180) is of considerable interest for the question of official supply of pottery to military sites.

It is slightly disappointing that the total yield of samian from Inchtuthil is small and that the sherds are mostly minute, but what there is has such importance that even some tiny sherds of decorated ware have been drawn.

All the sherds are in fabrics which are consistent with origin at La Graufesenque. In general the body fabrics tend to be slightly reddish, with abundant white or yellow-white specks of limestone. It is less easy to generalise about the glazes, because they have been affected by the rather acid soils in which they have usually been lying. Conspicuously glassy glazes of Neronian and Neronian-Flavian types are totally lacking, however.

A. SAMIAN POTTERS' STAMPS (FIG. 96)

Since the initial, summary publication of the Inchtuthil samian stamps (*Britannia* iii (1972), 4), another fragment has been identified (S9). It is now also possible to quote the final die numbers (in the Leeds Index) for the stamps. In what follows superscript **a** indicates that the stamp is known at La Graufesenque, superscript **b** that stamps from other dies of the same potter are recorded there.

- S1 Censor of La Graufesenque.^a Form 15/17 or 18 stamped [OF.]C·EN (3a). Stamps from this die are appreciably less common than from most others with the same reading. It was used mainly on dishes, though a few examples on cups of forms 27 and 33 are known. Twenty-three of the recorded stamps are from the Rhineland or Britain as opposed to two from France. Contexts with significant evidence for dating include: Brough-Petuaria, Carmarthen, Hedernheim (two) and Heidelberg. (East wall, *Taberna* 112)
- S2–3 Iullinus of La Graufesenque. ^b Forms 15/17 or 18, stamped [IVL]INI and [IVL]INI (3c). This stamp has previously been recorded from Newstead. It also appears in the Burghöfe Geschirrdepot (Ulbert 1959, 41, No. 71, now confirmed as Iullinus), Okarben and Usk. It was always used on dishes, mostly form 18, but with a few examples of form 15/17. (Gutter Group)

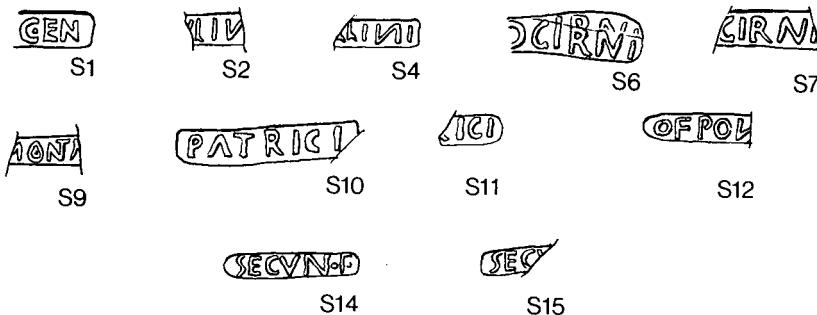


FIG. 96 The samian potters' stamps. Scale, 1:1.

- S4 Iullinus of La Graufesenque.^a Form 15/17 or 18¹, stamped [IVL]LI¹ (7a). The stamp is known from many Flavian foundations, including Caerleon (two), Chester, Chesterholm, Corbridge (two) and Butzbach (two). Although the stamp was used on cups occasionally, dishes predominate, with a relatively high proportion of form 15/17 which may mean that it was in use before 3e. (Gutter Group)
- S5–8 Logirnus of La Graufesenque.^a Form 15/17 or 18 (four), stamped [L]OGIRNI *bis imp.*, [LO]GIRNI (two) and L (5a). Much of the distribution for this stamp looks like a roll-call of sites founded in the 70s and 80s of the first century. A single example on form 24 at La Graufesenque suggests that it was in use very soon after A.D. 70. Camelon has also produced four examples of the stamp. (Gutter Group)
- S9 Montanus of La Graufesenque.^b Form 15/17 or 18, stamped in poor impression [OFM]ONT¹ANI (1a). Montanus must have begun work under Nero, since one of his stamps (7b) is on Ritterling form 8, and another was in one of the shops at Colchester destroyed in A.D. 61 (4a). There is no evidence of the use of this stamp (1a) before the 70s and several examples are from sites founded in the 70s and 80s, with an example from Verulamium Period II. (Gutter Group)
- S10 Patricius i of La Graufesenque.^b Form 15/17 or 18, stamped PATRICI (13a). All six examples otherwise known are on cups of form 33 from London. (Gutter Group)
- S11 Patricius i of La Graufesenque.^b Form 15/17 or 18, stamped [PATR]ICI (13c). Recorded from the York fortress, this stamp is otherwise rare. Patricius's work was almost entirely Flavian, and he was associated directly or indirectly with Calvus, as he stamped a handle of a bowl of form 37 (with spout and handles) from a Calvus mould. For a possible decorated bowl of his see D32 below. (Gutter Group)
- S12 Pontheius of La Graufesenque.^a Form 18, stamped OFPO[ITHEI] (1a). This stamp is from the original version of a die later modified by the cutting of swallow-tail ends. The original is also known from Hofheim and, on marbled ware, at York, where all the marbled ware is patently Flavian. The later version (1a') occurs at Corbridge. (Gutter Group)
- S13 Pontus of La Graufesenque.^b Form 15/17 or 18, stamped [OFP]ONTI (8g). Probably one of Pontus's latest dies, since stamps from it are recorded from Corbridge, Holt and the Saalburg. A scratch on the die eventually made the P appear more like an R, and the stamp has often been assigned to Frontinus. (Gutter Group)
- S14–15 Secundus ii of La Graufesenque.^b Forms 15/17 or 18 (two), SECVN.F and SECW/N.F]. Not a particularly common stamp, this is known once on form 29 and it occurs at the Chester and Nijmegen fortresses. The recorded distribution is almost entirely confined to Britain and the Rhineland. (Gutter Group)

B. THE PLAIN SAMIAN (FIG. 97)

As with the stamps, most of the plain samian from Inchtuthil comes from the Gutter Group outside *Tabernaem 112–3*, which was presumably tipped from a store on the north side of the *via principalis* close to the *principia*. Perhaps this was the store from which the centurions of the first cohort drew their supplies of tableware. (The association of glass vessels apparently from the same store might be seen as giving support to this suggestion.) It appears that when the fortress was evacuated, it was decided to dump the stored pottery rather than carry it away, but it was thoroughly smashed in the process. Although the deposit was overwhelmingly of plain samian, a fairly high proportion of all the decorated ware found came from this group too. Unfortunately the chemical erosion of the sherds in the ground, though not extreme, makes it impossible to decide whether any of the vessels had been used, or whether they merely had the degree of wear to be expected of stored pots.

None of the plain samian is pre-Flavian, and all would have been dated as Flavian, or perhaps sometimes Flavian-Trajanic, or more widely Flavian or Trajanic, if it had come from an undated context. Pieces with the high glazes particularly common c. A.D. 55–75 are entirely absent, as are all the specifically pre-Flavian forms.

For the Gutter Group it is exceedingly difficult to know what the relative quantities of particular forms mean for their popularity. For instance, in theory the unusually high proportion of dishes of forms 22/23 (eighteen ± two rims) could equally point to their popularity, hence the provision of an adequate supply, or their unpopularity, and thus large numbers being left on the shelves. In fact the form is never very common as a normal site-find, so presumably the second explanation is likely to be right. On the other hand the low proportions of forms 27 and 18R probably mean that stocks had been depleted by recent demands. All that can usefully be done, then, is to record the approximate numbers of each form present. The figures are based on counts of rims for all forms except 15/17 (for which the external fluting serves as a diagnostic feature) and the decorated bowls, for which detached rims could rarely be matched with wall sherds nor shown not to belong with them. The totals are shown in TABLE XIX.

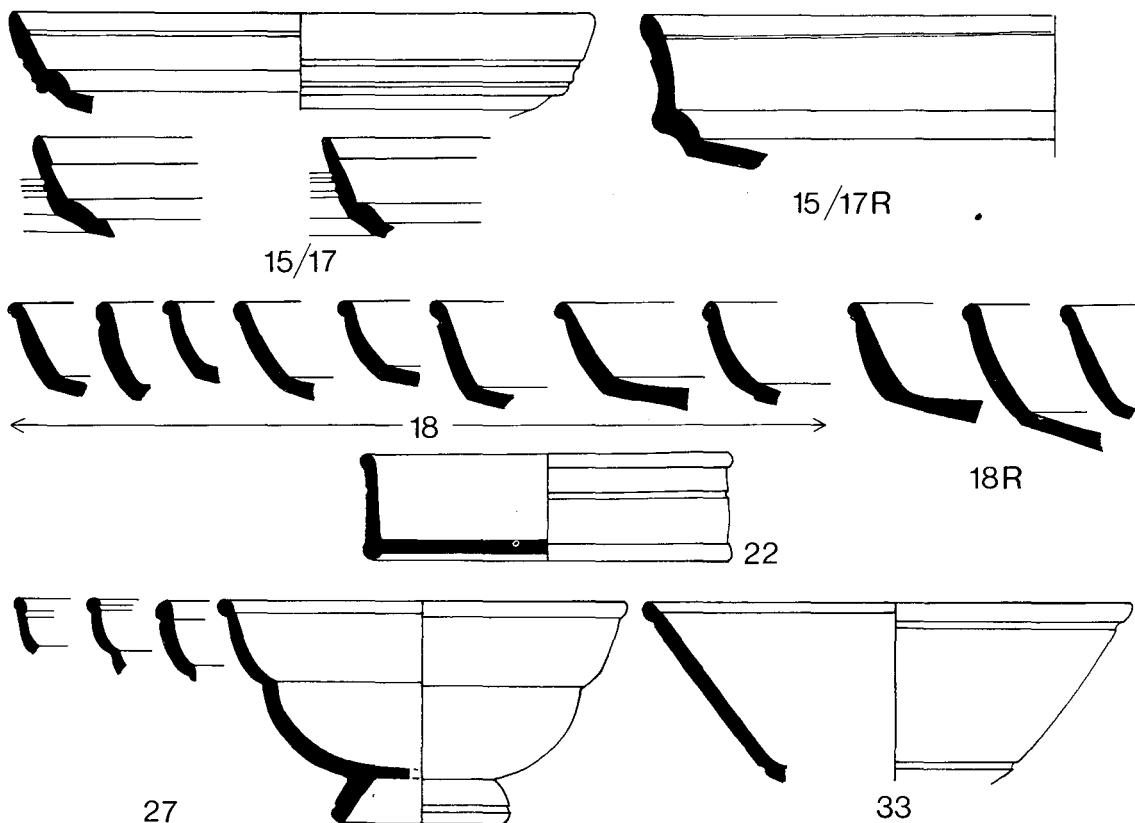


FIG. 97 The plain samian vessels. Scale, 1:2.

TABLE XIX
FREQUENCY OF SAMIAN FORMS AT INCHTUTHIL

		DECORATED	
Form	Total	Form	Total
15/17	15 ± 2	29	8
15/17R	2(?+1)	30	1
18	294 ± 15	33	3
18R	7	35	1
22/23	18 ± 2	37	3
27	6	Curle 11	1

Although it is not usual to illustrate plain samian ware in excavation reports, it is felt that the Inchtuthil material is so exceptionally well-dated that some illustration is needed to define the ranges for each form. This also has the advantage that verbal description can be reduced greatly, and all that is needed is comment on a few minor features of particular forms.

Forms 18 and 18R normally occur in very different proportions from the Gutter Group ones. A rapid, random check suggests that the ratio should be one 18R to fifteen 18s. As for details of the dishes, only one form 18 has a definite external offset at the junction of base and wall, thus confirming the pre-Flavian to early Flavian date usually suggested for that feature. Prominent internal offsets are also rare, though slight ones occur in about 50 per cent of the dishes. Of form 18R only one example has a strong external offset, but three others have slight ones.

Form 27. Four examples are of the smallest variety and all are grooved internally below the lip. Two larger cups both have slight offsets rather than grooves (and the same is true of the larger cups in other groups at Inchtuthil). Of the three footings definitely of this form, two are ungrooved externally, the third is strongly grooved. In other words such grooving was practised by some potters and not by other contemporary ones.

Forms 15/17 and 15/17R (Ritterling 4b). One of the most useful contributions of the Inchtuthil material is the confirmation that forms 15/17 and 15/17R continued in use in more or less the standard versions known in pre-Flavian and early Flavian times. Indeed, the form seems to have continued even later, though in increasingly crude versions.

C. THE DECORATED SAMIAN (FIG. 98)

All the decorated ware is South Gaulish, and it is virtually certain that all comes from La Graufesenque in view of the fabrics and of the parallels adduced below. Since 1972, when a summary was published in *Britannia* iii, 4, a few more sherds have come to hand, but they scarcely alter the relative balance of the main forms, 29, 30 and 37. There are some sherds from decorated forms which do not have surviving traces of decoration. Since it is impossible to be sure how many belong to bowls dealt with below, they have been omitted from the statistics in TABLE XIX above. Finally, it should be noted that two decorated sherds found among Professor Richmond's effects may perhaps be from Inchtuthil. Neither has very significant decoration, though they are probably assignable to Calvus and Frontinus.

D1 Form 29, five sherds almost entirely from the upper zone. The style is one associated with a partnership stamp of a Mur- with a Ter-, originally reading **OF-MVR-TER-F** (1a), but known principally in a broken version **OF-MVR-I** (1a'). Presumably the association is between the known potters Murranus and Tertius, both of whom stamped decorated ware, the former commonly, the latter rarely. The Inchtuthil bowl is linked to them by the use of the paired hares and dogs (Hermet 1934, pl. 26, 58 variant and pl. 26, 24), the panel with leaf-tips and wavy lines, the hollowed rosette and the unusually fine beads bordering the cordon. All are on a bowl, stamped with the

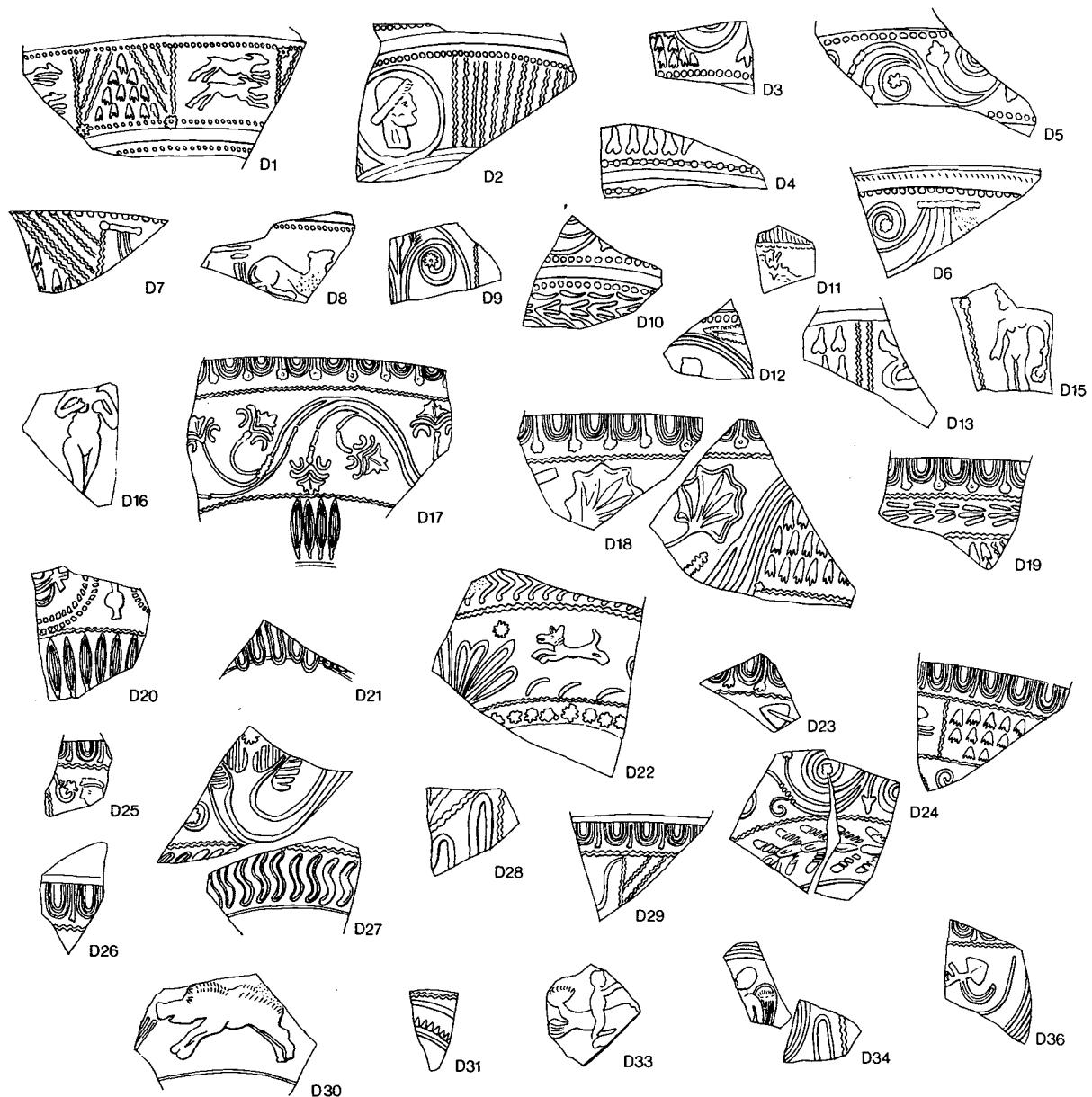


FIG. 98 The decorated samian. Scale, 1:2.

broken die (1a') noted above, formerly in the London Museum (A 25626). The small fragment of lower zone suggests that a large scroll was used, as on the London bowl. The small beads are evidently typical of the partnership, as they are also on one of their bowls (1a') from Heddernheim (Frankfurt α 22226), but are not known for Murranus or Tertius separately though they recur on a bowl stamped by Salutus at Utrecht, together with the paired hares. However, the Utrecht bowl has no other link with the Inchtuthil and London vessels. Murranus's latest stamps and decorated ware appear at Flavian foundations, but never commonly, so he had probably ceased to produce by about A.D. 75. If the association stamp on the London bowl represents a take-over of the Murranus firm by Tertius, or another man with a name beginning in Ter-, it might be slightly later. (Similar associations of Lic(inus?) and Sev(erus?) and of Bassus and Coelus are definitely later than the work of Licinus and Bassus.) (1952: AP)

- D2 Form 29, lower zone. The scheme of decoration is exactly the same as the one on a form 29 from Carlisle (May 1917, pl. II, 16) stamped on the base OFRV[FIN] by Rufinus ii (4b). Both bowls could be from the same mould. The head approximates to Hermet

1934, pl. 24, 297 = O.1322, but as Mr. Dannell has pointed out (*Antiq. Journ.* xliv (1969), 164 ff.), there are several variants of the type. (1960: *Tabernae* immediately west of *principia*, second compartment from north)

- D3 Form 29, upper zone. Although comparatively little decoration is left, a generally similar arrangement is on Knorr 1919, Taf. 22c (Censor), and closer ones are to be found on a bowl of Frontinus from Richborough (Bushe-Fox 1932, pl. XXVI, 3) and on an unpublished bowl of Coelus from Koblenz. (1955: post-hole, colonnade of *Tabernae*, W. side of *via decumana*)
- D4 Form 29, upper zone. The same leaves used in this way are on bowls from Königshoffen and Xanten with mould-stamps of Iustus. (1957: SE corner of *Taberna* 112)
- D5 Form 29, upper zone. A precise match for the scroll is on a form 29 at Rochester stamped internally by Frontinus (1c) and from a mould also stamped by him (23a). (Gutter Group)
- D6 Form 29, upper zone. The zone of rather indistinct festoons is too banal for parallels to be meaningful. (Gutter Group)
- D7 Form 29, upper zone. The panel of leaf tips and wavy lines is precisely paralleled at Strasbourg on a bowl from a mould stamped by Severus (26b), but stamped internally by C. Silvius Patricius (11a). (Gutter Group)
- D8 Form 29, lower zone. The feline in the festoon (?) (Hermet 1934, pl. 25, 23) was used by Crestio on a bowl in the old Guildhall Museum. This piece is strictly unassignable, though the neat, small beads bordering the cordon suggest comparison with No. D1, though the bowls are definitely different. (Gutter Group)
- D9 Form 29, lower zone. A bowl from Wall stamped internally by Patricius, but perhaps from a Calvus mould, has the same composite ornament as in the medallion here. (Gutter Group)
- D10 Form 29, with parts of both zones. The wreath in the lower zone was favoured by Frontinus, who used it in this position on a bowl from Heidelberg-Neuenheim (Knorr 1919, Taf. 63 c), though it was used earlier by Passenus (*ibid.* Taf. 62, 51). However, since the upper zone is similar to No. D5, a connection with Frontinus seems certain. (Gutter Group)
- D11 Form 29, upper zone and rim with very fine rouletting. A blurred figure alone survives, but is not identifiable. (Gutter Group)
- D12 Form 29, lower zone. Presumably a panelled scheme, with the large double medallion and corner tassel with leaf occupying one panel. The leaf was used by Rufinus, but also by C. I(ulius) Sa- (Hermet 1934, pl. 82, 1 with his ovolو and style), who also used the medallion and Cupid (*ibid.* pl. 18, 38 approximately). (1957: E. wall of *Taberna* 112)
- D13 Form 29, upper zone, with the usual upper beads evidently cut away in finishing the rim. Although the small leaves were used by several Flavian potters, they and the scene in the next panel, a man being eaten by a beast (Hermet 1934, pl. 25, 33 = O.1493) occur together on a form 29 from Nijmegen stamped by Vanderio (*Numaga* xiii (1966), 277, No. 5). (1952: AF)

- D14 Form 29, lower zone with part of a poorly-impressed stag, one of the variants of Hermet 1934, pl. 27, 1 or 3 = O.1701. (Gutter group)
- D15 Form 29, with parts of both zones. In the upper zone the panels of leaf-tips and diagonal lines are close to No. D1, though the beads are not the same. The figure in the lower zone is Venus (Hermet 1934, pl. 18, 24 = O.313). Not assignable to a particular potter. (NMA, FY98 = *Archaeologia* lxiv (1912–13), 309, No. 68)
- D16 Form 30 with Venus (Hermet 1934, pl. 18, 8 = O.331). This figure-type is almost certainly a Flavian introduction, as Oswald thought. (Gutter Group)
- D17 Form 37, two joining fragments. Frontinus and Paullus iii both used the ovolo, which originated in the 70s and is present in a clearer version in the Pompeii Hoard of A.D. 79 (Atkinson 1914, 48, 50, 51, etc.). The large scroll of this bowl does not match any known work of Frontinus, Paullus or the Pompeian potter, however, and its unusual leaf is only known certainly in the work of Crestio and M. Crestio (Knorr 1919, Taf. 27, 17 and 28, 25 with Textbild 17). On the other hand the third element of decoration, the ‘palisade’, was commonly used by Frontinus to close his decoration, as on the Rochester bowl quoted under No. D5. (1959: ‘*basilica exercitatoria*’)
- D18 Form 37, two fragments not joining. The same ovolo as on D17, though the scroll is obviously very different in style. The leaf was used by Calvus, and is on a bowl in his style at Camelon (NMÅ, FX78 = FX82), but it was probably also used by M. Crestio. But Frontinus used identical leaf-tips in divided lower parts of scrolls (Knorr 1952, Taf. 25A), so on balance this bowl is likely to be his work. (1960: south gutter of *via quintana* north of *tabernae* immediately west of *principia*)
- D19 Form 37, two burnt fragments. The same ovolo as the last two, but here with zonal decoration including the straight wreath of plants certainly used by Passenus in his late work (Knorr 1952, Taf. 48A), but probably also used by Frontinus (*Chester Arch. Journ.* xxxiii (1939), 52 No. 3 seems to be a slightly misdrawn rendering of it). It should here be noted that the ovolo of Nos. D16–18 has already been recorded from Inchtuthil (*Archaeologia* lxiv (1912–13), No. 69), and that it is one of the commonest at Camelon. In this version, as opposed to the original one, it obviously belongs primarily to the 80s. (1957: east wall of *Taberna* 112)
- D20 Form 37. Both the festoons with their pendant and the palisade are matched precisely on a bowl from Alcester with the same ovolo as Nos. D16–18. Both features are common in the work of Frontinus (Knorr 1952, Taf. 25). (1955: post-hole of colonnade of *tabernae* on west side of *via decumana*)
- D21 Form 37 base with the bottom of the decoration. The small sinuous gadroons are diagnostic of Frontinus and are on a stamped bowl from Newstead (Curle 1911, 109, No. 4). (1963)
- D22 Form 37 with zonal decoration. The plant and grass blades in the main zone are on a bowl from Augsburg with M. Crestio’s trident-tongued ovolo (Roger 1914, Taf. xx, i), but the chevron-wreath was used by Frontinus on a stamped bowl from Camelon (NMA), and is on many unstamped bowls by him and other contemporaries. (1962: ovens)
- D23 Form 37 fragment with M. Crestio’s trident-tongued ovolo and a stirrup-leaf commonly used by him. (1962: ovens)

- D24 Form 37, twelve small sherds from a bowl with internal grooves at the level of the top of the mould, as is usual on form 30. The ovolo is one well-known on bowls from moulds stamped by Mommo and ones signed by Memor and a potter whose name began Trim- (from recent work at Camelon). Cf. Atkinson 1914, 64 which also has the same wreath as this. In addition Mommo used the leaf-tips (*ibid.* No. 7) and the hare in the upper zone (*ibid.* No. 3). The small leaf in the scroll is on an unpublished form 30 from Verulamium stamped OFMO retro. (Gutter Group)
- D25 Form 37 flake with the same ovolo as the last. For what it is worth, the rosette on the corner tassel matches one used by Mommo, though the human head has not been identified. (Gutter Group)
- D26 Form 37 with ovolo alone surviving. C. Valerius Albanus, M. Crestio and, perhaps, Severus used it, and it has been found at Camelon. (1957: east wall of *Taberna* 112)
- D27 Form 37, two sherds not joining. Both the large scroll and its leaves are matched on a stamped bowl of M. Crestio from Strasbourg (unpublished?). The leaves are also on the Patricius bowl noted under No. D9. The S-shaped gadroons are common to M. Crestio, Severus and, probably, Frontinus (another Camelon bowl in his style). (Gutter Group)
- D28 Form 37 with only part of an unattributable saltire. (1962: gully west of third small building from the east in the *scamnum tribunorum* south of Tribune's House III (FIG. 36).
- D29 Form 37 with a blurred ovolo, probably the Memor and Mommo one of Nos. D24–5. The surviving decoration is too inadequate to suggest a potter. (1961: Gutter on south side of *via principalis* east)
- D30 Form 37, presumably part of a freestyle zone, with boar (Hermet 1934, pl. 27, 42) and part of a conventional plant like that on No. D22. The boar was used by many Flavian potters, including Cosius Rufinus, Frontinus, Mommo and Secundus. (1960: south gutter of *via quintana* north of *tabernae* immediately west of *principia*)
- D31 Form 37 fragment. As the unusual medallion, apparently in a scroll, is on a bowl probably from Camelon (Falkirk Museum) with the same festoons and pendants as on D20, this piece is likely to be from a Frontinus bowl. (Gutter Group)
- D32 Form 37 with ovolo only. A stamped bowl of Patricius from Chester (*Chester Arch. Journ.* xxxiii (1939), pl. XXIX 7) almost certainly has the same ovolo. (Provenance?)
- D33 Form 37 flake, burnt. This sherd is interesting because it has the rare figure-type of a youth (Arion?) or *putto* riding on a dolphin (Hermet 1934, pl. 22, 199). (Provenance?)
- D34 Form 37, two fragments, one burnt. Both the double medallion and Cupid (Hermet 1934, pl. 18, 38 variant = O.436 or 436A) were used in this way by C. I(ulius) Sa- (*ibid.* pl. 82, 1 and 7). (1957: east wall of *Taberna* 112)
- D35 Form 37 with a common type of wreath used by many potters, including Censor, Crucuro, Frontinus and Iucundus. (1955: southernmost wall, *tabernae* on *via decumana*)
- D36 Form 37, perhaps with the same ovolo as Nos. D24–5 (and cf. D29). The leaf was used by several potters but no precise parallel has been found for the festoon. (1969: stray find in the NMA)

GENERAL COMMENTS ON THE DECORATED SAMIAN

Although form 29 was normally stamped internally with a potter's name in the south of Gaul, only rarely do mould-stamps or signatures appear on the bowls. For forms 30 and 37 the position is even worse, because the bowls were scarcely ever stamped after moulding, but mould-stamps and signatures are still very uncommon. Some potters, such as M. Crestio, Crucuro, Frontinus, Germanus or Iustus did regularly stamp moulds, however, and it is possible to define styles for them and so attribute unstamped fragments with fair certainty at times. Some others stamped or signed their moulds occasionally, such as Memor, Mommo, Severus, C. Valerius Albanus and Vitalis. It is possible to go some way towards identifying their unstamped work. However, many of these potters used motifs, and sometimes combinations of them, in common, and frequently only general parallels can be quoted. At Inchtuthil the problems are exacerbated by the small sizes of the sherds in general. As might be expected, there are definite links with work in the Pompeii Hoard (Atkinson 1914), particularly for the bowls with the Memor-Mommo ovoli. At the other end of the Inchtuthil range, one can only note that the absence of work by the common Flavian-Trajanic potters, such as Biragillus, Crucuro, Masclus ii (once known as Mascuus) and, above all, Mercator is total, as in the other military sites north of the Forth-Clyde line.

Potters whose names are mentioned more than once in the parallels quoted above are, in order of frequency: Frontinus, M. Crestio, Mommo, Severus, Calvus, Censor, C. I(ulius) Sa-, Memor, Mur- Ter-, Patricius, Rufinus and C. Valerius Albanus. Of these, Frontinus and M. Crestio are notably absent at Pompeii and probably began making decorated ware about A.D. 80.

There are no surprises in the Inchtuthil decorated ware, except perhaps the total absence of anything of pre-Flavian manufacture and the extreme rarity of pots likely to belong to the early 70s. It looks very much as if those requiring table-ware at Inchtuthil drew on new material available in stores such as the one which led to the Gutter Group (p. 000). The implication seems to be that the legion was buying in table-ware from merchants, and at Inchtuthil surely not by local purchase. Forethought and ordering somewhere further south must surely have been in question. This was no doubt a small part of the logistical problems involved, but it is useful to have such a hint of official ordering. Presumably those drawing on the stored table-ware would be required to pay for it.

CHAPTER 33

THE OTHER ROMAN POTTERY

By MARGARET J. DARLING

The coarse pottery amounted to 1,721 sherds, 27.3 kg. This total excludes the samian and two complete amphorae (Camulodunum form 186 and Dressel 20, PL. XLVI) in the National Museum of Antiquities of Scotland in Edinburgh. Approximately half the pottery came from identifiable contexts, but only one major deposit for pottery was represented, the latrine pit in Tribune's House III, which produced 234 sherds (4.6 kg). The presence of only one pit-group and the small total quantity of pottery limit the conclusions that can be drawn. With these factors and the short occupation in mind, the pottery is presented as a type series.

The notable feature of the coarse pottery is the quantity seemingly made locally for, although the clay sources have not been identified, igneous inclusions and the high mica content suggest a relatively local source despite the sandy nature of the subsoil at the site itself and in the immediate area. Tributaries of the Tay to the north and west cut through igneous and schistose rocks, and it seems likely that the clay used was local water-deposited clay. Discovery of roads related to the construction traffic may aid future work to determine the source of the clay, and perhaps even a works-depot which, as at Holt (Grimes 1930), would also have produced tiles for the bath-house. The fact that both tiles and daub appear to have been made from the same clay as the pottery (see Dr. D.F. Williams's report, p. 339) adds to the probability of a local clay source (see p. 47). The local vessels divide into two fabrics, but these may be no more than a coarse and a finer version of the same clay (see Dr. D.F. Williams's report, p. 339); the locally-made pottery at the legionary fortress at Wroxeter has a similar division. The different versions of the fabric appear to have been used for different vessel-forms to some extent, but both are quite often used irrespective of form. The pottery is summarized in TABLE XX.

TABLE XX
POTTERY: SUMMARY OF QUANTITIES

	<i>Sherds</i>	<i>percentage</i>	<i>Weight (grams)</i>	<i>percentage</i>
Fabric 1 – local, coarser	899	52.2	8140	29.9
Fabric 2 – local, finer	404	23.5	9222	33.8
Imported fine wares	195	11.3	1221	4.5
Amphorae	154	8.9	4070	14.9
Mortaria from England and Imports	25	1.5	3745	13.7
Misc. non-local coarse wares	44	2.6	867	3.2
<i>Total</i>	1721		27265	

These figures show a significant difference between sherd count and weight for the two versions of the local fabric, for the coarser Fabric 1 was much more fragmented, a sherd of Fabric 2 weighing approximately 2.5 times heavier. This obscures the relationship between the two fabric variants, and also masks the importance of the locally-made pottery. In view of the small quantity, a vessel-count based primarily on rims is more useful to assess the assemblage. This produces the breakdown shown in TABLE XXI (excluding amphorae as containers, and the single imported lamp):

TABLE XXI
POTTERY: SUMMARY OF RIM-COUNT

	<i>Vessels</i>	<i>Total</i>	<i>percentage</i>
Fabric 1: coarse wares	61		
mortaria	8	69	47.6
Fabric 2: coarse wares	42		
mortaria	5	47	32.4
Mortaria from elsewhere		10	6.9
Miscellaneous coarse wares		7	4.8
Imported fine wares		12	8.3
	<i>Total</i>	145	

This clarifies the dependence of the garrison on locally-made pottery, especially when it is noted that the seven miscellaneous vessels were all in differing fabrics, and that the twelve imported vessels included probably ten Pompeian red-ware platters which were all found thrown out of *Taberna*e 112–13 with samian and glass vessels, and possibly constituted one single consignment.

Locally-made pottery accounted for over 80% of the pottery from the site; this compares closely with interim figures from the Wroxeter legionary fortress of c. 78%, and a similar result may be expected from the fortress at Usk (Greene, forthcoming).

The range of forms being produced and their division between the two versions of local fabric are shown on TABLE XXII (based on vessel count):

TABLE XXII
POTTERY: SUMMARY OF FORM AND FABRIC

	<i>Vessels</i>	<i>Fabric 1</i> <i>percentage</i>	<i>Vessels</i>	<i>Fabric 2</i> <i>percentage</i>
Flagons	10	14.5		
Beakers/small jars	1	1.4	8	17.0
Jars	36	52.2	10	21.3
Bowls	8	11.6	18	38.3
Mortaria	8	11.6	6	10.6
Platters	1	1.4	5	10.6
Lids	2	2.9	1	2.1
Tazze	3	4.3		
	<i>Total</i>	69	47	

It is apparent that Fabric 1 was used exclusively for flagons and tazze and for 78% (that is, 36 out of 46) of the locally made jars. Fabric 2 seems to have been used more for what may be considered table-ware; but since many of the bowls and even the platters were probably employed for cooking, use of the finer fabric may not be closely related to vessel function.

FABRICS 1 and 2 (Local)

Since 68 of the published 92 vessels are in the two local fabrics, a conventional catalogue is unnecessary, and only descriptions of individual vessels of non-local origin are given. The local fabrics are:

Fabric 1. Fairly hard fabric often with rough feel, and varying quantities of quartz, sub-rounded, occasionally angular, and usually well-sorted; some opaque quartz, occasional red-brown and black inclusions; micaceous. Vessels in this fabric are denoted by open circles on the illustrations. For mortaria in this fabric and in Fabric 2, see p. 331. For the results of thin-sectioning see p. 339.

Fabric 2. This seems to differ from Fabric 1 only in having fewer inclusions. The fabric, for that reason, seems softer and more powdery. Both local fabrics occur in varying shades of red-brown to orange, mostly in shade 5 YR 6/6, but also in range 7.6 YR 7/6 – 5 YR 5/8. The present hardness of the fabric is relatively unimportant since soil-conditions have adversely affected all the pottery. Vessels in this fabric are denoted by closed circles on the illustrations. The surfaces are generally untreated beyond routine smoothing, although knife-trimming of the basal zone is common. For the results of thin-sectioning see p. 339.

CATALOGUE OF NON-LOCAL VESSELS

- 33. Hard red-brown fabric with rough drab brown surfaces, and common ill-sorted sub-rounded quartz, and opaque quartz; occasional crystalline inclusions; discoloured and heavily sooted externally.
- 35. Hard dark grey roughish fabric with common tiny sub-rounded well-sorted quartz and occasional red-brown (?) iron-ore. Burnished with horizontal lines on neck, closely rilled on shoulder, and only smoothed below.
- 58. Fairly hard rough light brown fabric with common ill-sorted sub-rounded quartz and opaque quartz, occasional black (?) iron-ore.
- 59. Hard rough light grey fabric with moderate ill-sorted sub-rounded to angular quartz and occasional iron-ore.
- 65. Hard dark grey fabric with almost black core, light brown cortex and surfaces, smooth feel; moderate very tiny sub-rounded to angular quartz; dimples pushed out from inside into two sizes of tube for the three vertical schemes of roundels, interposed by larger roundels, again pushed out into some type of former. Exterior surface densely mica-dusted a bronze colour.
- 66–71. Pompeian red ware, Peacock's Fabric 3 (Peacock 1977, 154). Pale beige fabric (5 YR 6/6 – 7.5 YR 7/4) with sparse well-sorted tiny quartz and mica. The platters are fairly thickly slipped internally (some matt but also some glossier) in dark red (10 R range from 4/6, 4/8, 5/6), this slip extending over the rim and terminating either just below the chamfer, where this occurs, or at the groove. The rest of the exterior (and on the lid, No. 71) is washed light brown (2.5 YR 6/6). For discussion of these vessels, see the Section following.

Amphorae

- 72. Dressel 20 rim in typical rough sandy fabric.
- 73. Dressel 2–4. Fairly hard light brown fabric, exterior surface being partially lighter in

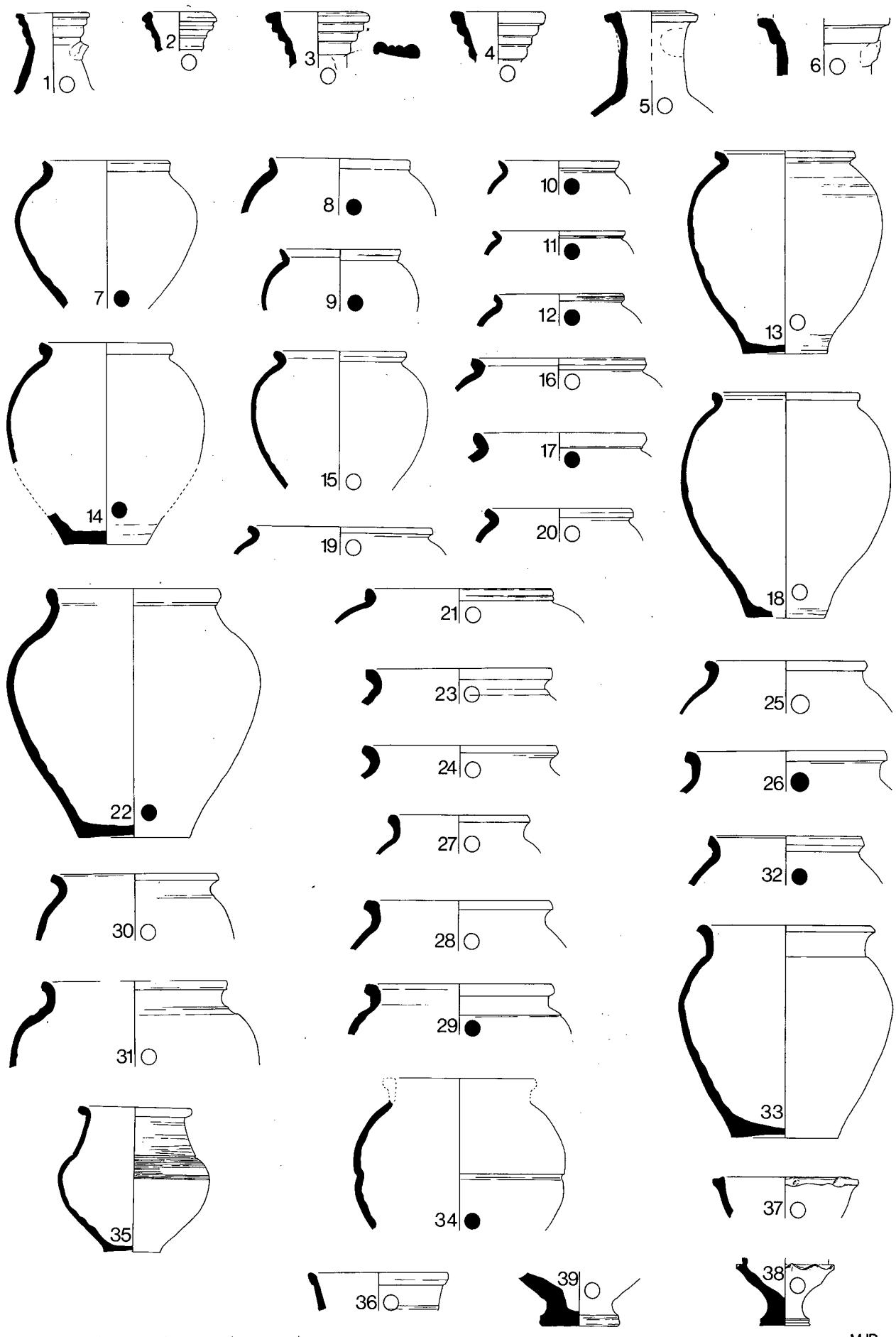


FIG. 99 The other Roman pottery. Scale, 1:4. Note: an open circle denotes Fabric 1, a black circle Fabric 2.

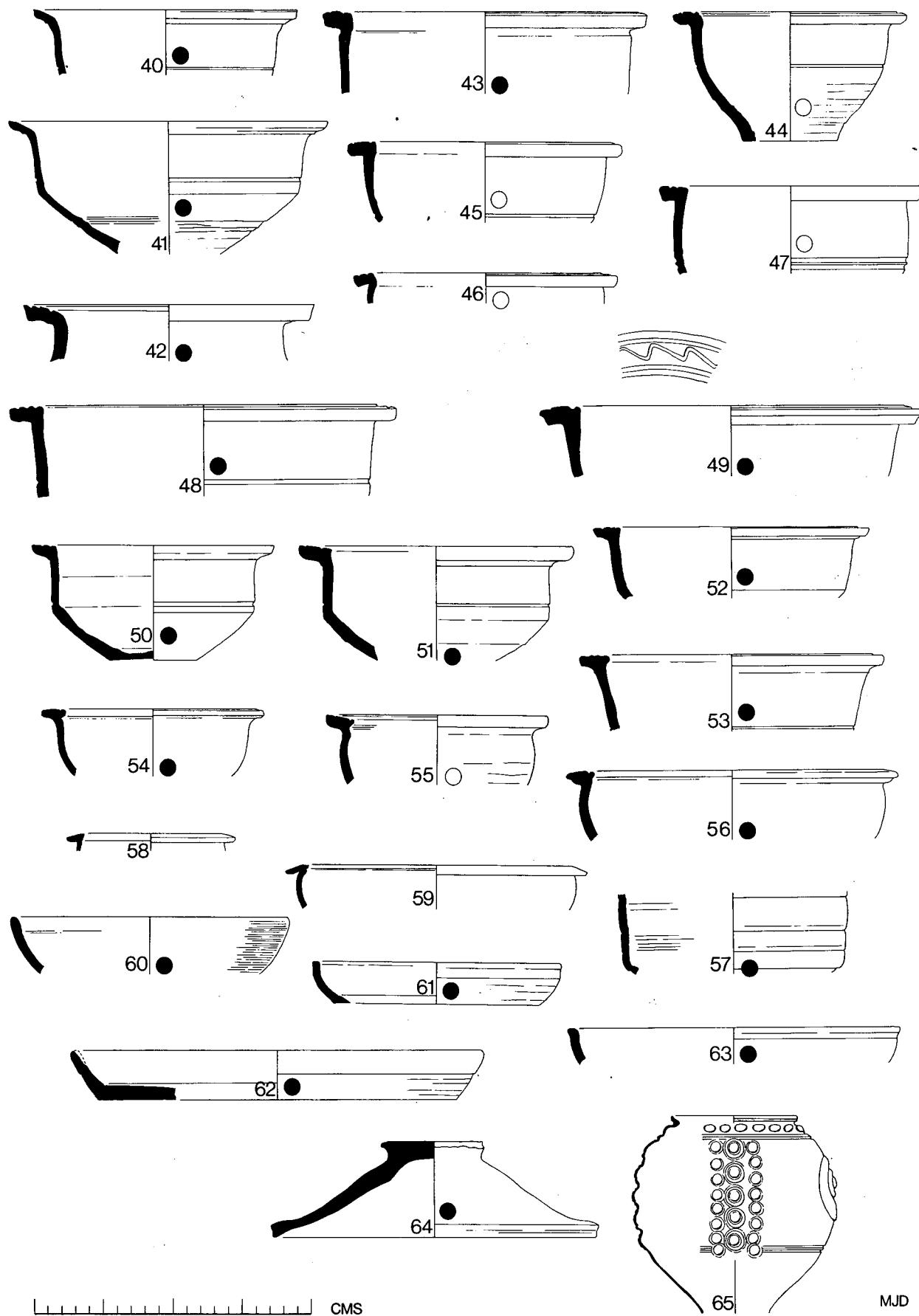


FIG. 100 The other Roman pottery. Scale, 1:4. Note: an open circle denotes Fabric 1, a black circle Fabric 2.

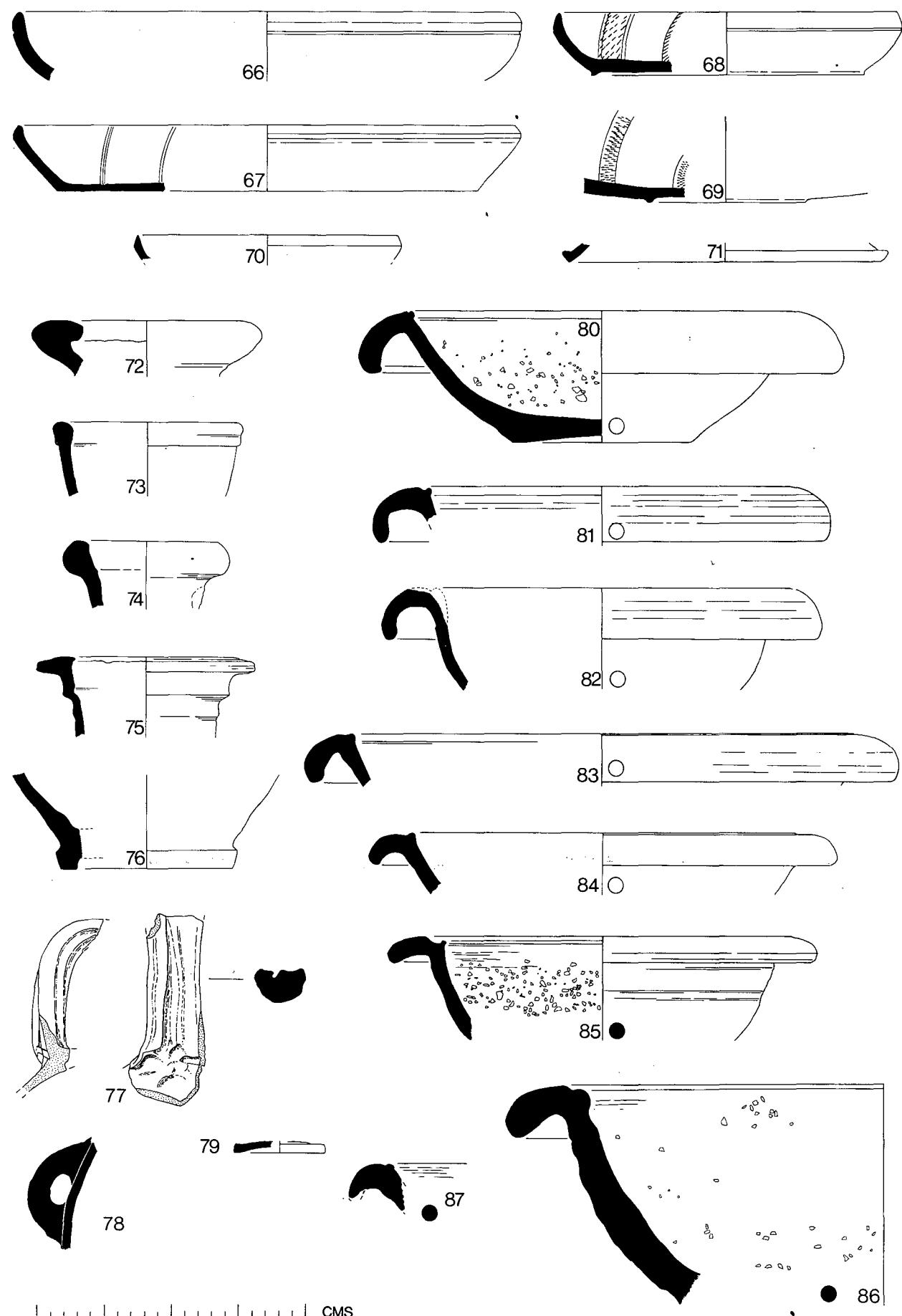


FIG. 101 The other Roman pottery. Scale, 1:4. Note: an open circle denotes Fabric 1, a black circle Fabric 2. For Nos. 80-87 see p. 332.

- colour (5 YR 6/6), with common to abundant tiny angular quartz, sparse tiny black inclusions; and occasional earthy cream and red iron-ore.
74. Pélichet 47. Softish dark cream to light brown surface (7.5 YR 7/4 – 2.5 YR 6/6), light red-brown core burnt greyish; almost grit-free fabric with occasional quartz and red-brown inclusions.
 - 75–77. Pélichet 47 types. Soft dark cream with pinkish core (10 YR 7/4) fabric, in very friable condition; very sparse sub-rounded well-sorted quartz, occasional iron-ore, and mica.
 78. Handle from a variety of the 'carrot type' amphora as Camulodunum 189. Hard rough fabric, varying in colour from light red-brown to brown, with abundant sub-rounded well-sorted quartz.
 79. Soft cream fabric (10 YR 7/4) with lighter surface (10 YR 8/4) with common tiny opaque quartz and sparse red and black (?) iron-ore.

POMPEIAN RED WARE (See above, Nos. 66–71)

Forty-seven sherds (1.032 kg) were found, representing a maximum of ten vessels. These accounted for 3.0–4.5% on count and weight of the coarse pottery (excluding amphorae as containers), and 6.2% on a minimum-vessel count. These were found with other pottery flung out from *Tabernae* 112–13 and trampled into the gutter, and may therefore represent the remains of a single consignment. All are in Peacock's Fabric 3 (1977, 154).

The platters divide into two types, the first represented by Nos. 67 and 70, the second by Nos. 68, 69 and probably also 66. The first type is thinner-walled with bevelled rims and (on the evidence of No. 67) with flat bases, although similar platters in the same fabric with footings at the junction of wall and base are known from several sites (Richborough: Peacock 1977, fig. 3, Nos. 7 & 8; Kingsholm (but unusually in Peacock's Fabric 1): Darling 1985, 71; Leicester: Kenyon 1948, fig. 57, No. 2; Haltern: Loeschke 1909, Taf. XIV, 15, type 75A, Goudineau 1970, pl. II, No. 19; Trier: Gose 247, Goudineau 1970, pl. III, No. 39, this last example being rather clumsy and dated to the last third of the second century). Moreover, because of the frequent absence of adequate base sherds, there can be no certainty that some were not rouletted as Type 2, since the Caerleon example (Boon 1967, No. 13) has normal concentric grooves at the edge of the base, and the rouletted zone is towards the centre. The second type is thicker, with a groove externally just below the rim, and decorated on the floor with rouletting. The presence or absence of footing and/or rouletting on this fabric may not be significant, although it seems clear that rouletting is very rare and probably a Flavian introduction. The presence of a footing on this platter can probably be dated to the pre-Flavian period in view of the evidence from Kingsholm, although there on vessels in Peacock's Fabric 1, of Italian origin. The flat-based form of Camulodunum 17 is much more common.

The only parallel traced with the rouletting characteristic of the second type is that from Caerleon (Boon 1967, fig. 3, No. 13) which came from the levelling of the parade-ground which, although laid down c. A.D. 140, was composed of predominantly Flavian rubbish. This vessel differs from the Inchtuthil examples in having only one band of rouletting, and a pair of concentric grooves; the base is finished with several *double* footings and it does not have the groove on the rim. This vessel is in the same fabric as micaceous sigillata known to come from Lezoux. Some dishes in identical fabric are known from Colchester, although none is published with rouletting. No continental examples have been traced, although coarse-ware dishes with rouletting on the floor are known from Aquitaine (Santrot and Santrot 1979, Nos. 41 and 47 for instance).

The lid, No. 71, does not correspond to the type example figured by Peacock (1977, fig. 3, No. 9), but the form is known from Usk (Greene 1979a, fig. 54, Nos. 7–9) and Richborough (Bushe-Fox 1949, pl. XCI, No. 453).

The occurrence of this group at Inchtuthil, all of the same fabric and virtually of the same form, including at least four examples of rare decorated platters, is interesting, and for Inchtuthil to have the equivalent of ten vessels in such a small group of pottery, coupled with the rarity of Pompeian red ware on most Flavian sites, suggests that these constitute just one shipment.

A further sherd, which was unfortunately too small for illustration, appears to come from a flange-rimmed bowl. Such bowls in Pompeian red ware are known from Britain (Richborough: Bushe-Fox 1949, pl. XCI, No. 438 but in Fabric 6, a grey/black fabric); but more importantly, one example came from Newstead (Curle 1911, pl. XLVIII, type 39). This is particularly interesting as it is described as of hard, fine-textured yellow-grey ware with the interior slipped *white*, and was found in a pit associated with early samian and also with fragments of at least three other bowls of the same type; but these were slipped pinkish-red internally. Newstead also produced a more conventional Camulodunum Type 17 platter (Curle 1911, pl. XLVI, type 32) in yellowish-grey ware with pink colouring on the interior. The slightly ambiguous fabric-colour description is unfortunate as it seems possible that two different sources may have been producing bowls of this type. These bowls figure among the vessels from Blicquy (de Laet and Thoen 1969, fig. 2) where they appear to have two fabric colours, one of grey-black considered to be produced in eastern Belgium, and the other with oxidized tones of white to yellow, more common in the Rhineland and comparatively rare at Blicquy.

The Inchtuthil flange-fragment does not resemble the Richborough or Newstead examples, but could be similar to some from Blicquy (de Laet and Thoen 1969, fig. 5, type 2). This type is very rare; three examples are known from tombs at Blicquy itself and one from the necropolis of Courtrai-Molenstraat; they are of similar date to Type 1 there and to the Richborough and Newstead bowls, Flavian to early second century. The Inchtuthil fragment is similar to one of the three examples figured (*ibid.*, fig. 5). De Laet and Thoen suggest that a potter or potters moved from the Rhineland to Belgium, so that the same form occurring in differing fabrics is not surprising. Since the Inchtuthil sherd is in Fabric 3, it is possible that the Rhineland examples came from Gaul. No other example has been traced in Britain.

THE MORTARIA

Report based on a study by K.F. Hartley (quantification by M.J. Darling)

The mortaria occurred in the following fabrics:

Fabric 100. Hard, granular greyish-cream fabric, often with pink core and often with cream to buff slip; the texture was obtained by the addition of a massive quantity of well-sorted quartz inclusions to the clay, perhaps with a little flint. Trituration consists of flint, red-brown material and quartz. The workshops producing this fabric were at Brockley Hill (Middlesex), Bricket Wood, Radlett, and Verulamium (Hertfordshire) and probably elsewhere in the area; unless the specific workshop is known, the term 'Verulamium region' is used. See Nos. 91, 92.

Fabric 101. Hard, granular orange-brown fabric with thick black core and a brownish slip; inclusions and trituration are probably identical with those of Fabric 100. Verulamium region. Only one incomplete rim-section was found, with concentric scoring on the inside only.

Fabric 102. Similar to Fabric 100 except in having a partially black core and much smaller-sized inclusions, so that the fabric is less granular; no trituration survives. Origin uncertain, either Verulamium region or the Rhineland. Only one incomplete rim-section occurred.

Fabric 103. Softish, fine-textured buff-cream fabric with some very tiny quartz, flint and red-brown inclusions; flint and quartz trituration. This fabric disintegrates badly in acid soil. Imported from Gaul, perhaps from the Pas de Calais. See No. 88.

Fabric 104. Very hard, off-white fabric with abundant ill-sorted quartz inclusions and abundant quartz trituration. The single example has a dark grey core and may have had a cream slip. The production-site is unknown but the fabric and trituration can be closely matched in later mortaria which can be attributed to the Rhineland. See No. 90.

Fabric 105. Very hard fabric, apparently dark grey throughout but with a thick cream slip; abundant quartz inclusions, tending to be smaller and perhaps fewer than in Fabric 104. Trituration as with Fabric 104. Probably from a similar source. See No. 89.

Fabric 106. Cream fabric with laminated structure and ill-sorted transparent and pinkish quartz, opaque red-brown and blackish inclusions; quartz and red-brown sandstone trituration; buff slip. Origin unknown, but the Rhineland is more likely than Scotland as there is no evidence for production of this type of fabric in Scotland in the first century. Only a worn base and body-sherd were found.

Fabric 1 (see also p. 325). Slightly micaceous, self-coloured, orange-brown fabric sometimes with a drab grey core and a smallish amount of inclusions, mostly quartz with very occasional red-brown material; white quartz trituration (No. 80).

Fabric 2 (see also p. 325). Softish, fine-textured pink-brown fabric with occasional quartz and brown (? iron-rich) inclusions; trituration as with Fabric 1, but sometimes with a small amount of igneous material. Nos. 85 and 86 have trituration of white quartz and sandstone. For the results of thin-sectioning, see p. 339.

The mortaria in Fabric 1 are quite obviously made at Inchtuthil (see below) and Fabric 2 is so similar that production at the same workshop is probable. These two fabrics are not always clear-cut and there are some mortaria (e.g. Nos. 85–87) which are perhaps midway between the two.

The mortaria represented 3.8% and 33.7% of the coarse pottery on count and weight and are summarized in TABLE XXIII.

TABLE XXIII
QUANTIFICATION OF THE MORTARIA

	Sherds	percentage	Weight (grams)	percentage	Minimum Nos.	percentage
Local, Fabric 1	24	36.4	2395	26.1	8	32.0
Fabric 2	17	25.8	3045	33.2	5	20.0
Verulamium region,						
Fabrics 100/1	6	9.1	1230	13.4	7	28.0
North Gaul, Fabric 103	13	19.7	590	6.4	1	4.0
Rhineland, Fabrics 104/5	4	6.1	1740	18.9	2	8.0
(?) Rhineland, Fabric 106	1	1.5	140	1.5	1	4.0
Unknown, Fabric 102	1	1.5	45	0.5	1	4.0
Total	66		9185		25	

The stamped rim of Albinus, No. 92, is included only under the minimum numbers estimate, as this was not available when the pottery was quantified.

Comments

At least 25 mortaria are represented by the sherds from Inchtuthil. The group is notable on two counts. First, it is interesting to find that a site occupied for so short a time, c. A.D. 83–87, had mortaria from at least five different sources, two of which could well be in the Rhineland (Nos. 89, 90 and unillustrated Fabric 106), and one certainly in Gaul. The main outside supplier was, however, the potteries in the Verulamium region, which produced seven, almost a quarter of the sample.

But the more interesting aspect is that over half of the total number exhibit every likelihood of being products of a local workshop. The fabrics (1 and 2) are consistent with such a source, and in particular the rim-forms used with Fabric 1 cannot be paralleled elsewhere; the type of concentric scoring on at least three (Nos. 81, 82 and an unillustrated example) is very exceptional and can be paralleled only on the interior of some Claudian wall-sided mortaria. It is not to be confused with the close scoring on mortaria made in the Verulamium region (as No. 91), or in the Gaulish potteries which made Groups I and II (Hartley 1977) in the late Neronian and Flavian periods. No. 85 is a typical widely-made pre-Flavian form, recorded at Usk, where it was one of the forms produced, and at Fishbourne (Cunliffe 1971, type 142), Camulodunum (Hawkes and Hull 1947, fig. 53, No. 23), Kingsholm and elsewhere. It was not made in the highly successful commercial potteries in the Verulamium region and Gaul which were active in the Neronian-Flavian period, and there is a possibility that it was made primarily or solely by the army. The Inchtuthil workshop which produced these mortaria along with other types of pottery would certainly be military, and the two features already mentioned, the unusual concentric scoring and the profiles of Nos. 84 and 85, suggest that it was working in a conservative tradition.

Unfortunately No. 87 (and another unillustrated example) are too fragmentary for useful comment; but they differ from the group described only in the fabric having fewer inclusions and in the use of a slip; the concentric scoring on the interior of No. 87 is similar to that on No. 81.

Description of illustrated mortaria

Because of the local pottery production and the closely dated occupation at Inchtuthil (A.D. 83–87), all drawable pieces are illustrated except for mortaria made in the Verulamium region (Fabrics 100, 101), where the rim-profiles for this period are well known.

80. Fabric 1. The upper surfaces are smooth but the under surfaces have been made abrasive by the addition of tiny quartz particles.
81. Fabric 1, burnt, with an unusual widely-spaced type of concentric scoring used on the interior and on the flange. This type of scoring is probably a development of the scoring sometimes used on Claudian mortaria before trituration grit was used.
82. Fabric 1, well-worn and burnt, with identical scoring on the flange to that on No. 81, but any which may have appeared on the inside has been worn away.
83. Fabric 1. Faint trace of similar concentric scoring can be discerned on the flange only.
84. Fabric 1. A form not commonly found in Flavian groups.
85. Fabric 2, with some sandstone and a little igneous material amongst the trituration grit. This is a pre-Flavian form, rarely found in Flavian contexts and perhaps only produced by military potters.
86. Fabric 2, with trituration similar to that of No. 85.
87. Fabric 2, with cream slip and with concentric scoring on the inside only.
88. Fabric 103. Form Gillam 238 (Hartley Group II) imported from Gaul, perhaps from the Pas de Calais. A detached base, probably from the same vessel, shows little or no wear since the close but uneven concentric scoring (combined with grit) which is common to this type is preserved in its entirety except in the centre of the base, where it may initially have been only superficial; the concentric scoring plus grit occurs also on top of the flange.
89. Fabric 105. From an unknown source, probably in the Rhineland.
90. Fabric 104, burnt and heavily worn. This is not a common rim-form in the Flavian period. The fabric and trituration have much in common with No. 89 and it is probably from the same source.
91. Fabric 100, heavily worn with smooth rim and concentric scoring on the inside only. Although this rim-type was used by other potters, it was probably used most commonly by Albinus. Verulamium region, c. A.D. 60–90.

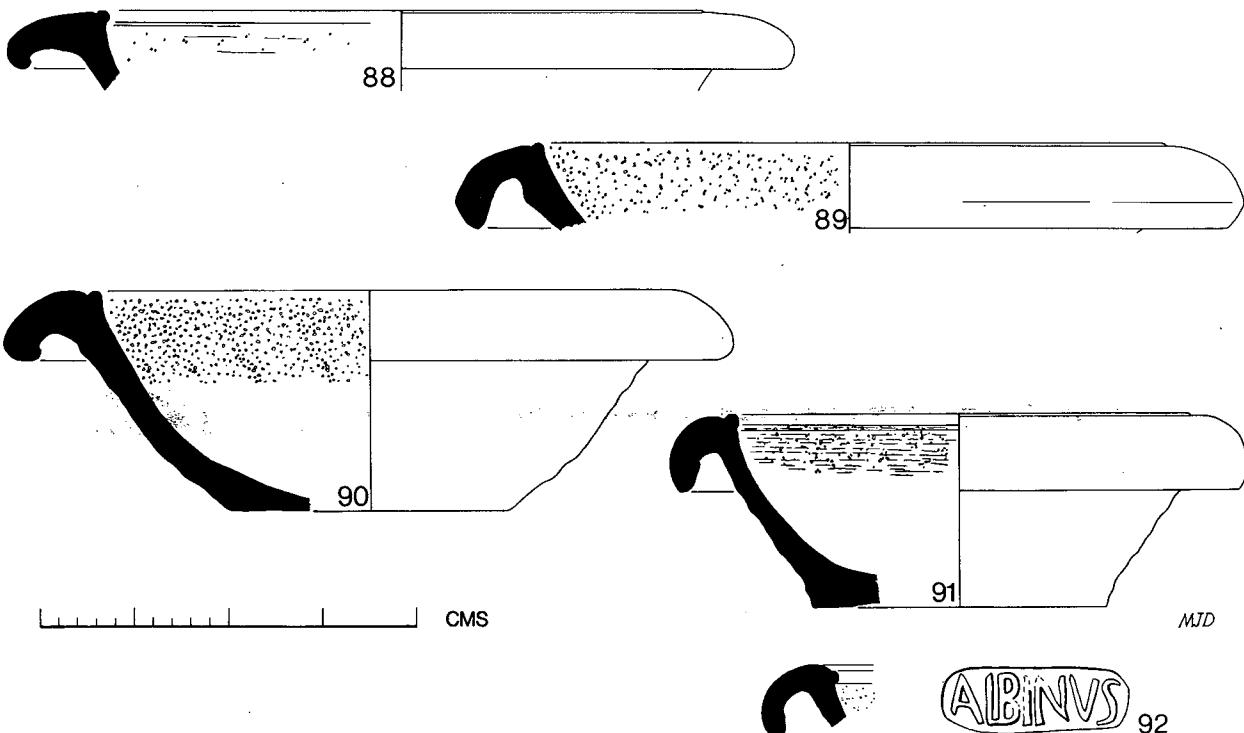
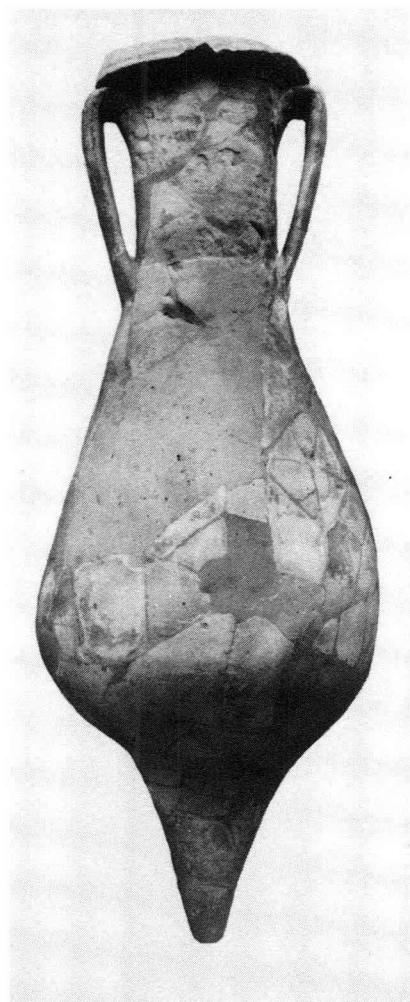


FIG. 102 The other Roman pottery. Scale, 1:4 (with stamp on No. 92 at 1:2)

92. Fabric 100 with a stamp of Albinus from one of at least eight dies used by him (cf. Frere 1972, fig. 145, No. 5 for a stamp from the same die). Albinus is by far the most prolific producer of stamped mortaria recorded in Britain. Over 350 mortaria of his are known from sites throughout the province, including 12 from Scotland, approximately 115 from London and 55 from Verulamium. There is considerable evidence to attest his mainly Flavian date but the earliest record of his work is from a deposit at Verulamium, dated A.D. 55–61 (Richardson 1944, 123, No. 4). His overall activity was probably A.D. 60–90. His kilns have not yet been found, but the fabric used was undoubtedly produced in the Verulamium region, his son Matugenius worked at Brockley Hill, and counterstamps of a type he used are recorded in number only at Bricket Wood at the kiln of Oastrius (Saunders and Havercroft 1977).

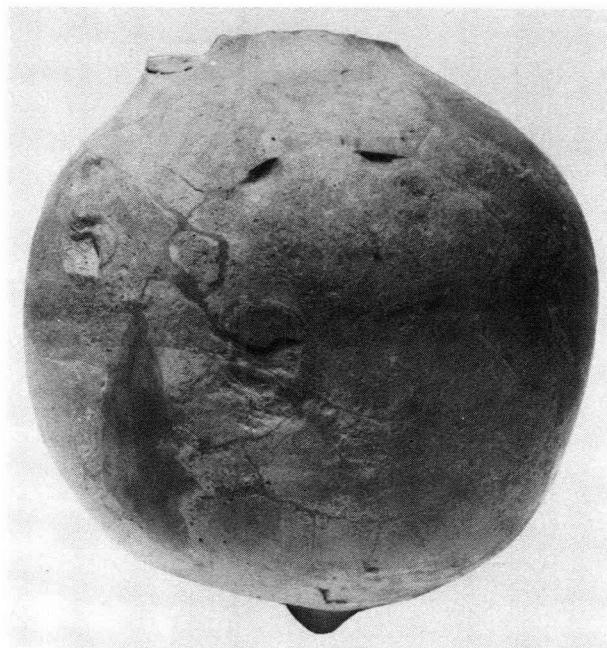
THE AMPHORAE

Amphorae from the site amounted to 154 sherds (4.070 kg), from which figures two amphorae, a Camulodunum form 186 and a Dressel 20, are excluded as these are reconstructed at the National Museum of Antiquities of Scotland (PL. XLVI). Both appeared to have been broken deliberately, and the Dressel 20 had previously been in use without its neck, where the break had been trimmed off. The quantified site-finds accounted for 8.9% to 14.9% on count and weight of all coarse pottery. Because of lack of comparative information from Flavian sites and Inchtuthil's location in the extreme north, it is impossible to be certain if these proportions show any abnormality. It seems probable, however, that the garrison was receiving less amphora-contained goods than would have been likely further south, to judge from Neronian-Flavian sites for which figures are available, and which received a more varied range. The amphorae are summarized in TABLE XXIV.



(Photos: National Museum of Antiquities, Edinburgh, copyright reserved)

Pl. XLVI A Restored amphora of Camulodunum form 186, found in 1962 in the area south of Tribunes' Houses III and IV (p. 333).



Pl. XLVI B Restored amphora of Dressel form 20 with neck removed, found in 1962 in the area south of Tribunes' Houses III and IV (p. 333).

TABLE XXIV
QUANTIFICATION OF THE AMPHORAE

Type	Count	percentage	Weight	percentage
Dressel 20, Spanish	20	13	1595	40
Dressel 2-4	47	31	1085	27
Pélichet 47 sp. or Dressel 30	79	52	1195	30
Camulodunum 189 type	6	4	115	3
<i>Totals</i>	152		3990	

The thick Dressel 20 sherds inevitably distort the analysis, as does the tendency for Gallic amphorae to fragment more; but the relatively high quantity from Gaul is notable. Estimations of individual vessels would suggest that perhaps eight Dr. 2-4 amphorae and five Gallic amphorae of Dr. 30 or Pélichet 47 were involved. Since the Dr. 2-4 amphorae were coming from differing sources, some probably from Gaul, the Gallic share of amphora-borne goods seems high.

The occurrence of sherds of an amphora of the 'carrot type' Camulodunum 189 is of interest, as this type seems to appear more commonly on military sites; this fact, along with their small size and probable East Mediterranean origin, suggests that their contents (perhaps figs or dates) were more appreciated by the Roman army than by British civilians.

DISCUSSION OF THE ASSEMBLAGE

Of identifiable flagons the ring-necked type predominates, as often happens on Flavian sites. Although these occur on early military sites in the Rhineland and in Britain, they are usually less common than other forms such as the Hofheim collared type. Ring-necked flagons were rarely made by the potters working for the army at Usk, Wroxeter, Longthorpe and Kingsholm, and this situation contrasts strongly with that at the later site at Holt where they were the commonest type, other forms only occurring as single examples. There is also a contrast, however, with the early site at Lake Farm, Wimborne, where virtually all the flagons were ring-necked. Hofheim flagons continued to be made in the Rhineland, the ring-necked form being comparatively rare, as at the Domitianic site at Bad Nauheim where only three of those illustrated (Simon 1959-60, Abb. 14, Nos. 27-29) were ring-necked. Flagons reflect differences in pottery-assemblages on a geographical basis (see Greene 1973, 31), the forts at Aislingen and Burghöfe (Ulbert 1959) for instance producing no ring-necked flagons, and the flagons from the later Flavian fort at Oberstimm (Schönberger 1978) are of similar Danubian style. Flagons of differing types on early military sites may indicate potters with different backgrounds, and more evidence is needed from those sites to explore the unusual popularity of the ring-necked form later in the first and second centuries.

The most common vessel-form comprises the jars. These are markedly different from those seen on earlier military sites, and show a new style which lasts well into the second century, and can be broadly classified as Flavian-Trajanic, as also do the reeded- (or flange-) rimmed bowls. The jars show variations of a stubby everted rim, in contrast to the necked form with rounded or squared rims seen on earlier sites. Although both forms occur, the stubby Flavian rim of Nos. 7-22, so typical of rusticated jars of Flavian-Trajanic date, account for over 66% of the jars (contrast Red House, Corbridge, where under 50% were of this type: Dore 1980, 114). This jar-form can be seen emerging in early groups at Caerleon and other Flavian sites, but its ubiquity at Inchtuthil is notable, particularly when compared with Wroxeter where occupation continued throughout this period, and where the necked forms predominated. Most of the jars can be easily

paralleled on other Flavian sites and it is surprising that Inchtuthil has produced no rusticated jars, which are so common on Flavian-Trajanic sites. These are well known in legionary contexts at Lincoln, and a jar from Newstead (Curle 1911, pl. XLVI, No. 29) from an early pit is particularly close to the Lincoln examples in the style of heavy rustication. The change from necked jars to those with everted rims was not necessarily an insular development, since pottery from such widely-separated Flavian sites as Bad Nauheim and Oberstimm (Simon 1959–60; Schönberger 1978) shows similar characteristics; the reorganisation of the army after the Civil War in 69–70 may have led to the blurring of some of the regional characteristics seen in pottery from earlier sites. The absence of any native British influence on the pottery from Inchtuthil suggests that the potters working for the army were continentals, and it is possible that the change in jar-type reflects continuing continental influence.

The reeded-rim bowls show many diverse types (see Gillam 1973, 53) and while two vessels at Red House, Corbridge (Hanson *et al.* 1979, fig. 17, Nos. 73 and 74) can be closely paralleled in form at Inchtuthil (with Nos. 40, 41 and 58, 59), the variety is apparent at both sites (see Dore's discussion in Hanson *et al.* 1979, 54). This diversity may be a feature of the period, and is apparent at Oberstimm in eight plates of drawings of this type of bowl (Schönberger 1978, Taf. 80–87). Red House, Corbridge, however, produced a number of plain-rimmed carinated bowls which may be loosely related to the samian form 29, or, more probably, to the carinated bowl common on the Continent, particularly in the Upper Rhine to Danube area. No equivalent to these occurs at Inchtuthil, and since there are 14 examples illustrated from Corbridge, this emphasizes a further difference between the two sites.

The only fine-ware vessel from Inchtuthil was the eggshell mica-dusted beaker, No. 65, which came from a gully between store-rooms on the *via principalis* and the second Tribune's House (*JRS* xlvi, 1955), and could have represented either rubbish from the Tribune's House or discarded stores when the fortress was abandoned. This is more likely to have been an officer's personal property, probably from the Rhineland. These dimpled beakers are comparatively common on early sites, although always sparsely represented, and are sometimes stamped with their makers' names (as at Lincoln, stamped by Camaro: Webster 1949, fig. 11, No. 19; Richborough: Bushe-Fox 1932, pl. XXXVIII, No. 286; 1949, pl. LXXII, No. 1). The dimples are sometimes randomly placed, but are often arranged as pendent triangles (Marsh 1978, fig. 6.9, type 20 for instance, and at Holt: Grimes 1930, fig. 63, No. 50). No parallel for the elaborate decoration of the Inchtuthil example has been traced, although one from Colchester shows similar large bosses (Marsh 1978, fig. 6.9, No. 20.7). These beakers are dated to the second half of the first century in the Rhineland (Gose 1950, form 182) and a similar date probably obtains in Britain.³⁰⁶

Pompeian red-ware platters were probably used as cooking or baking vessels (Boon 1967, 40, fn. 1), and No. 62 is clearly a local imitation, many of which occur at Wroxeter. These are relatively rare even on early sites; and since the Inchtuthil platters were found together, they may be the remnants of a consignment dumped during the evacuation.

Over 50% of the mortaria were locally made, and mortaria from the Continent or southern Britain are already well known from Agricolan sites in Scotland (Hartley 1977, 10), and also occur at the supply base at Red House, Corbridge (Hartley 1979, 51) which, in common with Fendoch and Newstead, produced sherds identical in form and fabric to No. 88. It may be remarked that the fabric of this mortarium is extremely similar to that of the Pélichet 47, Nos. 75–77. The very small beads on some of the local mortaria (as on Nos. 80, 81 and 85) are notable (compare an example from Fendoch: Richmond and McIntyre 1938, fig. 15, No. 1), and Mrs. Hartley's view that No. 85 is a form possibly made primarily or solely by the army is relevant.

306. Only a few mica-dusted vessels are known from Scotland, including a sherd of a similar beaker from Camelon where a flat-rimmed bowl and an everted-rim beaker also occurred. The Flavian sites of Strageath (unpublished) and Crawford produced a cordoned beaker and a curved-sided dish respectively (*PSAS* 104, fig. 19, No. 47), and two bowls from Newstead are likely to be of similar date (Curle 1911, fig 26, No. 13 and Pl LI, No. 8) (information C.R. Wallace).

Of the 76 coarse-ware vessels illustrated (excluding amphorae, Pompeian red ware and the mica-dusted beaker), 68 vessels were seemingly made locally, and the range of forms shows that the potters were producing virtually all the pottery required by the garrison. As at Red House, Corbridge, the pottery shows no sign of native influence, and Curle's comment with regard to Newstead is as pertinent today as it was in 1911: 'There is reason to believe that, at Newstead, continental types were more common in the early than in the later period. This would be most naturally explained by supposing that in the Antonine period, with more settled conditions, the bulk of the coarse ware used would be supplied by potteries established in Britain' (Curle 1911, 250). Despite the reluctance of the army to be involved in potting (Darling 1977, 68; Greene 1973, 33), the location of the site in an aceramic area, the size of the garrison and campaign conditions made the local manufacture of pottery inevitable at Inchtuthil in much the same way as earlier at Usk and Wroxeter. Two alternatives were available to deal with the absence of adequate supplies of pottery from local native sources: import from the south and east of England or local manufacture. The logistics of moving quantities of pottery over long distances into hostile areas, the need for tiles and the requirements of clay for daub made local production the only realistic solution. Professor St. Joseph has calculated that some 7,000 cubic yards of clay would have been needed for the daub in the timber-framed buildings; and since the clay probably came from the same general area as that used for the pottery (see Dr. Williams's report, p. 339), the source must have been relatively close.

That the potters were closely associated with the army seems indubitable. There is no native influence, as would be expected had the army collected civilian potters from southern England. It is unlikely that civilian potters would willingly follow the army into hostile territory (see Greene 1979b, 102 discussing the known limited migration of potters), particularly at this period of increased civilian demand further south, itself doubtless encouraged by Agricola's policies. The mortarium form, No. 85, discussed by Mrs. Hartley (p. 332) seems confined to military sites. None of the exotic forms or techniques found at the later legionary sites of Holt, Caerleon, York, Vindonissa, Nijmegen etc. occurs at Usk, Wroxeter and Inchtuthil, where the pottery has a distinctly prosaic and practical appearance. The common Inchtuthil jars are different from those seen on the earlier sites, but the form is also evident on Flavian sites on the Continent. Attention has been drawn to epigraphic evidence for military involvement in pottery (Breeze 1977, 136) and, while it is uncertain whether these men (including *immunes*) were concerned with making tiles or both tiles and pottery, the close association of the two products at Holt and other sites makes this of little significance.

Military involvement in pottery-making is evident in different areas of the Empire for a variety of reasons at various periods (early in the Rhineland: Darling 1977, 64; Flavian-Trajanic sites such as Holt, Nijmegen etc.: Grimes 1930; Holwerda 1944; the Northern frontier: Gillam 1973, 53; Breeze 1977, 136; York: King 1975; Perrin 1977; Cramond: Rae and Rae 1974 with North African forms; kiln at Bar Hill producing North African red-slip forms: Perrin 1981, 59). In Britain, the concentration is always north and north-west (Caerleon ware, Boon 1966b, is not certainly connected with the fortress alone), and it seems clear that the import of Durotrigan and other pottery from the south in the Hadrianic period would not have entirely solved the logistical problem of pottery and tile supply; on occasions the army would still have to make its own pottery, particularly when tiles were also needed.

The location of the Inchtuthil fortress and its conquest-phase context suggests that the potters were probably soldiers; but slaves (as suggested for the later exotic wares at Holt etc. by Greene 1977, 125) could be a possibility.

The assemblage differs in types from that at Wroxeter (relevant if Legion XX was involved at both sites) and also at Red House, Corbridge and at Newstead, where both sites seem to have drawn on many different sources; their location further south and the size of their garrisons are relevant here. The pottery from Red House, Corbridge may also reflect its function as a supply base channelling stores to other forts. Whether any vessels from

Inchtuthil went to auxiliary forts in the area is at present uncertain, although the occasional sherd from Fendoch and Ardoch show similar fabrics and forms. Analysis would be required to check this, and more material from other Agricolan sites in the area would be necessary to make this worthwhile.

ACKNOWLEDGMENTS

The opportunity to report on this pottery was kindly given to me by Professor J.K. St Joseph and I am grateful to him and Professor S.S. Frere for their help and comments. I am also indebted to Mr John Dore, Mrs Kay Hartley and Dr David Williams for their assistance with various aspects of the pottery and for useful discussion, and to the staff of the National Museum of Antiquities of Scotland, Edinburgh for allowing me access to their collection.

CHAPTER 34

FABRIC EXAMINATION

By D.F. WILLIAMS

A. POTTERY AND TILE

A small number of samples of Roman pottery and tile from Inchtuthil were submitted for fabric examination in thin section under the petrological microscope. The object of the analysis was twofold: (1) to determine the rock and mineral content of the samples and to see if there are any noticeable differences in the material submitted, and (2) if possible to suggest likely source-areas for the pottery, and in particular to decide whether a local origin is possible. Munsell colour charts are referred to, together with free descriptive terms.

PETROLOGY AND FABRIC

Fabric 1

Hard, rough sandy fabric, light red (2.5YR 6/8) in colour, slightly darker on the outer surface. Thin-sectioning shows frequent grains of subangular quartz, average size 0.10–0.50 mm, together with flecks of mica, and a little sandstone, set in a fairly clean clay matrix.

Fabric 2

Soft, smooth micaceous fabric, reddish-yellow (5YR 7/6 to 7.5YR 7/6) throughout. Thin-sectioning shows a fabric which is texturally quite different to Fabric 1. Under the microscope the non-plastic inclusions in this sample consist of a groundmass of plentiful subangular quartz grains, average size below 0.10 mm, and flecks of mica.

Tile Sample

Similar to Fabric 2 in the hand-specimen, but slightly harder and grittier. Thin-sectioning shows a groundmass of small quartz and mica similar to Fabric 2, but in this case there are also a scatter of larger grains of quartz and quartzite and some small weathered fragments of igneous rock and quartz-mica-schist.

Mortarium of Fabric 2

Similar to Fabric 2 in the hand-specimen, but slightly grittier. Thin-sectioning shows a similar fabric to the tile sample. A small piece of basalt was also noted.

COMMENTS

Inchtuthil is situated in an area of Old Red Sandstone, with deposits of andesite and basalt lavas, mica-schist and basalt, dolerite and camptonite dykes a mile or two to the north of the site. Given the petrology of the above samples, it is quite possible that all four may have been made fairly close to Inchtuthil. However, in the absence of local clay sampling, other areas should not be excluded.

B. DAUB

A small fragment of daub from Inchtuthil was submitted for fabric examination in thin section under the petrological microscope, and comparison with a small group of pottery and tile previously examined from the site. In hand-specimen the daub is composed of a friable, reddish-brown (between Munsell, 5YR 6/4 and 6/6) sandy clay which is conspicuously micaceous. A thin section revealed frequent subangular grains of quartz, average size up to 0.20 mm across, with a scatter of slightly larger grains, and flecks of mica (mostly muscovite but with some biotite), together with a little iron ore.

The fragment of daub is more coarse than the samples of pottery and tile previously examined from Inchtuthil, which is perhaps what one would expect, for it is unlikely that the clay of the daub received much attention before use. However, the high mica content of the daub does recall the fabric of a sherd of Fabric sample 2, a tile and a mortarium all previously examined from Inchtuthil, and it is possible that all these utilized clay from the same general area.

CHAPTER 35

TILE WITH PAW-MARKS (PL. XLVII)

One tile from the bath-house carries the paw-marks of a dog. Professor Stuart Piggott kindly arranged for this to be examined at the Department of Zoology at Edinburgh University, where the marks were identified as those of a small dog of whippet or greyhound type, moving fast. In view of the likelihood of a local manufacture of the tiles at Inchtuthil, the identification is not without interest in the context of the fortress.



(Photo: Dept. of Archaeology, Edinburgh University, copyright reserved)

Pl. XLVII Roman tile from the Bath-house with footprints of dog.

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