

The Antonine Wall

Papers in honour of
Professor Lawrence Keppie

edited by

David J. Breeze and William S. Hanson



ARCHAEOPRESS ROMAN ARCHAEOLOGY 64



The Antonine Wall

Papers in honour of Professor Lawrence Keppie

edited by

David J. Breeze and William S. Hanson



ARCHAEOPRESS Publishing LTD
Summertown Pavilion
18-24 Middle Way
Summertown
Oxford OX2 7LG

www.archaeopress.com

ISBN 978-1-78969-450-5
ISBN 978-1-78969-451-2 (e-Pdf)

© Archaeopress and Authors 2020

Cover illustrations

Front: The Distance Stone of the Twentieth Legion from Hutcheson Hill (*RIB* III 3507) found in 1969 lying face down in a shallow pit immediately to the south of the Wall (copyright Hunterian, University of Glasgow). **Back:** Restored half-life-sized statue of the Roman god Mars from the annexe of the fort at Balmuildy (*CSIR* 129) (copyright Hunterian, University of Glasgow).

All rights reserved. No part of this book may be reproduced, or transmitted, in any form or by any means, electronic, mechanical, photocopying or otherwise, without the prior written permission of the copyright owners.

Printed in England by Severn, Gloucester

This book is available direct from Archaeopress or from our website www.archaeopress.com



Lawrence at Westerwood. Photo the late Margaret J. Robb

Dedicated to the memory of Margaret Robb (1952-2017)

Contents

List of Figures	iv
List of Tables	ix
List of Contributors	x
Abbreviations	xv
1. Lawrence Keppie: an appreciation	1
David J. Breeze and William S. Hanson	
2. The Antonine Wall: the current state of knowledge	9
William S. Hanson and David J. Breeze	
3. The Landscape at the time of construction of the Antonine Wall	37
Mairi H. Davies	
4. The Impact of the Antonine Wall on Iron Age Society	47
Lesley Macinnes	
5. Pre-Antonine coins from the Antonine Wall	61
Richard J. Brickstock	
6. Planning the Antonine wall: an archaeometric reassessment of installation spacing	67
Nick Hannon, Lyn Wilson, Darrell J. Rohl	
7. The curious incident of the structure at Bar Hill and its implications	86
Rebecca H. Jones	
8. Monuments on the margins of Empire: the Antonine Wall sculptures	96
Louisa Campbell	
9. Building an image: soldiers' labour and the Antonine Wall Distance Slabs	110
Iain M. Ferris	
10. New perspectives on the structure of the Antonine Wall	121
Tanja Romankiewicz, Karen Milek, Chris Beckett, Ben Russell and J. Riley Snyder	
11. Wing-walls and waterworks. On the planning and purpose of the Antonine Wall	142
Erik Graafstal	
12. The importance of fieldwalking: the discovery of three fortlets on the Antonine Wall	186
James J. Walker	

13. The Roman temporary camp and fortlet at Summerston, Strathclyde	193
Gordon S. Maxwell and William S. Hanson	
14. Thinking small: fortlet evolution on the Upper German <i>Limes</i>, Hadrian's Wall, the Antonine Wall and Raetian <i>Limes</i>	201
Matthew Symonds	
15. The Roman fort and fortlet at Castlehill on the Antonine Wall: the geophysical, LiDAR and early map evidence	218
William S. Hanson and Richard E. Jones	
16. ‘... one of the most remarkable traces of Roman art ... in the vicinity of the Antonine Wall.’ A forgotten funerary urn of Egyptian travertine from Camelon, and related stone vessels from Castlecary	233
Fraser Hunter	
17. The Kirkintilloch hoard revisited	254
J.D. Bateson	
18. The external supply of pottery and cereals to Antonine Scotland	263
Paul Bidwell	
19. The army of the Antonine Wall: its strength and implications	286
David J. Breeze	
20. Why was the Antonine Wall made of turf rather than stone?	300
Nick Hodgson	
21. Antoninus Pius' Guard Prefect Marcus Gavius Maximus with an Appendix on new evidence for the <i>Fasti</i> of Britain under Antoninus	313
Anthony R. Birley	
22. Civil settlement and extra-mural activity on the Antonine Wall	332
William S. Hanson	
23. Roman women in Lowland Scotland	346
Lindsay Allason-Jones, Carol van Driel-Murray and Elizabeth M. Greene	
24. Where did all the veterans go? Veterans on the Antonine Wall	366
Alexander Meyer	
25. ‘So the great Romans with unwearied care’: Sir John Clerk's museum	377
Iain Gordon Brown	

26. John Anderson and the Antonine Wall	394
Geoff B. Bailey and James Mearns	
27. Reconstructing Roman lives	416
Jim Devine	
28. The power of vivid images in Antonine Wall reconstructions: re-examining the archaeological evidence	420
Christof Flügel and Jürgen Obmann	
29. The Antonine Wall: some challenges of mapping a complex linear monument	432
Peter McKeague	
30. Connecting museums and sites. Advanced <i>Limes</i> Applications – a Creative Europe project	448
Erik Dobat	
31. The Antonine Wall as a World Heritage Site: People, priorities and playparks	455
Patricia Weeks	
32. ‘Then ’twas the Roman, now ’tis I’	463
Iain Gordon Brown	

List of Figures

1. Lawrence Keppie: an appreciation

Figure 1.1. Lawrence receiving the Presidential Award in 2009 for his services to Glasgow Archaeological Society.....	2
Figure 1.2. Excavations starting at Bothwellhaugh in 1975	4

2. The Antonine Wall: the current state of knowledge

Figure 2.1. Map of the Antonine Wall as completed	11
Figure 2.2. Defensive pits on the berm at Callendar Park	13
Figure 2.3. Section of the Military Way bypass at Croy Hill	13
Figure 2.4. Aerial photograph of the fortlet at Duntocher	14
Figure 2.5. Plan of the fort and annexe at Bearsden	17
Figure 2.6. Plan of the fort and annexe at Rough Castle	18
Figure 2.7. Map of the Antonine Wall as planned	20
Figure 2.8 Map of the Antonine Wall showing the location of Distance Stones and camps.....	20
Figure 2.9. Aerial photograph of the construction camp at Easter Cadder with the line of the Military Way and Antonine Wall Ditch beyond	22
Figure 2.10. Plan of the small enclosure at Buchley	24
Figure 2.11. Lollius Urbicus inscription from Balmuildy	29
Figure 2.12. Sestertius of Antoninus Pius commemorating the victory in Britain	29

3. The Landscape at the time of construction of the Antonine Wall

Figure 3.1. The Antonine Wall in its environmental context, highlighting coastal areas below 13 m OD.....	39
---	----

5. Pre-Antonine coins from the Antonine Wall

Figure 5.1. Coins from the Antonine Wall, with suggested dates of deposition	61
Figure 5.2. Examples of coins from the Antonine Wall	62
Figure 5.3. A virtually unworn <i>dupondius</i> of Domitian from Camelon	62
Figure 5.4. Bar graph of coins from Camelon 1975-81, with suggested dates of deposition	65
Figure 5.5. Bar graph of coins from Newstead, with suggested dates of deposition	66

6. Planning the Antonine Wall: an archaeometric reassessment of installation spacing

Figure 6.1. Fortlet sequence showing distances between fortlets	68
Figure 6.2. Plan of Croy Hill and the change in the Wall's course at Seabegs Wood	70
Figure 6.3. Proposed fortlet positions that correspond with changes in direction of the Wall's Rampart.....	74
Figure 6.4. Spacing between forts considered primary shown in Roman miles	75
Figure 6.5. Spacing between all forts shown in Roman miles	76
Figure 6.6. Fort spacing demonstrating a system where different measurement standards were used in different areas.....	78
Figure 6.7. Spacing between the Wilderness Plantation minor enclosures	81
Figure 6.8. Spacing between the expansions	82

7. The curious incident of the structure at Bar Hill and its implications

Figure 7.1 Outline drawings of the two structures under Bar Hill and Croy Hill	86
Figure 7.2 Outline drawings of all the temporary camps known along the Wall	88
Figure 7.3 Map of the Wall showing the locations of the camps.....	89
Figure 7.4 Viewshed analysis showing areas visible from the Bar Hill structure	90
Figure 7.5 Viewshed analysis showing areas visible from Castlehill.....	92

8. Monuments on the margins of Empire: the Antonine Wall sculptures

Figure 8.1. Traces of pigment on the Parthenon Marbles, British Museum	97
--	----



Figure 8.2. Polychromy on marble relief from Nicomedia	98
Figure 8.3. Distance Stone from Summerston	99
Figure 8.4. Colour palette for Antonine Wall sculptures	102
Figure 8.5. Colour palette for Hadrian's Wall sculptures	102
Figure 8.6. Altars to Mithras from Carrawburgh.....	103
Figure 8.7. Digital reconstruction of the Bridgeness Distance Stone	105
9. Building an image: soldiers' labour and the Antonine Wall Distance Slabs	
Figure 9.1. Antonine Wall legionary distance slab of the VIth Legion, Braidfield	111
Figure 9.2. Antonine Wall legionary distance slab of the XXth Legion, Old Kilpatrick	113
Figure 9.3. The Rudge Cup.....	115
Figure 9.4. Soldiers engaged in construction work on Trajan's Column, Rome	117
10. New perspectives on the structure of the Antonine Wall	
Figure 10.1. Section through Antonine Wall at Croy	122
Figure 10.2. Section through Antonine Wall at Bantaskin	122
Figure 10.3. Section through Antonine Wall at Inveravon fort.....	123
Figure 10.4. Stone base of Antonine Wall at Hillfoot cemetery, New Kilpatrick	124
Figure 10.5. Section through Antonine Wall at St Flannan's Church, Kirkintilloch.....	125
Figure 10.6. Plan and section through Antonine Wall at Callendar Park.....	127
Figure 10.7. Section through Antonine Wall at Tentfield	134
Figure 10.8. Sections and plan through Antonine Wall at Croy	135
11. Wing-walls and waterworks. On the planning and purpose of the Antonine Wall	
Figure 11.1. Contour maps of Bar Hill and Bearsden	149
Figure 11.2. Elevation maps of selected fort and fortlets sites showing their spatial relation to valleys	150
Figure 11.3. LiDAR image of the Seabegs Wood showing the alignment of the Military Way.....	151
Figure 11.4. LiDAR images of Rough Castle showing road tracks leading to the north-east.....	154
Figure 11.5: Intervisibilities between the main installations of the Antonine Wall.	154
Figure 11.6. LiDAR image of the Westerwood area	157
Figure 11.7. Ordnance Survey map of the Cadder area	159
Figure 11.8. Resistivity survey of Castlehill fort.....	160
Figure 11.9. The course of the Ditch in the Auchendavy area	163
Figure 11.10. Intervals between the main installations of the Antonine Wall in Roman miles	164
Figure 11.11. Plans and sections of stone-lined pit at Croy Hill	168
Figure 11.12. Hypothetical north side of the proposed abortive fort on Croy Hill	171
Figure 11.13. 'Sequential stratigraphy' of logical, spatial and structural dependencies between the main elements of the Antonine Wall system	176
Figure 11.14. Fort sizes in relation to the wider geography of the Forth-Clyde isthmus.....	181
12. The importance of fieldwalking: the discovery of three fortlets on the Antonine Wall	
Figure 12.1. Altar dedicated by Vibia Pacata from Westerwood	186
Figure 12.2. Site of Seabegs fortlet	188
Figure 12.3. Site of Kinneil fortlet	189
Figure 12.4. Site of Cleddans fortlet	191
Figure 12.5. Plan of excavations at Seabegs fortlet	192
13. The Roman temporary camp and fortlet at Summerston, Strathclyde	
Figure 13.1. Aerial photograph of Summerston camp and fortlet	194
Figure 13.2. Location map of the line of the Wall, the construction camp and fortlet at Summerston	195
Figure 13.3. Overall site plan, showing the location of the excavation trenches at Summerston	195
Figure 13.4. Sections through the eastern ditches of the camp and enclosure at Summerston	196

Figure 13.5. Photograph of section through the eastern ditch of Summerston camp	197
Figure 13.6. Trench plan and section through the contiguous ditches of the camp and enclosure at Summerston.....	198
Figure 13.7. Photograph of section through the contiguous ditches of the camp and enclosure at Summerston	199
14. Thinking small: fortlet evolution	
Figure 14.1. Plans of fortlets: milecastle 37; Barburgh Mill; Haselburg; and Pen Llystyn	202
Figure 14.2. The Upper German and Raetian frontiers	204
Figure 14.3. Hadrian's Wall, as completed at the end of Hadrian's reign in AD 138	205
Figure 14.4. A selection of fortlet plans from the Upper German Limes, Hadrian's Wall, Antonine Wall and Raetian Limes	206
Figure 14.5. Fortlet locations on the Upper German <i>Limes</i>	207
Figure 14.6. A comparison between the plots occupied by milecastle 48 and milecastle 45.....	209
Figure 14.7. Fortlet locations on the Antonine Wall: Croy Hill; Wilderness Plantation; Summerston; Duntocher.....	212
15. The Roman fort and fortlet at Castlehill on the Antonine Wall	
Figure 15.1. Roy's plan of the fort and small enclosure at Castlehill	218
Figure 15.2. 2nd edition 25 inches to the mile Ordnance Survey map of Castlehill	219
Figure 15.3. Location plan of the resistivity surveys of Castlehill.....	220
Figure 15.4. Location plan of the 2008 magnetic survey of Castlehill	221
Figure 15.5. Location plan of the 2011 magnetic survey of Castlehill	222
Figure 15.6. Annotated composite resistivity survey of Castlehill.....	223
Figure 15.7. Annotated 2008 magnetic survey of Castlehill.....	225
Figure 15.8. Annotated 2011 magnetic survey of Castlehill.....	226
Figure 15.9. LiDAR-derived digital terrain model of Castlehill.....	229
16. '... one of the most remarkable traces of Roman art ... in the vicinity of the Antonine Wall'	
Figure 16.1 The two Camelon urn fragments	234
Figure 16.2. The Camelon complex, with other burials	235
Figure 16.3. The two Camelon urn fragments, digitally restored to their original relationship	237
Figure 16.4. Drawing of the Camelon urn, with proposed restoration of its original form	237
Figure 16.5. Distribution of 'tureen'-type funerary urns	239
Figure 16.6. Three alabaster urns as found in a <i>columbarium</i> on the Via Laurentina, Rome	240
Figure 16.7. Urn MNR 135738 from the Via Laurentina, Rome	241
Figure 16.8. The two basalt vessel sherds from Castlecary	243
Figure 16.9. Drawings of the two basalt vessel sherds	244
17. The Kirkintilloch hoard revisited	
Figure 17.1. Parcel from the Kirkintilloch hoard	255
18. The external supply of pottery and cereals to Antonine Scotland	
Figure 18.1. British potteries as far north as Hadrian's Wall which supplied Antonine Scotland	265
Figure 18.2. The supply at South Shields in Period 6B, beginning in c. AD 222	267
Figure 18.3. Quantities of coarse wares from beyond Scotland compared with those of local or uncertain origins.....	271
Figure 18.4. Sources of stamped mortaria exported to Antonine Scotland	272
19. The army of the Antonine Wall: its strength and implications	
Figure 19.1. The tombstone found at Croy Hill depicting three legionaries	287
Figure 19.2. The altar dedicated by the First Cohort of Baetasians at Old Kilpatrick.....	288
Figure 19.3. One of the altars erected by M. Cocceius Firmus at Auchendavy	293
Figure 19.4. Map of Antonine Scotland	295
Figure 19.5. An impression of the fortlet at Barburgh Mill by Michael J. Moore	296



22. Civil settlement and extra-mural activity on the Antonine Wall

Figure 22.1. Plan of the fort, annexe and adjacent field system at Carriden.....	333
Figure 22.2. Plan of land divisions around the fort at Croy Hill	337
Figure 22.3. Aerial photograph of field systems to the south-east of Inveresk	338
Figure 22.4. The pottery kiln to the east of the fort at Croy Hill during excavation.....	339

23. Roman women in Lowland Scotland

Figure 23.1. Funerary monument from Shirva of a person reclining on a four-legged couch.....	350
Figure 23.2. Cork slipper from Inveresk.....	353
Figure 23.3. Main Antonine footwear styles.....	354
Figure 23.4. Graph of shoe styles correlated with size from Camelon	355
Figure 23.5. A pair of ‘Camelon’ style ladies’ shoes from Camelon	356
Figure 23.6. Bar Hill child’s shoe	358

24. Where did all the veterans go? Veterans on the Antonine Wall

Figure 24.1. Altar from Castlecary dedicated by a veteran of <i>legio VI Victrix</i>	367
Figure 24.2. Tombstone of a veteran of <i>legio XX Valeria Victrix</i> from Gloucester	372
Figure 24.3. Tombstone of a veteran of <i>legio II Augusta</i> from Caerleon	373
Figure 24.4. Tombstone of a veteran of <i>legio II Augusta</i> from Great Bulmore, dedicated by his wife.....	373
Figure 24.5. Tombstone of a veteran of <i>legio II Augusta</i> from Great Bulmore, dedicated by his wife and son	373
Figure 24.6. Tombstone of a veteran of <i>legio XX Valeria Victrix</i> from Chester	373

25. ‘So the great Romans with unwearied care’: Sir John Clerk’s museum

Figure 25.1. Sheet of notes on Antonine Wall topics by Sir John Clerk, 1740.....	380
Figure 25.2. Sir John Clerk’s sketch for a library and museum on the Penicuik estate, 1741.....	391

26. John Anderson and the Antonine Wall

Figure 26.1. Avondale Folly looking north-east	413
Figure 26.2. Hart’s drawing of the lintel at Inveravon Tower	413
Figure 26.3. Hart’s drawing of Inveravon Tower.....	413

27. Reconstructing Roman lives

Figure 27.1. Gravestone of Verecunda.....	417
Figure 27.2. Filming Verecunda against a green screen backdrop.....	418
Figure 27.3. Verecunda at the well in Bar Hill fort.....	419

28. The power of vivid images in Antonine Wall reconstructions

Figure 28.1. Saalburg 1913. Position of reconstructed earthworks A and B north of the stone fort and the line of the Upper German Limes	421
Figure 28.2. Saalburg 1913. Total view of the reconstructed earthworks B and A	422
Figure 28.3. Saalburg 1913. Kaiser Wilhelm and dignitaries inside earthwork A.....	422
Figure 28.4. Saalburg 1913. Earthwork A. Preparing the posts and cleaning the building plot of bushes	423
Figure 28.5. Saalburg 1913. Kaiser Wilhelm inspecting work in progress on the wattle-and-daub-construction	423
Figure 28.6. Saalburg 1913. Hammering down the posts for merlons.....	424
Figure 28.7. Saalburg 1913. Earthwork A with merlons in wattle and daub.....	424
Figure 28.8. Antonine Wall, reconstructed milefortlet	427
Figure 28.9. Hadrian’s Wall, reconstructed milecastle	428
Figure 28.10. Antonine Wall, Watling Lodge fortlet, virtual reconstruction	429

29. The Antonine Wall: some challenges of mapping a complex linear monument

Figure 29.1. Extract from the Macdonald folio; the course of the Antonine Wall to the west of Callendar House, Falkirk.....	434
Figure 29.2. Extract from the 1954 to 1957 Ordnance Survey map folio depicting the course of the Antonine Wall to the west of Callendar House	436

Figure 29.3. Extract from the 1980 Ordnance Survey map depicting the course of the Antonine Wall to the west of Callendar House, Falkirk	438
Figure 29.4. Sample map depicting the components of the Antonine Wall based on the Antonine Wall World Heritage Site nomination documentation	441
Figure 29.5. Extract from the Event map prepared to support the nomination of the Antonine Wall as a World Heritage Site	442
Figure 29.6. The course of the Antonine Wall to the west of Callendar House, Falkirk displayed against OS Open data mapping	443
30. Connecting museums and sites. Advanced <i>Limes</i> Applications – a Creative Europe project	
Figure 30.1. Using the Antonine Wall application at Bar Hill fort.....	450
Figure 30.2. Screenshots of the Antonine Wall app: a scanned altar and interview with Prof. Lawrence Keppie	451
Figure 30.3. Augmented Reality: ground plan of Eining-Weinberg scanned with a phone and screenshot displaying the 3D reconstruction	453
31. The Antonine Wall as a World Heritage Site: People, priorities and playparks	
Figure 31.1. Antonine Wall Gallery at the Hunterian Museum	456
Figure 31.2. Interpretation panel using new Antonine Wall branding	456
Figure 31.3. Worksheet created to showcase the Antonine Wall	457
Figure 31.4. Examples of different content available in the Antonine Wall app	458
Figure 31.5. One of the characters/scenes showing artefacts in background	458
Figure 31.6. A worksheet that forms part of the handling resources.....	459
Figure 31.7. Children’s design and a completed playpark at Callendar House, Falkirk.....	459
Figure 31.8. The replica Bridgeness distance slab	460
Figure 31.9. Example of trial street art with Antonine Wall themes	461
Figure 31.10. Engaging with the Wall at the Glasgow Mela	461

2. The Antonine Wall: the current state of knowledge

William S. Hanson and David J. Breeze

Earlier Roman occupation

The narrow neck of the Forth-Clyde isthmus followed by the Wall is an obvious potential Roman frontier location. According to Tacitus (*Agricola* 23) 'the isthmus was now firmly held by garrisons (*praesidia*)' during the Flavian conquest of Scotland, when it served as a temporary halt during Agricola's fourth campaign, which was primarily one of consolidation and fort building (Hanson 1991: 107). However, there is surprisingly little supporting structural evidence for a pre-Antonine frontier. Leaving aside forts beyond the eastern and western ends of the Wall at Elginhaugh and Barochan Hill respectively, the latter investigated by Lawrence, the most obvious installation is the fort at Camelon (Maxfield 1980). Full publication of the excavations undertaken in the 1970s is still awaited, but has been augmented by more recent work (Hunter 2012: 285; Kilpatrick 2016). The strategic importance of the site, however, seems to relate more to operations beyond the isthmus, as indicated by its location north of the Wall in the Antonine period, and the large number of camps beside it (Jones 2005: 551). The only other confirmed installation on the isthmus is the fortlet or small fort at Mollins, which encloses 0.4 ha over the ramparts. An aerial photographic discovery, its Flavian date was indicated on the basis of very limited ceramic evidence from small-scale excavations in the 1970s (Hanson and Maxwell 1980).

There is, however, a long tradition of earlier, potentially Flavian, use of Antonine Wall sites. The thesis was most extensively developed by Macdonald (1934: 267-73 and 466-68) and was widely accepted thereafter. The most credible structural elements at that time were the earlier enclosures recorded beneath the forts at Croy Hill and Bar Hill, but these were shown by subsequent excavation to be later in date (Hanson forthcoming a; Keppie 1985: 51-8; Jones, this volume). Various other sites along the Wall have produced a few Flavian finds from early excavations (e.g. Old Kilpatrick, Balmuildy, Cadder, Kirkintilloch, Castlecary and Mumrills), but without any associated structural evidence (Hanson 1980). At none of these sites, however, is the dating evidence sufficiently strong to support Flavian occupation (Brickstock, this volume). Further Flavian installations are to be expected, but there is no reason for them to coincide with Antonine Wall forts, as the criteria for the location of a continuous linear barrier were not necessarily the same as those which determined the positioning of an individual fort.

Landscape and environment (Davies, this volume)

The estuaries of the Forth and Clyde determined the general topographic location of the Antonine Wall. The relative sea level in the Roman period is considered to be broadly similar to current levels, perhaps with extensive mudflats (Tipping and Tisdall 2005: 444-46), which casts some doubt on earlier suggestions that the river Carron was navigable as far as Camelon (Tatton Brown 1980; Bailey 1992).



In general, the Wall traversed some of the better soils in Scotland for arable agriculture, particularly towards its eastern end (Bibby 1991), which may account for the relatively poor turf available for Wall building in this sector. Woodland continues to be evidenced in both the pollen and macroplant record (e.g. Hanson 1996), though this may represent managed rather than wild woods. Rapid and large-scale woodland clearance linked to the expansion and probable intensification of agriculture was a late Iron Age phenomenon, though cereal cultivation is recorded in Scotland some 3000 years earlier (Tipping 1994; Ramsay and Dickson 1997), so the establishment of the Antonine Wall would have taken place within a well-established farmed landscape in which crop-growing was probably important (Tipping and Tisdall 2005: 458-62). Barley is consistently recorded as predominant in the macroplant record from military sites, though the significance of this is debated (below).

Roman Iron Age settlement in the Wall zone

There is no up-to-date, comprehensive survey of the Iron Age settlement pattern in the Wall zone. Overviews covering parts of the area have been limited by modern county boundaries (RCAHMS 1963; 1978) and largely pre-date the data explosion from intensive aerial survey, whose potential impact is perhaps best illustrated by work in East Lothian (e.g. Cowley 2009). As a result there are different interpretations of the likely intensity of settlement across the isthmus (Hanson and Maxwell 1986: 164; Breeze 1985: 225-26). While there is evidence to suggest that there was a persistent cultural difference north and south of the isthmus (Hunter 2007: 288, 290-2), the overlap in the distribution of the different forms of metalwork involved hints at a contested zone between that isthmus and the estuary of the Tay which chimes well with the location of Roman outposts beyond the Antonine Wall (Hanson forthcoming b).

The specific question of the Wall's impact on indigenous society has remained largely unconsidered (but see Macinnes, this volume), though the investigation of Roman finds from non-Roman sites has a long history and has proved informative in a broader context. For example, the Lowland brochs of the Forth Valley are architecturally-exotic sites, often rich in Roman finds, that are generally seen as centres of regional elites (Macinnes 1984), though most of the evidence suggests a Flavian rather than Antonine floruit. The recovery of quantities of Roman material is not restricted to the brochs, but includes important sites such as Traprain Law in East Lothian and Hyndford crannog in Lanarkshire (Hunter 2009a; RCAHMS 1978: 108-09). Where Iron Age sites are attested along the Wall line, as for example at Castle Hill by Bar Hill and on Croy Hill, they seem likely already to have gone out of use by the time of the Roman conquest. The defended settlement at Camelon, however, does appear to have been broadly contemporary with the adjacent fort, though precisely how it related to the Roman occupation remains unclear (Proudfoot 1978: 122-23).

The mural barrier and the Military Way

Recent LiDAR analysis has indicated that the Antonine Wall was 42 Roman miles (some 62 km) long (Hannon *et al.* 2017: 453-55), slightly longer than previous map-based estimates. It runs from Bridgeness on the Firth of Forth to Old Kilpatrick on the River Clyde (Figure 2.1). The discovery of the largest and most elaborate Distance Stone at Bridgeness (Figure 8.7) is still the best indicator of the terminus, although various attempts to locate the ditch immediately to the west of where it was found have failed. Nor has an extension to the fort at Carriden to the east been located.



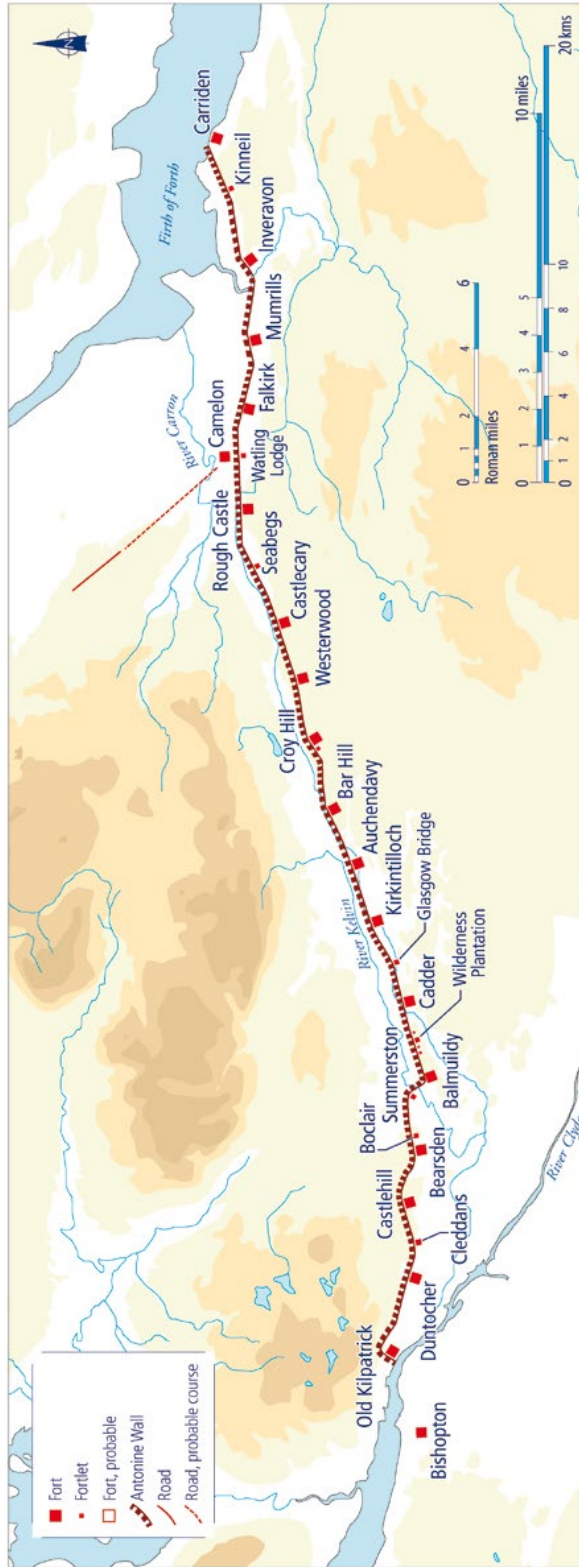


Figure 2.1. Map of the Antonine Wall as completed, based on currently available information (copyright D.J. Breeze).



The material used for the rampart varied along its length (Keppie 1974; 1976: 77-8). The preferred construction material was turf blocks (Figure 10.7), but mixed earth or clay, revetted by turf or clay cheeks, was variously used to the east of Watling Lodge (Romankiewicz *et al.*, this volume). The rampart was underpinned by a stone base formed of dressed kerbs retaining rough boulders or cobbles (Figure 10.4). This varied in width from c. 4.3-4.9 m, and may have been designed to be 15 Roman feet wide (4.4 m). Culverts through the base, defined by dressed stones with a flagged floor and capping, have been located at quite frequent intervals, as close as 15 m (Keppie 1976: 74-6). These were constructed to facilitate drainage through the Wall. Excavation has occasionally revealed repairs necessitated by damage to the superstructure, possibly from a build-up of water, as at Tollpark and Bantaskin (Keppie 1976: 68-76; Keppie and Breeze 1981: 231 and 245). No evidence exists for the way in which the Wall was carried across rivers, but both large culverts and probable supports for a wooden bridge are attested at stream crossings (Bailey 1996).

Nowhere does the rampart survive to a height of more than 1.8 m and the largest number of turf lines recorded in section is 22 (Steer 1957: Fig 3 – though the associated text suggests only 20). Combined with the fact that a turf or clay-revetted rampart must be battered to maintain structural stability, this would suggest a minimum rampart height of c. 3 m (Keppie 1976: 77; Hanson and Maxwell 1986: 81-3). There is no evidence to indicate how the rampart was completed at the top, though most reconstructions assume a walkway and palisade. A single post-hole within the body of the rampart at Mumrills could be interpreted as a support for a palisade (Bailey forthcoming). Allowing for the rampart batter, provision of a walkway five Roman feet (1.48 m) wide would make 3 m the maximum height achievable.

To the north of the rampart lay a wide and deep V-shaped ditch, which is often the most impressively preserved structural element of the Wall (e.g. Figure 12.2). At its consistently greatest size, between Bantaskin and Bar Hill, it was c. 12.2 m wide and 3.7 m deep. Both to the west and to the east of this stretch, however, the ditch was smaller, though not falling below c. 6 m in width (Keppie 1974; 1976: 76).

The berm between the rampart and ditch varies in width from a norm of c. 6 m to as much as 9 m, the increase often mirroring the reduction in ditch width (Keppie 1976: 76). Wider berm widths are recorded in areas, such as Croy Hill, with more complex topography. At various places along the eastern half of the Wall elongated sub-rectangular pits have been located on the berm (e.g. Bailey 1995; Woolliscroft 2008: 142-45 and 162-63). Usually three or four rows have been recorded, set in a quincunx pattern (Figure 2.2). On analogy with more numerous examples from Hadrian's Wall, they are generally considered to have held thorny branches rather than upright, sharpened stakes, creating the Roman equivalent of barbed-wire.

The material from the ditch was tipped out onto the north side, creating a low, outer mound that served to heighten the counterscarp of the ditch (Keppie 1976: 76; Hanson and Maxwell 1986: 77). The upcast was usually spread out to about 150% of the width of the ditch, but where the ground to the north sloped away it was piled up to a crest forming a substantial barrier in its own right. A small marking-out bank and a line of boulders have occasionally been recorded on the north lip of the ditch and it has been noted that the turf was not always first removed from below the mound (GAS 1899: 106 and 108; Breeze 2014a: 22).



Figure 2.2. Defensive pits on the berm at Callendar Park (copyright D.J. Breeze).



Figure 2.3. Section of the Military Way bypass at Croy Hill (© W.S. Hanson)



The final linear feature was a road, the Military Way, which served as a lateral communication link between the installations along the frontier (Keppie 1976: 76-7; Robertson 2015: 22). It has been recorded sporadically from Inveravon to Cadder (e.g. Figure 2.9), and then entering the fort of Old Kilpatrick at the western end of the Wall. It was generally about 5-5.5m wide, constructed of rough stones topped by small stones and gravel, with a distinct camber, flanked by ditches. It lay on average some 36-46 m south of the rampart and was usually connected to the *via principalis* of the attached forts. Quarry pits are still visible between the road and the rampart at Bonnyside, and one was found beneath the expansion at Bonnyside East (Steer 1957). There is evidence from several sites, such as Croy Hill, Bar Hill, Rough Castle, Duntocher and possibly Westerwood, that a bypass road was also provided to avoid the need to pass through each fort (Macdonald 1934: 129; 139; 144-45; 147; 177; 254-56; Hanson forthcoming a) (Figure 2.3). Crossings of the rivers Kelvin and Avon would have been



facilitated by bridges, as confirmed for the former by the discovery of Roman stones in the river to the north-west of Balmuildy (Robertson 1974).

Fortlets

Until John Gillam's seminal paper (1975) prompted a search for more, only four fortlets were known on the Wall at Duntocher (Figure 2.4), Wilderness Plantation, Watling Lodge and Glasgow Bridge. Five further fortlets were then discovered relatively quickly at Kinneil, Seabegs Wood, Cleddans, Croy Hill and Summerston, though the evidence for the latter is quite slight (Keppie and Walker 1981; Hanson and Maxwell 1986: 93-95; Hanson and Maxwell, this volume; Walker, this volume). Four others have been postulated, of which neither Rough Castle nor Laurieston can confidently be sustained on the available evidence; while kinks in the line of the Wall at Girnall Hill and Carleith, thought to indicate the site of two others, failed to be confirmed by excavation. However, resistivity data provides previously unrecognised support for the suggested fortlet at Castlehill (Figure 15.6) and a case has been made for the presence of one at Bar Hill, primarily on the basis of a need to provide access to the other side of the Wall for the garrison of the fort (Keppie 1980; Jones and Hanson, this volume; Hanson



Figure 2.4. Aerial photograph of the fortlet at Duntocher, after exposure of its rampart base in 1978, from the NNW. The line of the Ditch is visible as a slight hollow running diagonally across the lower half of the image. An exposed section of Wall base is arrowed (© W.S. Hanson).



forthcoming b). Most recently a section of the rampart of another fortlet has been uncovered during rescue excavation ahead of a house extension at Bocclair several hundred metres to the east of the fort at Bearsden (Hunter 2019: 412). Where it has been possible to test the relationship, all fortlets were either contemporary with or preceded the construction of the mural barrier and so must be seen as part of the original design (Hanson and Maxwell 1986: 93). A challenge to the consistency of this evidence in respect of Wilderness Plantation and Kinneil cannot readily be sustained (Hanson forthcoming b *contra* Bailey and Cannel 1996: 307-08 and Symonds 2017: 139).

Gillam hypothesised that originally the Antonine Wall fortlets were positioned at approximately one-mile intervals, like the milecastles on Hadrian's Wall. He further suggested that they were interspersed between six primary forts, but that during the construction process further forts were added to the Wall on or adjacent to alternate fortlets (Gillam 1975). This model met with general agreement, but various considerations have resulted in recent challenges to Gillam's overall scheme (below).

Some irregularity in the spacing of the known fortlets would seem to indicate that a fixed-spacing system, in which their position in relation to the landscape was essentially arbitrary, is overly prescriptive (but see Hannon *et al.*, this volume). It is clear that the independent fortlets at Lurg Moor and Outerwards were carefully placed within the landscape to oversee the western coastal flank of the Wall. Thus, some on the Wall line, such as Duntocher, may have controlled concealed access routes, while there are indications that the westernmost fortlets may have been sited in order better to oversee the terrain to the south of the Wall (Graafstal *et al.* 2015: 63-64; Symonds 2017: 144-149).

It is widely agreed that the design of the fortlets was heavily influenced by that of the milecastles on Hadrian's Wall (e.g. Hanson and Maxwell 1986: 93-5; Robertson 2015: 27; Breeze 2006: 86) (Figure 14.4). The most celebrated feature of the latter, the presence of paired gateways providing access through the barrier, is also integral to the former. As at MC 50 (High House) on the Turf Wall of Hadrian, more postholes seem to be present at the north gateways of fortlets than at the south, which may indicate the presence of a tower only at the former. A causeway over the Wall ditch opposite a fortlet is known only at Watling Lodge where the main road to the north crossed the frontier line, but excavation at Kinneil revealed tentative traces that a crossing point had originally existed and was subsequently dug out (Breeze 1974: 166; Bailey and Cannel 1996: 337). If the majority of the causeways had been eliminated during the operational lifespan of the fortlets, this may suggest that the Antonine Wall became markedly less porous over time; Welfare (2000: 18-19) has suggested that the removal of causeways on the Antonine Wall influenced the similar action on Hadrian's Wall when the army returned south.

The northern rampart of each fortlet constructed as one with the Wall seems to have been wider than the other three (Figure 14.4 J), presumably to facilitate the seamless integration of the fortlet with the Wall. Concomitantly, this implies that the rampart around the rest of the fortlet would have been lower. The evidence on this issue from the two freestanding fortlets at Duntocher and Cleddans is less clear. The presence of a defensive ditch or ditches, not usually provided outside milecastles, is a significant addition to the design, possibly linked to the absence of an equivalent to the Vallum.

Too little is known about the internal layout of the fortlets to be certain that a standardised approach was adopted. However, in the three where the interiors have been more extensively explored, wooden structures, presumably barracks, have been recorded on both sides of the internal road, while Kinneil also revealed evidence for a lean-to building set against the northern rampart and a well (Robertson



1957: 16-33; Wilkes 1974: 55-57; Bailey and Cannel 1996: 310-14 and 336-41). Slight traces of structures on one side of the central road were also noted at Croy Hill (Hanson forthcoming a). Three sites (Kinneil, Seabegs and Croy Hill) have also provided evidence of associated features just outside the rampart. However, we still lack direct evidence for the nature of the fortlets' garrisons, whence they were derived or what function they were intended to perform.

How and when the fortlets were abandoned is disputed. A secondary layer of cobbling apparently sealing the interiors has been recorded within all the fortlets that were sufficiently well preserved for it to survive (Robertson 1957: 23-27; Wilkes 1974: 57 and Fig. 2; Bailey and Cannel 1996: 315 and 342-4; Hanson forthcoming a). This has generally been interpreted as indicating that the fortlets were decommissioned during the life of the Wall and has been linked with signs that the gateways at Seabegs and Kinneil may have been narrowed or removed. However, attention has been drawn to the pottery from these two sites that could indicate a longer period of occupation (Keppie and Walker 1981: 149; Bailey and Cannel 1996: 329) and it has been suggested that the cobbling may simply have been intended to provide a useful hard surface in damp conditions (Symonds 2017: 142-144).

Forts

There are 17 forts currently known along the line of the Antonine Wall (Figure 2.1), most of them first recorded in antiquarian accounts either as extant earthworks or concentrations of Roman finds. The locations of the latter were later confirmed by excavation, aerial reconnaissance or geophysical survey. Two further fort sites have been postulated on the grounds of spacing, at Seabegs and Kinneil. Neither of these have been confirmed, though fortlets have been identified in the immediate vicinity of both. The disposition of the forts along the line is generally taken to indicate an intention to dispose them some 2-3 Roman miles apart (3-4.4 km). In fact, distances vary between 1.6 and 3.9 Roman miles (2.4-5.8 km), though 80% lie between 1.6 and 2.6 Roman miles (2.4-3.9 km) apart (Figure 11.10). As with the fortlets, applying a standard spacing is almost certainly too prescriptive and other factors, such as the local topography and relationship to north-south routeways (Graafstal *et al.* 2015: 63-4; Graafstal, this volume) (Figure 11.2), should also be taken into account. Indeed, it has been suggested that the forts towards the eastern end of the Wall may have been more widely spaced because the Wall was effectively shielded here by the outpost forts (below) (Breeze and Dobson 1976: 96).

All of the forts but two (Bar Hill and Carriden) are attached to the barrier. However, their structural relationship with it varies. Old Kilpatrick, Balmuirdy and Castlecary clearly predate the construction of the rampart, as does Auchendavy on the basis of the geophysical evidence (Jones *et al.* 2006: 13-14; Jones and Leslie 2015: 319-20). The small fort at Duntocher also predates the Wall, though it post-dates a fortlet on the same site. Inveravon, Westerwood, Croy Hill, Cadder and Rough Castle have all produced stratigraphic evidence to suggest that they were constructed after the Wall rampart was laid out, though the latter two also provide indications which seem to contradict this apparent chronological relationship. Despite the implication of the published plan (Robertson 2015: Fig. 40), there is no direct evidence of the relationship between the fort and Wall at Falkirk (Bailey forthcoming). Most forts were, like the Wall, defined by ramparts of turf or clay on a stone base, but two (Balmuirdy and Castlecary) had stone walls.

There is considerable variation in the sizes of the known forts (0.12-2.6 ha). In other contexts the two smallest (Inveravon and Duntocher) would be referred to as fortlets (Symonds 2017: 5-12) and several



others (Rough Castle, Westerwood and Croy Hill) were not of sufficient size to house a full auxiliary unit (Breeze, this volume). Indeed, it is difficult in most cases to see how the fort sizes relate to the attested garrisons. At several forts more than one auxiliary unit is recorded epigraphically, though cavalry are poorly attested in comparison to Hadrian's Wall and legionary detachments are thought to have been quite widely used (Breeze 1993: 288-90; Breeze 2006: 81-94 and 189-92; Robertson 2015: 31-34).

All the forts on the line of the Wall are oriented towards it, which usually means north because of the general orientation of the Wall. The one exception is Cadder, which faces east, though it may have originally been designed to face north given the apparent central location of its north gate. There is a wealth of data for the central range of buildings (headquarters building, commanding officer's house and granaries) mainly from sites excavated between 1900 and the 1930s. These were usually stone-built, but several forts (Bearsden, Old Kilpatrick, Cadder) have one or more of the central buildings of timber construction (Figure 2.5), and in some cases (Mumrills and Cadder) there are buildings that appear to have both timber and stone phases. Evidence for the existence of workshops in the central range is slight, while the identification of non-standard buildings is often hampered by the consistent use of post-hole construction (e.g. Breeze 2016: 314-20 and 335-43).

Several of the forts (Old Kilpatrick (possibly), Balmuildy, Cadder, Castlecary, Bar Hill, Westerwood, Mumrills and Bearsden in its primary phase) have internal bathhouses. This is unusual because of the

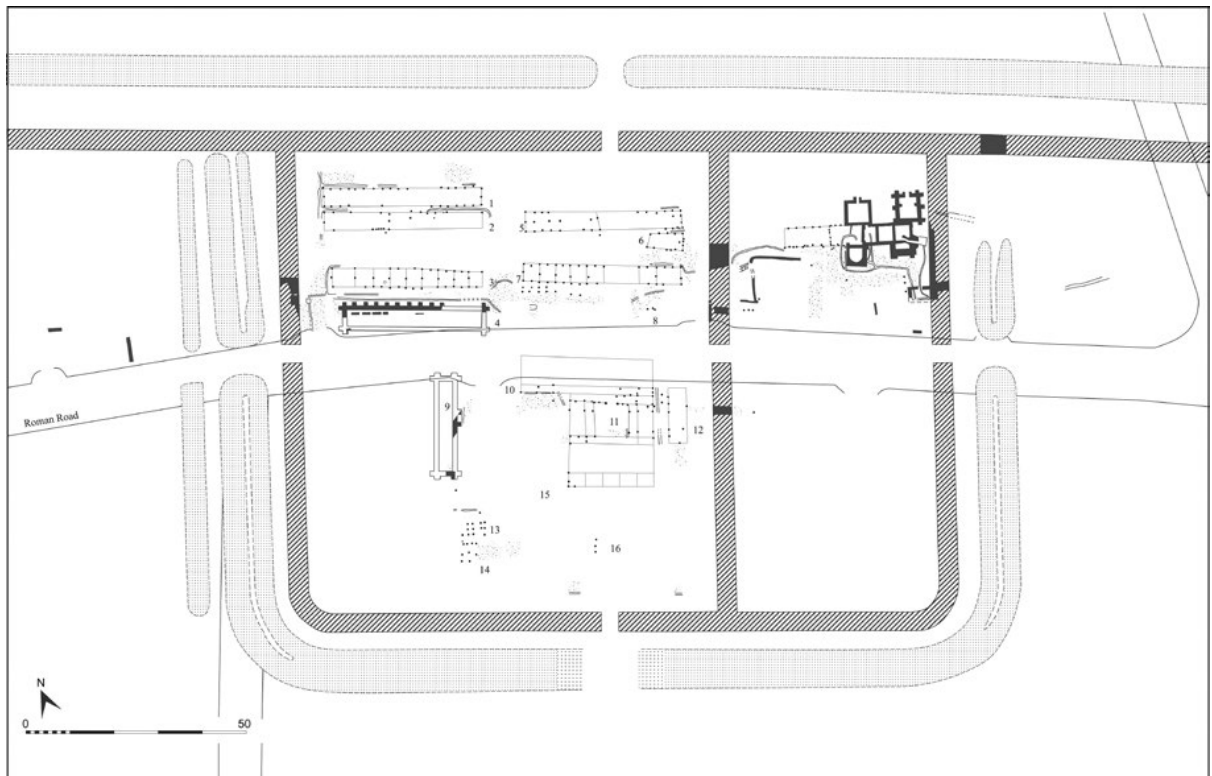


Figure 2.5. Plan of the fort and annexe at Bearsden (after Breeze 2016: Fig. 21.14b)



associated social activities and potential fire risk (cf. *RIB* 1730 recording the rebuilding of the bathhouse at Bowes 'burnt by the violence of fire'). The significance of this arrangement in the Wall forts is debated (Bailey 1994; Keppie 2004: 204-09). However, external bathhouses, sometimes in an annexe, are equally common (Duntocher, Bearsden, Auchendavy, Croy Hill, Rough Castle and Carriden) and the small size of several of the forts makes provision of an internal bathhouse seem unlikely. Currently only Old Kilpatrick, Cadder, Balmuildy and probably Castlecary are known to have both internal and external bathhouses. The sizes of the bathhouses do not seem directly to reflect the size of the fort.

Excavation in the forward and rear parts (*praetentura* and *retentura*) of forts has generally been more limited, but where this has taken place, long, narrow buildings of timber construction are indicated. These are generally interpreted as barracks, though they are not infrequently smaller than the norm (e.g. McIvor *et al.* 1980: 280-81; Breeze 2016: 337) (Figure 2.6). It has been suggested that some forts may never have been fully provided with internal buildings (Keppie 2009: 1138), though this is difficult to demonstrate given the lack of large-scale modern excavation in their interiors (Breeze, this volume). The known plans of accommodation blocks are too fragmentary to contribute meaningfully to any calculation of fort garrisons, which have been postulated on the basis of the epigraphic record (e.g. Hanson and Maxwell 1986: 153-58; Breeze 2006: 91-94; Keppie 2009). Evidence for the extent to which women and children were resident within these barracks continues to accumulate (Allason-Jones *et al.*, this volume), as, for example, at Bar Hill (Figure 23.6).

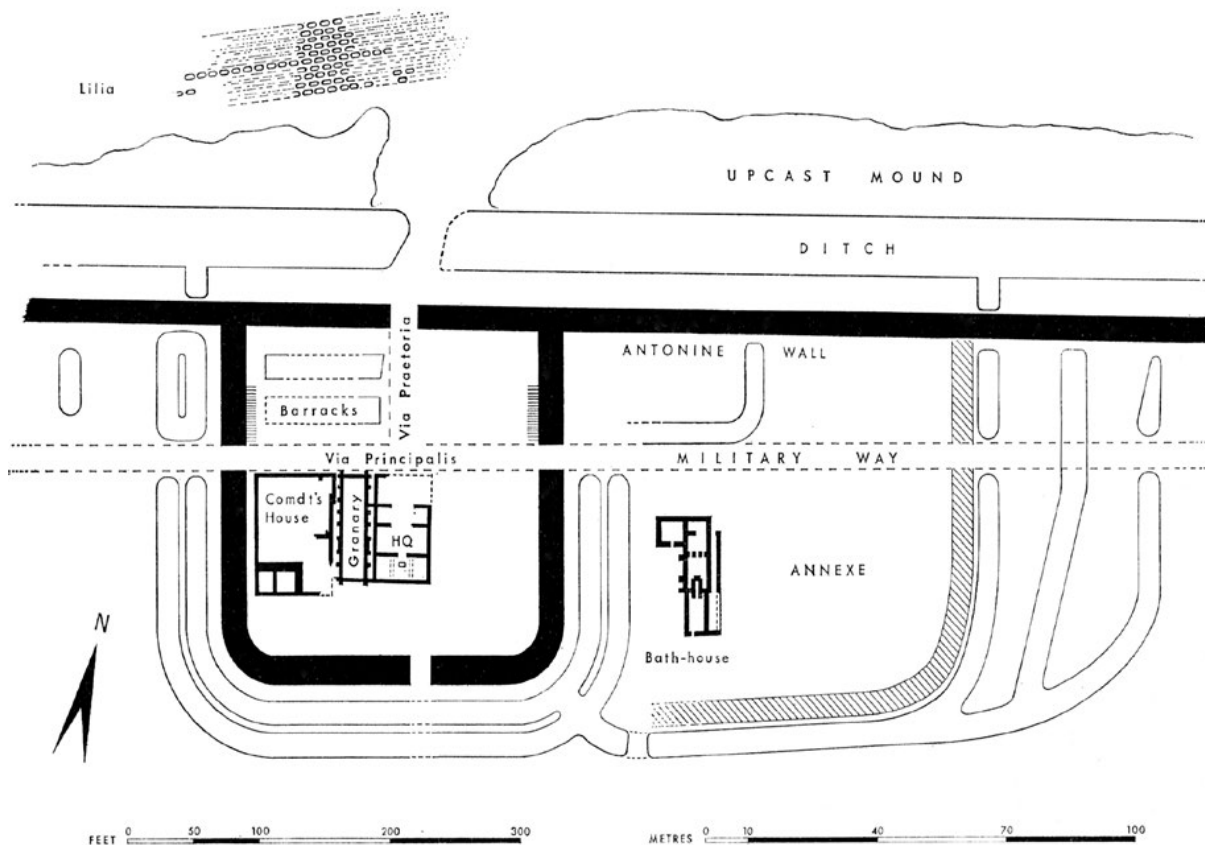


Figure 2.6. Plan of the fort and annexe at Rough Castle (after MacIvor *et al.* 1980: Fig. 1)



Planning and building the Wall

For much of its length the Wall followed the Midland Valley, sitting on its southern slopes overlooking the marshy ground to each side of the Rivers Carron and Kelvin. To the east, it was situated on top of the raised beach overlooking the Forth. To the west, beyond the River Kelvin, the Wall line utilised the drumlins of the Clyde Valley before ending on the north side of the river. With some exceptions, the Wall line follows the most elevated, north-facing ground, resulting in frequent changes of direction, but is not always placed in the most advantageous defensive position thereon (Hanson and Maxwell 1986: 162-3; Poulter 2009: 116). It is now generally agreed that the location of many of the installations was determined first, both forts and fortlets, though there is dispute about whether this applies to all of the former.

Until the 1970s the Wall was thought to have been designed as a unitary monument (Macdonald 1934: 162; Robertson 1960: 27). However, the differing structural relationships between forts, fortlets and Wall led John Gillam to suggest that its original plan had been modelled on Hadrian's Wall in its developed form, with six forts some eight Roman miles (11.8 km) and fortlets approximately every 1.1 Roman miles (1.6 km) apart between each (1975) (Figure 2.7). This hypothesis was tested and, seemingly, supported by a successful search for more fortlets which, where the relationship was examined, were all either contemporary with or preceded the construction of the mural barrier (above).

More recently, however, inconsistencies in the structural relationships between the Wall and some of the supposedly secondary forts (such as the existence of primary causeways at Rough Castle and Cadder, and an apparently primary well or cistern at Croy Hill) (Figure 11.11), the strategic positioning of some supposedly secondary forts and the apparent primacy of fort locations in relation to the planning of the Wall line have resulted in a re-assertion of the view that all the forts were also part of the original design (Poulter 2009: 117-24; Graafstal *et al.* 2015; Symonds 2017: 144-46; Graafstal, this volume). This debate is ongoing, though Gillam's original hypothesis, which remains the basis for our understanding of the building of the Antonine Wall, has been positively re-evaluated, emphasizing the fact that fortlets lie too close to forts at Duntocher, Croy Hill and Castlehill for them easily to be seen as part of the same unitary plan (Hanson forthcoming b).

Various attempts have been made to calculate how the construction of the Wall was organized, utilising a range of archaeological and epigraphic evidence (e.g. Keppie 1974; Hanson and Maxwell 1986: 104-36). Some 20 Distance Stones (traditionally referred to as Distance Slabs) are known that record the erection of the rampart by soldiers from the Second, Sixth and Twentieth legions (Keppie 1998: 72-90). As well as the symbols of the legions, several also feature sculptural scenes depicting sacrificing to the gods, fighting, and victory celebrations (Breeze and Ferris 2016) (e.g. Figures 8.3 and 8.7). They form a unique body of military sculpture and ongoing research is seeking to recreate the original use of colour on the stones (Campbell, this volume).

The fact that the Distance Stones, which were erected at each end of a building sector, detail very precise lengths of Wall constructed by each legion implies careful subdivision of the work (Keppie 1998: 50-56). However, attempts to correlate variations in the dimensions of the elements of the Wall and the changing character of the materials employed in construction of the rampart with these building sectors have not been successful. Nor do the lengths the Distance Stones record appear to be laid out in relation to the installations along the Wall line, but rather they follow their own independent logic (Hannon *et al.* 2017: 460). More Distance Stones are known from the most westerly four-mile sector (Castlehill to Old



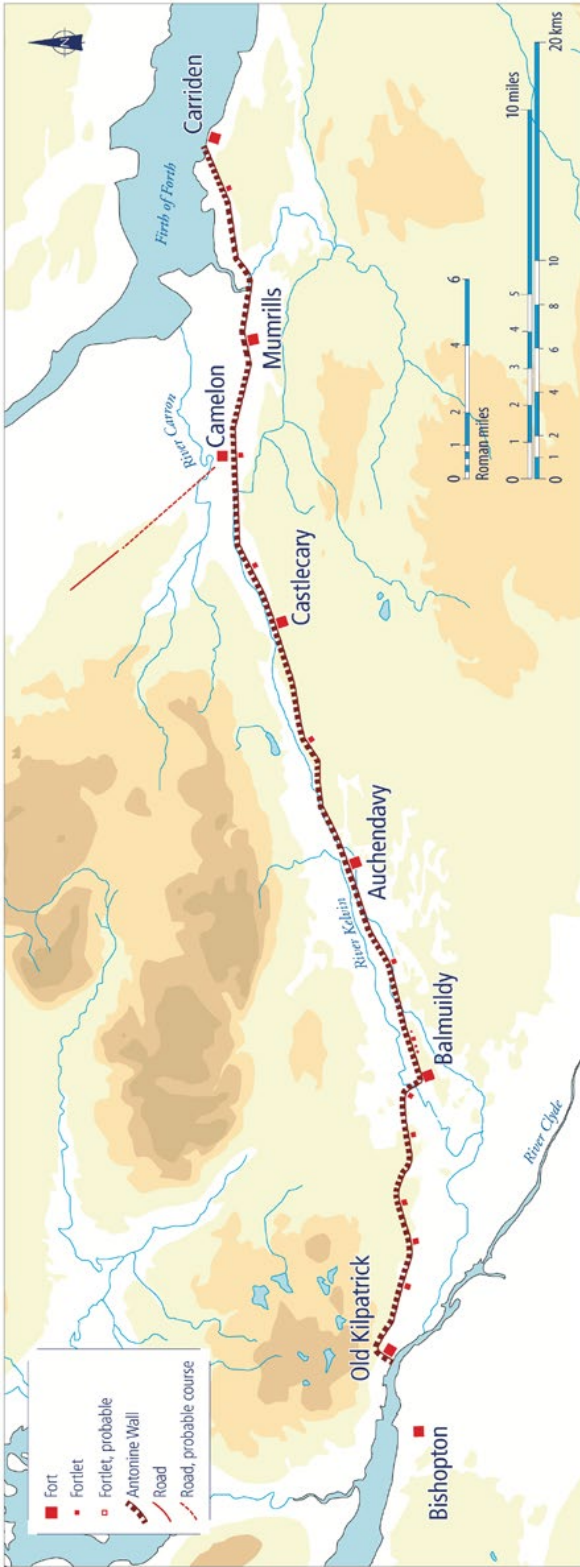


Figure 2.7. Map of the Antonine Wall as planned, based on currently available information (© D.J. Breeze).



Figure 2.8 Map of the Antonine Wall showing the location of Distance Stones and camps (© D.J. Breeze).



Kilpatrick) because it was divided up into six smaller lengths (Figure 2.8), the distances constructed being measured in feet rather than paces. It is generally accepted that this increased subdivision was intended to hasten completion of the construction, indicating that this section was the last to be built (Keppie 1979: 7). It has been proposed that the Wall was built from east to west (e.g. Macdonald 1934: 393-400; Keppie 1974: 151), though once the line had been agreed, there is no inherent reason why the actual building process should necessarily have started at one end and progressed to the other. Indeed, pointing to the odd lengths recorded on the Distance Stones allocated to the three legions in the central sector, Hassall argues that the section from Castlehill to Seabegs, some 20 Roman miles long, almost half the total length of the Wall, was divided equally between them and was the first to have been built (1983). Others have suggested that the sector east of the Avon was a late addition because of the misalignment of the Wall line on opposite banks of that river, or even that the original eastern terminus of the Wall lay at Watling Lodge (Maxwell 1989: 163; Bailey 1995: 595). It is worth noting in general, however, that the subdivision into sections allocated to different legions, combined with considerations of efficient manpower distribution, implies that work may have commenced in at least three sections simultaneously.

Some installations can be shown to have been prioritized in the building process. Thus, the fortlets at Duntocher (Figure 2.4) and Cleddans at the western end of the Wall were originally built as freestanding structures, while that at Seabegs Wood is located on a slight salient (Figures 6.2b and 12.5), suggesting that its location pre-empted the convenience of a straight stretch of Wall. Similarly, the forts at Old Kilpatrick, Balmuildy, Castlecary and Auchendavy clearly predate the construction of the rampart. Building inscriptions from forts indicate both legionary and auxiliary involvement in their construction, in some cases (Castlecary and Bar Hill) at the same site.

Accommodation for the soldiers building the Wall was provided in temporary camps that form a body of evidence unique to the Antonine Wall (e.g. Figure 2.9). Some 20 of these have been recorded along the length of the Wall, most of them relatively small (2-2.5 ha), though two larger camps lie north of the Wall, one each beside the primary forts of Castlecary and Balmuildy (Hanson and Maxwell 1986: 117-21; Jones 2005) (Figure 7.2). In the eastern half of the Wall the camps are found in pairs at each end of a legionary building sector, suggesting a possible division of labour. The pattern is less clear to the west, however, where fewer camps are known (Figure 7.3). The two adjacent construction camps at Little Kerse and Polmonthill near Inveravon were, unusually, provided with annexes, though their function is not known. The way in which the camp at Garnhall II abuts the southern face of the Antonine Wall rampart raises questions about its chronology and function, and the two distinct phases of use of the camp at Dullatur suggest that the building process may have been more complex than is generally assumed (Jones 2005). Two small temporary enclosures that underlie the forts at Bar Hill and Croy Hill presumably also relate to the surveying, planning or possibly construction of the Wall (Jones 2005: 553-54 and this volume) (Figure 7.1).

Minor installations

Six expansions, so-called because they consist of a southern extension of the rampart, were discovered along the line of the Wall in the 1890s (GAS 1899: 77-79, 84-85 and 107). They occur in pairs: one pair on each side of the fort at Rough Castle, referred to as Tentfield East and West and Bonnyside East and West, and one pair on the western slope of Croy Hill. A seventh has been claimed at Inveravon (Dunwell and Ralston 1995: 526-30 and 567-69), but the north-south dimensions of the cobble base recorded there are too large by comparison with the other examples, while the discovery of an associated post-hole would be more appropriate if the cobbling were to be identified as the rampart of a small fort.





Figure 2.9. Aerial photograph of the NW quadrant of the construction camp at Easter Cadder in the left foreground, with the line of the Military Way (revealed primarily as line of quarry pits) and the Antonine Wall Ditch beyond it to the right, bisected by a modern pipeline (© W.S. Hanson).



Each expansion consisted of a turf mound on a cobble base some 5.2m square attached to the rear of the Wall rampart after its construction (GAS 1899: 77-79 and 84-85; Steer 1957). Steer suggested that the superstructure was bonded with the Wall at Bonnyside East, even though the base was not and also overlay a quarry pit for the Military Way; nor is the section drawing through the Wall and expansion, whose integrity is open to challenge, as supportive of that interpretation as the text implies (Hanson forthcoming b). The purpose of the expansions is not certain, though it seems most likely to have been related to long-distance signalling by fire, as quantities of burnt material were recovered from Bonnyside East, though whether that involved lateral signaling is questionable (*contra* Poulter 2018). The two pairs of expansions on either side of Rough Castle may have been intended to signal to the outpost forts in the north, while the pair on Croy Hill may have faced south towards the fort at Bothwellhaugh in Clydesdale.

Only three so-called small enclosures are known along the Wall, all discovered through aerial photography, two to the west and one to the east of the fortlet at Wilderness Plantation, referred to as Buchley, Wilderness West and Wilderness East respectively. The spacing between the enclosures and the fortlet varies between 260-295m, rather less than one-sixth of a Roman mile. Only one example has been excavated, showing that it consisted of a single ditch surrounding a very slight rampart of dumped-earth, internally revetted with turf, enclosing an area c. 5.5 m² (Hanson and Maxwell 1983) (Figure 2.10). Its construction does not seem to have been integrated with that of the Wall rampart, though the turf had not been stripped from the interior prior to its construction. Neither an entrance nor any internal structure was found, so its purpose remains a mystery.

It has long been argued that towers ought to exist on the Wall, on analogy with linear frontiers elsewhere (e.g. Gillam 1975: 55-56), but they continue to remain elusive. It was thought that the small enclosures near Wilderness Plantation (above) were potential candidates, but excavation failed to find any supporting structural evidence. Two other possible candidates have been suggested, but neither are entirely convincing. A penannular, ditched enclosure 26.5 m in diameter was located on aerial photographs just to the south of the Wall at Garnhall. Excavation identified an internal post-hole structure interpreted as a tower c. 4 m square (Woolliscroft 2008: 145-57 and 163-67). However, the post-holes are not sufficiently deep to support such a structure, nor are they regularly laid out or central to the enclosure. Moreover, no Roman pottery was recovered, while the surrounding ditch was partly overlain by the Military Way, so identification as an Iron Age structure seems preferable. A rectangular interruption in the clay cheek at the rear of the Wall in Callendar Park was interpreted as a post-setting for a timber tower (Bailey 1995: 585-86 and Illus. 3), but the structural stability of such a post is questionable, since the batter of the rampart would mean that very little of it would have been supported by rampart material, and no corresponding setting in the body of the rampart was located. However, evidence of occupation was also found immediately to the rear of the Wall some 100 m to the east, where a two-phase hearth and a possible lean-to timber structure were identified indicating some form of Roman activity nearby (Bailey 1995: 580 and 586). Given the consistent failure to find evidence of towers, doubts are beginning to be expressed that they existed at all (Breeze 2019: 96-97; Hanson forthcoming a). Perhaps the placing of the forts on the line of Hadrian's Wall during its construction made the towers/turrets there less relevant, from which a decision flowed not to construct them on the Antonine Wall.

Other occasional enigmatic features have been recorded attached to the Wall. A 12 m long, narrow stone platform added to the back of the Wall at Tollpark was regarded as too massive and regular to constitute a repair (Keppie and Breeze 1981: 239-40). One suggestion is that it served as a means of



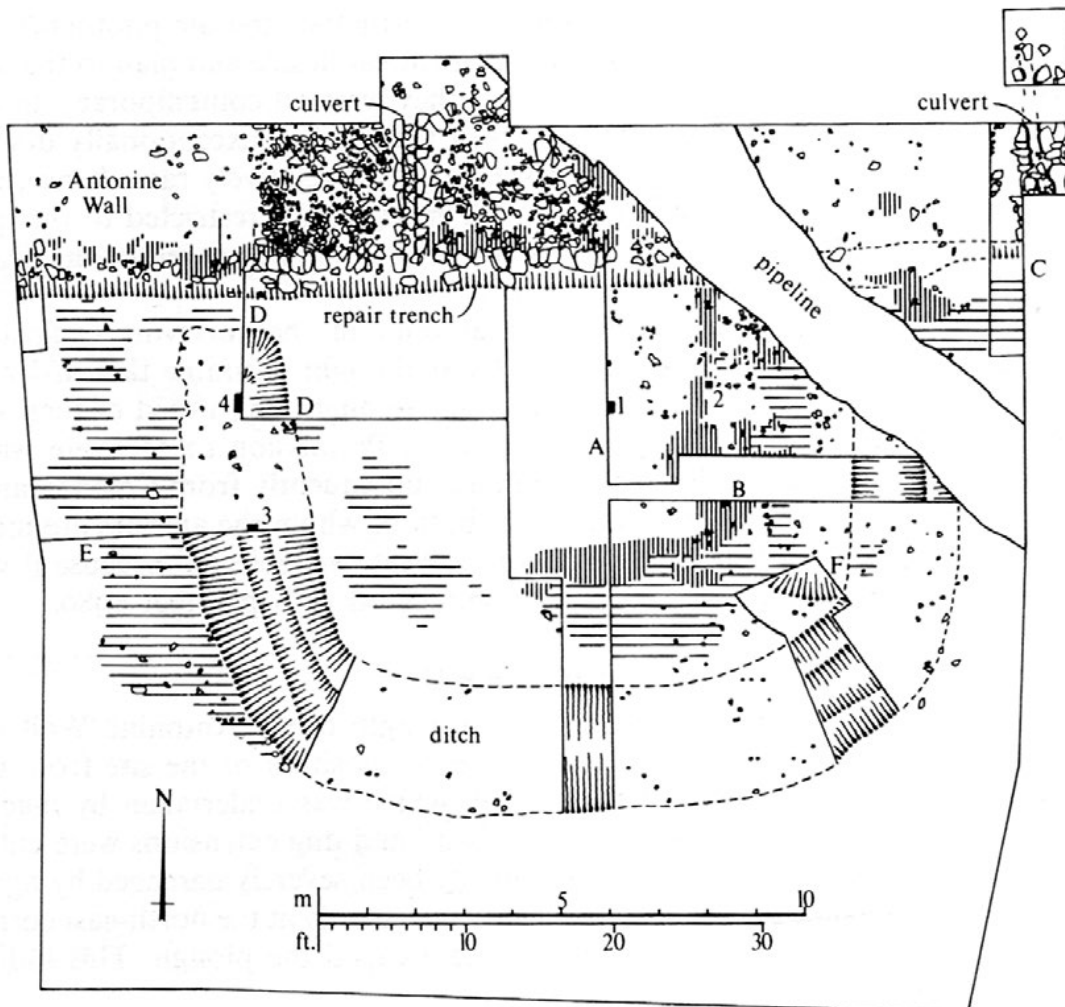


Figure 2.10. Plan of the small enclosure at Buchley (after Hanson and Maxwell 1983: Fig. 2)

access to the Wall top (Robertson 2015: 18), though neither the absence of a turf stack above it nor the presence of extensive burning on its surface would seem to support such an interpretation. A similar discovery was recorded some 874 m to the west at Garnhall (Woolliscroft 2008: 158-62), though its irregular remains and location next to a culvert may hint at an association with repairs.

Annexes

Several of the forts on the Wall were provided with an annexe, that is an enclosure attached to one side of the fort, though Carriden, Mumrills, probably Falkirk and possibly Castlecary have two. Many annexes were encountered between 1900 and the 1930s during the initial investigations into the layouts of the forts themselves, though there was no systematic search for them. Salway suggested that the annexes



were provided because there was no Vallum, which had served as an elongated annexe on Hadrian's Wall (Salway 1965: 158). Bailey, noting that the annexes on the Antonine Wall were an afterthought, suggested that the original intention had been to provide a Vallum and the annexes were created only once that idea had been abandoned (Bailey 1994: 300); though annexes are commonly provided at forts across northern and western Britain from the Flavian period onwards. The annexes vary considerably in internal area (0.3-1.7 ha). Two (Duntocher and Rough Castle) were larger than the forts to which they were attached (Figure 2.6), assuming the identifications of the two enclosures at Duntocher do not need to be interchanged (cf. Swan 1999: 431-33).

The annexes were usually defined, like the forts, by a rampart and one or more ditches, though detailed excavated evidence for their defences is limited. Two ditches are attested in the north-west corner at Mumrills, but no meaningful rampart was detected (Bailey forthcoming). The provision of annexes does not seem to have been part of the original scheme for the Wall, though only at Rough Castle has it been possible to investigate the junction between the Wall and annexe rampart. The latter appears to abut the Wall, but then so does the fort rampart, and further uncertainty is introduced by the positioning of a culvert through the annexe rampart immediately beside its junction with the Wall (Buchanan *et al.* 1905: 466 and Fig. 1). Elsewhere, however, there is other evidence to suggest the annexes were later additions (e.g. Balmuildy, Castlecary and probably Falkirk), such as the infilling of ditches between fort and annexe or differences of construction material used for the ramparts. Though superficially of one build with the fort, the annexe at Bearsden also seems to be secondary as neither the north and south gates nor the headquarters building were centrally located within the fort; rather they were central to the whole fort/annexe enclosure (Figure 2.5). This suggests that the annexe had been created by subdividing what was originally intended as a larger fort during its construction (Breeze 2016: 330-34).

When the decision was made to add annexes to forts and whether it was, indeed, a single decision is a matter of much debate (below). The evidence from both Bearsden and Duntocher indicates it took place there while the Wall was still being built. Arguing for a hiatus in the whole construction process before the decision to add annexes was taken, Swan dated it to the return of a task force from Mauretania in AD 149/50 on the basis of the widespread distribution along the Wall of pottery with strong North African influences (Swan 1999: 445-47). A slightly later date for the return of these troops is now indicated by a diploma from Mauretania, which mentions veterans from *cohors I Baetasiorum* discharged in 152/3 (Eck *et al.* 2016). If this were to provide a *terminus post quem* for all annexes, such a late date would imply a considerable delay before the Wall was completed. However, despite Steer's assertion to the contrary, the southern ditch of the western annexe at Mumrills was clearly earlier than the outer fort ditch, whose infilling has been dated by pottery and coins to the mid-150s AD (Macdonald and Curle 1929: 402; Steer 1961; Bailey forthcoming). This would suggest that the infilling of the fort ditches was not a necessary precursor to the construction of the annexe at Mumrills or, by extension, at any other fort. However, Bailey now postulates, somewhat tendentiously, that the southern annexe ditch at Mumrills must therefore relate to an earlier Antonine fort on the same site (Bailey 2010 and forthcoming).

There has been very little attempt, other than occasional exploratory trenches and some geophysical survey, to elucidate the interiors of annexes. Bathhouses occur in several, in some cases in what is clearly a secondary context (e.g. Balmuildy). Where annexes have been investigated more extensively, notably at Mumrills and Falkirk (assuming the features overlying the infilled ditches to the east of the latter are within an annexe rather than a civilian settlement), they have produced quantities of Roman



material culture and evidence of buildings of varying size and complexity but predominantly timber construction. They also contain traces of cobble surfaces, pits, ovens or furnaces and metalworking, suggesting areas of semi-industrial activity (Bailey 1994: 305-09 and forthcoming). There is insufficient evidence to be certain about the density of that activity, though the fact that at some sites (e.g. Balmuildy and Falkirk) buildings were erected over the infilled ditches of the forts would seem to suggest that space in annexe interiors was at a premium.

There is considerable debate about the function of annexes generally. Some see them as serving entirely military requirements for the production and maintenance of equipment for the Roman army and the provision of secure areas for goods and vehicles in transit, or the protection of livestock, such as cavalry horses (e.g. Breeze 2006, 95; Hanson 2007: 667-69 and this volume). Others prefer to equate them with the provision of protection for civilian occupation (e.g. Sommer 2006: 123).

Outpost forts

While the Antonine Wall followed a geographically well-defined line convenient for the purposes of military control, it did not represent the northern limit of contemporary Roman occupation. This extended as far north as the estuary of the Tay, a distance of over 50 km, with four permanent garrison posts along an arterial road which arched across the base of the Fife peninsula following the general line established in the Flavian period. The road crossed the Wall on an original causeway not, as might have been expected, at a fort, but at the fortlet of Watling Lodge (Breeze 1974; Keppie *et al.* 1995: 622-26 and 664-65). The first fort on the road north lies only 1.2 km beyond the Wall at Camelon. There is then a considerable gap before reaching Ardoch, though this may have been filled by a fort at the crossing of the Forth in the vicinity of Stirling. The equivalent Flavian fort, however, lies further to the west at Doune.

Three of the four outpost forts (Camelon, Ardoch and Bertha) are above average in size (6.2-c. 9 acres; 2.5-3.6 ha), and at least three (Camelon, Ardoch and Strageath) had large annexes. All seem to have been provided with strong defences, as might be expected for garrisons outposted beyond the line of the main frontier, best exemplified at Ardoch because of the impressive survival of its ditches. Only the fort at Strageath has been excavated in modern times and has provided clear evidence of two phases of Antonine occupation (Frere and Wilkes 1989: 126-31). Analysis of the complex defences of the fort at Ardoch also suggests two Antonine phases (Breeze 1983), though this has been disputed (Maxwell 1989: 165-68).

Extramural activity (Hanson, this volume)

Given the discovery some 140 m east of the fort at Carriden of an inscription dedicated by *vicani* (RIB III 3503), there can be no doubt that there was a settlement (*vicus*) inhabited by non-military personnel outside at least one of the forts on the Wall. However, despite a considerable focus of research effort over more than 20 years, particularly by means of geophysical survey, very little structural evidence of such settlements has been forthcoming.

Only at Croy Hill is there clear evidence of buildings, though very little area excavation has taken place elsewhere (Figure 22.2). A single timber building was recorded to the south-west of the fort, set within a ditched compound adjacent to a trackway which curved down the slope towards the fort bypass road



to the south. However, the wide range and large quantity of finds from the drainage ditches defining that trackway indicated a strong focus of settlement activity on the flat plateau immediately north of the excavated area (Hanson, this volume and forthcoming a). Only very fragmentary structural remains have been recorded elsewhere (e.g. Bearsden, Bar Hill, Westerwood and Mumrills). Those found beyond and overlying the ditches on the east side of the fort at Falkirk are usually regarded as lying within an as yet undefined second annexe to the fort (above), though a rectangular hypocausted building some 500 m further east probably does relate to civilian activity (Keppie and Murray 1981).

A range of other activities is known to have taken place in the immediate vicinity of forts. Rectilinear land divisions of varying character have been recorded adjacent to several forts and in most cases a Roman date has been confirmed. Extensive excavation to the east of the fort at Croy Hill revealed a system of fence lines and short stretches of ditch on both sides of the fort bypass road (Figure 22.2) (Hanson forthcoming a). Similar features have been excavated at Auchendavy, where they lie north of the Wall, with traces found also at Westerwood (Dunwell *et al.* 2002: 274-279; Keppie 1995). At Rough Castle a system of extant small enclosures immediately to the south-east of the fort are aligned on a probable Roman road (Máté 1995); while at Carriden an extensive system of ditch-defined rectilinear fields or plots, recorded as cropmarks, are also clearly aligned on the Roman road leading east from the annexe of the fort (Keppie *et al.* 1995: 602-06) (Figure 22.1).

There are scattered indications of industrial activity taking place outside forts, some of which is likely to have involved civilians. The evidence of local pottery production associated with individual forts is increasing (below), but few actual kilns have been located. In two of the three known cases, Croy Hill (Figure 22.4) and Duntocher (Hanson forthcoming a and this volume; Newall 1998: 25-8), these are located outside the fort/annexe, as is a tile kiln at Mumrills (Macdonald 1915: 123-28 and plates II and III). The presence of broken or incomplete architectural stonework in the backfill of Roman features at Croy Hill may indicate the activities of a stonemason nearby.

The only cemetery known outside any of the Wall forts is at Camelon, though occasional burials have been recorded elsewhere (Breeze *et al.* 1976; Breeze and Rich Gray 1980; Hanson, this volume and forthcoming a; Hunter, this volume). However, tombstones or funerary reliefs are known from several forts (Bar Hill, Croy Hill, Mumrills and Auchendavy), including four that are clearly non-military in character from Auchendavy (Keppie 1998: 113-18) (e.g. Figure 27.1).

Other external religious activity is attested by the recovery of altars, most of which are antiquarian discoveries lacking precise contextual information. Nonetheless, their occasional recovery from apparently primary contexts some slight distance removed from forts, as at Westerwood, Mumrills, Castlecary, Croy Hill and Bar Hill (*RIB III* 3504; *RIB I* 2140; 2149; 2159; 2160; 2167) (Figure 12.1), suggests that the location of small shrines in the immediate vicinity of forts was not uncommon. Altars to the goddesses of the parade ground from outside the forts at Castlehill and Auchendavy may hint at the location of associated parade grounds (Keppie 1998:102-08).

Production and procurement

The Roman army had a voracious appetite and had to be armed, housed, fed, watered and clothed. While the procurement of some items might involve long-distance supply, much of these requirements



would have been met locally (Breeze 1984). The evidence for these activities on the Antonine Wall, however, is patchy, particularly for those involving organic remains.

Apart from the rare discovery of actual kilns at Duntocher, Bar Hill (within the furnace chamber of the bathhouse) and Croy Hill, local pottery production is evident through potters' stamps on mortaria and wasters from several forts, including Balmuilty, Bearsden, Bar Hill, Croy Hill, Duntocher and Mumrills (Swan 1999:452-61; Hartley forthcoming; Bidwell, this volume). Tile production is also evidenced by a kiln at Mumrills, while variations in the style of box flue tiles suggests localised production, each unit being responsible for producing its own (Macdonald 1915: 123-28 and plates II and III; Keppie 2004: 218-19). A survey of wares along the Wall that show strong African influence, some of which were clearly of local manufacture, has provided valuable insights not only into troop movements (below), but into wider ethnic influences on pottery production (Swan 1999; 2009). Sporadic evidence of ironworking has been recovered from the forts at Falkirk, Mumrills and Inveravon (e.g. Dunwell and Ralston 1995: 540 and 561-2). Evidence for local glass manufacture is similarly sparse, though glass-blowing has been suggested at Camelon and recycling may also have taken place at forts along the Wall (Price 2002: 90; 2016: 185).

Amphorae are common finds and provide invaluable information on the procurement and transportation of exotic foodstuffs and liquids, including wine, olive oil and *garum* (e.g. Fitzpatrick 2016), while palaeobotanical evidence from Bearsden has demonstrated the consumption of a wide range of food stuffs including spelt, emmer and durum wheat, barley, lentil, beans, celery, turnip, radish, bilberry, strawberry, blackberry, raspberry, hazel nuts, figs, coriander, dill and opium poppy, the last four probably imported from the continent (Dickson and Dickson 2016: 223-35). The paucity of faunal remains from the Wall, because of the poor survival of bone and other organic evidence in acidic Scottish soils, makes it challenging to pin down wider consumption practices with certainty, though several types of locally available wild fruits, game, fish and shellfish are variously attested (Hanson and Maxwell 1986: 179). The biochemical analysis undertaken at Bearsden hinted that the soldiers had a mainly plant-based diet (Knights *et al.* 1983).

Quernstones confirm the processing of grain, some of which may have been locally produced, though insufficient environmental evidence currently exists to confirm that suggestion. Both macroplant and pollen analyses regularly indicate the presence of barley, though whether this was also consistently used as a human food source, rather than just as a feed for animals, is disputed (cf. Miller and Ramsay 2007: 136-37; Dickson and Dickson 2016: 271). Ovens set into the rampart of Wall forts combined with the ceramic evidence of mortaria, cooking pots, braziers and casserole-type dishes demonstrate cooking traditions.

The Wall in its historical context

Antoninus Pius' decision to reverse his predecessor's policy and advance the frontier in Britain seems to have been taken very soon after his accession. The governor responsible, Q. Lollius Urbicus, is attested building both at Corbridge in AD 139-40 and at Balmuilty (Figure 2.11) presumably shortly thereafter as his victory is confirmed on a diploma issued on 1 August 142 and celebrated on coins which began to be issued late in that year, some directly referencing the province (*Historia Augusta Antoninus Pius V*; *RIB* I 1147; 1148; 2191; 2192; *RMD* IV 164; *RIC* Antoninus Pius, 719, 743-5) (Figure 2.12).





Figure 2.11. Lollius Urbicus inscription from Balmuildy (© Hunterian, University of Glasgow).



Figure 2.12. Sestertius of Antoninus Pius depicting a winged Victory and the title *Imperator II Britan* on the reverse (© Hunterian, University of Glasgow)

There has been some debate about the reasons for this dramatic change of policy. It is now widely agreed that the new emperor, who lacked military experience and reputation, needed the prestige that such a military victory would bring (e.g. Breeze 1976: 76; Hanson and Maxwell 1986: 60-61), though it remains possible that there was some unrest on the frontier at the time to prompt military action. The



reason that the forts on the Antonine Wall are so much more closely spaced than those on Hadrian's Wall or, indeed, on almost any other Roman frontier, requires explanation, regardless of whether this represents the original plan or came about as the result of changes made during the construction process. It does imply a greater concern for border security, and the suggestion that the building of the Wall sparked a local hostile reaction is a potentially attractive explanation (Hanson and Maxwell 1986: 165; Hanson forthcoming b). Alternatively, it has been suggested that the density of military installations represents the end point of a development in frontier control which had started about 60 years earlier (Breeze 1982: 161-4).

There have long been problems understanding the chronology of the northern frontier in the mid-later second century, with disagreements concerning the length of occupation of the Wall and the number of phases involved. For a time a consensus appeared to have been reached on two phases of occupation with the end of the Antonine period in Scotland coming in c. AD 164 on the basis of the samian pottery and the latest dated stratified coin from the Wall (Hartley 1972; Haverfield 1899: 160-1; Hanson and Maxwell 1986: 137-51). However, Hodgson put forward a cogent case for dismissing the existence of a second Antonine phase, with the end of the occupation beginning by AD 158, the epigraphically attested date for the refurbishment of the curtain of Hadrian's Wall (Hodgson 1995; 2009; *RIB* I 1389). He noted that hardly any excavated sites have provided unequivocal evidence of a second Antonine occupation following a period of abandonment, and suggested that the minor structural changes attested need be no more than piecemeal alterations and repairs to predominantly timber buildings. He further argued that where two Antonine phases could be demonstrated, they reflected changes of garrison concomitant upon the necessary reassessment following the addition of further forts to the Wall, rather than indicating any later reoccupation. This interpretation of the dating evidence has been widely accepted (e.g. Breeze 2006: 167; Keppie 2009: 1136). However, the timescale for the process of abandonment seems uncomfortably lengthy, so that Hodgson is forced to postulate either a phased withdrawal or occasional use of certain sites as outposts of Hadrian's Wall. Furthermore, if this re-dating is then combined with a return to the concept of the Wall as a unitary design (above), then an alternative explanation must be found for the more persuasive structural indications of two phases of occupation, such as the rebuilding of the headquarters building and commanding officer's house at Mumrills, the abandonment of two barrack blocks at Old Kilpatrick or the rebuilding of the outpost fort at Strageath.

The identification of pottery with strong North African influences from various sites on the Wall (notably Mumrills, Croy Hill, Bar Hill, Bearsden, Duntocher and Old Kilpatrick) indicates the presence of troops, slaves or dependants who originated from or had served in that region (Swan 1999). The most likely historical context for their presence is the return of a task force previously withdrawn to assist in Pius' Mauretanian war that may have started in the late 140s and was certainly in progress in the 150s. Two soldiers from British units were discharged in North Africa in 152/3, one of the units involved being based at Bar Hill (Eck *et al.* 2016). There is currently no independent evidence to support the suggestion that the return of these troops was linked to a hiatus in Wall building and the decision to build annexes, which would imply a lengthy delay in the whole construction programme (above).

The reasons for the abandonment of the Wall are no less uncertain, particularly now that a link with the end of the reign of Pius in AD 161 appears less chronologically sustainable. There is evidence to suggest that the decision was both ordered and controlled, involving the deliberate demolition of forts



followed by careful tidying up, as attested by the infilling of wells at Old Kilpatrick and Bar Hill (Miller 1928: 23; Robertson *et al.* 1975: 14), the paucity of the material left behind (Breeze 2016: 375) and the careful removal and burial of some of the Distance Stones, perhaps reflecting some ritual acts (Keppie 1998: 51-52 and 67; Breeze and Ferris 2016).

Hodgson suggests that the withdrawal from Scotland was a reaction to local opposition that was greater than could be contained by the forces then available because of military demands elsewhere in Europe (Hodgson 1995: 39-43; 2009). It is suggested that the geographical focus of that opposition was south-west Scotland on the basis of a range of evidence: a relative lack of Roman material on Iron Age settlement sites (Wilson 2003: 113-14); the need for closer control reflected in the enhanced disposition of well-defended fortlets throughout the occupation (Symonds 2017: 81-90); and the continued hostile opposition suggested by the apparently disastrous fate of the fort at Birrens (Hanson and Maxwell 1986: 145), the latter further supported by the number of temporary camps in the area that appear to date to this period (Jones 2011: 123). However, alternative explanations for the density of fortlets in the area have been offered, including a need to economise on manpower and a requirement to ensure that nothing undermined the victorious campaign on behalf of the new emperor (Miller 1952: 212-35; Breeze 1976: 73-76); while the destruction of Birrens by hostile forces is disputed (Breeze 1977: 459) and the paucity of Roman material on rural sites can now be seen as part of a wider pattern (Breeze 2014b: 54-55).

The most recent analysis argues that the primary reason for the withdrawal was a shortage of manpower (Hanson and Breeze forthcoming). This had been stretched throughout the Antonine occupation, as indicated by the provision of a number of very small forts on the Antonine Wall, some with legionary garrisons. The final straw, however, may have been the dispatch of troops from all three British legions to Germany in AD 158 to assist with the expansion and complete reconfiguration of the frontier there.

There are slight hints of activity that may post-date the reign of Antoninus Pius. Famously, the latest dated stratified coin from the Wall is of Lucilla (AD 164-69) from the granary at Old Kilpatrick and there is a very small number of unstratified coin finds of Marcus and Commodus from other fort sites (Abdy 2002: 200, 206 and 211). There is also some evidence of the re-use of buildings for such different purposes that continuity of military occupation may be questioned. Thus, iron-working was attested in the dismantled latrine of the bathhouse at Carriden (Hunter 2009b: 228-29); a pottery kiln was inserted into the stokehole of the bathhouse at Bar Hill when it was no longer in use (Keppie 1985: 60 and 72-73; Swan 19:9, 426-27 and 456-57); and a kiln of uncertain purpose was inserted in to the northern end of one of the granaries at Balmuildy (Miller 1922: 27-8 and pl. XB).

However, the abandonment of the Wall and its rapid integration back into the indigenous settlement landscape is suggested by the record of a souterrain being constructed in the Wall ditch at Shirva (Welfare 1984: 314-16). It utilised Roman stonework, some of it inscribed, which probably come from the nearest fort at Auchendavy and its associated cemetery.

The protection of the Antonine Wall

The Antonine Wall was inscribed as a World Heritage Site in 2008, being added to the Frontiers of the Roman Empire World Heritage Site (Weeks, this volume). As part of the process the detailed protection



of the Wall through scheduling was reviewed, a new GIS for the frontier established and a *Map of the Antonine Wall* published (McKeague, this volume). The setting of the Antonine Wall in rural contexts is also protected by the buffer zones associated with the World Heritage Site.

Bibliography

- Abdy, R. 2002. A survey of the coin finds from the Antonine Wall. *Britannia* 33: 189-217.
- Bailey, G. B. 1992. Along and across the river Carron. *Calatria* 2: 49-84.
- Bailey, G.B. 1994. The provision of fort-annexes on the Antonine Wall. *Proceedings of the Society of Antiquaries of Scotland* 124: 299-314.
- Bailey, G.B. 1995. The Antonine frontier in Callendar Park, Falkirk: its form and structural sequence. *Proceedings of the Society of Antiquaries of Scotland* 125: 577-600.
- Bailey, G.B. 1996. Stream crossings on the Antonine Wall. *Proceedings of the Society of Antiquaries of Scotland* 126: 347-69.
- Bailey, G.B. 2010. An early Antonine fort at Mumrills. *Proceedings of the Society of Antiquaries of Scotland*, 140: 93-103.
- Bailey, G.B. forthcoming. *The Antonine Wall in Falkirk District: excavation & observation 1991-2017*. Falkirk.
- Bailey, G.B. and J. Cannel 1996. Excavations at Kinneil fortlet on the Antonine Wall, 1980-1. *Proceedings of the Society of Antiquaries of Scotland* 126: 303-346.
- Bibby, J.S. (ed.) 1991 *Land capability classification for Agriculture* (2nd edn). Aberdeen: Macaulay Institute.
- Breeze, D.J. 1974. Excavations at the Roman fortlet on the Antonine Wall at Watling Lodge. *Proceedings of the Society of Antiquaries of Scotland* 105: 166-175.
- Breeze, D.J. 1976. The abandonment of the Antonine Wall: its date and implications. *Scottish Archaeological Forum* 7: 67-80.
- Breeze, D.J. 1977. Review of *Birrens (Blatobulgium)* by A.S. Robertson and *Kastell Kunzing-Quintana* by H. Schonberger. *Britannia* 8: 451-60.
- Breeze, D.J. 1982. *The Northern Frontiers of Roman Britain*. London: Batsford.
- Breeze, D.J. 1983. The Roman forts at Ardoch, in A. O'Connor and D.V. Clarke (eds) *From the Stone Age to the 'Forty-five*. *Studies presented to R.B.K. Stevenson, Former Keeper National Museum of Antiquities of Scotland*: 224-36. Edinburgh: John Donald.
- Breeze, D.J. 1984. Demand and supply on the northern frontier, in R. Miket and C. Burgess (eds) *Between and beyond the Walls: essays on the prehistory and history of North Britain in honour of George Jobey*: 264-86. Edinburgh: John Donald.
- Breeze, D.J. 1985. Roman forces and native populations. *Proceedings of the Society of Antiquaries of Scotland* 115: 223-8.
- Breeze, D.J. 1993. Cavalry on frontiers, in D.J. Breeze and B. Dobson *Roman officers and frontiers*: 288-97. Stuttgart: Franz Steiner.
- Breeze, D.J. 2006. *The Antonine Wall*. Edinburgh: John Donald.
- Breeze, D.J. 2014a. The marking-out of Hadrian's Wall. *Archaeologia Aeliana* 5th series 43: 19-26.
- Breeze, D.J. 2014b. Envoi, in D.J. Breeze, *The Impact of Rome on the British Countryside*: 54-5. London: Royal Archaeological Institute.
- Breeze, D.J. 2016. *Bearsden. A Roman fort on the Antonine Wall*. Edinburgh: Society of Antiquaries of Scotland.
- Breeze, D.J. 2019. *Hadrian's Wall. A study in archaeological exploration and interpretation*. Oxford: Archaeopress.
- Breeze, D. J., J. Close-Brooks and J.N.G. Ritchie 1976. Soldiers' burials at Camelon, Stirlingshire, 1922 and 1975. *Britannia* 7: 73-95.
- Breeze, D.J. and B. Dobson 1976. *Hadrian's Wall*. London: Allen Lane.
- Breeze, D.J. and I. Ferris 2016. They think it's all over. The face of victory on the British frontier. *Journal of Conflict Archaeology* 11.1: 19-39.
- Breeze, D.J, R.H. Jones and I.A. Oltean (eds) 2015. *Understanding Roman frontiers: a celebration for Professor Bill Hanson*. Edinburgh: John Donald.
- Buchanan, M., D. Christison and J. Anderson 1905. Report on the Society's excavation of Rough Castle on the Antonine vallum. *Proceedings of the Society of Antiquaries of Scotland* 39 (1904-05): 442-99.



- Cowley, D.C. 2009. The Traprain environs in a regional perspective, in C. Haselgrove, *The Traprain Law environs project*: 205-23. Edinburgh: Society of Antiquaries of Scotland.
- Dickson, C. and J.H. Dickson 2016. The Plant Remains, in Breeze 2016: 223-80.
- Dunwell, A., G. Bailey, A. Leslie and A. Smith 2002. Some excavations on the line of the Antonine Wall, 1994-2001. *Proceedings of the Society of Antiquaries of Scotland* 132: 259-304.
- Dunwell, A. and I. Ralston 1995. Excavations at Inveravon on the Antonine Wall, 1991. *Proceedings of the Society of Antiquaries of Scotland* 125: 521-76.
- Eck, W., P. Holder and A. Pangerl 2016. Eine Konstitution aus dem Jahr 152 oder 153 für Niedermösische und Britannische Truppen, abgeordnet nach Mauretania Tingitana, mit einer Appendix von Paul Holder. *Zeitschrift für Papyrologie und Epigraphik* 199: 187-201.
- Fitzpatrick, A.P. 2016. Amphorae, in Breeze 2016, 171-76.
- Frere, S.S. and J.J. Wilkes 1989. Strageath. *Excavations within the Roman fort, 1973-86* (Britannia Monograph Series 9). London: Society for the Promotion of Roman Studies.
- Gillam, J.P. 1975. Possible changes in plan in the course of the construction of the Antonine Wall. *Scottish Archaeological Forum* 7: 51-56.
- Glasgow Archaeological Society (GAS) 1899. *The Antonine Wall Report*. Glasgow: Glasgow Archaeological Society
- Graafstal, E., D.J. Breeze, R.H. Jones and M.F.A. Symonds 2015. Sacred cows in the landscape: rethinking the planning of the Antonine Wall, in Breeze *et al.* 2015: 54-69.
- Hannon, N., D.J. Rohl and L. Wilson 2017. The Antonine Wall's distance-slabs: LiDAR as metric survey. *Journal of Roman Archaeology* 30: 447-68.
- Hanson, W.S. 1980. Agricola on the Forth-Clyde isthmus. *Scottish Archaeological Forum* 12: 55-68.
- Hanson, W.S. 1991. *Agricola and the conquest of the north* (2nd edn). London: Batsford.
- Hanson, W.S. 1996. Forest clearance and the Roman army. *Britannia* 27: 354-58.
- Hanson, W.S. 2007. *Elginhaugh: a Flavian fort and its annexe* (Britannia Monograph 23). London: Society for the Promotion of Roman Studies.
- Hanson, W.S. (ed.) 2009. *The army and frontiers of Rome. Papers offered to David Breeze on the occasion of his sixty-fifth birthday and his retirement from Historic Scotland* (Journal of Roman Archaeology Supplementary Series 74). Portsmouth, Rhode Island: Journal of Roman Archaeology.
- Hanson, W.S. forthcoming a. *Excavations outside the Roman fort on the Antonine Wall at Croy Hill, 1975-78*. Edinburgh: Scottish Archaeological Internet Reports.
- Hanson, W.S. forthcoming b. The design of the Antonine Wall. *Britannia* 51.
- Hanson, W.S. and Breeze, D.J. forthcoming. Julius Verus and the abandonment of Scotland. *Britannia* 51.
- Hanson, W.S. and G.S. Maxwell 1980. An Agricolan *praesidium* on the Forth-Clyde isthmus (Mollins, Strathclyde), *Britannia* 11: 43-49.
- Hanson, W.S. and G.S. Maxwell 1983. Minor enclosures on the Antonine Wall at Wilderness Plantation. *Britannia* 14: 227-43.
- Hanson, W.S. and G.S. Maxwell 1986. *Rome's North-West Frontier. The Antonine Wall* (revised edn). Edinburgh: Edinburgh University Press.
- Hartley, B.R. 1972. The Roman occupation of Scotland: the evidence of samian ware. *Britannia* 3: 1-55.
- Hartley, K.R. forthcoming The mortaria, in Hanson forthcoming a.
- Hassall, M. 1983 The Building of the Antonine Wall. *Britannia* 14: 262-4.
- Haverfield, F. 1899 Appendix 1. In *The Antonine Wall Report*: 153-68. Glasgow: Glasgow Archaeological Society.
- Hodgson, N. 1995. Were there two Antonine occupations of Scotland? *Britannia* 26: 29-49.
- Hodgson, N. 2009. The abandonment of Antonine Scotland: its date and causes, in Hanson 2009: 185-93.
- Hunter, F. 2007. Artefacts, regions and identities in the northern British Iron Age, in C. Haselgrove and T. Moore (eds) *The later Iron Age in Britain and beyond*: 286-96. Oxford: Oxbow.
- Hunter, F. 2009a. Traprain Law and the Roman world, in Hanson 2009: 225-240.
- Hunter, F. 2009b. Roman Britain in 2008. 2. Scotland. *Britannia* 40: 225-31.
- Hunter, F. 2012. Roman Britain in 2011. 2. Scotland. *Britannia* 43: 283-89.



- Hunter, F. 2019. Roman Britain in 2018. 2. Scotland. *Britannia* 50: 412-15.
- Jones, R.E., A. Leslie and P. Johnson 2006. Recent geophysical surveys at Roman forts in Central Scotland, in R.E. Jones and L. Sharpe (eds) *Going Over Old Ground. Perspectives on archaeological geophysical and geochemical survey in Scotland* (British Archaeological Reports 416): 8-28. Oxford: Archaeopress.
- Jones, R.E. and A. Leslie 2015. The contribution of geophysical surveys to the understanding of Roman frontiers, in Breeze *et al.* 2015: 312-27.
- Jones, R.H. 2005. Temporary camps on the Antonine Wall, in Zs. Visy (ed.) *Limes XIX. Proceedings of the XIXth International Congress of Roman Frontier Studies*: 551-60. Pécs: University of Pécs.
- Jones, R.H. 2011. *Roman Camps in Scotland*. Edinburgh: Society of Antiquaries of Scotland.
- Keppie, L.J.F. 1974. The building of the Antonine Wall: archaeological and epigraphic evidence. *Proceedings of the Society of Antiquaries of Scotland* 105 (1973-74): 151-65.
- Keppie, L.J.F. 1976. Some rescue excavations on the line of the Antonine Wall, 1973-76. *Proceedings of the Society of Antiquaries of Scotland* 107 (1975-76): 61-80.
- Keppie, L.J.F. 1979. *Roman Distance Slabs from the Antonine Wall: a brief guide*. Glasgow: Hunterian Museum.
- Keppie, L.J.F. 1980. The Roman fort(s) on Castlehill, Bearsden, *Glasgow Archaeological Journal* 7: 80-84.
- Keppie L.J.F. 1985. Excavations at the Roman fort on Bar Hill, 1978-82. *Glasgow Archaeological Journal* 12: 49-81.
- Keppie, L.J.F. 1995. Excavation at the Roman fort of Westerwood on the Antonine Wall, 1985-88. *Glasgow Archaeological Journal* 19 (1994-95): 83-99.
- Keppie, L.J.F. 1998. *Roman Inscribed and Sculptured Stones in the Hunterian Museum University of Glasgow* (Britannia Monograph Series 13). London: Society for the Promotion of Roman Studies.
- Keppie, L.J.F. 2004. A Roman bath-house at Duntocher on the Antonine Wall. *Britannia* 35: 179-224.
- Keppie, L.J.F. 2009. The garrison of the Antonine Wall: endangered species or disappearing asset?, in A. Morillo, N. Hanel and E. Martin (eds). *Limes XX. XXth International Congress of Roman Frontier Studies*: 1135-45. Madrid: Polifemo.
- Keppie, L.J.F. and D.J. Breeze 1981. Some excavations on the line of the Antonine Wall, 1957-80. *Proceedings of the Society of Antiquaries of Scotland* 111: 229-47.
- Keppie, L.J.F. and J.F. Murray 1981. A Roman hypocausted building at Falkirk, *Proceedings of the Society of Antiquaries of Scotland* 111: 248-62.
- Keppie, L.J.F. and J.J. Walker 1981. Fortlets on the Antonine Wall at Seabegs Wood, Kinneil and Cleddans. *Britannia* 12: 143-62.
- Kilpatrick, M.C. 2016. ARO22: *Outside the walls: excavations within the annexe at Camelon Roman fort*. Archaeology Reports Online http://archaeologyreportsonline.com/PDF/ARO22_Redbrae_Road.pdf
- Knights, B., C.A. Dickson, J.H. Dickson and D.J. Breeze 1983. Evidence concerning the Roman military diet at Bearsden, Scotland, in the 2nd century AD. *Journal of Archaeological Science* 10: 139-52.
- Leslie, A., G. MacGregor and P.J. Duffy 2007. Excavation of defensive ditches at Balmuildy Roman fort, Glasgow, 1999. *Scottish Archaeological Journal* 29.2: 113-54.
- Macdonald, G. 1915. Some recent discoveries on the line of the Antonine Wall. *Proceedings of the Society of Antiquaries of Scotland* 49 (1914-15): 93-138.
- Macdonald, G. 1934. *The Roman Wall in Scotland*. Oxford: Oxford University Press.
- Macdonald, G. and A.O. Curle 1929. The Roman fort at Mumrills, near Falkirk. *Proceedings of the Society of Antiquaries of Scotland* 63 (1928-29): 396-575.
- Macinnes, L. 1984. Brochs and the Roman occupation of lowland Scotland. *Proceedings of the Society of Antiquaries of Scotland* 114: 235-249.
- MacIvor, I., M.C. Thomas and D.J. Breeze 1980. Excavations on the Antonine Wall fort of Rough Castle, Stirlingshire, 1957-61. *Proceedings of the Society of Antiquaries of Scotland* 110 (1978-80): 230-85.
- Máté, I.D. 1995. Excavations of an enclosure system at Rough Castle, Falkirk. *Proceedings of the Society of Antiquaries of Scotland* 125: 483-97.



- Maxfield, V.A. 1980. The Flavian fort at Camelon. *Scottish Archaeological Forum* 12: 69-78.
- Maxwell, G.S. 1989. *The Romans in Scotland*. Edinburgh: Mercat Press.
- Miller, J and S. Ramsay 2007. Archaeobotanical report, in Leslie, *et al.* 2007: 113-154.
- Miller, S.N. 1922. *The Roman fort at Balmuildy*. Glasgow: Maclehose, Jackson.
- Miller, S.N. 1928. *The Roman fort at Old Kilpatrick*. Glasgow: Jackson and Wylie.
- Miller, S.N. 1952. An historical survey, in J. Clarke, J.M. Davidson, A.S. Robertson and J.K. St. Joseph (eds) *The Roman Occupation of South-Western Scotland*: 212-35. Glasgow: Maclehose.
- Newall, F. 1998. The Roman fort on Whitemoss Farm, Bishopton, Renfrewshire. Part 2: Whitemoss and the Antonine Wall: the place of Whitemoss in Roman Scotland. *Scottish Naturalist* 10: 13-43.
- Poulter, J. 2009. *Surveying Roman Military landscapes across Northern Britain: the planning of Dere Street, Hadrian's Wall and the Vallum, and the Antonine Wall in Scotland* (British Archaeological Reports British Series 492). Oxford: Archaeopress.
- Poulter, J. 2018. New discoveries relating to the planning of the Antonine Wall in Scotland. *Britannia* 49: 113-146.
- Price, J. 2002. Broken bottles and quartz sand: glass production in Yorkshire and the north in the Roman period, in P. Wilson and J. Price (eds) *Aspects of industry in Roman Yorkshire and the North*: 81-99. Oxford: Oxbow.
- Price, J. 2016. Glass, in Breeze 2016: 185-193.
- Proudfoot, E.V.W. 1978. Camelon native site. *Proceedings of the Society of Antiquaries of Scotland* 109 (1977-78): 113-28.
- Ramsay, S. and J.H. Dickson 1997. Vegetation history of central Scotland. *Botanical Journal of Scotland* 49: 141-150.
- RCAHMS 1963. *Stirlingshire: an inventory of the ancient monuments*. Edinburgh: Her Majesty's Stationery Office.
- RCAHMS 1978. *Lanarkshire: an inventory of the prehistoric and Roman monuments*. Edinburgh: Royal Commission on the Ancient and Historical Monuments of Scotland.
- Robertson, A.S. 1957. *An Antonine Fort, Golden Hill, Duntocher*. Edinburgh: Oliver and Boyd.
- Robertson, A.S. 1974. River crossings on the Antonine Wall, in E. Birley, B. Dobson and M. Jarrett (eds) *Roman Frontier Studies 1969*: 94-101. Cardiff: University of Wales Press.
- Robertson, A.S. 1960. *The Antonine Wall. A handbook to the Roman Wall between Forth and Clyde and a guide to its surviving remains*. Glasgow: Glasgow Archaeological Society.
- Robertson, A.S. 2015. *The Antonine Wall. A handbook to Scotland's Roman frontier* (6th edn revised and edited by L. Keppie). Glasgow: Glasgow Archaeological Society.
- Robertson, A.S., M. Scott and L.J.F. Keppie 1975. *Bar Hill: a Roman fort and its finds* (British Archaeological Reports, British Series 16). Oxford: British Archaeological Reports.
- Salway, P. 1965. *The Frontier People of Roman Britain*. Cambridge: Cambridge University Press.
- Sommer, C.S. 2006. Military vici in Roman Britain revisited, in R.J.A. Wilson (ed.) *Romanitas: Essays on Roman archaeology in honour of Sheppard Frere on the occasion of his ninetieth birthday*: 95-146. Oxford: Oxbow.
- Steer, K.A. 1957. The nature and purpose of the expansions on the Antonine Wall. *Proceedings of the Society of Antiquaries of Scotland* 90 (1956-57): 161-69.
- Steer, K.A. 1961. Excavations at Mumrills Roman fort, 1958-60. *Proceedings of the Society of Antiquaries of Scotland* 94 (1960-61): 86-132.
- Swan, V.G. 1999. The twentieth legion and the history of the Antonine Wall reconsidered. *Proceedings of the Society of Antiquaries of Scotland* 129: 399-480.
- Swan, V.G. 2009. *Ethnicity, conquest and recruitment: two case studies from the Northern military provinces*. Portsmouth, Rhode Island: Journal of Roman Archaeology Supplementary Series 72.
- Symonds, M. 2017. *Protecting the Empire. Fortlets, frontiers and the quest for post-conquest security*. Cambridge: Cambridge University Press.
- Tatton Brown, T.W.T. 1980. Camelon, Arthur's O'on, and the main supply base for the Antonine Wall. *Britannia* 11: 340-3.
- Tipping, R. 1994. The form and fate of Scottish woodlands. *Proceedings of the Society of Antiquaries of Scotland* 124: 1-54.
- Tipping, R. and E. Tisdall 2005. The landscape context of the Antonine Wall: a review of



- the literature. *Proceedings of the Society of Antiquaries of Scotland* 135: 443-470.
- Welfare, H. 1984. The southern souterrains, in R. Miket and C. Burgess (eds) *Between and beyond the Walls. Essays on the prehistory and history of North Britain in honour of George Jobey*: 305-23. Edinburgh: John Donald.
- Welfare, H. 2000. Causeways at milecastles across the ditch of Hadrian's Wall. *Archaeologia Aeliana* 5th series 28: 13-25.
- Wilkes, J.J. 1974. The Antonine Wall fortlet at Wilderness Plantation, Lanarkshire. *Glasgow Archaeological Journal* 3: 51-65.
- Wilson, A. 2003. Roman and native in Dumfriesshire. *Trans Dumfriesshire Galloway Natur. Hist. Antiq. Soc.* 77: 103-60.
- Woolliscroft, D.J. 2008. Excavations at Garnhall on the line of the Antonine Wall. *Proceedings of the Society of Antiquaries of Scotland* 138: 129-76.

