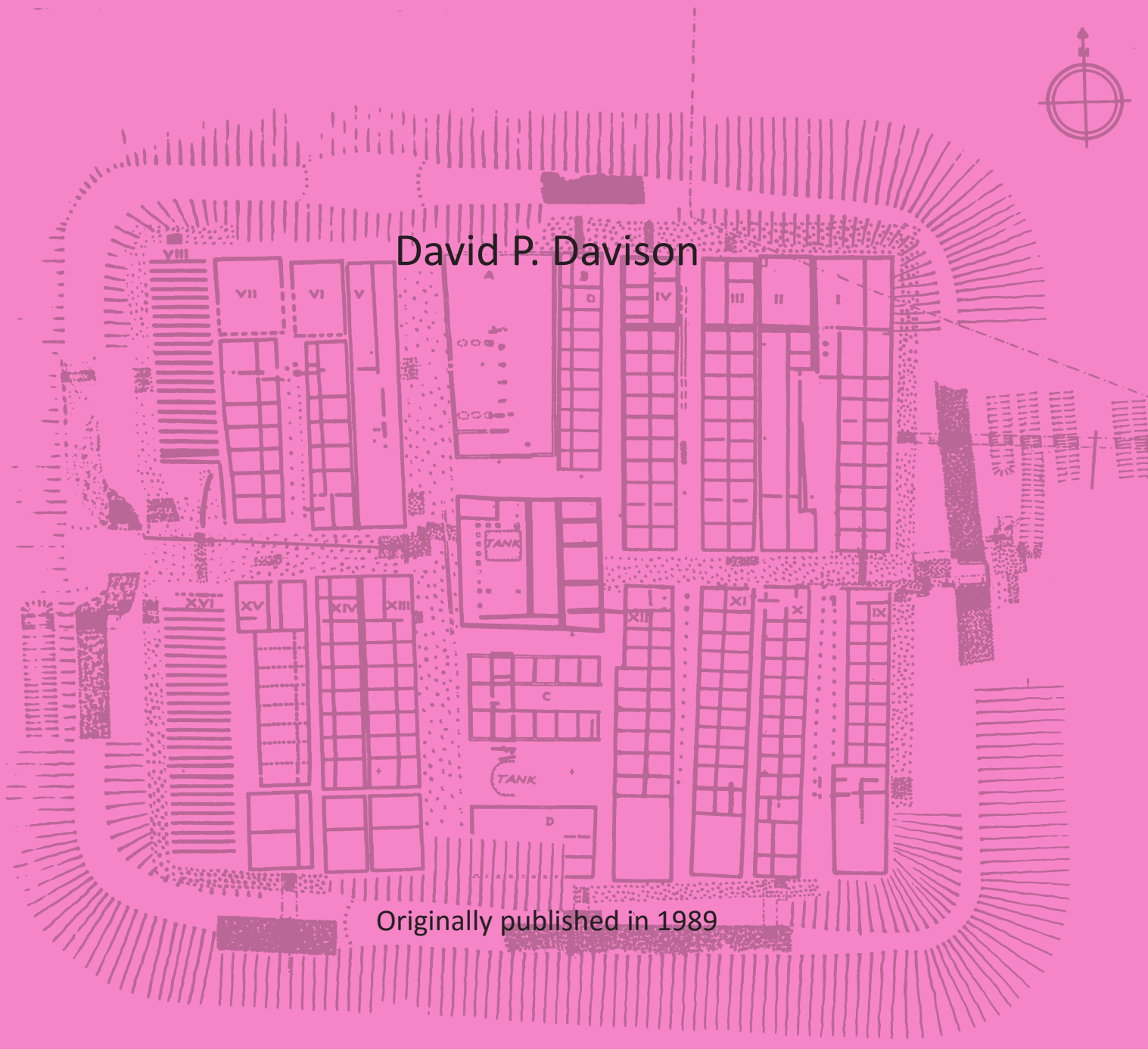
The Barracks of the Roman Army from the 1st to 3rd Centuries A.D.

A comparative study of the barracks from fortresses, forts and fortlets with an analysis of building types and construction, stabling and garrisons

David P. Davison



Originally published in 1989

To my parents

CONTENTS

VOLUME I

Acknowledgements xiv

Chapter 1 The Evidence 1

Introduction: Roman military barracks 1

Statistical Analysis 2

The Buildings 4
- Conformation 4
- Overall Dimensions 6
- Areas 8

Officers' and Men's Quarters 9
- Officers' Quarters 9
- Men's Quarters 9
- Length Proportions 10
- Area Proportions 11

The *Contubernia* 12
- *Contubernium* Totals 12
- *Contubernium* Areas 13
- Total Living Space 14
- *Papilio/Arma* Proportions 14

Conclusions 15

Chapter 2 Legionary Barracks 17

Introduction 17

The Cohort Barracks 18
- Building Types 18
- Veranda and Porticus 18
- Rear Wall Construction 20
- Construction Methods 20
- Overall Dimensions 21

The Centurions' Quarters 24
- Conformation 24
- Dimensions 26

The Men's Quarters 28
- Dimensions 28

Relationship between Centurions' and Men's Quarters 30
- Lengths 30
- Areas 32

The *Contubernia* of the Cohort Barracks 32
- Special *Contubernia* 33
- *Contubernium* Totals 35
- *Contubernium* Areas 37
- Total Living Space 38
- Living Space per Man 39
- *Papilio / Arma* 39
- *Papilio / Arma* / Veranda 39

Conclusions 40
- The Augustan/Tiberian Period 40
- General 41

The Cohort-Blocks 42
- Fortress Layout 42
- Configuration 45
- Dimensions 47
- Relationship with Fortress Areas 48
- Relationship with Fortress Lengths 49
- Relationship with Fortress Widths 49
- Discrepancies 50
- Cohort and Barrack Widths 51

The First Cohort 52
- Conclusions 56

Concluding Remarks 58

Albano 59

The Non-Cohort Barracks 60
- Inchtuthil 60
- Chester 61
- Exeter 61
- Longthorpe 61
- Nijmegen 62
- Vetera I 62
- Haltern 63
- Neuss 64
- Bonn 65
- Vindonissa 66
- Conclusion 71

Chapter 3 Auxiliary Barracks 72

General Description 72
- Building Types 72
- Veranda 74
- Rear Wall Construction 77
- Construction Methods 77
- Overall Dimensions 79

The Officers' Quarters 82
- Conformation 82
- Dimensions 83
- Seniority 86

The Men's Quarters 89
- Dimensions 89

Relationship between Officers' and Men's Quarters 91
- Lengths 91
- Areas 92

The *Contubernia* 94
- Special *Contubernia* 94
- *Contubernium* Totals 96
- *Contubernium* Areas 97
- Total Living Space 99
- Living Space per Man 101
- *Papilio / Arma* 101
- *Papilio / Arma* / Veranda 102

The Barracks in their Forts 103
- Areas 103
- Lengths 104
- Topography 105
- Fort Layouts 106
- Anomalous Types 107
- Barrack Group Configurations 108
- Dimensions 109
- Officers' Quarters 110

Continuity 111

Concluding Remarks 112

Chapter 4 Fortlet Barracks 116

Introduction 116

General Description 117
- Barrack Types 117
- Veranda 118
- Rear Wall Construction 118
- Construction Methods 118
- Dimensions 119

The Officers' Quarters 121
- Dimensions 123

The Men's Quarters 123

Relationship between Officers' and Men's Quarters 124

The *Contubernia* 124
- Special *Contubernia* 124
- *Contubernium* Areas 125
- *Contubernium* Totals 126
- Total Living Space 127
- Living Space per Man 127
- *Papilio / Arma* 127
- *Papilio / Arma* / Veranda 128

The Barracks in their Fortlets 128
- Areas 128
- Lengths 128
- Topography 128
- Layout Types 129
- Dimensions 129
- Officers' Quarters 130

Conclusion 130

Chapter 5 Stables, Stores and Horses 131

Introduction 131
- The Problems 131
- Horse Numbers 133

Characteristics of Stables 136
- Configuration and Dimensions 136
- Internal Features 137
- Pictorial Representations 141
- Roman Civilian Stables 141
- Conclusion 143

The Horses of the Roman Army 143
- The Faunal Remains 143
- Sculptural Evidence 145
- Literary Evidence 147

Stables, Stores, Sheds and Workshops 148
- Conformation 148
- Overall Dimensions 149
- Conclusions 150
- The Legionary Fortresses 151

The Probable Stables 151
- Building Type O 151
- Building Type R 152
- Building Type T 153
- Building Type S 154
- Building Type H 154
- Building Type G 155
- Building Type J 156
- The Remainder 158
- Conclusions 160

Discussion 161

Chapter 6 Garrisons 164

Introduction 164

Theoretical Unit Strengths and their Implications 166

Problems 168
- Numbers 168

- Vexillations and Outposting 169
- Changes of Garrison 170
- Builders and Intended Occupants 172
- *Contubernia* and Special *Contubernia* 172

Distinctions between Barracks in Auxiliary Forts 174
1 - Legionary / Auxiliary
Previous Suggestions 174
- Size 175
- Officers' Quarters 176
- *Contubernium* Totals 177
- *Contubernium* Size 178
- Living Space per Man 178
- Conformation 179
- Construction 180

Further Suggestions 180
- Men's Quarters 180
- Officers' / Men's Quarters 181
- *Contubernium* Proportions 181
- Conclusion 182

Distinctions betwen Barracks in Auxiliary Forts 182
2 - Infantry / Cavalry / Mixed Units
Previous Suggestions 182
- Building Types 182
- Size 183
- *Contubernium* Totals 186
- *Contubernium* Size 187
- Living Space per Man 188
- *Contubernium* Proportions 188

Further Suggestions 189
- Officers' Quarters 189
- Men's Quarters 190
- Officers' / Men's Quarters 190

Contrasting Barracks 191
- Fendoch 191
- Strageath 192
- Elginhaugh 193
- Caerhun 194
- Echzell 195
- Drobeta 195
- Conclusion 197

More Problem Garrisons 197
- Bearsden 197
- Birrens 198
- Hod Hill 199
- Dover 200
- Valkenburg Castellum 1 201
- Hofheim (Steinkastell) Period I 203
- Rottweil Kästell III 203
- Oberstimm 204
- Slăveni 204

Type-Sites 205
- *Cohors Quingenaria Peditata* 205
- *Cohors Milliaria Peditata* 205
- *Cohors Quingenaria Equitata* 206
- *Cohors Milliaria Equitata* 206
- *Ala Quingenaria* 206
- *Ala Milliaria* 207
- Discussion 207

Conclusion 207

Chapter 7 Construction and Amenity 209

Standard Units of Measurement 209
- Introduction 209
- Fortresses 209
- Forts 211
- Fortlets 212
- Conclusion 213

Construction 213
- The Builders 213
- Tents 214
- Site Preparation 215

Construction Techniques 216
- Post-Pit 216
- Post-Trench 216
- Sill Beam 218
- Stone Sill 218
- Wattle, Daub and Plaster 220
- Other Methods 222
- Variety 222
- Centralised Organisation and Supply 225

Appointments 225
- Roofing 225
- Veranda 227
- Flooring 228
- Doors 229
- Windows 230

Amenities 230
- Hearths 230
- Latrines and Washing Facilities 233
- Storage Pits and Rubbish Pits 237
- Rebuilding 238

Furnishings 238
- Furniture 238
- Wall Painting 239

Barrack Activities 240
- Cooking and Eating 240
- Further Activities in the *contubernia* 244

Conclusion 245

Chapter 8 Conclusions 246

Introduction 246

Results 246
- Fortresses 246
- Forts 248
- Fortlets 250
- Horses and Stables 251
- Garrisons 252
- Construction and Amenity 254

VOLUME II

Location Maps 1 - 6

1 *Britannia* 257
2 The Antonine Wall 258
3 Hadrian's Wall 258
4 Rhine and Upper Danube 259
5 Lower Danube 260
6 Italy and North Africa 261

List of Sites included in Tables 262

Figures A - E

A Building Types 267
B Rear Wall Configuration Types 271
C First *Contubernium* Types 272
D End *Contubernium* Types 273
E Fort Layout Types 274
F Barrack Group Configuration Types 275

Figures 1 - 123

Chapter 1 The Evidence

1 Building Types: All Buildings (Total Sample) 276
1.1 Building Types: Barracks (Amended Sample) 277
1.2 Building Types: Barracks - Augustan/Tiberian 277
1.3 Building Types: Barracks - Claudian/Neronian 277
1.4 Building Types: Barracks - Flavian 278
1.5 Building Types: Barracks - Trajanic/Hadrianic 279
1.6 Building Types: Barracks - Antonine 279
1.7 Building Types: Barracks - Severan 280
1.8 Building Types: Barracks - Third Century 280

2	Overall Dimensions	281
2.1	Overall Dimensions - Augustan/Tiberian	283
2.2	Overall Dimensions - Claudian/Neronian	284
2.3	Overall Dimensions - Flavian	285
2.4	Overall Dimensions - Trajanic/Hadrianic	286
2.5	Overall Dimensions - Antonine	287
2.6	Overall Dimensions - Severan	288
2.7	Overall Dimensions - Third Century	289
3	Barrack Proportions	290
4	Barracks and Ancillary Buildings: Areas	291
4.1	Areas - Augustan/Tiberian	292
4.2	Areas - Claudian/Neronian	292
4.3	Areas - Flavian	293
4.4	Areas - Trajanic/Hadrianic	294
4.5	Areas - Antonine	295
4.6	Areas - Severan	296
4.7	Areas - Third Century	296
5	Officers' Quarters: Areas	297
5.1	Officers' Quarters: Areas - Augustan/Tiberian	298
5.2	Officers' Quarters: Areas - Claudian/Neronian	298
5.3	Officers' Quarters: Areas - Flavian	299
5.4	Officers' Quarters: Areas - Trajanic/Hadrianic	300
5.5	Officers' Quarters: Areas - Antonine	301
5.6	Officers' Quarters: Areas - Severan	302
5.7	Officers' Quarters: Areas - Third Century	302
6	Men's Quarters: Areas	303
6.1	Men's Quarters: Areas - Augustan/Tiberian	304
6.2	Men's Quarters: Areas - Claudian/Neronian	304
6.3	Men's Quarters: Areas - Flavian	305
6.4	Men's Quarters: Areas - Trajanic/Hadrianic	306
6.5	Men's Quarters: Areas - Antonine	307
6.6	Men's Quarters: Areas - Severan	308
6.7	Men's Quarters: Areas - Third Century	308
7	Length Proportions: Officers' and Men's Quarters	309
7.1	Length Proportions - Augustan/Tiberian	310
7.2	Length Proportions - Claudian/Neronian	310
7.3	Length Proportions - Flavian	311
7.4	Length Proportions - Trajanic/Hadrianic	312
7.5	Length Proportions - Antonine	313
7.6	Length Proportions - Severan	314
7.7	Length Proportions - Third Century	314
8	Area Proportions: Officers' and Men's Quarters	315
8.1	Area Proportions - Augustan/Tiberian	316
8.2	Area Proportions - Claudian/Neronian	316
8.3	Area Proportions - Flavian	317
8.4	Area Proportions - Trajanic/Hadrianic	318
8.5	Area Proportions - Antonine	319
8.6	Area Proportions - Severan	320
8.7	Area Proportions - Third Century	320
9	*Contubernium* Totals	321
9.1	*Contubernium* Totals - Augustan/Tiberian	322
9.2	*Contubernium* Totals - Claudian/Neronian	322
9.3	*Contubernium* Totals - Flavian	323
9.4	*Contubernium* Totals - Trajanic/Hadrianic	324
9.5	*Contubernium* Totals - Antonine	325
9.6	*Contubernium* Totals - Severan	325
9.7	*Contubernium* Totals - Third Century	325

10 *Contubernium* Areas 326
10.1 *Contubernium* Areas - Augustan/Tiberian 327
10.2 *Contubernium* Areas - Claudian/Neronian 327
10.3 *Contubernium* Areas - Flavian 328
10.4 *Contubernium* Areas - Trajanic/Hadrianic 329
10.5 *Contubernium* Areas - Antonine 330
10.6 *Contubernium* Areas - Severan 331
10.7 *Contubernium* Areas - Third Century 331
11 Total Living Space (Men's Quarters) 332
11.1 Total Living Space - Augustan/Tiberian 333
11.2 Total Living Space - Claudian/Neronian 333
11.3 Total Living Space - Flavian 334
11.4 Total Living Space - Trajanic/Hadrianic 335
11.5 Total Living Space - Antonine 336
11.6 Total Living Space - Severan 337
11.7 Total Living Space - Third Century 337
12 *Contubernium* Proportions: *Papilio/Arma* 338
12.1 *Contubernium* Proportions - Augustan/Tiberian 339
12.2 *Contubernium* Proportions - Claudian/Neronian 339
12.3 *Contubernium* Proportions - Flavian 340
12.4 *Contubernium* Proportions - Trajanic/Hadrianic 341
12.5 *Contubernium* Proportions - Antonine 342
12.6 *Contubernium* Proportions - Severan 343
12.7 *Contubernium* Proportions - Third Century 343

Chapter 2 Legionary Barracks

13 Men's Quarters and Verandas: Comparative Widths 344
14 Rear Wall Construction 345
15 Construction Methods 346
16 Barrack Lengths 347
17 Barracks and Fortresses: Comparative Lengths 348
18 Centurions' Quarters: Integral and Non-integral 349
19 Centurions' Quarters: Dimensions 350
20 Men's Quarters: Dimensions 351
21 Centurions' Quarters and Barracks: Comparative Lengths 352
22 Centurions' and Men's Quarters: Comparative Lengths 353
23 Centurions' and Men's Quarters: Comparative Areas 354
24 Special First *Contubernia*: Types 355
25 Special End *Contubernia*: Types 355
26 Special First and Standard *Contubernia*: Comparative Areas 356
27 Special End and Standard *Contubernia*: Comparative Areas 357
28 *Contubernium* Totals and Barrack Lengths 358
29 *Contubernium* Totals and Men's Quarters' Lengths 359
30 *Contubernium* Spacing 360
31 *Contubernium* Living Space (Timber/Stone) 361
32 *Contubernium* Living Space per man 362
33 *Papilio/Arma*: Comparative Areas 363
34 *Papilio/Arma*/Veranda: Comparative Proportions 364
35 *Papilio/Arma*/Veranda: Comparative Proportions (periods) 365
36 Cohort-Blocks: Barrack Pairing 366
37 Cohort-Blocks: Dimensions 367
38 Cohort-Blocks: Proportions 368
39 Cohort-Blocks and Fortresses: Comparative Areas 369
40 Cohort-Blocks and Fortresses: Comparative Lengths 370
41 Cohort-Blocks and Fortresses: Comparative Widths 371

42 Cohort-Blocks and Barracks: Comparative Widths 372
43 Cohort-Blocks and Streets: Comparative Widths 373

Chapter 3 Auxiliary Barracks

44 Building Types: Barracks 374
45 Barrack Porticus: Presence and Absence 375
46 Barrack Porticus (Building Type A) 375
47 Men's Quarters and Veranda Space (Type A): Comparative Widths 376
48 Building Type A: Comparative Rooflines 377
49 Rear Wall Construction 378
50 Construction Methods 379
51 Barrack Lengths 380
52 Officers' Quarters: Integral and Non-integral 381
53 Officers' Quarters: Dimensions 382
54 Officers' Quarters: Areas according to different Building Types 383
55 Men's Quarters: Dimensions 384
56 Men's Quarters: Areas according to different Building Types 385
57 Officers' and Men's Quarters: Comparative Lengths 386
58 Officers' and Men's Quarters: Comparative Areas 387
59 Special First *Contubernia*: Types 388
60 Special First and Standard *Contubernia*: Comparative Areas 389
61 Special End *Contubernia*: Types 390
62 Special End and Standard *Contubernia*: Comparative Areas 391
63 *Contubernium* Totals and Barrack Lengths 392
64 *Contubernium* Totals and Men's Quarters' Lengths 393
65 *Contubernium* Breadths and Men's Quarters' Lengths: Comparison 394
66 *Contubernium* Spacing 395
67 *Contubernium* Living Space (Timber/Stone) 396
68 *Papilio/Arma*: Comparative Areas 397
69 *Papilio/Arma*: Comparative Proportions (Building Types A and B) 398
70 *Papilio/Arma*/Veranda: Comparative Proportions 399
71 *Contubernium*/Veranda: Proportions of Building Width 400
72 Barracks and Forts: Comparative Areas 401
73 Barracks (*per strigas*) and Forts: Comparative Lengths 402
74 Barrack (*per scamna*) Lengths and Fort Widths: Comparison 403
75 Fort Layout Types 404
76 Barrack Orientation 405
77 Barrack-Group Configurations 406
78 Three-Barrack Groups: Dimensions 407
79 Three-Barrack Groups: Areas 408
80 Barrack Pairs: Dimensions 409
81 Barrack Pairs: Areas 410
82 Barrack Pair Width / Distances between Quarters: Comparison 411

Chapter 4 Fortlets

83 Men's Quarters and Veranda Space: Comparative Widths 412
84 Barrack Lengths 413
85 Projected Centurial Barracks: Dimensions 414
86 Officers' Quarters: Dimensions 415
87 Men's Quarters: Dimensions 415
88 *Contubernium* Totals and Men's Quarters Lengths 416
89 *Contubernium* Spacing 417
90 *Papilio/Arma*: Comparative Areas 418

91 *Papilio/Arma*/Veranda: Comparative Proportions 419
92 Barracks and Fortlets: Comparative Areas 420
93 Barracks and Fortlets: Comparative Lengths 421
94 Building Pairs: Dimensions 422
95 Widths of Building Pairs / Distances between Quarters: Comparison 423

Chapter 5 Stables, Stores and Horses

96 Building Types 424
97 Construction Methods 425
98 Stables: Dimensions 426
99 Stables: Areas 427
100 Stables: Dimensions of Internal Divisions 428

Chapter 6 Garrisons

101 Attested Garrisons: Barrack Lengths 429
102 Attested Garrisons: *Contubernium* Totals 430
103 Legionary Barracks: Living Space per Man 431
104 Attested Garrisons: Living Space per Man 432
105 Attested Garrisons: Barrack Building Types 433
106 Attested Garrisons: Fort Layout Types 434
107 Attested Garrisons: *Contubernium* Living Space 435
108 Attested Garrisons: *Contubernium* Proportions 436
109 Attested Garrisons: Areas of Officers' Quarters 437
110 Attested Garrisons: Areas of Men's Quarters 438
111 Attested Garrisons: Total Living Space per Barrack 439
112 Attested Garrisons: Barrack Length Proportions 440
113 *Viae Sagulares*: Widths 441
114 *Intervallum* Space: Widths 441
115 *Viae Praetoriae*: Widths 442
116 *Viae Principales*: Widths 442
117 *Viae Decumanae*: Widths 443
118 *Portae Praetoriae*: Widths 443
119 *Portae Principales*: Widths 444
120 *Portae Decumanae*: Widths 444

Chapter 7 Construction and Amenity

121 *Contubernium* Width into Centurion's Quarters Length (Fortresses) 445
122 *Contubernium* Width into Officers' Quarters Length (Forts) 446
123 Roof Elevations 447

Plans 1 - 25

1 Neuss - *Novaesium* 449
2 Dormagen 451
3 Krefeld-Gellep Period II 453
4 Krefeld-Gellep Period III 454
5 Krefeld-Gellep Period IV Phases a and b 455
6 Fendoch 456
7 Strageath Flavian 457
8 Strageath Antonine I 458

9	Strageath Antonine II	459
10	Elginhaugh	460
11	Caerhun	461
12	Echzell	462
13	Drobeta	463
14	Bearsden	464
15	Birrens	465
16	Hod Hill	466
17	Dover *Classis Britannica* Fort II	467
18	Valkenburg Castellum 1	468
19	Hofheim Steinkastell I	469
20	Rottweil Kastell III	470
21	Oberstimm	471
22	Slăveni	472
23	Gelligaer II	473
24	Künzing	474
25	Chesters	475

Tables A - G

A	Barracks and Stables	476
B	Qualities of the good horse	477
C	Distinctions between different breeds of horse	478
D	Characteristics of different barbarian cavalry traditions	480
E	Stables without internal subdivisions: internal widths	481
F	Theoretical space allowance per horse	482
G	Building Inscriptions - *Britannia*	484

Bibliography 485

Ancient Authors 485
Modern Literature 489

VOLUME III

Introduction to the Tables 563

Abbreviations 564

Tables I - XII Fortresses

I	History	565
II	Fortress Dimensions	570
III	Barracks and Ancillary Buildings	574
IV	Description	582
V	Lengths	592
VI	Widths	599
VII	*Contubernia* / Rooms	608
VIII	Special *Contubernia*	616
IX	Areas	619
X	Proportions	627

XI Cohort-Blocks 635
XII Roads and Gates 639

Tables XIII - XXIV Forts

XIII History 643
XIV Fort Dimensions 666
XV Barracks and Ancillary Buildings 683
XVI Description 709
XVII Lengths 738
XVIII Widths 758
XIX *Contubernia* / Rooms 783
XX Special *Contubernia* 802
XXI Areas 806
XXII Proportions 830
XXIII Barrack Distribution 847
XXIV Roads and Gates 860

Tables XXV - XXXVI Fortlets

XXV History 873
XXVI Fortlet Dimensions 877
XXVII Barracks and Ancillary Buildings 881
XXVIII Description 885
XXIX Lengths 890
XXX Widths 894
XXXI *Contubernia* / Rooms 898
XXXII Special *Contubernia* 901
XXXIII Areas 903
XXXIV Proportions 907
XXXV Barrack Distribution 910
XXXVI Roads and Gates 912

ACKNOWLEDGEMENTS

This study is substantially my 1987 Oxford D.Phil thesis. I am very grateful to my examiners, Professor B. W. Cunliffe and M. W. C. Hassall, for their helpful comments.

I should like to thank the following archaeologists who have given me so freely of their time, ideas and often of their unpublished material:

Dr D. J. Breeze, Edinburgh
Dr W. S. Hanson, Glasgow
C. Daniels, Newcastle
Dr R. Hall, York
D. Phillips, York
T. J. Strickland, Chester
M. Jones, Lincoln
J. Pamment, Birmingham
H. Owen-John, Swansea
M. Dobson, Exeter
Dr V. Maxfield, Exeter
Dr J.-S. Kühlborn, Münster
Prof Dr J. E. Bogaers, Nijmegen
Dr R. Pirling, Krefeld-Gellep
Dr T. Bechert, Duisburg
Prof Dr H. von Petrikovits, Bonn
Prof Dr D. Baatz, Saalburg
Prof Dr S. von Schnurbein, Frankfurt
Dr P. Wagner, Wiesbaden
Prof Dr H.-U. Nuber, Freiburg
Dr E. Schallmayer, Karlsruhe
Dr C. S. Sommer, Stuttgart
Dr T. Fischer, München
C.-M. Hüssen, München
Dr M. Mackensen, München
W. Zanier, München
Dr S. Rieckhoff-Pauli, Regensburg
Dr O. Harl, Wien
Dr H. Stiglitz, Wien
Dr E. Bonis, Budapest
Dr S. Soproni, Budapest
D. Bojović, Beograd
Dr M. Bărbulescu, Cluj-Napoca
Dr D. Isac, Cluj-Napoca
N. Holmes, Edinburgh
Dr L. J. F Keppie, Glasgow
I. Caruana, Carlisle
Dr B. Heywood, York
T. Sumpter, Wakefield
K. Scott, Nuneaton
Dr G. Webster, Wroxeter
V. Metcalf-Dickinson, Swansea
D. Britton, Oxford
P. C. Henderson, Exeter
P. Crummy, Colchester
Prof Dr J. H. Bloemers, Amsterdam
Dr J. K. Haalebos, Nijmegen
Dr C. Reichmann, Krefeld-Gellep
Dr M. Gechter, Bonn
Dr C. Rüger, Bonn
Prof Dr H. Schönberger, Frankfurt
Dr F.-R. Herrmann, Wiesbaden
Dr M. Kley, Mannheim
Dr M. Hartmann, Brugg
Dr D. Planck, Stuttgart
Dr J. Heiligmann, Tübingen
Dr J. Garbsch, München
Dr E. Keller, München
Prof Dr G. Ulbert, München
Dr H. Koschik, Nürnberg
Dr J. Prammer, Straubing
Dr M. Kandler, Wien
Dr H.-J. Ubl, Kritzendorf
Dr M. Németh, Budapest
Prof Dr J. Šašel, Ljubljana
Dr V. Vasić, Beograd
Dr N. Gudea, Cluj-Napoca
Dr M. Rusu, Cluj-Napoca.

My tenure of the British Council / Land Rheinland-Pfalz Scholarship for 1983-84 at Johannes Gutenberg-Universität Mainz enabled me to pay close attention to the continental material and I wish to acknowledge the generous hospitality and use of the libraries of the Römisch-Germanisches Zentralmuseum Mainz and of the Römisch-Germanische Kommission Frankfurt; also the particular kindnesses of Dr J. Oldenstein and Dr B. Oldenstein-Pferdehirt during my time in Mainz.

My greatest debt is to my Oxford supervisor, Professor S. S. Frere, for his unfailing help, counsel and encouragement, and for his initial suggestion that I might like to look at the barracks at Hod Hill.

Chapter 1

The Evidence

Introduction: Roman military barracks

In their excavations at the Roman fort of Cappuck, Roxburghshire, in 1911-12, Stevenson and Miller were able to distinguish 'two oblong buildings of the usual barrack type' and 'traces of what looked like a third'. In their report, they wrote that 'such buildings are almost always found in Roman forts and call for no comment' (Stevenson and Miller 1911-12, 464). Such an observation may now appear somewhat brusque; rather more considered are the words of John Ward in his report on the excavations at Gelligaer. In 1903 (49) he wrote:

> 'If a number of plans of Roman forts, that of Gellygaer included, be compared, it will be found that while in no two of them do these buildings exactly agree, there is a general correspondence both in their forms and distribution'.

Ward was writing not only about barrack buildings, but essentially his observation remains true of them today. In spite of the considerable amount of evidence recovered since the beginning of the century, in many ways it is still not possible to go further than Ward's statement. All too often the barracks appear similar and are arranged in familiar patterns, but nevertheless withhold their full meaning. While Ward's words remain true, few would now agree that barracks call for no comment.

The very mass of barrack evidence, whose buildings at least are clearly all of the same family, challenges an understanding of its variation and variety and of the manner in which the variety is complicated by change and development through time, by location in different provinces, by the vagaries of different architects and builders and even by the impact of different building materials. More specifically it challenges an intepretation of the essential differences between legionary and auxiliary barracks (of increasing importance as it comes to be understood that legionaries not uncommonly formed whole or part of the garrisons of auxiliary-sized forts and that auxiliary units also are to be found quartered in legionary fortresses (for example at Neuss) and of the differences between barracks of different kinds of auxiliary unit. With the increase in material it also becomes possible to consider the ways in which the barracks relate to each other within fortress, fort and fortlet, for example in terms of seniority or simply for the organisation of such tasks as the baking of bread.

There are more direct questions which the study of the barracks may help to answer. For the legions, the problem of the double-strength first cohort remains, nor is it certain where in the fortress the legionary cavalry were accommodated. The location of their mounts is just as much a problem.

For the auxiliaries the question of garrison remains a vexed one. In this connection Breeze and Dobson (1974) have demonstrated the potential significance of the total number of buildings in a fort and the importance of identifying the stables where present. Surely there ought to be a

recognisable difference between infantry and cavalry barracks and at least it ought to be possible to recognise a stable. But this latter has remained a problem and certainly no 'stable type' has been established; their recognition could provide a key to the identification of certain garrisons and barrack types.

Breeze (1974c; 1977c) has done much to explain the working of fortlet barracks, but there is yet room to explore just how closely the fortlet barracks relate to ordinary auxiliary barracks.

For many of these questions, the written sources of evidence are surprisingly unhelpful. We are left with the archaeological evidence from the fortresses, forts and fortlets themselves, that is the barracks and the stables/stores/workshops whose very identification is so often tentative and qualified.

Statistical Analysis

It must be stated that any statistical analysis of this material has to confront very considerable problems. For the reasons given above it has been considered important to begin by presenting the basic evidence from the fortresses, forts and fortlets together, yet the provenance of this evidence is thoroughly mixed. The legionary fortresses themselves vary considerably in date, size and conformation and this is even more true of forts and fortlets. Such differences may have profound effects on the nature of the barracks. It is possible to compare the barracks according to period and province, but the other difficulties are not so easily overcome.

Again it has been considered important to include the whole range of available material rather than to concentrate on a smaller number of recently-excavated, well-known and possibly unrepresentative examples. But this has meant that the dates of the excavations considered here span broadly the whole of the present century with an inevitable variation in the quality of the evidence.

Furthermore, the degree to which all the barracks from the same fortress, fort or fortlet is known varies considerably. The sites which may be said to have been totally excavated by area excavation probably numbers just one, Elginhaugh, and even here it proved impossible to investigate the areas round the fort which, as will be shown, may be crucial for interpretation (Hanson 1987). Most sites have been only partially excavated in the sense either that the area of the excavation has been limited or that excavation has taken the form of narrow trenches. This technique can give accurate information on the overall dimensions of buildings, but cannot be said to give full details of the internal layout of the barracks. Only evidence which may be taken to have been reasonably proved by excavation has been included in this work.

The importance of this is shown by the evidence from the most recently and most fully-excavated forts such as Strageath, Elginhaugh and Hesselbach. This shows that neighbouring barracks, apparently of very similar dimensions, may have a different internal composition and that the barracks of the *praetentura* may in no way be taken as a model for those of the *retentura*; furthermore they may be differently aligned and of a different size. The evidence from Vindonissa shows that the same may be true at fortresses.

Thus only in a very limited way may the single barrack known from a fortress or fort be taken to be typical of that site; what is typical can only be learnt when the whole site has been excavated. In the same way it would be incorrect to take the mean of the various barrack dimensions from any one site as representative of that site; differences in barracks may, or may not, reflect important differences in function.

The only secure base for comparison is to consider every barrack actually known, ie the total sample of the whole population of barracks. Thus the bar graphs in Chapter 1 take the evidence provided by this total sample of barracks as their starting point.

Yet, in spite of what has been said above, it is true that where many barracks from the same building period of the same fortress or fort are known, often many are consistent in their composition and size. For legionary fortresses this is true of Inchtuthil, Chester, Caerleon and Neuss (although at all these sites there are relatively small numbers of barracks of a radically different nature); for auxiliary forts the same may be said for Newstead III and IV (*praetentura*), Elginhaugh (*praetentura*), Wallsend, Pen Llystyn, Gelligaer II, Valkenburg Castellum 1 (*latus praetorii*), Hofheim Steinkastell Period I (*praetentura*), Rottweil III (*praetentura*), Künzing, Drobeta and Slăveni. Certainly it is true that barracks from the same fortress or fort nearly always resemble each other more closely than barracks from other even contemporary fortresses and forts.

Thus the total sample of barracks tends to emphasise the barracks from those fortresses and forts which have been more fully excavated at the expense of those only partially excavated. If the present purpose were to examine only a small number of sites, the peaks resulting from those most fully excavated would be recognisable, but in considering the evidence in total, the provenance of such peaks is obscured and the overall picture is distorted. Thus in the composition of the graphs, in addition to the recording of the total sample it was decided also to record a 'corrected' sample. In the legionary fortresses every significantly different example from each site was recorded, but where the barracks of one cohort are all the same only one example for that cohort was recorded. Similarly for the auxiliary forts, every significantly different example from each site was recorded, but where the barracks are the same throughout the fort, or throughout one half of the fort, only one example for each quarter of the fort was recorded. It is acknowledged that this is not a scientific sample, the different numbers of barracks in different fortresses and forts and their different conformations and alignments ensure that; but it is believed that the resultant figures provide a more accurate representation of the total population of barracks than that of the total sample. Both samples are shown in the graphs which display the overall evidence in Chapter 1, but when the different subjects are examined according to period and province, and in greater detail in the subsequent chapters, only the amended sample is used.

Nowhere has the attempt been made to make statistical projections or to lay down statistical criteria on the basis of the figures presented; such would be inappropriate, incorrect and even meaningless given the nature of the subject and the evidence available. For example, the average for the overall size of a Flavian auxiliary barrack may be established using 'standard deviation' (although in many periods totals do not allow such a calculation) but there is little value in this when the evidence shows that such a norm is a misconception; what exists is rather a wide range from

forts of different sizes and conformations, and even from the same fort. Even barracks of the same overall size may have a radically different make-up which may be of much greater significance that their size. Rather the figures have been used to present the full range of the known evidence. It will be seen that it is the range of the evidence at any one time which is more significant than apparent high concentrations or averages.

It has been stated above that certain barracks in legionary fortresses are believed to have housed auxiliary troops and certain barracks in auxiliary forts are believed to have housed legionaries. Such questions will be discussed fully below, but in order not to prejudge the issue and to allow anomalies and exceptions more easily to be revealed, all barracks deriving from legionary fortresses have been given in the graphs as legionary barracks and all barracks deriving from auxiliary forts have been given as auxiliary barracks. Furthermore they are so referred to in the text. All barracks of the Augustan/Tiberian period have been counted as legionary.

Each building deriving from a fortlet also has been treated as a separate entity. Thus those pairs of buildings which apparently come together to form one centurial barrack in the manner outlined by Breeze (1974c; 1977c) will not be considered as such until Chapter 4. Included in the fortlet section are the barracks from the milecastles of Hadrian's Wall and the barracks from continental *Kleinkastelle*.

The evidence usually can be assigned to period without difficulty. On the few occasions where the construction of a building may cover two periods, the evidence from that building has been included in both periods in the graphs relating to the individual periods, but only once in the graphs representing the total evidence. Included in the evidence for the third century are all the buildings which reflect an earlier period but which have undergone third-century or later reconstruction (eg Lauriacum, Carnuntum); where recent excavation has clarified earlier plans, only the recent results have been used (eg Housesteads). The new style 'chalet' barracks of the late third century (and those of a slightly earlier date revealed at Chesterholm (Bidwell, 1985)) have not been included.

This work does not consider in detail evidence from the provinces to the east of the Mediterranean.

It is the purpose of this first chapter to compare the barracks (and their principal constituent elements) according to their derivation from fortress, fort or fortlet and according to their date and province.

The Buildings

Conformation

Figure 1 displays the incidence in the total sample of the Building Types of all the buildings which have been interpreted as barracks, stables or stores/workshops in the fortresses, forts and fortlets (for definition of the Building Types see Figure A). Large manufacturing buildings from the fortresses, *horrea* and *valetudinaria* have not been included.

It is apparent that the most important Building Type overall is Type A, followed by Types B, O, Jx, H, J, N and G. Type A is the best known form of barrack with projecting officers' quarters and a veranda usually (but not

necessarily) in front of the men's quarters. In fact the pre-eminence of this Type is reinforced by the considerable presence of Type Jx. Type Jx represents the partial remains of a building which, if fully known, could be either of Type A, Type B or Type J. But the fact that these examples usually are found with evidence for the presence of a veranda makes it more likely for the full building to have been of Type A rather than of Types B or J, since these latter are only very rarely found with verandas while they are a usual feature of Type A buildings. Type B constitutes a clearly-defined barrack-form in which the officers' quarters do not project in front of the line of the men's quarters. The difficulty of a considerable proportion of the evidence is reflected in the large number of examples of Type O. Type O buildings are those which the excavations have been able to define only as rectangular buildings of some kind.

The vast majority of the buildings in Figure 1 is made up of barracks. The number interpreted as stables or stores is relatively very small, but it is one of the problems of the subject that buildings intepreted as stables or stores/workshops may take the same building form as those interpreted as barracks; thus the common barrack forms of A, B, H, J and Jx have all sometimes been interpreted as stables or stores. With 36 examples, Type O has the highest total of buildings interpreted as stables/stores, but it has been pointed out that it is difficult to define the full nature of Type O buildings. More significant is the interpretation of all 23 of the Type S buildings and all four of the Type T buildings as stables or stores. Type R buildings have 16 so interpreted in an overall total of 45 (nearly all from forts), while with 14 and ten examples respectively Types H and N are the only ones remaining at all frequently interpreted as stables/stores. Stables and stores/workshops will be discussed in Chapter 5.

When the distribution of these Building Types between fortresses, forts and fortlets is considered it is clear that there is a great contrast between the three. Type A is the most important form in fortresses and forts, but it features only very little in fortlets. Type B on the other hand hardly appears at all in fortresses but is almost as significant as Type A in forts. Again it features only little in fortlets. Types Jx, J and G are evenly balanced between the fortresses and forts although Type J is favoured in the fortlets. Not surpisingly, Type O is much more significant in forts and fortlets than in fortresses and it is joined in this by Type N which is a building of very similar form but which has a mass of internal walls which have not been disentangled by the excavator. In contrast, Type H is a well-defined form and has a significant presence in forts while being the most important single form in the fortlets. It is hardly ever found in fortresses while its relatively simple form may be considered well-suited to the less sophisticated buildings of the fortlets. But Type X is the most characteristic barrack form in the fortlets to which its incidence is almost entirely confined.

When the Types of those buildings interpreted as barracks are considered from period to period and from province to province and according to the 'corrected' figures rather than the total sample (Figs 1.1 - 1.8), it is clear that little break in the pattern is revealed. Most notable is the performance of Type B in the Antonine period where it outnumbers Type A. This is the result of the large number of examples from forts in *Britannia*, many on the Antonine Wall. Otherwise the picture remains remarkably consistent although the prevalence of Type X in the fortlets of *Germania Superior* and *Germania Inferior* should be noted.

Overall Dimensions

Figure 2 illustrates the overall dimensions of the buildings discussed above. The graph does not present the measurements of every building known, but rather those of every different example from each fortress, fort and fortlet. While buildings from the same site often have the same dimensions, those from different sites very rarely do. Nevertheless measurements from different sites sometimes coincide and the number of such occasions (nearly always 2 but in two examples 3) is marked next to the point. Thus the graph displays not the intensity of the total sample at any one place, but rather the full range of the dimensions of the buildings so far known. It should be noted that for reasons of practicality it was found best to use different scales for the lengths and widths. Thus the relative differences in the lengths of the buildings are twice as great as at first sight appears; nevertheless the patterns remain clear.

Figure 2 shows broadly three principal concentrations. The first is to be seen between the lengths of 70 and 90 m and concentrates in the much more narrow width range of 10 to 13 m. The second is more diverse with lengths of 30 to 52 m and widths of 4 to 13 m. Within this group particular concentrations may be seen at the lengths of 40 m and from 46 to 50 m. The third is considerably more diffuse, loosely distributed between the lengths of 4 and 26 m and between the widths of 3 and 12 m.

These concentrations admit very great variation yet it is clear that they accord, in the main, with the their provenance from fortress, fort or fortlet. But there are many exceptions to this rule.

The pattern established by the barracks is clear but that revealed by the ancillary buildings, ie stables, stores and workshops, is more varied. Examples of such buildings from fortresses are few. Many of those from forts accord with the size-range of the auxiliary barracks, but there is a considerable number of such buildings smaller than the auxiliary barracks approximating rather to the size of the fortlet barracks. The relationship between the fortlet barracks and fortlet ancillary buildings is different, the ancillary buildings being in general considerably smaller than the barracks.

When the distribution of the barracks is considered according to period and province (Figs 2.1 - 2.7), it can be seen that the three major concentrations are present throughout the periods under consideration. Even the relatively small number of examples from the Augustan/Tiberian period conforms to the overall pattern. This pattern is first firmly established in the Claudian/Neronian period and these three concentrations achieve their greatest intensity in the Flavian period after which time the auxiliary concentration admits greater variety.

Throughout all periods the three concentrations reflect their provenance from fortress, fort or fortlet. Isolated legionary examples are not found in the auxiliary group after the Flavian period, but occasional auxiliary examples occur in the legionary group at all times. Again in all periods there is some overlap between the auxiliary and fortlet groups.

The legionary barracks (disregarding the untypical evidence of the barracks of the double-strength first cohorts) present in every period a much greater variety of lengths than widths. Already they cover their greatest

range of sizes in the Claudian/Neronian period and diminish in the Flavian to a range which remains fairly constant in the subsequent periods.

In contrast, the auxiliary barracks, while showing a similar variation in lengths, have a much greater range of widths. It is clear that they are considerably smaller in the Claudian/Neronian than in subsequent periods. They are at their largest overall in the Flavian and Antonine periods and in both of these periods have subsidiary concentrations of small barracks with lengths of *c* 31 and *c* 15 - 28 m respectively. This latter group is associated with a group of large fortlet barracks in the Antonine period. Some unusually wide auxiliary barracks are to be seen in the Severan period.

In all periods, with the necessary exception of the Augustan/Tiberian, the largest amount of information comes from *Britannia*. In spite of this it is possible to see that the evidence from all the provinces covers very much the same range although there are minor variations. Most of the notably small legionary barracks in the Claudian/Neronian and Flavian periods derive from *Britannia*. This is true also of most of the small auxiliary barracks in the Claudian/Neronian period as of the two subsidiary auxiliary groups mentioned for the Flavian and Antonine periods. *Germania Superior* and *Raetia* provide a number of large auxiliary barracks in the Flavian period while *Dacia* is the provenance of the wide Severan auxiliary barracks. In the Hadrianic/Trajanic and Severan periods there are concentrations of small fortlet barracks; these derive in the main from the milecastles of Hadrian's Wall.

The ancillary buildings from auxiliary forts display a more considerable variation according to period and province. In the Claudian/Neronian period there is a group whose lengths are considerably greater than those of the barracks for the period. They derive from *Britannia* (Hod Hill). In the Trajanic/Hadrianic period there is a strong concentration of small ancillary buildings very much in the range of the fortlet concentration and the provenance for many of these buildings is *Germania Superior*. Similarly, in the Antonine period, there is a group of ancillary buildings rather larger than those mentioned above but still smaller than contemporary barracks. *Britannia* provides the provenance for many of these buildings.

The number of ancillary buildings from fortlets is too few to make useful comment possible.

It is apparent from the above graphs that there is no very clear correlation between the lengths and widths of the barracks. This is confirmed in Figure 3 which expresses the proportions of the barracks when their overall lengths are divided by their widths. The total barrack sample is given. Although there is some overlap between them, the proportions of the legionary, auxiliary and fortlet barracks are very different, but most striking is the wide range of values for each provenance. The main legionary concentration is between 6,0 and 8,0 but shows no peak within that range; the auxiliary distribution is more diffuse and again reveals no clear peak within the main concentration from 4,0 to 6,75. From this it may be concluded that the barracks were not built according to set length and width proportions. Certainly the evidence shows no clear connection with the same proportions which can be extrapolated from Hyginus' provision for the marching-camp. This gives ratios of 1 : 5 (for eight *contubernium* tents) or 1 : 6 (for ten *contubernium* tents).

Areas

Figure 4 demonstrates the overall areas taken both by the total sample and the amended sample of the barracks and ancillary buildings (excluding the area of verandas where present). The graph shows three major groupings. There is a concentration of small buildings with areas of between *c* 25 and 100 sq m and a further concentration of large buildings with areas of between *c* 650 and 800 sq m, but the great mass of the evidence falls between *c* 125 and 525 sq m. Given the evidence of the previous section it is no surprise that these three concentrations correspond in general to their provenance from fortress, fort and fortlet.

It is noticeable that legionary examples are represented right down to the lowest values and that some auxiliary examples are as large as 1200 sq m and are absent only from the very highest values of over 1300 sq m. The fortlet buildings cover a considerable proportion of the auxiliary values.

The legionary barracks present some very large examples of over 1300 sq m but concentrate mainly between *c* 675 and 850 sq m. The auxiliary barracks range principally from *c* 125 to 550 sq m but achieve their greatest concentration over *c* 325 sq m. The fortlet barracks have values as high as *c* 450 sq m but concentrate from *c* 25 to 100 sq m. The amended sample emphasises the spread of the legionary values and reduces the significance of the legionary concentration between *c* 700 and 800 sq m.

The ancillary auxiliary buildings cover the range of the principal auxiliary group but extend to the lowest values and concentrate in the lower half of the auxiliary range. The fortlet ancillary buildings are found only up to *c* 100 sq m, certainly smaller than many of their corresponding barracks.

Considered according to period and province (Figs 4.1 - 4.7), the pattern is very much that of the previous section. The polarisation of the barrack concentrations is to be seen from the Augustan/Tiberian period but is most marked in the Flavian. The Trajanic/Hadrianic period is that where there is the least overlap between the legionary, auxiliary and fortlet values.

The relatively small size of the auxiliary barracks in the Claudian/Neronian period again emerges and it is clear that *Britannia* rather than the other provinces provides their provenance. Again it is clear that most of the small auxiliary values in the Flavian and Antonine periods are from *Britannia*, but that in the Trajanic/Hadrianic period, *Germania Inferior*, *Germania Superior* and *Raetia* also provide small auxiliary barrack values as well as *Britannia*. On the other hand a notable group of large auxiliary values are to be found in *Germania Superior* in the Flavian period.

It should be noted that each concentration covers a very large range of values and the patterns here portray even less uniformity than in the previous section. It will be shown that area measurements of elements of the barrack consistently display less pattern than linear measurements. This demonstrates that the buildings are likely to have been set out according to linear rather than area considerations. This suggests that barracks did not have theoretical areas to which they had to conform, but rather were built to fill a given space according to proportions which could be measured on the ground.

Officers' and Men's Quarters

Officers' Quarters

It must be considered whether the component parts of the barracks demonstrate the same trends. From the Augustan/Tiberian period it is possible to recognise the area set aside for the centurions or decurions in nearly all the barracks.

Figure 5 displays the areas of the officers' quarters. As is to be expected the areas concentrate within a narrower range than those of the whole barrack. Most of the examples fall in the range of *c* 25 to 375 sq m. In contrast to the previous Figures there are within this range just two principal peaks, at *c* 50 to 150 sq and at *c* 250 to 325 sq m. A subsidiary peak at *c* 175 sq should also be noted.

The two principal peaks accord with their provenance from fortresses and forts, but it is clear that there is considerable overlap between them. It is apparent that the examples from the fortlets do not form a separate concentration but rather concentrate in the lower half of the auxiliary values. The amended sample much reduces the significance of the legionary concentration on *c* 300 sq m.

Examination according to period and province (Figs 5.1 - 5.7) shows that the concentrations in Figure 5 begin in the Augustan/Tiberian period and continue throughout the subsequent periods.

The range covered by the legionary examples remains fairly constant throughout although it can be seen that the lowest legionary values derive from *Britannia* in the Claudian/Neronian and Flavian periods. The auxiliary examples show a clear concentration of low values in the Claudian/Neronian period for which *Britannia* provides the provenance. Again the auxiliary values concentrate at a slightly higher point in the Flavian than in the other periods as the consequence of a number of large examples from *Germania Superior* and *Raetia*. The slightly larger than average auxiliary values from *Raetia* continue into the Antonine period. The range covered by the fortlets also remains fairly constant although the Antonine period has a group of relatively high values whose provenance is *Britannia* and *Germania Superior*.

The degree of overlap between the legionary and auxiliary examples varies considerably. It is at it greatest in the Flavian period, diminishes considerably in the Trajanic/Hadrianic and disappears in the Antonine only to return in the two remaining periods. Given the fairly large number of examples for the Antonine period, this distinction between legionary and auxiliary should be noted. In every period the examples from the fortlets are to be found in the lower half of the range covered by the auxiliary forts although the large fortlet examples from the Antonine period extend two thirds of the way through the range.

Men's Quarters

Figure 6 displays the areas of the men's quarters. This Figure shows several important differences to that of the officers' quarters. The range of sizes is considerably greater, but this might well be expected considering the larger areas concerned. Furthermore the main concentration

covers the very wide range of *c* 175 to 525 sq m with only one central peak at *c* 275 sq m. There is one minor concentration at *c* 75 - 125 sq m.

Although the legionary and auxiliary examples group at the higher and lower ends respectively of the main concentration, their values overlap much more than do those of the officers' quarters. This may reflect a greater standardisation in the officers' than the men's quarters. On the other hand the fortlet examples concentrate more exclusively among the smallest values than did their officers' quarters; this again is to be expected if their officers' quarters were following auxiliary barrack norms. The amended sample reveals less significant difference here although it removes the subsidiary legionary concentration on *c* 675 sq m.

Examination of the men's quarters according to period and province (Figs 6.1 - 6.7) shows again that the concentrations revealed in Figure 6 are to be seen already in the Augustan/Tiberian period and continue through the subsequent periods. On the other hand there is much greater variety in detail than for the officers' quarters.

The legionary values in the Claudian/Neronian period concentrate below the average legionary point. This is caused by a group of low legionary values from *Britannia*. Exactly the converse is true in the Flavian period where the legionary concentration at a higher than average point is the consequence of high values from *Britannia*. The evidence from the other provinces is much more constant until the influence of Lambaesis in the third century.

The evidence from *Britannia* is again the cause of the auxiliary values concentrating below the average point in the Claudian/Neronian period. In contrast the auxiliary values concentrate at their highest point in the Flavian period as the result of large examples from *Germania Superior* and *Raetia*. Once more *Britannia* is responsible for many of the low auxiliary values in the Trajanic/Hadrianic and Antonine periods but it should be pointed out that the province also has examples of average and larger than average size. The highest fortlet values are to be found in the Antonine period and derive from *Britannia* and *Germania Superior*.

The overlap between legionary and auxiliary values is apparent in the Claudian/Neronian period and reaches its high point in the Flavian. It declines in the Trajanic/Hadrianic and is hardly present in the Antonine and subsequent periods. The overlap between the fortlet and auxiliary barracks is greatest in the Antonine period.

Length Proportions (Officers' and Men's Quarters)

Figure 7 displays the percentages of the overall barrack lengths taken up by the officers' quarters. The graph shows three major concentrations: 20 - 26 % (within which there is a clear peak from 24 to 26 %), 28 - 29 % and 31 - 35 %. There are two further smaller concentrations at 14 - 17 % and at 43 - 45 %. The three major concentrations imply building proportions of 1 : 3; 1 : 2,5 and 1 : 2.

The legionary evidence concentrates mainly between 31 and 36 %, but examples are found throughout the total range and there is a significant subsidiary legionary concentration on 25 %. In contrast, the auxiliary evidence examples are found mainly between 20 and 29 % and they peak

strongly at 24 to 25 %, although again they are found throughout the total range. The evidence from the fortlets shows no very clear pattern but tends to concentrate among the higher percentages. This is to be expected in the light of the relatively small size of their men's quarters. The amended sample reduces the impact of *c* 37 % from the fortresses.

When the same evidence is considered according to period and province (Figs 7.1 - 7.7), it is apparent that the concentrations of Figure 6 are not yet present in the Augustan/Tiberian period when there is an emphasis on figures below 20 %. The concentrations are certainly discernible in the Claudian/Neronian period and achieve their greatest emphasis in the Flavian, thereafter to diminish.

The concentrations for the Claudian/Neronian period would be much more apparent were it not for the evidence from *Britannia*. Here there are several legionary examples with low percentage values while there is a number of auxiliary examples with much higher values. This evidence contrasts with that of the other provinces which corresponds much more with the overall norm. These differences continue into the Flavian period. In contrast to the evidence from the other provinces the legionary evidence from *Britannia* shows a marked concentration at *c* 25 %. Also present is a number of auxiliary values above *c* 38 % although much of the auxiliary evidence from *Britannia* now agrees with the lower values in the other provinces. In the Trajanic/Hadrianic period the evidence from *Britannia* reflects much more the overall norm. The legionary concentration on 25 % has gone and the auxiliary evidence concentrates between 20 and 26 %. But now the auxiliary evidence from all the other provinces can be seen to be much more diffuse ranging from *c* 12 to 38 %. Much of the evidence for the Antonine period comes from *Britannia* but it can once more be seen to be atypical for there is a considerable presence of auxiliary evidence in the higher values over 30 %. In the Severan period the evidence, as far as it is known, reverts to the overall pattern while in the third century legionary evidence is diffuse with a number of examples below 30 %.

Thus *Britannia* is notable for low legionary percentage values in the early periods and for high auxiliary values in several periods.

Area Proportions (Officers' and Men's Quarters)

Figure 8 displays the percentages taken by the officers' quarters of the total living areas of the barracks (excluding the area of the veranda where present). The pattern which emerges is much less clear-cut than that of the length percentages. Two principal concentrations are apparent, from *c* 23 to 32 % and from *c* 37 to 44 %. But within these groups there is a number of subsidiary concentrations and many values fall outside them.

The two major concentrations correspond in the main with their provenance from fortress and fort, but while only a few legionary examples fall in the lower concentration, auxiliary presence in the higher percentage group is much more common. In contrast to Figure 6, there are few legionary examples which fall below 30 %, on the other hand many auxiliary examples are to be found above 33 %. The prevalence of the legionary barracks among the higher values is to be explained by their Type A building form with projecting centurions' quarters. It has been shown that this Type is not so prevalent in the auxiliary barracks. The evidence from the fortlets ranges throughout the graph without showing any particular pattern.

Figures 8.1 - 8.7 again reveal considerable variation according to period and province. The Augustan/Tiberian period shows nothing of the overall pattern of Figure 8, but this emerges in the Claudian/Neronian period and is most emphatic in the Flavian. Thereafter the evidence is spread very evenly between *c* 16 and 40 % until the concentrations are again to be seen in the Severan period.

It is not surprising that, given the evidence of the previous section, the balance of evidence from *Britannia* should again be different to that from the other provinces. In the Claudian/Neronian period *Britannia* has a number of very high auxiliary values and although these are not so prevalent in the Flavian period, at this time the legionary values from the province concentrate at a lower point than those from the other provinces. Again in the Trajanic/Hadrianic period the auxiliary evidence from the other provinces is more diffuse than that from *Britannia*. Much of the evidence in the Antonine period is from *Britannia* and it is predominantly auxiliary. It ranges much more widely range than in the previous period.

The best explanation for the relatively diffuse nature of this evidence is that the total area of the men's quarters in relation to that of the officers' quarters was not the underlying criterion for the planning of the barracks, but rather their linear relationship on the ground provided the basis for their arrangement.

The *Contubernia*

Contubernium Totals

The division of the men's quarters into *contubernia* is often by no means regular, but in many examples, even when full evidence is lacking, it is possible to make a reasonable estimate of their number. For purposes of comparison those first and end *contubernia* which sometimes take a different form to the other *contubernia* of the same barrack are here both counted as single *contubernia*. Their forms are defined in Figures C and D.

Figure 9 shows the barrack *contubernium* totals. Most examples fall within the range of 7 to 13 *contubernia*; within that range there is a strong peak on 10 and a subsidiary lower peak on 8. Most legionary barracks have between 11 and 13 *contubernia*. On the other hand, 10 is the total most often found in the auxiliary barracks although there are many examples with 8 or 9. Some fortlet barracks have up to 7 *contubernia* but 3 is the most common total: the way in which pairs of these barracks combine to form the accommodation for a century will be discussed in Chapter 5. The amended sample reduces the significance of the concentration on 12 *contubernia* in the fortresses.

The range of totals covered by the legionary barracks appears to be present even from the Augustan/Tiberian period, although at this time there is an emphasis on large totals over 13. Certainly the legionary emphasis on totals of 11, 12 and 13 is present in the Claudian/Neronian period and continues with little variation throughout subsequent periods. Furthermore there appears to be little variation from province to province (Figs 9.1 - 9.7).

On the other hand there is considerably more variation among the auxiliary barracks. There is a concentration of low auxiliary totals in the

Claudian/Neronian period which is largely the impact of the evidence from *Britannia*. In the Flavian period the auxiliary evidence groups at the high end of its total range and this is the consequence of a series of high totals from *Germania Superior* and *Raetia* and an increase in the totals from *Britannia* from the previous period. Thereafter the auxiliary pattern reverts to the norm although small totals may be seen in *Germania Superior* in the Trajanic/Hadrianic period and a strong emphasis on the total of 8 appears in the Antonine period, largely as as result of evidence from *Britannia*.

The number of examples from fortlets is not sufficient to be able to discuss any patterns in their behaviour, but it is noticeable that their lowest totals are most marked in the Trajanic/Hadrianic, Antonine and Severan periods. To some extent this is the influence of the evidence from the milecastles of Hadrian's Wall.

The evidence of the *contubernium* totals thus reflects generally that presented above. Although precise correlations cannot be made, larger men's quarters have more *contubernia*. These relationships will be investigated further in Chapters 2 and 3.

Contubernium Areas

Figure 10 shows the living space of the individual *contubernia*, that is clear of all walling internal and external. The size of the *contubernia* of the same barrack can vary considerably, but the evidence here is drawn from what may be considered to be the single norm for each barrack.

In contrast to much of the evidence presented above, Figure 10 shows only one main concentration, from *c* 14 to 29 sq m. The peak is at *c* 21 to 25 sq m. It is striking that both the legionary and auxiliary examples are to be found in fairly equal proportions throughout this very broad principal group although the auxiliary *contubernia* are a little more in evidence among the lower values and the legionary among the higher. Much of the evidence from the fortlets reflects that from the forts. Outside the main concentration the largest examples are drawn both from legionary and auxiliary contexts but never from fortlets. The smallest examples are nearly all from auxiliary and fortlet contexts. Thus it is clear that provenance is no secure guide to the size of *contubernium*. The most important effect of the amended sample is to remove the legionary peak on *c* 33 sq m.

Comparison according to period and province (Figs 10.1 - 10.7) shows that the the Augustan/Tiberian evidence concentrates at a noticeably lower point than that of the subsequent periods. In the Claudian/Neronian period, the pattern begins to match that of the overall norm, in spite of both legionary and auxiliary values from *Britannia* which are markedly lower than those of the other provinces. In the Flavian period the evidence concentrates within its narrowest range overall and the auxiliary *contubernia* have their highest values and very much match the legionary for size; those from *Britannia* are notably higher than in the previous period although they still concentrate at a slightly lower point than those of *Germania Superior* and *Raetia*. The auxiliary evidence covers a wider range in the Trajanic/Hadrianic period which is the consequence of low values from *Britannia*, *Germania Inferior* and *Germania Superior*. In general the auxiliary evidence has become much more diffuse and this trend continues in the Antonine period, particularly

in *Britannia*. In the Severan period, there is little evidence from *Britannia* but that from the other provinces shows the few auxiliary examples covering almost their whole range. As usual the largest legionary examples are found in the third century.

Total Living Space

The product of the number of *contubernia* and their internal area (including adjustments for special first and end *contubernia* where present) is the total living space available in the men's quarters of the barrack (Fig 11). Once more only one principal concentration can be see from *c* 140 to 300 sq m. Clearly this is a very great range and it is surprising that the legionary and auxiliary evidence overlaps so considerably throughout in spite of the larger number of *contubernia* of the legionary barracks. Given their small *contuberium* totals, the presence of the evidence from the fortlets at the bottom end of the scale is not surprising. The amended sample much reduces the significance of the peaks on *c* 250 and 290 sq m in the fortresses.

Examination according to period and province (Figs 11.1 - 11.7) shows that the evidence for the Augustan/Tiberian period accords more with the overall pattern than in the previous section. In the Claudian/Neronian period the legionary concentration achieves already the norm which it maintains until the large values of the third century, although the impact of the double-strength first cohort barracks can be seen in the Flavian period.

The auxiliary evidence for the Claudian/Neronian period shows low readings which derive almost entirely from *Britannia*. All of the auxiliary examples in the Flavian period begin at a much higher point, form a tighter group and concentrate at their highest mark. This changes considerably in the Trajanic/Hadrianic period where the auxiliary readings again become much more diffuse and include many low values. Much of the impulse for this derives from *Britannia*, but also from *Germania Superior* and the lower Danube provinces. The auxiliary position changes very little in the Antonine period where much of the evidence comes from *Britannia*. In the Severan period, the auxiliary evidence is even more diffuse.

Papilio/Arma Proportions

Although the subdivision of the *contubernia* into *papilio* and *arma* is not present in all forms of barrack (see Figure A), it occurs early and often enough to be considered a basic element. The proportions nearly always remain constant throughout the same barrack and only occasionally is it difficult to judge which way the barrack is facing.

Figure 12 shows that the *papiliones* usually take the greater part of the *contubernia*, although there is a significant minority of barracks where the *arma* are marginally larger. The evidence covers the fairly wide range of *c* 42 to 72 %. Within this range there is a concentration from *c* 58 to 66 % implying the building proportions of 2 : 1; much more emphatic is the peak on 50 % demonstrating the proportions of 1 : 1. These proportions may have structural implications for the barracks and these will be discussed in the later Chapters. The amended sample has little impact on the overall shape of the graph.

There are considerable differences between the legionary and auxiliary evidence. It is the legionary barracks which provide much of the impetus towards the concentration on *c* 66 % and although there is a subsidiary legionary peak on 50 %, the evidence for this latter proportion is predominantly auxiliary. Evidence from auxiliary barracks continues to be well represented up to 72 % but does not show any marked concentration at 66 %. Where the *arma* are larger than the *papiliones* it is nearly always in auxiliary barracks. The fortlet evidence very much follows that of the auxiliary barracks but hardly features above 66 %.

Examined according to period and province (Figs 12.1 - 12.7) it can be seen that the legionary evidence varies very little but rather mirrors the range of the legionary distribution in Figure 12. The legionary evidence from *Germania Inferior* in the Flavian period concentrates at a slightly higher point than usual, and that from *Britannia* in the Trajanic/Hadrianic period at a slightly lower point than usual, but these distinctions are marginal.

The evidence of the auxiliary barracks is much more varied although it covers the full range in all periods where there is sufficient evidence. In the Claudian/Neronian period in all provinces it covers the range from *c* 50 to 76 % evenly. The Flavian period sees the beginning of the emphasis on 50 % in all provinces but particularly in *Britannia* and *Germania Superior*. This trend continues in the Trajanic/Hadrianic period under the influence of the evidence from *Britannia* and *Raetia*, but this period also sees the largest number of *papiliones* under 50 %, most of them in *Britannia*. The proportion of 50 % reaches its apogee in the Antonine period, again most emphatically in *Britannia* where the emphasis on values below 50 % is slightly reduced from the previous period. The evidence for the Severan period is much reduced, but it continues to show the prevalence of 50 %. The connection of this proportion with barracks of Building Type B will be explored in Chapter 3.

The evidence from the fortlets is insufficient to speak of trends, but when present the *papiliones* cover a wide range in each period.

Conclusions

The evidence presented above shows that the Roman Army barrack achieved very early in its life (certainly from the Claudian/Neronian period and in many respects as early as the Augustan/Tiberian) the characteristic make-up which it was to maintain through the next three centuries.

Throughout this period, in spite of temporal and regional variations, it is possible to perceive a balance in the component parts of the barrack; thus large barracks tend to have large officers' quarters, large men's quarters and large *contubernia*, similarly small barracks small. This being said, the officers' quarters do reveal a greater consistency than other parts of the barracks and this may be of value for interpretation.

In spite of the presence of a notable group of small legionary and auxiliary barracks in *Britannia* in the Claudian/Neronian period and of some large auxiliary barracks in *Germania Superior* and *Raetia* in the Flavian and Trajanic/Hadrianic periods, perhaps the most striking feature of the evidence is the very lack of differentiation from period to period and from province to province; rather the evidence covers the whole range throughout.

Thus differences between the barracks cannot be explained simply in terms of period and province, but rather imply functional differences.

It was to be expected that evidence from the auxiliary forts and the fortlets would often agree; rather more surprising is the overlap in the auxiliary and legionary evidence. This takes place to a much higher degree than can be explained by the presence of legionaries in auxiliary forts or of auxiliaries in legionary fortresses. Thus hard criteria for the identification of barracks inhabited by legionaries or auxiliaries cannot be laid down but certain factors such as general size or *contubernium* totals may form the basis of a presumption that a barrack was built for legionaries or auxiliaries. More detailed argument will have to proceed from this point.

Chapter 2

Legionary Barracks

Introduction

From the classic fortress plans such as those of Neuss or Inchtuthil, it would appear easy enough to recognise the large barracks of the legionary cohorts in their uniform groupings of six *hemistrigia* distributed mainly round the perimiter of the fortress and in the *latera praetorii*. But the earlier and more irregular in shape the fortress, the more difficult becomes the task of recognising the cohort barracks as distinct from other barracks of various kinds assuredly present in all fortresses, that is the 'Centurienkasernen' from some of those named 'Unterkunfte für Immunes' and 'Hilfstruppenkasernen' by von Petrikovits (1975, Bilder 4, 5, 8). It is the purpose of the first section of this chapter to discuss the cohort barracks.

The earliest barracks to be considered in this work come from the Augustan supply-bases or fortresses of Haltern, Oberaden, Rödgen and Dangstetten. Although their barracks are immediately recognisable, it is not certain to what extent they accommodated legionaries and/or auxiliaries. In order to explore such questions, all the known barracks from Oberaden, Rödgen and Dangstetten have been included in this first section. The cohort groups at Haltern emerge fairly clearly: 11g, 11f, 11e, 11d, 11b, 11a (von Schnurbein 1981, Abb 12). At the same time there are other buildings which still have the general form of barracks (11c, 10, 8a, 8b, 8c, 8d), but are so unlike the cohort barracks in form and disposition in the fortress that they will not be considered in the first section. Similarly Vindonissa while having recognisable cohort barracks to the west of the *via decumana*, in the last two *scamna* of the *retentura*, and to the north side of the west gate, also has a number of buildings in the north-east corner and elsewhere which, while demonstrating many aspects of centurial barracks, are so lacking in uniformity and vary so much in size that they will not be considered in the first section. However, (*contra* von Petrikovits 1975, 45, Bild 5,5), it is concluded here that the barracks to the east of the *valetudinarium* have sufficient uniformity and size in most of their phases to be included in this section.

From the Claudian/Neronian period the cohort accommodation is easier to recognise and has been illustrated for some fortresses by von Petrikovits (1975, 111, Bild 33) although it would appear that his location of one of the cohorts in Bonn may now require revision. Von Petrikovits places this cohort in the second to last *scamnum* on the right hand side of the *retentura*. Recent work has shown that these barracks are very short in comparison with the other cohort barracks at Bonn. The missing cohort should rather be placed more conventionally in the left *latus praetorii*. These shorter barracks from Bonn will be considered in the last section of this chapter. All remaining non-cohort barracks, including those identified as accommodation for auxiliary troops at Neuss and Longthorpe, will be discussed in the final section of this chapter. To qualify for consideration in this final section, the building must have features as outlined in Figure A. For this reason not all buildings defined as 'Unterkunfte für Immunes' by von Petrikovits will be discussed.

The barracks at Albano, although clearly recognisable, are sufficiently unusual to constitute a special case. They will be discussed separately.

The Cohort Barracks

Building Types

Type A is the usual form of barrack for the legionary cohorts. It is only the Augustan/Tiberian period which sees any real variation in this rule. In this period no Type predominates. Type A is the most common at Haltern, but there also seems to be evidence for Type G in cohort groups 11g and 11b. Dangstetten has Type B barracks and the same may be said of Rödgen, but there is a possibility that the Rödgen examples have *contubernia* without central partitions (Schönberger and Simon 1976, 28). This would make them into Type H barracks. 'Albrecht's Barrack' at Oberaden is of Type D but it is much more difficult to define the very rudimentary barracks or *hibernacula* built in the north-west corner. Here nine small independent centurions' quarters have associated tent lines or *hibernacula* (Kühlborn 1982, 506-508; Baatz 1985). They seem to have the same widths as the rather variable centurions' quarters and they approximate best to Types H and B.

After the Augustan/Tiberian period, Type A is almost universal. The most striking exceptions are the Type Z barracks at Vetera I and Bonn which will be discussed more fully below. Other barrack forms where the *contubernium* is not divided into *papilio* and *arma* become even more uncommon. The only two examples come from Gilberd School Colchester and from Potaissa. Although the centurions' quarters are not yet known from either site, it is probable that the barracks are both of Type G. More problematic are the Breite *valetudinarium* barracks at Vindonissa. Period 1 seems to begin with Type A barracks which change to Type G in Period 2, to Type J in Period 4 and finally back to Type A in Period 5/6. In Period 3 the buildings take a very different form which will be described in the second section of this chapter. The Roman Gates barracks in the left *latus praetorii* at Caerleon also seem to have been subject to much variation. Although nearly always Type Jx, in Phase E Barrack 1 was either Type H or Type G. At Wien, Wildpretmarkt/Bauernmarkt Building A was probably of Type H in Phase 3 and Building B of Type H in Phase 1.

Where only part of a barrack is known, the most common designation is Type Jx, which as has been pointed out in Chapter 1, is most likely to indicate a Type A barrack if the complete plan of the building were known.

Veranda and Porticus

The roofed veranda with porticus is an almost universal feature of the cohort barracks. During excavations, the porticus has not always been demonstrated, but only rarely has the evidence suggested that none had existed. Such a situation is encountered most often in the Augustan/Tiberian period and in barracks not of Type A. In most of the barracks at Haltern no porticus has been verified and appears definitely absent in cohort 11c. The Type B barracks at Oberaden. Rödgen and Dangstetten all seem to have been built without a porticus, while 'Albrecht's Barrack' at Oberaden appears to have a longitudinal corridor in the place of the *arma* (Building Type D) and this must have served something

of the same function as a porticus. Barracks VII and VIII at Vindonissa Breite *valetudinarium* Period 3 have no veranda, neither do barracks III-VI but again this is less surprising because they are of Type B.

After the Augustan/Tiberian period examples lacking verandas are very few. Building B at the Wildpretmarkt/Bauernmarkt site at Wien in Phase 1, *c* AD 100, has no veranda; it is a Type H building. The first four *hemistrigia* of the first cohort at Lambaesis also do not have a veranda, but these buildings are highly unusual. For a long time it seemed that no evidence could be found for porticus columns at Caerleon while everything else about the barracks suggested that they should exist. The problem was solved at the Croft site in 1966 where one or two flat bases for the columns were found resting on the ground surface (Threipland 1967, 43).

The outside line of the porticus uprights nearly always coincides with the outside line of the centurion's quarters, but the veranda posts at the Deanery Field Chester are highly unusual in being placed their own width outside the line of the centurions' quarters. At Longthorpe, singularly among cohort barracks, the side walls of the *contubernia* probably continue across the depth of the veranda to form a series of open-sided cubicles.

In Figure 13 is contrasted the overall width of the men's quarters and the width of the veranda (taken to the outside line of the porticus columns). Most of the men's quarters widths are to be found between 7,00 and 9,50 m, while the veranda widths vary from 1,50 to 3,75 m, that is a variation of 2,50 m in both. Given the greater overall size of the men's quarters, their width is considerably more constant than that of the veranda.

On those occasions where a veranda has not been verified but rather assumed, in the main, the dimensions of such barracks are quite consistent with the others. The main exceptions to this come from the Augustan/Tiberian period and are found mostly at Haltern. In cohorts 11d and 11b, the men's quarters are 6,50 m and the unverified veranda 3,00 m wide, while even more extremely, the comparative measurements from cohort 11f are 6,00 and 4,50 m and for 11g 6,50 and 4,50 m. All these barracks are of Type A, but their very proportions and the width of the veranda space would seem to make a formal veranda with porticus unlikely. The same point may be made with Building II at Breite Period 2 Vindonissa giving measurements of 8,50 and 3,80 m, although these measurements do fall within the range where veranda with porticus has been found. This is also true of all such buildings of similar dimensions in succeeding periods with the exception of one group in the Flavian period. The relevant dimensions of Barracks 1, 2 and 3 in the south-west corner of the fortress at Nijmegen in Periods 3 and 4 are just 6,75 and 1,75 m. The smallest example on the graph it may be, but the two elements of the barrack remain in proportion; possibly the whole was too small for a veranda. The widest veranda with porticus has been identified in the Main Stone and Late Stone Phase at Northgate Brewery Chester dating to the Antonine period. Here the men's quarters measure 7,50 m and the veranda 4,20 m, very unusual proportions.

For the remaining examples it will be noted that, although some of the men's quarters are very wide, up to 18 m in the extreme case of the first cohort at Lambaesis, in spite of this the depth of the veranda remains very much between 2,0 and 3,0 m. The men's quarters with widths over 10,0 m, excepting the third century examples, are from Longthorpe Building XIV, Neuss Building 148 and Aquincum in the *latera praetorii*. The overall

impression is one of considerable continuity and agreement from period to period.

Rear Wall Construction

Figure 14 displays the incidence of the different construction arrangements for the rear walls of the barracks and the materials used therein (see Figure B). It is clear that until the end of the Antonine period, Type 1 is predominant, that is the rear walls being separated by a space of some two metres throughout their length, an arrangement which would facilitate the escape of rainwater. Except in the Antonine period, Type 2 with rear party wall is always present, but only becomes predominant in the Severan period, while in the third century it is almost the only style. This building arrangement implies the construction of a basilica-type roof if any daylight is to be enabled to penetrate to the *papiliones*. This will be discussed in Chapter 7.

Type 3 is present in significant numbers only in the first three periods. Barracks of this form have a rear party wall for the centurions' quarters, but a space between the rear walls of the men's quarters as in Type 1. It is possible that some of the buildings in the north-west corner at Oberaden follow this arrangement (not all of the centurions' quarters have party rear walls), but Type 2 is more likely there. It is also possible that the the first three timber phases of the Northgate Brewery barracks at Chester are of Type 3, but the clearest examples come from Neuss where the only exceptions to this arrangement occur between possible cohort-block divisions (see below). At these points, the intervening space runs for the whole length of the barracks. Type 4, the reverse of Type 3, with the men's quarters having a rear party wall and the centurions' quarters remaining separate has just two examples. The first is from Dangstetten in the barracks east of Straße II/Straße III, while the second example from the Niedermünster in Regensburg may date to as late as the fourth century.

Type 5 denotes barracks which have a party wall with a building not interpreted as a barrack.

Figure 14 also shows the material used in construction. It is clear that there is no bias towards one kind of construction method shown by any Type. Thus the Type 2 rear walls do not favour the stone sill construction with its possibly greater strength and stability as might have been expected.

Construction Methods

Figure 15 traces the history of the construction methods of the cohort barracks. It is clear that, until the Trajanic/Hadrianic period, the various kinds of timber building techniques are most common. It is only in the Trajanic/Hadrianic period and after that 'stone' barracks, or more accurately, half-timbered buildings resting on stone sill walls, become predominant. In the Augustan/Tiberian period, all three methods of timber building are in evidence: post-pit, post-trench and sill beam, but post-trench construction is the most common form, as it remains throughout. Indeed, after this first period there is very little evidence again for post-pit and sill beam construction. In the Claudian/Neronian and Flavian periods construction activity is equally divided between post-trench and stone sill techniques. There is very little evidence at all for barracks

constructed entirely of stone although it has been suggested for the Wildpretmarkt/Bauernmarkt Buildings at Wien in all their Phases, also in Wien at Heidenschuß/Am Hof and Judengaße. These buildings were constructed at the end of the first century, and if true, the use of such a technique at so early a period is highly unusual. The only other instance appears to be at Folliot House Chester in Period 2 of the late second century. Stone sill construction remains the norm in the barracks of the third century.

It is clear that stone-sill wall construction begins earlier in the provinces outside *Britannia*. In the Claudian/Neronian period already Vetera I, Neuss, and some barracks at Vindonissa have stone sills and these become usual in the Flavian period although, even then, it was still possible to build timber-based barracks as in Period 4 at Nijmegen. In *Britannia*, on the other hand, timber cohort barracks are almost universal in the Flavian period. It is the Trajanic/Hadrianic period which sees the wholesale adoption of the stone-sill method in *Britannia* although the second and third timber Phases of the Northgate Brewery barracks in Chester come into this period.

These different techniques will be discussed more fully in Chapter 7.

Overall Dimensions

The dimensions of the legionary barracks have been described in Chapter 1. It is the purpose of this section to point out more specifically the most significant developments in the cohort barracks.

The cohort barracks of the Augustan/Tiberian period (Fig 2.1) cover a very wide range of sizes from *c* 30 × 9 m to 90 × 10 m. Within this range there is no very marked concentration. Each of the fortresses, with the possible exception of Haltern, shows a wide variety of lengths and widths. At Rödgen this ranges over some 33 m in length and 3 m in width. The variation in length at Vindonissa is 26 m covering two cohort groups, but the variation in width is very little. At Dangstetten too there is a length difference of 14 m and a width difference of 5 m over three possible cohort groups. Even within the same cohort at Breite North Gate Vindonissa there is a 7 m length discrepancy. Only Haltern seems to be relatively uniform. Here a length difference of 6 m covers five cohort groups (three of the cohorts having the same length) and the variation in width is 3 m. One of the reasons for these variations is probably the irregular outlines of the fortresses at this early period, Haltern proving to be the exception to the rule.

The small officer-like quarters found in the north-west corner at Oberaden are entered on the graph and concentrate at the bottom of the Figure *c* 8 × 9 m. If the attendant rows of tents or *hibernacula* are added, they produce a length of *c* 70 m which is exactly that of 'Albrecht's Barrack' from the same fortress.

In the Claudian/Neronian period (Fig 2.2), the dimensions of the cohort barracks are less diffuse although their differences in length still range over 47 m; but this includes the extreme examples and the main group extends from *c* 68 to 96 m in length and has only a 4 m variation in width. *Britannia* provides examples at all points. Very small examples with lengths of 58 and 62 m come from Exeter whereas Colchester has examples of 86 and 88 m length. These are much outdone by the 105 m Barrack 1 (Building XIV)

from Longthorpe, the longest single barrack in the Empire. There are special reasons for the extraordinary size of this barrack which will be discussed below, but the small size of the Exeter barracks is probably connected with the problem of fitting sufficient numbers into a fortress of only 16,40 ha. The Vetera I barracks are of an average size with Colchester while those of Vindonissa continue to show much variation. Claudian/Neronian Vindonissa has barracks from three cohort groups and they vary by 28 m in length. Those at North Gate Breite are now slightly longer than before, *c* 96 rather than 88 m but they still vary much among themselves. The evidence for the Breite *valetudinarium* barracks falls into the middle of the range while those from Breite, six different barracks, are the smallest of the Vindonissa examples. With lengths of *c* 68 m they constitute a uniform group and are some of the smallest cohort barracks while those from Breite North Gate are among the largest.

The Flavian period (Fig 2.3) gives an even more varied picture. For the first time the courtyard houses and attendant men's quarters of the first cohort appear as very large examples. *Britannia* provides a very disparate picture with examples ranging from *c* 58 to 100 m in length. The very small examples come from Exeter. The barracks from Exeter and Inchtuthil are consistent in their size, but this cannot be said for Chester and Gloucester. The two examples at Gloucester vary by 28 m in length, the extraordinary length of the New Market Hall barrack being made possible only by its alignment *per scamna* in the right *latus praetorii*. This extreme length may also be connected with its being accommodation for the first cohort. Barracks at Chester give lengths of 84 m at Crook Street in the right *latus praetorii* and *c* 78 m at Deanery Field in the last *scamnum* of the *retentura*. Since these barracks are on the same alignment this discrepancy may stem from the unusual number of *scamna* at Chester, six rather than five and the consequent irregularity in the depths of the *scamna* (Carrington 1977).

The barracks from Neuss and Bonn cover a fairly narrow range and at *c* 80 m in length constitute some of the larger examples. Not so the Nijmegen barracks from Periods 4 and 5. At *c* 65 m, their size again may reflect the small size of their fortress of *c* 15 ha in period 4 and 16,50 ha in period 5. Again the differences at Vindonissa persist between the Breite and Breite *valetudinarium* sites with the barracks retaining their different sizes. In this period, the Breite Period 4 barracks are joined by those from Königsfelden West Gate Period 6/7 at the same length.

The Trajanic/Hadrianic period (Fig 2.4) in *Britannia* has cohort barracks from Chester and Caerleon. The Chester barracks display the same range of size as in the previous period, but they are now joined by the largest and longest barracks from Chester, those from Hunter Street/Princess Street with lengths of 88,50 m, that is 4,50 m longer than the previously longest barracks from Chester. The explanation for this considerable length probably lies in the fact that they are aligned *per scamna* in the middle of the *retentura*. By way of contrast, the examples from Caerleon, the courtyard houses of the first cohort excepted, vary by no more than 3 m over three sites.

Three sites at Chester and two sites at Caerleon see rebuilding to the same dimensions in the Antonine period (Fig 2.5). The most striking feature of this period is the presence of a very large barrack in terms of width if not in length *c* 75 × 20 m. This barrack is the second barrack of the first cohort at York and will be discussed below.

The Severan period (Fig 2.6) again sees rebuilding to the same dimensions at Hunter Street/Princess Street in Chester and at the Northgate Brewery. The barracks from Aquincum probably date to this period and at *c* 74 × 13 m are of about average size overall.

The third century shows a considerable change (Fig 2.7). The first cohort barracks at Lambaesis and those of cohorts B, C, D, and E are the largest barracks overall. Some of the longest barracks of all come from this period from Regensburg, Lauriacum and Carnuntum. Carnuntum has four cohorts with barracks of *c* 90 m in length while all the cohorts at Lauriacum bar one probably measure some 87,5 m although the calculation is complicated at Lauriacum by the apparent absence of the centurions' quarters. The Niedermünster barracks in Regensburg are probably *c* 86 m long. Carnuntum provides another example of barracks of considerably different sizes from the same fortress, for the barracks of the *praetentura* front are only 75 m long. The irregular shape of the fortress may account for some of this variation.

Certain trends are apparent in this rapid review of the evidence. It is clear that the barracks of the cohort groups cover a very wide range of sizes and that this variation is at its greatest during the Augustan/Tiberian period. The Claudian/Neronian period has some of the longest barracks overall, above 90 m, while the truly short barracks below 66 m do not occur after the Flavian period. Although the widths of the barracks vary greatly in the earliest period, the significance of this factor soon diminishes and from the Claudian/Neronian period, the more important consideration is length. Figure 16 expresses the change in the lengths of the barracks over the successive periods.

To some extent at least, the size of the barrack is dependent on the size of its fortress, although this relationship may be complicated by a fortress which is not planned to accommodate a whole legion (eg Nijmegen Periods 4 and 5). But the correlation between barrack length and fortress length is not as clear as might have been expected. Figure 17 illustrates this relationship. It is true that some of the smallest fortresses do have some of the shortest barracks, ie Haltern, Vindonissa, Nijmegen Periods 4 and 5, Exeter, but many of the fortresses have barracks of the same length even though they themselves may have overall lengths which vary by up to 300 m. The fact that some of these examples are of barracks lying *per scamna* is not very significant because the cohort block tends to form a square. The only example where this alignment is of itself very important is at Eastgate Street/New Market Hall Gloucester.

It is apparent that there is often considerable difference in the lengths of barracks from the same fortress. This variation tends to be a product of early and/or irregular fortresses (Dangstetten, Vindonissa, Carnuntum). But Chester demonstrates that very different barrack lengths can be found in a regular fortress and all fortresses have barracks which vary by at least three metres in length. These differences in length from within the same fortress have no significant patterns. The first cohort, the special case of Gloucester excepted, as a rule does not have barracks any longer than those of the other cohorts, only Nijmegen in Period 5 shows a difference of any significance, some five metres. For the other cohorts, the most that can be said is that the first or last *scamna* of a fortress occasionally have different depths to the others. Thus the barracks in the last *scamnum* at Chester and Caerleon, and in the first *scamnum* at Colchester and Carnuntum are noticeably shorter than the other barracks from the same

fortress, while those in the last *scamnum* at Vindonissa are longer. But it is also possible for smaller barracks to be found in the central areas of the fortress. Examples are cohort 11g from Haltern to the right of the *principia*, Buildings 111-134 on the right side of the *retentura* at Neuss and those from Breite Vindonissa, which site lies in the second to last *scamnum* of the fortress. Any suggestions with regard to seniority would be purely speculative and could apply only to individual fortresses. For example. it might be reasonable to suggest that the small barracks along the *praetentura* front at Carnuntum are junior to the others in the fortress. Variations within the cohort-blocks will be considered below.

The Centurions' Quarters

Conformation

At their most elaborate, the centurions' quarters take the form of courtyard houses, but such provision is made only for the centurions of the first cohorts at Inchtuthil, Caerleon, Nijmegen (Periods 4 and 5) and Lambaesis and possibly at Haltern (see below). Elaborate provision was also made at Lauriacum and Carnuntum, but there the full nature of the quarters is uncertain.

The quarters of most legionary centurions are rather simpler buildings although they are still very large. The arrangement of their rooms takes many forms and probably reflects the wishes of their first occupants, but in general it resembles that of Roman town houses with a series of rooms opening off a longitudinal corridor. Very occasionally these buildings may have small courtyards. In Building 110 at Neuss a rectangular arrangement of four stone column bases indicates the presence of a small courtyard with a porticus. A similar arrangement has recently been found in a timber barrack at the Northgate Brewery site in Chester.

At the end of the second timber Phase of this Chester building *c* 115, the men's quarters to the south as well as most of the centurion's quarters were demolished, but it seems that part of the courtyard and veranda were retained to serve as an entrance porch for the adjacent centurion's quarters to the west. These quarters would have been the first of the next cohort (Ward and Strickland 1978, 16). On this occasion an entrance must have been constucted in the middle of the rear wall of the centurion's quarters, certainly in a position where it could not normally exist. This is indicative of the flexibility which could be brought to bear in certain circumstances. Entrances to the centurions' quarters must usually have been at the end of the building and from the veranda although indications are few.

Type A barracks and other barrack forms usually have centurions' quarters which are integral with the rest of the building but sometimes they are divided from the men's quarters by a narrow alley or passage some two metres wide. It is clear from Figure 18 that non-integral centurions' quarters are very unusual. In only two fortresses, Inchtuthil and Chester, is this feature found in all the barracks. Haltern, Wroxeter and Gloucester have examples of both forms while it seems that Potaissa has the passage in the single barrack sufficiently well-known to be able to judge (M. Bárbulescu pers comm). In all other fortresses where it occurs, Caerleon, Nijmegen Periods 4 and 5 and Lauriacum, the evidence derives only from the untypical first cohorts.

The association of this feature with *Legio XX* is immediately apparent. Taking the cohort-block as the standard unit, in five building periods at four fortresses, *Legio XX* is responsible for 22 examples with and only four without the division. The exceptions come from the Berkeley Street barracks at Gloucester and apparently from all the examples at Colchester. But it should be pointed out that *Legio XX* did not initiate the style at Chester because the earliest timber phases at the Princess Street/Hunter Street and Northgate Brewery barracks have this feature and it is thought that these barracks were built at the time when *Legio II Adiutrix* was in garrison *c* 74/79 - 87. The Wroxeter barracks too were built by *Legio XIV* rather than by *Legio XX* and so it must be said that the type is a general feature of the early cohort barracks in *Britannia*. The only examples elsewhere are at Haltern (cohorts 11g, 11b, 11a), but this fortress also has as many examples with integral centurions' quarters and indeed both forms appear to be present in cohort 11g. The example from Potaissa dates at the earliest from towards the end of the second century. No other legion demonstrates the same attachment to the feature as *Legio XX*.

This bears out von Petrikovits' view that this arrangement is a first century characteristic (1975, 62), but it is a feature which endures throughout the history of the fortress at Chester. Certainly the passage would have facilitated movement about the fortress and the cobbled surface which it received in the Deanery Field barracks at Chester shows that it was expected to take traffic. That such traffic was not always appreciated may be shown by the presence of two postholes across the passage associated with a second occupation level in the second century. The posts were of the right size to support a small barrier. At the Northgate Brewery site again at Chester, the alley was blocked with a stone wall in the third century, this time, it is suggested by the excavator, to make the centurion's quarters more comfortable and to spare them from draughts (Ward and Strickland 1978, 25-26).

In the cohort barracks, the position of the centurions' quarters at the head of the barrack is not quite universal. At two fortresses an important variation is to be seen (Building Type Z, see Figure A). It is now clear that throughout the fortress at Bonn, the stone Flavian barracks follow a pattern whereby, while the two end barracks of each cohort have Type A barracks of the normal form, the internal barracks have centurions' quarters across both ends of the intervening two double rows of *contubernia* thus forming an elongated H-shape. Close examination of the plan of Vetera I suggests that such an arrangements is also being followed there. This is true for both sides of the fortress and thus for both *Legio V* and *Legio XV*. These examples mark the only occurrence of Type Z to date, both in the same province if not built by the same legion.

It must be mentioned here that centurions' quarters seem not to be present at all at Lauriacum (except for the first cohort) or at the Niedermünster barracks in Regensburg until Period 3, that is until the fourth century. Von Petrikovits associates this absence at Lauriacum with Septimius Severus' grant of 197, which allowed the soldiers to contract legal marriages, and surmises that the centurions were now living with their families outside the fortress (1975; 67, 134-5). Baatz suggests that this absence may be more apparent than real. Possibly the centurions' quarters were timber buildings built before the rest of the stone barracks and were not observed by the early excavators; furthermore there appears to be evidence for habitation in the form of heating systems in the positions properly occupied by the centurions' quarters (Baatz 1977, 269). The evidence from

Oberaden shows that centurions' quarters could be built independently before the rest of the barrack.

But Baatz's explanation is thrown into doubt by recent findings in Regensburg. The excavations under the Niedermünster failed to find any centurions' quarters associated either with the post-trench men's quarters of Period 1. or with the stone-sill men's quarters of Period 2, both periods dating to the third century. Centurions' quarters are first present in Period 3 in the fourth century. These results are contradicted by the evidence from Grasgasse in the last *scamnum* of the *retentura* on the south side of the fortress. Here it was found that centurions' quarters were present from the earliest period and that they were constructed with stone sill walls in contrast to the probable timber of the men's quarters (Fischer 1986, 150). This would tend to confirm that centurions' quarters were indeed absent at the Niedermünster. It is possible that centurions were after all living outside the fortress; the identity of the buildings as barracks can hardly be doubted.

Dimensions

It was seen in Chapter 1 that the areas of the officers' quarters displayed greater consistency than the other elements of the barracks. It is possible that this consistency will be reflected in their dimensions.

Figure 19 shows the lengths and widths of the centurions' quarters of the cohort barracks. The distribution is fairly scattered but it is clear that there are only isolated examples longer than 32 m and wider than 14 m. This leaves two main concentrations: one with lengths which vary between 20 and 28 m, but the range of whose widths is more restricted between 9 and 13 m; the other a group with rather smaller dimensions *c* 8 × 8,5 m. With the exception of all the buildings *c* 15 × 22 m which derive from Vetera and Bonn, all the examples wider than 16 m are from the first cohorts, most of them being courtyard houses. The group of small examples comes entirely from the Augustan/Tiberian period leaving the main central group which contains examples from all periods.

The distribution for the Augustan/Tiberian period taken alone shows that its examples are to be found throughout the Figure but that the concentration of small examples derives entirely from this earliest period. All the examples over the length of 28 m come from Breite North Gate at Vindonissa, those remaining in the central group come from the same site, also from Cohort 11d at Haltern and from Dangstetten. The group of small examples is very distinctive. It contains all the buildings in the north-west corner at Oberaden as well as the centurion's quarters from 'Albrecht's Barrack' of the same fortress. Also present here are the quarters from cohorts 11b and 11g at Haltern and from Rödgen. It is interesting also that the two small buildings south of 'A' at Rödgen are on the edge of this group at *c* 6 and 6,5 × 6 m. It may be possible to think of them as providing officer accommodation. To do the same for the smallest building of *c* 4 × 4 m from Nijmegen is more difficult although it is reminiscent of the small quarters at Oberaden (J. E. Bloemers pers comm).

The Claudian/Neronian period again shows considerable variation in lengths although the concentration of small values has disappeared. The width variation covers the whole range of the central group. The isolated wide examples are from Vetera I where the barrack configuration is of Type Z as

mentioned above. Apparent is the relatively great size of the centurion's quarters at Longthorpe Building XIV of *c* 35 × 17 m. All the other examples longer than 32 m come from Period 2 of the Breite North Gate site at Vindonissa. These are exceptional values even for Vindonissa, the Breite barracks there providing most of the examples of the central group. Noteworthy is the contrast provided by the *Britannia* examples from Colchester, Exeter and Wroxeter. All of these are found within a length variation of 4,0 m and a width variation of 3,5 m. They constitute the lowest seven examples of the central group. It is striking that the examples from Exeter are no smaller than those from Colchester and Wroxeter although their barracks are shorter overall.

The Flavian period presents a much more concise picture. The very wide examples are the courtyard houses of the first cohort centurions at Inchtuthil and Nijmegen while the three remaining wide examples are the quarters of the Type Z barracks at Bonn. The rest of the examples present a much reduced range of lengths and widths which spans really just two metres. The two smallest examples derive from Nijmegen: the South-West Corner Period 3/4 and Praetoriumstraat Period 4. These quarters are noticeably smaller than the small examples from *Britannia* in the previous period and are also smaller than the two examples from Gloucester of *c* 20 × 10 m. These latter, together with the examples from Inchtuthil, in turn conform very closely with the examples from *Britannia* in the previous period. Neuss and Vindonissa provide the bulk of the evidence in the central group while the longest three examples come from Bonn.

The Hadrianic/Trajanic period provides an even closer concentration. The first cohort quarters from York and Caerleon provide the very wide examples while the smallest is the building which seems to be additional to the range of the courtyard houses at Caerleon. It is apparent that this building conforms very well to the size of the other centurions' quarters mentioned for *Britannia*. The two remaining examples from Caerleon have a two metre variation in length, but very remarkable is the uniformity shown by the half dozen Chester examples which vary hardly at all in spite of the narrow final *scamnum* and the different *per scamna* orientation of the Hunter Street/Princess Street barracks. The Davygate barracks at York also are of this size.

The Antonine barracks from Caerleon and Chester continue this pattern even though the Northgate Brewery barracks at Chester in this phase are about one metre shorter overall. In the Severan period, the Aquincum examples cover exactly the narrow Chester/Caerleon range and it is only in the third century that the pattern again becomes more disparate.

The great size of the first cohort examples from Lambaesis is apparent, but at *c* 26 × 16 m, the centurions' quarters from cohorts D and E are the same length but much wider than examples from other fortresses. The smallest example comes from the first cohort at Lauriacum at *c* 16 × 13 m, otherwise the remainder falls into the central group. It is interesting again that the centurions' quarters from Carnuntum vary in length by only three metres which is rather less than the range of their overall barrack lengths might imply.

In general it is clear that the centurions' quarters cover a very wide range of sizes, but that this range gradually diminishes until the Antonine/Severan periods. The third century evidence again displays much greater variation. Remarkable is the uniformity shown by the evidence from

Britannia and which broadly seems to fall into two groups according to length, the longer group of *c* 24 - 26 m comprising York, Chester and Caerleon, the shorter group of *c* 18 - 21 m comprising Inchtuthil, Wroxeter, Gloucester, Colchester and Exeter. There is not sufficient evidence to attribute sizes to any particular legion, but there does seem to be a clear provincial type for *Britannia* whose centurions' quarters concentrate at the base of the main central group of Figure 19.

It is also evident that the sizes of the centurions' quarters show much greater uniformity than those of the barracks overall, even within the same fortress. This very fact suggests that the seniority of the centurions is not reflected in the size of their quarters, those of the first cohort excepted. The centurions' quarters of cohort 11d at Haltern and of the cohort to the west of the North Gate at Vindonissa are the only examples where the quarters are consistently larger than those of other cohorts in the same fortress. Even these two are special cases. The dimensions of the buildings at Haltern are far from certain and the irregularity of the fortress at Vindonissa gives extra depth to the last *scamnum* which these barracks filled. The length proportions of the quarters are not different to those of other barracks in the fortress. In neither of these cohorts, although the individual quarters do vary in size, is any pattern of seniority discernible and this is true of all the cohort barracks, again with the exception of the first cohort. This remains true even with the Type Z barracks at Vetera I and Bonn. The centurions at both ends of the double barracks and the centurions of the end barracks of the cohorts all have quarters which are not significantly different in area.

The Men's Quarters

Dimensions

Figure 20 shows the lengths and widths of the men's quarters of the cohort barracks. The lengths vary very considerably, by some 30 m, but the variation in widths is very minor in comparison, essentially only some four metres. This is a considerable contrast to the centurions' quarters. The variation in the lengths of the men's quarters is evenly distributed over 30 m while that of the centurions' quarters is much more concentrated within *c* 15 m. Given the shorter length of the centurions' quarters, perhaps this is not surprising. By way of contrast, the widths of the centurions' quarters have a wider range of variation, some six metres in their principal concentration.

The evidence for the Augustan/Tiberian period presents a very disparate picture and covers almost the entire range from all periods. The examples from Rödgen alone span the entire range, from lengths of 62 m to the three smallest examples. Evidence from Vindonissa at West Gate Königsfelden and Breite North Gate varies by some 11 m in length while the Haltern examples 11b, 11g, and 11d range over eight metres. The examples at both Dangstetten and Oberaden ('Albrecht's Barrack') at over 58 m are comparable with the long Rödgen quarters.

The Claudian/Neronian period shows a very similar range of lengths, but the widths are more narrowly confined, now ranging over 2,5 m rather than 3,0 m. The evidence divides into two main groups according to length, one *c* 50 - 60 m, and the other *c* 40 - 45 m. The longest example is from Longthorpe and stands alone. The two lengths of *c* 64 m are from the Breite North

Gate at Vindonissa and examples from Vindonissa span the whole of the rest of the evidence, some 24 m. The smallest examples come from Königsfelden West Gate Period 5 and from Breite Periods 3 and 4, while all those in the middle concentration derive from Breite North Gate. The irregular shape of the fortress must go a long way to explain these variations, variations which are more pronounced than those in the centurions' quarters. The group of smallest examples includes those from Exeter while those from Colchester and Exeter fall in the middle of the total range.

The evidence for the Flavian period continues to cover about the same span but clearly divides into three groups at lengths of *c* 43, 50, and 60 m. Again examples from Vindonissa are to be found in all three groups, while all the examples from Periods 4 and 5 at Nijmegen are in the group of shortest quarters with the exception of the first cohort barracks of Period 5 whose men's quarters measure *c* 49 m. The remainder of the central group is made up of examples from Neuss and Bonn. The group of longest quarters, which contains many of the longest men's quarters from any period, has some seven examples from Inchtuthil and two from Chester. It is interesting that two fortresses connected with the same *Legio XX Valeria Victrix* should produce such similar and fairly unusual results. But the examples from Chester, Princess Street/Hunter Street Period 1 and Crook Street, in spite of being in the same general group, are separated by some five metres. This is in spite of the remarkable uniformity of their centurions' quarters as pointed out above. On this occasion, the cause of the greater length of the Princess Street/Hunter Street quarters may be the *per scamna* alignment of the barracks. Most striking of all is the difference at Gloucester between the Eastgate/New Market Hall quarters with 80 m and the Berkeley Street quarters with 52 m. Both barracks are aligned *per scamna*, but an explanation may lie in the presence of the first cohort in the longer quarters.

The Trajanic/Hadrianic period provides fewer examples, but again a considerable range of lengths is covered. Period 5 at Nijmegen provides the three smallest examples. The evidence from three sites at Caerleon varies by only four metres in the middle of the range *c* 50 m, but most striking of all is the evidence from Chester. In addition to the examples mentioned in the previous paragraph rebuilt to the same size in this period, the barracks along the *retentura* front at Deanery Field and Northgate Brewery must be mentioned. The length of the men's quarters here is only *c* 50 m. This means that there is a difference of some 13 m in the evidence from Chester. In this case alignment is not the explanation because the barracks in question are aligned *per strigas*. The difference is probably connected with the fact that Chester has six *scamna* rather than the usual five and that the last *scamnum* is shallower than the rest (Carrington 1977). Little is known of the barracks in the *scamnum* at the front of the *praetentura*, but the indications are that the barracks there are of the normal 84 m length for Chester.

The Antonine and Severan periods provide little in the way of variation. Most striking for the Antonine period is the very considerable length of *c* 65 m from Potaissa, for the Severan the very large example of 66,25 × 9,90 m from Regensburg Niedermünster Period 1. The third century evidence is full of variety. The fairly scattered group of very wide buildings derives entirely from the first cohort at Lambaesis. Cohorts D and E in the *praetentura* are rather narrower but relatively long at *c* 71 m. There is an anomaly in the evidence from Lauriacum. The first cohort and all the others known except cohort J have lengths of *c* 70 m for the men's quarters,

but the same measurement for cohort J appears to be 47,50 m. Exactly this measurement is found for the short barracks of cohorts F and H in the *praetentura* at Carnuntum while the others have lengths of *c* 63 m.

The variability in the size of the men's quarters, in contrast with that of the centurions' quarters, is the product rather of the availability of space within the pre-formed *scamna*, rather than of seniority. As has been pointed out, there is no clear patterning in the distribution of barrack lengths in the fortresses.

Relationship between Centurions' and Men's Quarters

Lengths

Figure 21 displays the lengths of the cohort barracks and the lengths of their attendant centurions' quarters fortress by fortress and irrespective of period. On the whole the lengths of the centurions' quarters can be seen to be more constant than those of the men's quarters. Vindonissa stands out for its inconsistency and Inchtuthil, Chester, Vetera I and Bonn for their consistency. The lengths of many of the centurions' quarters tend to increase with the overall lengths of the barracks as, for example at Colchester, possibly Caerleon and possibly Neuss, but clearly this is not so at Inchtuthil, Chester, Gloucester, Vetera I and probably Bonn. In these fortresses the length of the centurions' quarters seems to have been predetermined. This approach would seem to have a strong connection with *Britannia*.

Figure 22 contrasts the lengths of the centurions' quarters and the men's quarters according to period and demonstrates the great variety of the evidence. There is a very wide range of component lengths and little that can be called a concentration. The greater consistency in the lengths of the centurions' quarters is apparent. But it was shown in Chapter 1 that there is a clear relationship between the two lengths, the centurions' quarters often taking up *c* 25 % or *c* 33 % of the total barrack length (Figs 7 - 7.7).

The Augustan/Tiberian period presents by far the most varied picture. It has been mentioned above that there is a striking agreement in the small sizes of the centurions' quarters of at least some of the barracks from three different sites. They all have centurions' quarters lengths of between seven and nine metres, even though their men's quarters' lengths vary from 40 to 63 m. Among the other examples there is great variety for both quarters even within the same cohort-block as at Vindonissa Breite North Gate Period 1. This is in spite of the fact that the shape of the cohort-block is not very irregular. The effect of these variations is that the percentages of the overall length taken by the centurions' quarters are the smallest and also the most varied of any period.

The Claudian/Neronian period presents a considerable contrast. The percentage values from Vindonissa still range very widely in this period and only the evidence from Vetera I approaches the mark of 33 % very clearly. It is very striking that the Type Z barracks should achieve this, ie 15 % at both ends of the double barrack. But the data for this period from *Britannia* is very interesting. The extraordinarily small size of the Exeter barracks at Goldsmith Street is evident, with lengths of *c* 17,50 /

43,00 m. In spite of this the centurion's proportion is still *c* 30 % in both examples. This contrasts with Colchester Culver Street and Lion Walk. Here the length of the centurions' quarters is little more than at Exeter, but in the longer barracks still produces a proportion of 22 %. Thus it is the men's quarters rather than the centurions' quarters which have suffered at Exeter. Longthorpe Building XIV stands isolated at *c* 70 / 34 m and in contrast with the other barracks in *Britannia* produces a figure of almost exactly 33 %.

The wide range of percentage values diminishes dramatically in the Flavian period. The evidence comes now largely from the central group of Figure 22. There is now a ten metre variation in the range of centurions' quarters lengths and a 20 m variation in the range of the men's quarters lengths. The figures from Vindonissa are as inconsistent as usual but they contrast with the evidence from Nijmegen Period 5 (deriving from five different cohorts), Caerleon and Neuss which clearly centres on 33 %. The Bonn barracks produce consistently the figure of 37 % from four different cohorts. Berkeley Street Goucester on the other hand has centurions' quarters' proportions of almost exactly 25 %. The other extraordinary first cohort barracks from Gloucester have the quite exceptional proportion for this period of 20 %. With the Berkeley Street barracks from Gloucester may be taken the evidence from Inchtuthil. The Inchtuthil evidence consistently produces the figure of 25 %.

It will be recalled that the evidence from Colchester gave proportions of c 22 %. The latter three fortresses were all built by *Legio XX* and all in all, the 25 % proportion is highly unusual in other cohort barracks. It is not too much to suggest that, in this respect at least, it was the practice of *Legio XX* to build in the proportions of 1 : 3 rather than of 1 : 2. Unfortunately the full length of the barracks at Wroxeter is not known, but it is clear that there too the lengths of the centurions' quarters are small, *c* 19 m, and directly comparable with Colchester and Gloucester. But by the time the legion came to Chester it seems that a change had taken place because the lengths of the Crook Street barrack Phase 1 produce a percentage of *c* 30 %. *Legio II Adiutrix* had established the fortress at Chester and the existing proportions of the buildings may have been enough to induce *Legio XX* to change its ways, but it should be remembered that *Legio XX* did at least continue to build barracks with a space between the centurions' and men's quarters. If this practice too was a feature of the building of *II Adiutrix* it does not seem to have survived the transfer to Aquincum.

Further contraction in the overall range of lengths takes place in the Trajanic/Hadrianic period. In spite of this the very wide range of figures from Chester is most striking. As has been remarked above, the centurions' quarters at Chester seem to be remarkably uniform and here there is information from four different sites which give centurions' quarters *c* 25,50 m while the lengths of the men' quarters range from 50 to 64 m, producing percentages of 29 - 34 %. By way of contrast, the lengths of the centurions' quarters at Caerleon seem to have varied much more from cohort to cohort, although not quite directly in proportion to the overall barrack length. The effect of this is to produce results which range from *c* 30,50 to 34,00 %.

For Caerleon the same continues to be true in the Antonine period, while at Chester the pattern of the previous period is being repeated with the short

barrack of the Main Stone Phase at the Northgate Brewery. In the Severan period it is again true at Princess Street/Hunter Street Period 3.

It is the third century buildings which again show a sudden increase in the variety of lengths. Just as suddenly there is a move away from the 33 % standard. Again there is great variety within the same fortress. Period 3 at the Niedermünster in Regensburg has *c* 24 % while cohorts D and E at Lambaesis have c 26 %. The first cohort at Lambaesis gives proportions from *c* 35 - 41 %. At Carnuntum the range is rather less, 29 - 36 % in spite of the huge difference in barrack lengths between the *praetentura* front and the rest of the *retentura*. Most surprising of all is Lauriacum. 19,50 % is the value for the first cohort; for the rest of the fortress securely excavated centurions' quarters are absent, but the theoretical calculation is for only 18 % except for the anomalous cohort J. These are the smallest proportions since the Augustan/Tiberian period.

The proportions bear very little comparison with those which may be extrapolated from Hyginus' provision for the marching-camp: 20 % (for eight *contubernium* groups) and 16,66 % (for ten *contubernium* groups).

Areas

Figure 23 compares the areas of the centurions' quarters with their men's quarters. The centurions' quarters concentrate between 200 and 350 sq m and the men's between 300 and 500 sq m. Clearly the figures cover a very wide range and reveal no clear concentrations although the greater consistency in the size of the centurions' quarters can be seen.

The component values in the Augustan/Tiberian period are very disparate and this disparity continues into the Claudian/Neronian period. The diffuse evidence is particularly clear at Vindonissa and continues throughout the life of the fortress. The range of the evidence contracts in the Flavian period and this accentuates the extraordinary nature of the men's quarters at Eastgate Street/New Market Hall Gloucester (*c* 625 sq m). By way of contrast there is considerable agreement in the size of the centurions' quarters between *c* 225 and 325 sq m in the remaining three periods. The evidence for these figures is drawn from five fortresses. The sizes of the men's quarters remain as disparate as ever.

The centurions' and men's quarters areas follow trends which are familiar from the study of the component parts above. Those examples such as Inchtuthil and Gloucester the length of whose centurions' quarters take up *c* 25 % of the total barrack length find that the area proportions come up to *c* 33 %, while those whose centurions' quarters take *c* 33 % of the overall length find that the area proportions come up to *c* 40 % and this covers most of the barracks. The area proportions of the Type B barracks such as Rödgen and Dangstetten will remain the same as the length proportions. Fortresses such as Vindonissa and Carnuntum give very wide-ranging results even from within the same cohorts.

The *Contubernia* of the Cohort Barracks

The division of the *contubernia* into front and rear rooms (*papilio* and *arma*) is the form almost universally found in the cohort barracks. It has been noted above that the different barrack Types at Gilberd School

Colchester and at Potaissa mean that the division is not present while at Lauriacum the *arma* have an additional central subdivision at right angles to the central partition. The only very radical departure from the usual form is to be found at Lambaesis. There in the barracks of the first cohort, although the *contubernia* associated with the smallest centurion's quarters take the usual form, those of the other centuries are composed of three or four rooms. The *contubernia* of the other cohorts also diverge from the normal pattern. Here access to the *papiliones* is not through the *arma* but rather through a passage which runs alongside the self-contained *arma*.

Special *Contubernia*

While many cohort barracks have standard *contubernia* throughout the length of their men's quarters, there is a substantial minority where the first and last *contubernia* take a different form. These forms are defined in Figures C and D.

The first *contubernium* (next to the officers' quarters) takes some 11 different forms, nine of which occur in legionary barracks (Fig 24). In the cohort barracks, by far the most common is Type 'a', that is a first *contubernium* like the others in the men's quarters. Type 'a' predominates in all periods except in the third century, but here there are only four examples in total. Apart from Type 'a', the most common is Type 'h', present in considerable numbers in the Claudian/Neronian and Flavian periods and still found in the Trajanic/Hadrianic and Severan barracks. In the Claudian/Neronian period it occurs at Colchester and Vindonissa, but most prominently at Neuss in the Flavian period. The two very similar Types 'e' and 'f' are found in the Flavian and Trajanic/Hadrianic periods at Nijmegen and Gloucester. The only other notable grouping is of Type 'd' in the Claudian/Neronian and Flavian periods at Vindonissa and also at Neuss. Other Types occur only incidentally. Longthorpe Building XIV is alone in having two special 'first *contubernia*' (Type 'g').

The predominance of Type 'a' should be emphasised and many fortresses have only this Type throughout, but some do have a greater range. Vindonissa has six identifiable types, while Neuss has three; several others have two. There are no clear fortress Types, but Type 'f' is particularly associated with Nijmegen Period 5, Type 'd' with Vindonissa and Type 'h' with Neuss. The evidence is insufficient to connect the Types with particular legions.

The end *contubernium* of the men's quarters takes some fifteen different forms. Nine of these are found in the cohort barrracks (Fig 25). Again the standard Type 'a' predominates in all periods and to about the same degree as for the first *contubernium* Types, but on this occasion the remaining evidence concentrates much more into just three other Types, 'k', 'n' and 'o'. Type 'k' refers to the Type Z barrack form and has been found only in the Claudian/Neronian and Flavian periods at Vetera and Bonn respectively. Type 'o' occurs in just one period, the Flavian at Neuss and very strongly at Nijmegen with seven examples. Most long-lived is Type 'n' which is found in all of the first six periods and in five fortresses. The strongest adherence to any particular Type is at Chester and Neuss which both give four examples of Type 'n' and at Nijmegen in Period 5 where there are seven examples of Type 'o'. There is little basis to connect any legion with a particular Type, but 'concluding walls' (Type 'o') appear to have been used in the barracks of the first cohort at York in the mid second century in

the same way as they were used at Neuss for Buildings 149-144 and 7-12 in the Flavian period. In both fortresses construction was by *Legio VI*. Elaboration of the ends of the barracks may have been more common than excavation has revealed (Pitts and St Joseph 1985, 154).

Figure 26 shows the distribution of these first *contubernia* in terms of area when plotted against the area of a standard *contubernium* in the same barrack. Immediately apparent is the great disparity of the special first *contubernia*. They can be smaller. of the same size, or much larger than their counterparts in the same barrack. There is no apparent concentration round any particular size acording to Type.

Very similar comments may be made concerning the areas of the special last *contubernia* and *Schlußbauten* (Fig 27). At least it is possible to say that the special end *contubernia* are always larger than the ordinary *contubernia* and usually at least twice as large. The same is true of the very disparate distribution of the end *contubernia* which have been extended and made into two or three room quarters or *Schlußbauten*. They have no commonalty of size to suggest a clearly-defined purpose.

The very variety of the different Types shown in Figures B and C also speaks against there being any single simple interpretation of these special *contubernia* and excavation has yet to reveal any strong clues. The special first *contubernia* may perhaps be regarded as guard-rooms or as a store-rooms, possibly for the artillery equipment of the century. In any event, it was sufficiently important to Barrack U1/K1 in the North-East Corner at Vindonissa (admittedly not a cohort barrack) to be retained through four building periods, even though the total number of *contubernia* was reduced by one in three out of the four periods. What is more, it is the centurion's quarters which increased in length necessitating, in the fourth period, the demolition of the dividing wall between the *papilio* and *arma* which was constructed of tufa and mortar of the second *contubernium* of the third period (Simonett 1938, 87-88). The excavator regarded the special first *contubernium* as an entrance hall to the centurion's quarters and this may have been true here, but it is not an arrangement which is demanded by the room layout of most centurions' quarters. Indeed, the special first *contubernium* at North Hill Colchester seems to connect with the second *contubernium* rather than the centurion's quarters.

Bogaers and Haalebos (1983) have suggested that the special first *contubernia* at Nijmegen were the location for the foot of a staircase leading to a second storey. But it is difficult to see why the barracks should need the extra accommodation thus provided and the proposal leads to severe problems for the construction of the building which will discussed in Chapter 7. It must be remembered that in most barracks, the first *contubernium* takes a standard form.

With regard to the special end *contubernia*, the most plausible explanation for the *Schlußbauten* (Type 'j') is that they provide more extensive accommodation for the *principales* of the century who would include at least three: *tesserarius*, *optio* and *signifer*. On the other hand Type 'm' with its open front as in the *praetentura* barracks at Carnuntum, has much more the appearance of a guard-room or a storage place for artillery weapons or vehicles. Most often the intention seems to have been to emphasise the private nature of the court between the facing rows of *contubernia* or of the verandas themselves (Types 'n' and 'o'). Indeed the end of the veranda enclosed in the manner of Type 'o' seems to have been thought suitable for

the emplacement of small latrines (see Chapter 7). The extension of the ends wall right across the barrack court (Type 'n') may reflect fortress discipline for it implies restrictions on the movements of the soldiers. On the other hand the walls may may simply be a means of protecting them from draughts or smells.

The presence of these special *contubernia* may provide a clue to the reason for the presence of more than the theoretical requirement of ten in the cohort barracks. Accepting the statement in the first chapter of Hyginus that there are 80 men in a century and that there are eight *gregales in a contubernium* group, the theoretical requirement is for a total of 10 *contubernia* for each cohort barrack. Furthermore, it has also been shown that the legionary cavalry were carried on the books of the legionary centuries and are likely to have lived in the cohort barracks rather than in special quarters of their own (Breeze 1969) and the same probably is true of the rest of the *immunes* (Baatz 1977, 267; Pitts and St Joseph 1975, 172). This means that in most cohort barracks there may be two or three *contubernia* spare. On occasion they would house the men of over-strength centuries, but they could also be used for purposes other than accommodation and sometimes receive special architectural treatment.

Contubernium Totals

The *contubernium* totals were discussed in general in Chapter 1 (Figs 9 - 9.7). For the cohort barracks the Augustan/Tiberian period exhibits a trend to large values with possibly 16 *contubernia* from the barrack to the east of 'A' at Rödgen and 15 *contubernia* from 'Albrecht's Barrack' Oberaden and from Building 4 of Breite North Gate Period 1 at Vindonissa. Cohort 11d at Haltern may well have had barracks with 14 *contubernia*. There are no examples of less than 10.

As is to be expected at this period, the number of *contubernia* does not remain consistent within the same fortress. At Haltern, while Cohort 11d has 14, the number in Cohort 11b ranges from 10 to 12 and at Rödgen there are examples of both 16 and 11 *contubernia*. Within the same cohort in Period 1 at the North Gate Breite at Vindonissa there are probably examples of both 15 and 12 *contubernia* from Buildings 4 and 2 respectively.

The Claudian/Neronian period shows greater uniformity with most examples having 12, 13 or 14 *contubernia*. Even the very small barracks at Exeter probably have 12 *contubernia*, at least at the Goldsmith Street site. Longthorpe Building XIV is exceptional with 16 *contubernia* (including as part of this number two special first *contubernia* of Type G). Discrepancy within the same fortress diminishes in this period. The Cohort of Period 2 at North Gate Breite Vindonissa gives a variation of only 11 to 13 rather than 12 to 15 of the previous period.

The Flavian period offers little in the way of exceptional values. Nearly all examples are in the range of 11 to 14 *contubernia*. Striking is the emphasis on low values in the short barracks at Nijmegen, particularly in Period 4. In the first cohort and in cohorts A, B and D there are examples of 10 *contubernia* which, in cohort D, continue into Period 5, while in this Period Barracks 1 and 2 of the first cohort have just eight *contubernia*. The most exceptional total for the period is from the Eastgate Street/New Market Hall barracks of the first cohort at Gloucester. Here it is possible that the barracks have 19 *contubernia*. This is made possible by the

considerable length of the barrack in its *per scamna* alignment in the right *latus praetorii*. Variation within the same fortress continues. The Inchtuthil barracks would all seem to have 14 *contubernia*, but the longer Barrack 53 has 15, while at Neuss the totals fluctuate between 12 and 13. Variation within the same cohort also occurs, for at Period 4 in Nijmegen, cohorts A and B both have examples of 10, 11 and 12 *contubernia*.

The Trajanic/Hadrianic period offers nothing exceptional. Examples from Chester vary from 11 to 12 and at Caerleon from 12 to 13. The same can be said of the Antonine period. Such a picture continues into the Severan period where the *retentura* barracks at Aquincum would seem to have 12 and the *praetentura* barracks 13 *contubernia*. Evidence from the third century does not break this established pattern. Surprising is the fact that the great difference in length in the barracks of the *praetentura* and *retentura* at Carnuntum produces only a difference of one in the number of *contubernia*, 11 to 12. The large barracks of cohorts D and E at Lambaesis still have only 14 *contubernia*.

It would appear that there is a connection between the lengths of the barracks and the *contubernium* totals. Figure 28 compares the number of *contubernia* with the overall length of the barracks. It can be seen that there is a broad correlation between the two. Although 12 *contubernia* are found in barracks of most lengths, those with 10 *contubernia* concentrate below 70 m and those with 13 and above concentrate over 74 m. The evidence from the Augustan/Tiberian period is very haphazard, but therafter the evidence is much more clearly regulated. There is a tendency for the Claudian/Neronian evidence to concentrate among the low values with three very long barracks providing the exceptions. The considerable Flavian evidence is spread over much of the central area of the graph while the later evidence is not exceptional although there is a tendency for the Trajanic/Hadrianic examples with 12 *contubernia* to be found in disproportionately long barracks.

In Figure 29 the number of *contubernia* is compared with the length of the men' quarters alone. The distribution displays a more precise correlation than in the previous graph. Ten *contubernia* concentrate on the men's quarters length of 40 m, 13 *contubernia* on 55 m and the trend continues on to 15 *contubernia* at 62 m. The rule is not hard and fast and examples of high totals of *contubernia* at quite low lengths occur and *vice versa*, but the distribution makes it possible to say that the length of the men's quarters alone was more important for deciding on the number of *contubernia* than the overall length of the barrack. Thus the *contubernium* can be seen as a fairly constant unit in the planning of the cohort barracks.

According to Figure 29, the very haphazard distribution of the Augustan/Tiberian data seems to have come more under control. The Claudian/Neronian evidence concentrates among the low values more markedly than before and the exceptionally long examples from the same period are not so conspicuous. Again the Flavian material has a very wide distribution, but one which clearly correlates the number of *contubernia* and the length of the men's quarters. Thereafter there is little exceptional although there is a tendency for the Trajanic/Hadrianic barracks with 12 *contubernia* to be found among the disproportionately long examples.

Baatz has proposed the prevalence of 13½ Roman feet (4 m) in the spacing of the dividing walls between *contubernia* leaving a free 13 feet for the

interior breadth (1975, 65). Figure 30 sets out the spacing (ie the distance between the mid points of the two side walls of the *contubernia*) of the cohort *contubernia* according to period. It is true that 13½ feet is the interval most commonly found, but the evidence as a whole covers a very wide range and distances from *c* 3,2 to 4,7 m are all common. Points of concentration occur at 3,5 m and 4,3 m which might indicate spacings of 10 and 13 Roman feet respectively. The evidence from the Augustan/Tiberian, Claudian/Neronian and Flavian periods is broadly similar; in the later periods the spacings increase in width.

Contubernium Areas

Contubernium living space was discussed in general in Chapter 1 (Figs 10 - 10.7). It has been shown that there is a general correlation between barrack length and *contubernium* totals, but this is not sufficiently strong to result in a standard *contubernium* size when complicated by the variation in the widths of the men's quarters. The sizes of the *contubernia* tend to reflect the overall size of their barrack. Thus the *contubernia* of the cohort barracks display a wide range of sizes which, with the exception of the Augustan/Tiberian, remains fairly constant throughout all periods. Unlike other elements of the barracks, *contubernium* size does not vary very much within the cohort group, although Vindonissa provides many exceptions to this statement. On the other hand considerable variation from cohort to cohort often occurs.

As is to be expected, the *contubernia* are generally at their smallest in the Augustan/Tiberian period. Haltern provides five examples from 12,75 to 16,25 sq m and those from Rödgen range from *c* 16 to 18 sq m. Nevertheless, very large examples come from Oberaden 'Albrecht's Barrack' (35,37 sq m) and Dangstetten, the southern Barrack to the East of Straße II (37,55 sq m). Small sizes persist into the following two periods at Exeter (*c* 18 - 24 sq m), Wroxeter and Gloucester (both *c* 20 sq m). But from the Claudian/Neronian period onwards it is the occasional very large examples over *c* 30 sq m which are more in evidence: Longthorpe Barrack II (33,30 sq m), Vetera I Barrack O (29,00 sq m), Inchtuthil Barrack 18 (31,33 sq m), Vindonissa Breite *valetudinarium* Period 3 Buildings VI and VII (36,82 sq m), Chester Deanery Field (30,82 sq m), Chester Hunter Street/Princess Street (30,59 sq m), Chester *praetentura* (38,25 sq m), Wien Wildpretmarkt/Bauernmarkt Building A Phases 1-3 (30,81 - 33,60 sq m), Potaissa (35,88 sq m), Lauriacum cohort J (32,78 sq m), Lambaesis (32,16 - 36,00 sq m). In the light of this evidence the figure of 77,28 sq m from Red House Corbridge surely is sufficient to call into question the interpretation of the building as a barrack (Hanson, Daniels, Dore and Gillam 1979, 81).

It might be thought that construction methods would affect the living space available in the *contubernia*. Figure 31 shows that the *contubernia* of the 'stone' barracks were more roomy. It might have been thought that wall thickness would limit the living space, or at least not augment it, but the opposite seems to be true. Figure 31 shows that both timber and stone barracks share many of the same values, but that the bulk of the stone-built *contubernia* have more space than the timber *contubernia*.

Total Living Space

Again, the total men's living area in the barracks (taking into account special first and last *contubernia*) was discussed in Chapter 1 (Figs 11 - 11.7). Clearly it is a product of the size of the *contubernia* and their total (tending to increase with the length of the men's quarters). Again the very large size of the barracks at Oberaden (530,55 sq m) and Dangstetten (413,05 sq m) is apparent in the Augustan/Tiberian period. Longthorpe Building XIV sustains this size into the next period with 434,32 sq m largely as the consequence of 16 *contubernia*. Vindonissa has four examples larger than 340 sq m from Breite Period 2 and from Breite *valetudinarium* Period 5. These large areas are the product of large numbers of *contubernia* rather than large *contubernium* size. The same may be said of Inchtuthil in the Flavian period where the calculations all come to more than 400 sq m for the cohort barracks. It will be remembered also that the Inchtuthil barracks were built in the proportions of 1 : 3, but in spite of similar proportions at Berkeley Street Gloucester, the 12 *contubernia* produce only the standard 305,37 sq m. Nevertheless, the 19 *contubernia* of the first cohort barracks at Gloucester have a total area of 492,10 sq m.

On the other hand, 387. sq m is the product of a large *contubernium* allied with a fairly large number of *contubernia*, 13, at Neuss Building 148. The same may be said for Bonn Caserne 12 with 390 sq m. Again in the Trajanic/Hadrianic period it is large *contubernium* size rather than number of *contubernia* which produces 459 sq m in the left *praetentura* at Chester and 367,08 sq m at Princess Street/Hunter Street Phase 1 in the same fortress. The same story is repeated with the 414,96 sq m of Antonine Potaissa, a product of just 11 *contubernia*, but *contubernia* which appear to have no central division. On the other hand, Severan Aquincum's 333,71 sq m in the *praetentura* is the product of fairly average size *contubernia* of 25,67 sq m, but allied with a total of 13. The large *contubernia* at Lauriacum, combined with a total of 12 produce the very large area of 393,36 sq m while the huge areas of Lambaesis cohorts D and E are the consequence of large *contubernia* of 32,36 and 38,74 sq m and the large total of 14.

Conversely, the relatively large number of *contubernia* in cohorts 11d and 11b at Haltern numbering 14 and 12/10 mean that in spite of the small *contubernium* areas of 15,00 and 24,50 sq m, quite reasonable centurial accommodation of 210,00 and 247,50 / 297,00 sq m is achieved. The same may be said for Rödgen where the 16 *contubernia* of the more northerly of the two buildings south of 'A' produce a total of 294,08 sq m but the other buildings with their 11 *contubernia* and small size *c* 17 sq m have areas of only 202,18 and 182,93 sq m. In the Claudian/Neronian period, it has been pointed out that the Exeter *contubernia* are small, but their total of 12 still produce areas comfortably over 200 sq m for the whole barrack. But it must be said that these totals are very much at the bottom end of the legionary scale and smaller than those of their contemporaries.

Thus there is no simple formula for the increase in the area available for accommodation in the men's quarters; as might be expected the size and numbers of the *contubernia* do not conform to any clear rule.

Living Space per Man

In the light of what has been said above, it is clear that there is no sure formula for calculating the living space available to each man in the cohort barracks; to divide the total living space of the men's quarters by 80 would almost certainly produce a false result. The most realistic figure is probably to be achieved by dividing the single *contubernium* living area by eight and the results of this process are shown in Figure 32. The evidence concentrates between 2,4 and 3,2 sq m and peaks at 2,8 sq m. The Augustan/Tiberian period has a number of lower values and the third century displays some large examples, but in general the evidence remains consistent throughout.

Papilio / Arma

Figure 33 contrasts the respective living areas of the *papiliones* and *arma*. In almost all examples the *papiliones* are larger than their corresponding *arma* and the distribution confirms the legionary predilection for 66 % of the total area of the *contubernium* noted in Chapter 1. These proportions are precisely those laid down by Hyginus; the depth of the *papilio* was to be ten feet and that of the *arma* was to be five feet. On the other hand the *papiliones* do not have a standard size to reflect Hyginus' provision for the area of the tent. In the central concentration the sizes of the *papiliones* and *arma* both range over some six metres and there is no indication that either conforms to a norm.

Exceptions to the usual *contubernium* proportions are few. In the Augustan/Tiberian period at Dangstetten the southern Barrack to the East of Straße II probably has *papiliones* smaller than *arma* (15,65 / 21,90 sq m) but most examples of unusual proportions come from the Claudian/Neronian period. The St Nicholas Priory barracks at Exeter are interesting in that they have *contubernia* with quite different proportions in the same barrack. Some have larger *arma* (9,25 / 12,25 sq m) while others have a more usual division (11,50 / 10,20 sq m). This same phenomenon is to be seen in the Bartholomew Street East barracks at Exeter, but here the *papilio* retains the greater area in both: 15,30 / 8,50 sq m and 13,60 / 10,20 sq m. These *contubernia* occur in the middle of the men's quarters and are not examples of special first *contubernium* types. Similar evidence comes from Vindonissa Breite in Period 3. Here Barrack V seems to have four normal *contubernia* with the larger *papilio*, but also six *contubernia* with larger *arma*, the sizes being 14,40 and 10,80 sq m. Barrack III in Period 4 also has larger *arma* than *papiliones*, 13,20 as opposed to 9,90 sq m.

The *valetudinarium* site at Vindonissa presents varied evidence in Period 6. Here again there are examples of large contubernia with different proportions in the same barrack. In Barrack 1 are *contubernia* of 19,10 / 9,75 sq m as well as 14,43 / 14,43 sq m. Barracks 2 and 3 give values of 19,11 / 8,58 sq m as well as 13,85 / 13,85 sq m.

Papilio / Arma / Veranda

Such regularity continues when the *papilio*, *arma* and veranda depths are expressed as percentages of the overall width of the barrack. Figure 34 presents a remarkably uniform picture with the *papiliones* taking 40 - 54 %, the *arma* 25 - 35 % and the veranda 18 - 30 % of the whole. As might be

expected, these proportions are very different to those of 41,67 / 20,83 / 37,50 % which may be extrapolated from Hyginus' provision for the marching-camp.

Taken period by period (Fig 35), the concentrations show remarkable uniformity, even in the Augustan/Tiberian period when considerably more disparity might have been expected. The loosest group certainly comes from the Claudian/Neronian period with a disproportionately large number of *papiliones* below the mark of 40 %. Familiar culprits are Exeter and Periods 3 and 4 at Breite Vindonissa. Breite Period 4 is again responsible for two *papilio* values near 30 % in what otherwise is a very homogeneous distribution for the Flavian period. The very small veranda percentage comes from Phase 1 at Crook Street Chester (11,13 %) which reflects the large size of the Chester *contubernia* mentioned above. This Claudian/Neronian disparity does not appear in the comparison of their men's quarters and verandas, the implication clearly being that the internal proportions of the barracks are not as constant.

For the remaining periods, it is noticeable that the Trajanic/Hadrianic seems to favour relatively wide *arma* and relatively narrow verandas. Evidence for this trend comes from Crook Street Phase 2, the Deanery Field and the left *praetentura* barracks at Chester and the Myrtle Cottage barracks at Caerleon, also from Strasbourg and Wien. This result should not be taken to be a Chester and Caerleon feature since other barracks from the same fortresses present more usual percentages.

The slight evidence for the Antonine and Severan periods falls much more in the middle of the overall range, but the third century examples once more approximate very closely to those of the Trajanic/Hadrianic period. Very low veranda percentages come from Period 3 at the Niedermünster in Regensburg and at Lauriacum. Cohorts D and E at Lambaesis have normal percentage values. The first cohort percentages from Lambaesis, in their very irregular form, have not been included here.

Conclusions

The Augustan-Tiberian Period

At the beginning of the chapter it was explained that the extent to which the barracks of the Augustan/Tiberian period accommodated legionaries and/or auxiliaries is uncertain. In order to explore this question most of the material from the period was included in this cohort barrack section.

It was shown in Chapter 1 that broad distinctions may be made between legionary and auxiliary barracks although precise definitions are not possible. When the barracks from the Augustan/Tiberian supply-bases/fortresses are considered it will be seen that, in their overall dimensions, very few fall within the main concentration of auxiliary barracks. The only exceptions are the barracks of cohort group 11g at Haltern and all the barracks at Rödgen (with the exception of the barrack to the immediate south of Building A, although it is possible that this building does not extend as far to the west as in Schönberger's reconstruction since the post-holes appear to stop some ten metres before this point). All other examples from Haltern, Oberaden and Dangstetten fall within the main legionary concentration.

Cohort group 11g at Haltern itself is problematic. The *c* 60 × 10,5 m of the barracks places them between the main legionary and auxiliary concentrations, but it may be that the neighbouring six small courtyard houses are to be associated with them as quarters for the centurions of the first cohort (von Schnurbein 1974, 69). This would mean that the barracks, as they stand, should be regarded merely as men's quarters; their size then is similar to the other men's quarters at Haltern and those at Oberaden and Dangstetten.

It has been shown that the centurions' quarters in the Augustan/Tiberian period are often of a size considerably smaller than in subsequent periods and the balance of the evidence would suggest that, in this period, this is a indicator of less significance than the overall size of the barrack in its interpretation. Thus the small size of the centurions' quarters at Haltern cohort 11b and Oberaden do not necessarily imply the presence of auxiliaries.

In the light of the evidence it would seem possible to suggest that a distinction may be seen between legionary and auxiliary barracks at this period and that Rödgen in particular was garrisoned by some 1000 auxiliary troops.

General

After the Augustan/Tiberian period the distinguishing of the cohort barracks becomes much less of a problem; what remains are the central questions of the extent to which characteristics of certain legions, fortresses and provinces can be established.

It must be said that there are still insufficient examples of barracks from different sites built by the same legion to be able to speak very clearly about individual legionary types. The one exception to this is *Legio XX* and certain characteristics of the buildings of this legion have been noted in the text.

On the other hand there are several fortresses of long duration with a number of overlying building phases where it might be possible to see the establishment of a fortress type. The prevalent space between the centurions' and men's quarters is an illustration of this process at Chester, while the Type Z barracks at Bonn had at least both timber and stone phases (Graurheindorferstraße), furthermore very possibly built by different legions. But such clear examples are only rarely to be seen. The space between the quarters at Inchtuthil and the unusual proportions of the barracks there, result from a single building phase. Certainly, only in the most general terms is it possible to speak of sizes of barracks, or their elements, as being typical of certain fortresses; variation is almost always greater than first inspection would suggest, not least with barracks of a different orientation.

Even less clearly is it possible to speak of provincial types. The fact that *Legio XX* was for so long in *Britannia* had a strong influence on the barracks of the province, but more general provincial characteristics are not self-evident. Most striking is the similarity in the size of the centurions' quarters in *Britannia* in the Claudian/Neronian and Flavian periods.

Thus the indications of certain legionary or provicial types are slight. In spite of the large number of excavated buildings, analysis is still limited by the amount of evidence available. This can be remedied only by further excavation.

The Cohort-Blocks

Fortress Layout

Von Petrikovits distinguishes two principal schemes for the arrangement of the cohorts in legionary fortresses:

> 'In Type 1 the barracks are positioned round most of the communal buildings like a frame, and are oriented in such a way as to give the soldiers the shortest distance from their accommodation to that section of the defences which was for them to defend.'...'In Type 2 the barracks of cohorts 1 - 10 are all aligned in the same direction in *scamna* 1, 3 and 5' (1975, 108).

Both types have two cohorts in the *latera praetorii*, one to each side of the *principia*.

Some recent excavations have provided evidence which suggests that, while recognising the general rectitude of von Petrikovits' scheme, adjustments might be required. It has been mentioned above that a second cohort should be seen in the left *latus praetorii* at Bonn. While the very slight evidence for the first cohort indicates that it is aligned *per strigas*, the rather more considerable remains of the other cohort in the *latera praetorii* suggest that it runs *per scamna*. This arrangement would be easier to achieve within the same *scamnum* at Bonn than in many other fortresses on account of the very nearly square configuration of the Bonn cohort-blocks. Such an arrangement brings it into conflict with von Petrikovits' Type 2 where all barracks are to be aligned *per strigas*. But the variation at Bonn may not be thought to be a very important one. Rather more serious objections come from Exeter.

Recent excavations in the Exeter fortress (Henderson 1984) have shown that the first *scamnum* of the right *praetentura* is occupied by two cohorts, the corner cohort being aligned *per strigas* (Bartholomew Street East) and, very surprisingly, the cohort adjoining the *via praetoria* being aligned *per scamna* with the centurions' quarters abutting the *via praetoria* (St Nicholas Priory). There is some evidence that the cohort in the left hand corner of the *praetentura* is also aligned *per strigas*. Thus, on the grounds of symmetry, it is possible to place a second cohort *per scamna* on the left hand side of the *via praetoria*. Such an arrangement places four cohorts across the width of the small fortress and is made possible only by the very short length of the Exeter barracks. The possible arrangements in the *retentura* are discussed later, but for the moment it is enough to say that the Exeter arrangement conflicts with von Petrikovits' Types 1 and 2.

Von Petrikovits assigns Inchtuthil to his Type 1. Inchtuthil expresses to the fullest degree the principle that the cohorts should be distributed round the fortress perimeter in such a way as to make the distance between their accommodation and the section of the defences assigned to their care as short as possible and those same defences as accessible as possible. With the exception of the first cohort, all the other cohorts at Inchtuthil

are aligned so that the legionaries have access to their section of the defences along the streets between their barrack *hemistrigia* with their centurions always placed at their head next to the rampart. This is achieved by aligning *per scamna* the cohort in the left *latus praetorii* (as at Bonn and Gloucester) and the four cohorts in the four corners of the fortress. This allows the centurions immediate access to the ends and sides of the fortress with their attendant centuries. As at Bonn, such an arrangement is relatively simple to achieve at Inchtuthil on account of the almost perfectly square configuration of the cohort-blocks. Thus the fortress architect combined the advantages of immediate and all round defence with ease and neatness of surveying, a notable achievement. Only the size of the double strength first cohort makes a *per scamna* alignment impossible while still being contained within the same *scamnum*. Such an ingenious and simple solution is not to be seen in any other fortress.

In some ways, it may be considered that Inchtuthil belongs rather more firmly to the tradition of the Type 2 arrangement than the Type 1. Unlike any of the other fortresses which von Petrikovits assigns to Type 1, Inchtuthil has cohort barracks in only three *scamna*. It is their orientation towards the defences which causes von Petrikovits to place it in Type 1. Certainly the orientation of the barracks to the defences is a feature of the Type 1 fortresses although usually it is only the barracks in the middle *scamnum* of the *retentura* which are aligned *per scamna*. Only Lambaesis has the corner cohorts in the *retentura* aligned *per scamna* in the manner of Inchtuthil. Furthermore, at Vindonissa, cohort barracks in the second *scamnum* of the *retentura* are aligned *per strigas* with the centurions' quarters abutting one of the internal fortress streets. Admittedly it is difficult to argue from such an irregular site as Vindonissa, but the same point may be made with regard to the 11g cohort barracks at Haltern.

Thus a great regard for the orientation of the barracks to the defences would not seem as important a factor in some of the fortresses classed as Type 1 by von Petrikovits as he suggests. Furthermore, in some respects, his Type 2 may have been no less desirable 'für eine rasche Besetzung der Wehranlagen' (1975, 108). Certainly the alignment of the barracks in the *retentura* of most Type 1 fortresses allows immediate access to the defences, but at Neuss and Lambaesis the distribution of the cohorts leaves only two cohorts in the *praetentura*. If these two cohorts take the front defences of the fortress as their responsibility, a balance of forces suggests that troops from the *retentura* will have to come to cover the two sides of the fortress *praetentura*, unless it is imagined that the two cohorts in the *latera praetorii* have this responsibility. Neither of these latter two arrangements allows direct access.

In comparison, the arrangement of Type 2 may not be so disadvantageous. With barracks lining the the *praetentura* and *retentura* ends of the fortress, a logical distribution of defensive responsibilities would be for the two central cohorts by the *porta praetoria* and *porta decumana* to take care of the two ends of the fortress and for the four corner cohorts to take care of the sides of the fortress, leaving the central defences of the *latera praetorii* for the two centrally-placed cohorts. Access to the defences for the cohorts next to the *portae praetoria* and *decumana* would be past their centurions' quarters, but the corner cohorts would have to pass down the barrack *strigae* and along a relatively narrow *via vicinaria* to the side defences. Admittedly this is not ideal, but Type 2 does maintain a much better balance of forces within the fortress than Type 1.

The disposition of the barracks at Exeter raises the question of just how important such considerations were, because there it would have been possible to have the corner cohorts aligned *per scamna* and the central cohorts *per strigas* in the manner of Inchtuthil to allow the best access to the defences, but this plan was not followed. Important or not, the arrangement at Inchtuthil represents the best theoretical solution.

The most important criterion for the analysis of the distribution of the cohort-blocks in the fortress is the number of *scamna* in which they are found. The arrangement of the cohorts does follow two different schemes: Type A, broadly following von Petrikovits' Type 1, where the cohorts are placed in more than three *scamna*, and Type B, broadly following von Petrikovits' Type 2, where the cohorts are found only in *scamna* 1, 3 and 5.

Von Petrikovits recognises the position of the first cohort to the right of the *principia* (1975, 38). In nearly all examples both of his Types 1 and 2, the first cohort is aligned *per strigas* with the centurion's quarters next to the *via principalis*; the same may be said for the other cohort in the left *latus praetorii*. But there are exceptions to this arrangement. Uniquely, at Nijmegen, the first cohort is placed in the *praetentura dextra* adjoining the *via principalis* but aligned *per scamna* with four of the five centurions' houses adjoining the *via sagularis* and the house of the *primus pilus* adjoining the *via praetoria*. At Gloucester, the first cohort, although conventionally placed to the right of the *Principia* is aligned *per scamna* with the centurions' quarters adjoining the *via sagularis*. The cohort in the left *latus praetorii* follows the same arrangement. The dispositions at Inchtuthil and Bonn have been mentioned above. The alignment of the centrally-placed cohorts does not affect the overall pattern of the cohort distribution.

Chester, Neuss and Lambaesis clearly belong to Type A and, in spite of its irregularities, Nijmegen too conforms to the definition for Type A. Vetera I is a special case being a double legionary fortress, but the number of barracks required makes it virtually certain that they will occur in more than three *scamna*, again conforming to Type A. Haltern also belongs to this first group, even though no barracks have so far been identified along the south side of the fortress, certainly there is room for them and thus more than three *scamna* would have been used for barracks. Von Petrikovits places Vindonissa in his Type 1, but the *principia* and the *praetorium* are so eccentrically placed that possibly it would be better to make Vindonissa a special case. No cohort barracks have been excavated to the south of the *via principalis*, but there is room for them there and this postulation would lead to there being cohort barracks in four *scamna*, again conforming to the definition for Type A.

Caerleon, Bonn, Lauriacum and Carnuntum clearly belong to Type B. Von Petrikovits also places Dangstetten in his Type 2 and probably it is acceptable to include it Type B. In spite of recent excavations it is not possible to assign York, Wroxeter, Vindobona or Singidunum to either Type, on the other hand Colchester and Aquincum can now more clearly be placed with Type B.

Exeter remains a problem. The disposition of the cohort barracks in the first *scamnum* of the *praetentura* has been discussed above. There are hints that the same arrangement may have been followed in the final *scamnum* of the *retentura*, which, accepting a conventional *latera praetorii*, would complete the ten cohorts and place Exeter with Type B. However, barracks

very much the same size as those in the first *scamnum* and aligned *per scamna* have been excavated in the fourth *scamnum* of the fortress at Goldsmith Street. There is space for a full cohort complement of six barracks here, but only if it is thought acceptable that that a fortress *via vicinaria* should pass between the two most southerly *hemistrigia*. At the foot or east end of the two most fully excavated barracks at Goldsmith Street and running at right angles to the barracks is a series of double rooms which look as if they could be *contubernia* from another barrack. Examination of the size of these '*contubernia*' shows that they are rather smaller than all the other *contubernia* at Exeter and are best interpreted as stores. If, according to the rules of symmetry, another cohort is placed in the equivalent position on the other side of the fortress, it no longer becomes necessary to place four cohorts in the fifth *scamnum*, but only two. If this is the situation, the cohort layout should be assigned to Type A. But it remains possible that the barracks at Goldsmith Street are not true cohort barracks in spite of being of probably typical size for Exeter cohort barracks. They do seem to be associated with store buildings and a *fabrica*. It is also possible that just one cohort has been displaced to Goldsmith Street for some reason. At Chester, for example, the fortress baths take up the space of one cohort in the first *scamnum*, although at Exeter the position of the Baths in the *latera praetorii* is ascertained.

For the moment, it would seem best not to assign Exeter to either group, but the balance of evidence may point to Type B. In any event, it is clear that a fortress the size of Exeter can accommodate the ten cohorts of a full legion as Bidwell first demonstrated (Bidwell 1980, 23). Wells would see a complete legion at Haltern (Wells 1977, 465) although this is not accepted by von Schnurbein (1981, 48). Certainly it is difficult to see there being sufficient room for ten cohorts at Nijmegen, but the lesson from Exeter is that the Roman army could be rather more flexible than hitherto suspected in the disposition of its cohorts.

Thus it will be seen that Types A and B very largely conform to von Petrikovits' Types 1 and 2. Only Inchtuthil has changed sides and Bonn has been confirmed in its group. Both Types have early and late examples, Haltern and Lambaesis for A and Dangstetten and Aquincum for B, but the balance of evidence suggests that Type A is the more predominant earlier form and one rather more suited to fortresses of irregular outline. From the Flavian period, Type B begins to come into its own.

Configuration

The conventional arrangement of the cohort-block is a familiar one: three pairs of facing barracks with the centurions' quarters at one end. Indeed this is the predominant pattern but irregularity in the pairing does occur. Figure 36 shows that the vast majority of cohort barracks have this standard arrangement (A) but that there is evidence for simple irregularity in the cohort (B) or for the different arrangement of the barracks in back to back pairs rather than facing pairs (C). It will be seen that the highest incidence of irregularity occurs in the Augustan/Tiberian period but thereafter it is minimal although still to be encountered in the Antonine period. Such irregularities are less surprising in the irregular fortresses of the earliest period and examples come from Haltern, Oberaden and possibly Vindonissa; rather more surprising is to find examples at Caerleon in the Domitianic, Hadrianic and Antonine periods at the Vine Cottage and Roman Gates barracks. The back to back arrangement is found most in the

earliest period at Rödgen and Dangstetten; much more surprising is its possible recurrence at Aquincum in the Severan period. Although irregularity of the fortress outline may give cause for non-conformity, it is just in the earliest period when the tradition of the maniple ought to have been at its most strong. But it should be emphasised that the norm predominates.

The position of the centurions' quarters at the heads of the barracks throughout the cohort also is not quite universal. As has been explained above the Type Z barracks at Vetera I and Bonn have centurions' quarters at both ends of double rows of *contubernia*.

The quarters of the first cohorts at Inchtuthil, Caerleon, and Nijmegen and the attendant courtyard houses of the centurions are exceptional and will be considered separately.

When considering the regularity of the cohort-blocks, it should be pointed out that in nearly all instances the block forms a rectangle. Where this is not true, usually the problem stems from the irregular shape of the fortress. Thus there is an eight metre length discrepancy in the Breite North Gate cohort at Vindonissa from the first to the sixth barrack and a ten metre length discrepancy across the whole width of the last *scamnum* at Carnuntum. The defences at Lauriacum form a parallelogram rather than a rectangle and the cohort-blocks conform to the overall outline of the fortress.

Within the fortresses, the cohort groups usually can be distinguished, but those at Neuss present particular problems (see Plan 1). In the final phase of the Flavian fortress there are 61 cohort barracks and although the general form of the cohort-blocks is clear, the detailed attribution of the individual barracks to them is not. The two cohorts at the corners of the *praetentura* present no problems, but the *latera praetorii* has a total of ten barracks instead of the expected twelve, there being only four to the left of the *principia*. The six barracks of the first cohort to the right of the *principia* form a clearly recognisable group.

The clearest dividing points in the *retentura* seem to come between Buildings 115 and 131, 148 and 147, 119 and 104. In these barracks there is a clear division between the rear walls of both the centurions' and men's quarters while the remaining barracks have rear party walls for the centurions' quarters although the men's quarters remain separated. This suggests that Buildings 110 - 115 and 104 - 99 form two cohorts behind the *latera praetorii*. The most coherent remaining group of six lies in the left corner of the *retentura*, Buildings 140 - 135. If this group is taken as a cohort, that leaves 143 and 142 to be placed with 147 - 144 or with 122 - 119. The balance of the fortress suggests that 142 and 143 belong with the left hand side and their configuration suggests as much as well. If it is accepted that the legionaries built their own barracks in their own cohort groups, then 142 and 143 have most in common with 140 - 138. They are the same length and the centurions' quarters take up the same proportion of the overall length. In 122 - 119, the proportion taken by the centurion is considerably greater. The proportions of the barracks in the very corner is unknown, but possibly the best solution here would be to place 143 - 137 and 136 - 119 together as groups of six. This leaves 15 barracks on the right hand side of the *retentura* for just two cohorts.

It is interesting that the 12 barracks lining the *retentura* divide into two groups according to the configuration of their end walls, 155-150 having short extending walls from the last *contubernium*, while 149 - 144 seem to have a wall sealing off the end of the street between the barracks. The same scheme can be seen in the *praetentura* Buildings 26 - 31. This is in spite of the division between the rear walls of 148 and 147 and the very considerable difference between these two barracks, 147 being very insubstantial in comparison with 148. The three barracks remaining are exceptional for Neuss. 131 has rather shorter centurion's quarters and consequently an additional *contubernium*. After 131 there is insufficient space for a normal *hemistrigium* before the next *striga* (Buildings 133 - 134) which in turn is unusually wide. Building 132, such evidence of it that there is, does not appear to be a normal barrack and is not considered to have existed in the final period (Koenen 1904, 140).

Thus there are at Neuss barracks sufficient for a full legion, but it is not clear in which barracks the cohorts are grouped. It would appear that patterns have been obscured by rebuilding and by major alterations. For example, it seems that some barracks are to be found under the later bath-house (Koenen 1904, 138; Baatz 1977, 268) while there may be additional earlier barracks to the right of the *principia*. In many ways, for the final period, it would seem he most sensible to ignore architectural hints given by the barracks and to distribute the cohorts round the fortress according to the accommodation available.

Dimensions

Figure 37 displays the overall length and width measurements of all those cohort-blocks with verified measurements. Here the cohort lengths are measured along the length of the constituent barracks and do not necessarily relate to the orientation of their fortress. The data fall into three major groups: the smallest values up to 80 m in length and up to 75 m in width; the main group with lengths of between 65 and 90 m and widths of between 75 and 100 m; the remainder with widths over 100 m. All the width measurements of over 100 m derive from first cohorts with the exception of cohorts in the *praetentura* at Lambaesis. The figure for Nijmegen is a notional one and imagines all the Nijmegen first cohort barracks side by side instead of in the arrangement of four and one as they are in the fortress. The other very exceptional point comes from New Market Hall Gloucester with the great length of *c* 100 m.

The group with the smallest dimensions derives almost entirely from the Augustan/Tiberian period, the only exceptions being from Exeter and Nijmegen. Rödgen provides the very smallest isolated example (*c* 50 × 44 m). Given the small size of these fortresses, this result is not surprising, but the lowly position of the Exeter cohorts is very striking with their very short lengths of 62 and 57,5 m. Only Cohort 11g from Haltern and Rödgen provide smaller examples. Dangstetten achieves the average overall length of 80 m, but the cohort remains very narrow.

With the exception of those from Exeter, the cohorts of the Claudian/Neronian period show some relatively high values very much round the mark of 90 × 90 m deriving from Colchester and Vindonissa. Subsequently there is little movement outside the central block except for the first cohort at Gloucester with its length of 102 m and the small *c* 65 × 72 m (Period 4) and *c* 67 × 82 m (Period 5) Flavian cohorts C and D from

Nijmegen. Only in the third century does the central concentration begin to cover a wider range with lengths of *c* 87 m from Lauriacum and *c* 90 m (cohorts B, C, D, E) from Carnuntum.

Figure 38 demonstrates the length against width proportions of the cohort-blocks. The peak of between 0,95 and 1,00 emphasises the strong trend to the square formation for the cohort-block, but striking is the preponderance of values below 1,00 rather than above 1,00. This demonstrates that most cohort-blocks are a little wider than they are long (measurements here are still along the length of the barracks). The lowest values come from the first cohorts at Caerleon, Inchtuthil, Nijmegen and Lambaesis as is to be expected. Apart from the first cohorts, the proportionately most wide examples come from Vindonissa (Breite), Exeter (right *praetentura*), Aquincum (*retentura*) and Carnuntum (cohort F left *praetentura*). The isolated group of three with values over 1,3 are Dangstetten and cohorts D and E in the *retentura* at Carnuntum. It is striking that Carnuntum should have such disparate values, some of the very lowest and some of the very highest, a feature not repeated in any of the other fortresses.

The distribution of the values does not display any particular trend from period to period. With the exception of Dangstetten, the Augustan/Tiberian material concentrates in the centre of the field, and it is not until the examples from the third century take their place that any clear trend is visible and this is merely a trend to an increased disparity of values. Given the regularity of the outline of the fortresses from *Britannia*, it is not surprising that the examples from *Britannia* should concentrate in the centre of the field.

Relationship with Fortress Areas

Such a variety of dimensions will produce a wide range of values for the overall areas of the cohort-blocks (Fig 39). The size of the cohort-blocks matches the distribution of Figure 37. First there are some very large values above 8500 sq m deriving mainly from the first cohorts, then a central block of values from *c* 6000 to 7750 sq m followed by a tail of lower values down to the very lowest of Rödgen at 2222 sq m. The isolated example to the right hand side of the Figure is from Oberaden. Although the lowest values do come as before from Haltern, Rödgen, Oberaden, Nijmegen and Exeter, the central group seems to be more tightly grouped than in the previous Figure and the large Claudian examples do not stand out so clearly. The reason for this is that the rectangular blocks of different proportions have similar areas.

Noteworthy in this Figure is the way in which, although the size of the cohorts does increase and decrease with the size of the fortress, this increase is not directly proportional. Thus the fortresses of Chester, Caerleon, Bonn, Vindonissa and Carnuntum, which vary from *c* 18 to 28 ha, all have cohort-blocks which take up little more than 6250 sq m. Furthermore, the variation within the same fortress can be very great. Perhaps it is not surprising that there should be variation within an irregularly-shaped fortress such as Haltern where there is a difference of 1800 sq m between the largest and the smallest cohort, or at Vindonissa where the difference is *c* 1000 sq m. The greatest discrepancy of all comes from Carnuntum and is *c* 2000 sq m. But the range at regularly-shaped fortresses such as Neuss can also be very great. At Neuss the possible difference is 1500 sq m and even at small Exeter possibly 650 sq m. On the other hand it must be

admitted that the four examples from Chester all fall within 500 sq m of eachother and two examples within 400 sq m of eachother express the whole range at Caerleon. The same may be said for Bonn while the discrepancy at Aquincum is only 250 sq m. Clearest of all are the results from Inchtuthil where all cohorts, with the exception of the first cohort occupy the same area.

Relationship with Fortress Lengths

Figure 40 demonstrates that the length of the cohort-blocks (here taken as the width of the *scamnum*) does not necessarily depend on the overall length of the fortress. Chester has the longest fortress dimension and yet the lengths of the cohort-blocks fall in the middle of the range. The additional *scamnum* here accounts for this (Carrington 1977). Equally, two of the cohort-blocks at Vindonissa illustrated are considerably longer than average in spite of the overall length of the fortress being the shortest bar two. It may be objected that Vindonissa is always exceptional, but even such a regular fortress as Inchtuthil has cohorts rather longer than the average in a fortress which is almost exactly of average length for Figure 40. Most strikingly, Exeter, by no means the shallowest fortress has the shortest cohorts of all. Some of the reasons for this have been explained above. Nevertheless, there is some correlation between fortress and cohort length. Haltern has some of the very shortest cohorts and is itself the shallowest fortress with the exception of Dangstetten. At the other end of the scale, some of the longest cohorts come from Lambaesis which is one of the longest fortresses. But, in general, the cohort-blocks remain within a fairly consistent range of lengths, between 72,5 and 90 m.

One of the striking features about Figure 40 is the considerable variation in the lengths of the cohorts within the same fortresses. Thus there are variations of 12,5 m at Haltern, 27,5 m at Vindonissa, 20 m at Carnuntum and 20 m at Exeter. Differences are also to be found in such apparently more regular fortresses as Chester, Caerleon, Neuss, Bonn and Lambaesis. Some of the discrepancy at Chester is to be explained by the presence of the additional *scamnum*. The difference at Chester is 10 m and at Neuss 15 m. Some of the distance at Neuss can be explained by the *per scamna* cohorts in the middle of the *retentura* whose overall widths are much greater than the lengths along the barracks. No special pleading can be put forward for Caerleon, Bonn or Lambaesis, but here again the differences are 7,5 m, 5 m and 7,5 m respectively. Such variations may be thought to be on the edge of being insignificant, but certainly it is possible for cohorts to cover a narrower range. The variation at Inchtuthil, Colchester, Nijmegen Periods 4 and 5, Lauriacum (with the exception of cohort J) and Aquincum is not more than 2,5 m.

Relationship with Fortress Widths

Figure 41, comparing fortress widths and cohort-block widths, presents a more varied picture than Figure 40. It is apparent that the variation in the cohort-block covers a similar range to the cohort lengths, some 40 m when the first cohort examples over 100 m are excluded, but it concentrates much less in the middle of that range. It is also apparent that the cohort widths show little correlation to fortress widths.

At 525 m, Bonn is the widest fortress, but the widths of its cohorts are strictly average, *c* 80 m. Haltern too, which in spite of its small size overall nevertheless is very wide at *c* 485 m, has some of the narrowest cohort blocks of 60 - 80 m. On the other hand, some of the smallest and narrowest fortresses do have some of the narrowest cohort-blocks. In particular this is clear in the case of Exeter and Nijmegen Periods 4 and 5. These fortresses are all *c* 350 m wide and all three have some cohorts below 75 m. But it must be said that the main concentration of values shows that in fortresses which vary between *c* 390 and 490 m in width, cohorts are to be found ranging from 75 to 95 m. All periods present some disparate values, but it is only the *praetentura* cohorts at Lambaesis, excepting the first cohort barracks, which are wider than 100 m.

It is clear that the cohort-block widths vary not only from fortress to fortress but also within the same fortress and to an extent much greater than their corresponding lengths. The special reasons for this at Exeter and possibly Nijmegen have been touched upon, but very striking is Neuss with a possible discrepancy of some 20 m, a figure which is not affected by those barracks aligned *per scamna*. Most emphatic of all is Carnuntum where the variation is *c* 26 m (not including the first cohort) although this figure clearly is influenced by the irregular shape of the fortress. At the same time it should be remembered that the differences at Inchtuthil and Bonn hardly cover more than one metre.

The foregoing calculations have revealed much discrepancy between the cohorts, often from cohorts within the same fortress. But such discrepancies are not consistent and do not assist in establishing a pattern of seniority any more than does the study of individual barracks. The most that can be said is that some cohorts offered less accommodation, for example those along the *praetentura* front at Carnuntum, and therefore may have been the home of the junior cohorts. Each case has to be examined on its merits.

Discrepancies

It has been noted above that, sometimes, the lengths of individual barracks of the same cohort vary in length. Such discrepancies are not surprising when dealing with an iregularly-shaped fortress and the lesson of these fortresses is that the barracks expanded to fill the space available rather than adhering to a rigid plan. Very clear examples of the process can be seen in the cohorts in the final *scamna* of Haltern, Vindonissa and Carnuntum. More surprising are differences within the cohorts of the regularly-shaped fortresses. Most cohort barracks are fairly uniform, but it should be noted that there is discrepancy within the cohorts even at Inchtuthil. One of the clearest examples is to be seen in the cohort occupying Barracks 18 - 13. Three different lengths are found: 84,18 m, 83,64 m and 82,98 m a difference of 1,2 m. Barrack 53 ought to be singled out for special mention. At 84,82 m, this barrack is markedly longer than the others in its cohort and indeed is the longest barrack in the fortress with the result that it alone has 15 *contubernia* rather than 14. Not too much should be made of these differences and it would be nonsensical to see in them implications for status; one metre more or less over 83 is insignificant. Such differences are much more likely to reflect construction practices and suggest that each century built its own barrack, possibly starting from one end, because clearly no very precise line was drawn out or survived to mark where the barrack should end.

Very similar remarks may be made concerning variation in the widths of barracks within the same cohort. It is not surprising to meet considerable variation at early and irregular sites, for example at Oberaden where the series of nine buildings in the north-west corner has a range of 8,00 to 11,60 m in the widths of the small centurions' quarters, only three being the same. Similarly the cohort on the Breite in the Claudian period at Breite Vindonissa has a range of 10,45 to 13,50 m in the widths of the centurions's quarters and from 8,10 to 9,00 m in the men's quarters. Similarly at the Breite North Gate the range is from 10,00 to 13,00 in the centurions' quarters and from 8,25 to 9,00 in the men's quarters. Such variation is found not only in the irregular fortresses. The centurions' quarters of Barracks 18 - 13 at Inchtuthil range from 10,36 to 11,59 m although their men's quarters are nearly uniformly 8,50 m, just one being different (8,85 m). On this occasion, Barrack 53 is in step with the other barracks in its cohort. It is possible that new excavations will produce variety hitherto unsuspected, for at the Roman Gates site at Caerleon, in Phase A, different men's quarters, apparently of the same cohort, measured 7,25 and 9,00 m. The special problems of Neuss have been mentioned, but if Buildings 147 and 148 were in the same cohort, then 147 had centurion's quarters 12,00 m wide and men's quarters 9,00 m wide, while 148 had corresponding widths of 13,00 and 10,25 m. In spite of these remarks, it must be said that most fortresses show a good degree of consistency within the cohorts. Certainly the evidence does not justify the construction of theories of seniority.

There are important variations in the widths of some barracks of the first cohorts, but these will be considered in the section devoted to the first cohort.

Relationship between Cohort and Barrack Widths

Figure 42 illustrates the relationship between the overall widths of the cohort-blocks and their constituent barracks. The distribution here demonstrates a clear trend of gradual increase in width of both centurions' and men's quarters in step with the increase in the overall width of the cohort. The relationship between the centurions' and men's quarters is not completely consistent, as might be expected, but the general trend is clear. With the exception of the cohort widths of 104,25 and 109,50 m, both from Lambaesis, all the cohort widths over 100 m derive from the first cohorts. This explains the exceptional nature of the right hand side of the Figure. The left side is much more consistent.

The difference between the widths of the centurions' quarters and the men's quarters remains remarkably consistent at about 2,50 m. This difference remains even though the Augustan/Tiberian barracks with widths of 9,30 and 9,50 m are much narrower than those with 12,33 m at Aquincum. Exactly the same may be said for the Exeter barracks in spite of their very small overall length; no compromise has been made in terms of overall width which is only just below average. The difference between the two elements of the barracks remains normal. It is only the very elaborate and large cohorts at Lambaesis which clearly break the pattern of the three metre difference, here it is four metres. The evidence shows that, as the cohorts expand in width, so do the centurions' and men's quarters in the individual barracks, all the while maintaining about three metres for the width of the veranda.

Figure 43 tells a very different story. Here the overall width of the cohort is compared with the width of the street between the centurions' quarters, the distance between the fronts of the facing *contubernia* and the distance (where present) between the rear walls of the barracks. It is clear immediately from the graph that all of these measurements remain remarkably constant irrespective of the width of the cohort. The width of the street between the centurions' quarters is nearly always 4,0 or 5,0 m, occasionally 6,0 m. The distances between the facing *contubernia* demonstrate just the same consistency. The distance is nearly always *c* 11 m, very occasionally 9,5 or 10 m. The distance between the rear walls of the barracks is nearly always *c* 1,5 m unless there is a party rear wall construction. These measurements approximate fairly closely to distances of 1½, 3, and ½ Roman feet respectively. There is no suggestion that this technique was used in cohorts which were narrow rather than broad. There is no apparent difference according to period.

Really it is only the cohorts at Lambaesis which stand out as different. The distance between the rear walls and between the centurions' quarters comply with the norm, but at 13 m, the distance between the men's quarters is exceptional. The only slight difficulty comes from the very early barracks at Rödgen and Dangstetten. These are of Type B form and thus there is no difference between the widths of their centurion' and men's quarters. In spite of this, both examples have a rear party wall construction and the distance between the centurions' and men's quarters falls within the range normal between centurions' quarters of 3,00 and 5,50 m respectively.

It is noteworthy that the barracks in the cohorts at Exeter comply entirely with the norm with measurements of 1,5, 5,0 and 10,5 m. This confirms the implications of the previous graph which suggested that the barracks at Exeter were normal except for their length and their orientation. They were not scaled down overall in order to accommodate them to the small fortress, they were rather reduced in length, particularly in the men's quarters.

The First Cohort

Subsequent to the work of von Petrikovits, in recent years the first cohort has been much discussed (Frere 1980; Pitts and St Joseph 1986, 165-169). The issues are well-known and it is not intended to repeat here all the arguments which have been deployed, but rather to highlight new evidence which has a bearing on the discussion.

Von Petrikovits (1975, 38) lays down three characteristics for the identification of the first cohort in the legionary fortress. On the basis of these characteristics, barracks of the first cohort have been recognised at Inchtuthil, Chester, Gloucester, Caerleon, Nijmegen (Period 5), Neuss, Lauriacum, Carnuntum and Lambaesis. New evidence for first cohort barracks from York, Nijmegen (Period 4) and Bonn must be adduced. In accordance with the theory that the first cohort is positioned to the right of the *principia*, perhaps cohort 11g should be recognised as the first cohort at Haltern (von Schnurbein 1974, 69). There are no obvious candidates at Vindonissa.

The layout of the first cohort shows considerably more variety than that of the other legionary cohorts. The first cohort at Inchtuthil is well-known

as the archetypal example of the first cohort of double strength referred to by Hyginus in *de Munitionibus Castrorum* xxi. At Inchtuthil the five courtyard houses of the centurions are clearly to be associated with two centurial barracks each.

At Nijmegen, partly as a consequence of the small size of the fortress, the first cohort is positioned to the right of the *principia*, but in the *praetentura* and not in the *latera praetorii*. In Period 5 Nijmegen has five courtyard houses for the centurions associated with six rows of *contubernia*. Placed between each of the two junior pairs of these *contubernia* is a row of single cell rooms. Plans of the excavations carried out by Brunsting in the 1960s and deposited in the ROB archive in Amersfoort show quite clearly that underlying the single cell rooms of Period 4 are two pairs of standard timber barracks with rear party wall construction, while under the standard *contubernia* of Period 5 are timber *contubernia*. The five stone centurions' houses of Period 5 also have five timber predecessors. These are the first cohort barracks of Period 4. This makes a total of five centurions' courtyard houses and ten sets of *contubernia* as at Inchtuthil: the second clear example of a milliary first cohort. Inspection of the archive was carried out by kind permission of Professor Bloemers.

The layout of the first cohort at Nijmegen Period 5 and Caerleon is very similar. At Caerleon, three courtyard houses have been excavated and the space remaining probably would allow the addition of two more. Much less is known of the men's quarters, but there would seem to be a number of sets of standard *contubernia*, probably six in all, and perhaps four lines of single-cell rooms interspersed between the rows of *contubernia*.

Haltern provides the only other example which may be included in this group if it is considered that the six courtyard houses 7a - 7f grouped to the right of the *principia* housed the centurions of the first cohort (von Schnurbein 1974, 69).

The remaining first cohorts follow a pattern of layout much more similar to that of the other legionary cohorts, although some are different in other ways. The first cohort at Gloucester is aligned unconventionally *per scamna*. Here the very long barracks would seem to have normal centurions' quarters, although incomplete excavation renders this far from certain. If the barracks are consistent in their size, there is room for six with six attendant centurions' quarters.

The evidence from Lauriacum, Carnuntum and Lambaesis is complicated by third-century and later rebuilding. In Lauriacum and Carnuntum the first cohorts are conventionally placed and aligned, but there is very little clear evidence for their centurions' quarters. But, unusually, in both of these cohorts, the maniple on the far right is narrower than the other two as von Petrikovits notes (1975, 42). This is not the situation at Lambaesis, but here the number of centurions' houses is in doubt. It looks as if the number is five, but it could be six if the largest house, one removed from the *principia*, is subdivided.

The most conventional evidence comes from Chester and from the final period at Neuss. The evidence from Chester is confused, but the Crook Street barrack should be one of the constituent barracks of the first cohort. This is a standard Type A barrack and is aligned *per strigas* to the right of the *principia*. Neuss probably has six conventionallly-placed barracks to the

right of the *principia* in the last stone period. Although the centurions's quarters have not been revealed by excavation, the regular spacing of the men's quarters would suggest six regular centurions' quarters like others in the fortress. Other questions arise from the Neuss evidence which will be discussed later.

New evidence for conventionally-placed and disposed first cohorts comes from York and Bonn. Excavations at York have revealed parts of the first three barracks of the first cohort in the early second century. The barracks are aligned *per strigas* and the second barrack, for which there is most evidence, seems to be of Type A although of an unprecedentedly larger size (Davison forthcoming). At Bonn there is very slight evidence from the men's quarters in the area of the first cohort that these barracks are aligned *per strigas*, in contrast to the cohort in the left *latus praetorii*. Thus the arrangement contrasts with that at Gloucester.

Some fortresses have one or two barrack-like buildings to the right of the *principia* before the beginning of the men's quarters of the first cohort proper. Inchtuthil has Buildings A and B, Chester has the Goss Street barrack and Neuss has Building 91. All of these will be discussed in the following section.

In spite of the extraordinary size of the courtyard houses, the lengths of the centurions' quarters of the first cohort, as a rule, do not take up a greater proportion of the overall length of their barracks than do the centurions' quarters in the other cohorts of the same fortress. As percentages of overall length, only the centurions' quarters from York, Nijmegen and Lambaesis take up a greater percentage of the length than usual in their fortresses. Even at York this difference is marginal: 37,20 % is only a little longer than the more usual 33 %. Unfortunately the same proportions cannot be calculated for the other partially-excavated barracks at York at Davygate in the east *praetentura*. In terms of length of the centurions' quarters alone, the Davygate examples are not much shorter than those of the first cohort at 25,91 m as opposed to 28,50 m. More considerable is the discrepancy at Lambaesis where, in the first cohort, the percentage ranges from 35,62 to 40,81 % as opposed to 26,02 % for cohorts D and E in the *praetentura*. To emphasise this point further, even the courtyard houses at Inchtuthil comply with the very small proportion shown by the other cohorts, almost exactly 25 %.

As has been mentioned above, the length of the barracks of the first cohort, as a rule, is not any greater than that of other cohorts from the same fortress. The clearest exception to this comes from the very long first cohort barracks at Gloucester (*c* 100 m). The other exception is Nijmegen where the lengths of the first cohort barracks by the *via sagularis* in Period 5 at 77,50 m are about seven metres longer than any others in the fortress. In both of these examples the discrepancy is allowed by the *per scamna* alignment. In all the other fortresses the depth of the *scamnum* determined the length of the barracks.

On the other hand, the widths of the men's quarters of the first cohort show some difference to those of the other cohorts. At Inchtuthil the width in the first cohort is 7,92 m while in the other cohorts it is most commonly 8,20 or 8,50 m. But at Caerleon it seems that the men's quarters of the first cohort are a little wider than in the other cohorts. 10,00 m is the figure for the first cohort while 9,00 and 9,50 m are more typical for the rest of the fortress. Of the conventionally-disposed first cohorts,

only those at Lauriacum, Carnuntum and Lambaesis show differences to other cohorts in their fortresses. The differences vary much within these first cohorts, but the greatest variation from the equivalent measurement in the others cohorts is at Lauriacum 2,5 m, at Carnuntum 9 m and at Lambaesis 6,5 m. In spite of these differences, Figure 42 shows that the widths of the streets and distances between the barracks remain remarkably consistent with those of the other cohorts. It is only the third-century examples which provide some very much greater widths.

Figure 19 gives the lengths and widths of the centurions' quarters. The courtyard houses from Inchtuthil, Caerleon and Nijmegen form a distinct group at *c* 20 x 26 m. Apart from the third-century examples, the only others to approximate to them in terms of overall size, although not in configuration, are the quarters of the second centurion of the first cohort at York (*c* 28 × 20 m) and the centurion's quarters of Building XIV at Longthorpe (*c* 35 × 16,5 m). At Inchtuthil, the quarters of the *primus pilus* are considerably larger than those of the other centurions of the first cohort, *c* 750 sq m as opposed to *c* 550 sq m, although those of the *hastatus posterior* are *c* 590 sq m. Again there is variation at Caerleon where House III, that of the *hastatus*, is larger than the other two known, *c* 550 sq m as opposed to *c* 438 and 423 sq m. At Nijmegen, the house of the *primus pilus* is again rather larger than the others which tend to be very similar. In Period 4, the quarters of the *primus pilus* cover *c* 660 sq m and the others *c* 450 sq m. In Period 5 the figures are *c* 713 sq m as opposed to *c* 478 sq m, although in this last period the house nearest the *via principalis* is a little larger than the others *c* 534 sq m. The six courtyard houses 7a - 7f at Haltern all have areas of *c* 480 sq m. By way of comparison, the area of the building in question at York is 564,59 sq m and of Building XIV at Longthorpe 581,00 sq m. In size these quarters overshadow all with the exception of the first cohort at Lambaesis and Barracks 3, 4 and 5 at Breite North Gate at Vindonissa in Periods 1 and 2. These are the remaining very long examples on Figure 18 and produce areas from *c* 434 to 556 sq m. Other first cohort examples concur with the general evidence for centurions' quarters.

The first cohort barracks in Periods 4 and 5 at Nijmegen are crucial for the understanding of Hyginus' statement concerning the first cohort of double size. It is clear that at Nijmegen a first cohort which once was milliary later became quingenary again. Nijmegen sees much activity during the Flavian period; at least four separate fortress periods have been revealed. Period 3 dates to the early Flavian period; this is followed by Period 'x' before the advent of Period 4. Period 4 ends *c* 89 with the building of the stone fortress of Period 5. Nothing is known of the first cohort buildings during Periods 3 and 'x', but it would seem reasonable to say that there is evidence for a double strength first cohort at Nijmegen from about the middle of the Flavian period until *c* 89.

Frere has pointed out that, as well as at Caerleon, there is room for a double first cohort in the Flavian period at York, Chester and Bonn (Frere 1980). Neuss presents a more difficult problem. The 128 m width of the right *latus praetorii* would allow the accommodation of a double strength first cohort in the timber phase of the fortress or just conceivably in the first stone phase. But this was not possible in the final stone phase when, as has been pointed out above, there appear to be six standard century barracks, with room possibly for a seventh in the area destroyed by the ditch system of the later auxiliary fort. Then come the buildings next to the *principia* different in nature to the first cohort barracks. But it

seems possible that there were eight stone barracks present on the site in the first stone phase. It is quite clear that the south-west bottom corner of a building was excavated which resembles the end *contubernia* of the other six barracks and is spaced perfectly to form the eighth barrack. Furthermore, part of a wall running north-south one third of the way down from the *via principalis* also was revealed. This wall is in perfect position to form the rear wall of such an eighth barrack. It is this building which has been built over in the final period of the fortress. This eighth barrack is, in turn, perfectly spaced from Building 91 next to the *principia* which suggests that Building 91 existed in both of the stone periods. Certainly there is room for only one more barrack before the *principia* if it is thought that Building 91 belongs only to the final period. This would make a total of 9 barracks and leave a broken pair next to the *principia*. It would seem more likely that eight centurial barracks were in position here in the first stone phase and that two more are to be found elsewhere, possibly on the other side of the *principia* where barracks of the first stone period underly the baths (Koenen 1904, 138; Baatz 1977, 268); there is room for four barracks here. The difficulty of recognising the cohort groupings at Neuss has been discussed above, but it would seem at least certain that there were more barracks in the first stone period than in the second.

It will be noted that Neuss has a total of ten barracks in the *latera praetorii* in the second stone phase. It may be argued that these ten barracks accommodated a first cohort of double strength; but this arrangement would provide 10 centurions' quarters rather than the requisite 5 and furthermore would leave only 51 barracks for the remaining nine cohorts instead of the necessary 54. Of course some of these cohorts may have been under strength, but it would seem preferable to regard the first cohort at Neuss as once again quingenary in this period, especially in light of the fact that the number of barracks in the *latera praetorii* has been reduced from the first stone phase.

Gloucester presents rather equivocal evidence. Although there is only sufficient space in the cohort block for six barracks, these barracks are of quite exceptional length, the extra length probably being taken up by additional *contubernia*. It may be possible to see here the first indications of a first cohort with very much over-strength centuries if not exactly double. Certainly at 492,10 sq m, the living area available to the century is very much more than the 305,37 sq m theoretically available at Berkeley Street but rather less than in the double barracks at Inchtuthil and Nijmegen. Indeed, the space available in the barrack at Gloucester resembles most closely of all that from Longthorpe Building XIV, 432,32 sq m. At the same time, the area of the centurion's quarters at Longthorpe, 581,00 sq m, is almost the same as those of the centurions of the first cohort at Inchtuthil barring the *primus pilus*. If Building XIV housed a centurion of the first cohort of *Legio IX*, possibly the *primus pilus* (Frere and St Joseph 1974, 35), this is (with the exception of Breite Vindonissa) the earliest evidence for a centurion receiving quarters much larger than those of the standard legionary cohorts.

Conclusions

The implications of the above are clear. It would seem that there is evidence for over-strength centuries in the first cohort in the Claudian and late Neronian/early Flavian periods at Longthorpe and Gloucester. Historical

circumstances however may explain the anomaly of Longthorpe while the evidence from Gloucester is not sufficiently certain to bear much reliance. Furthermore the presence of just 60 wards in the hospital at Vetera I implies that here in the Neronian period the first cohort was not double strength. The barrack evidence suggests rather, that at some time before the middle of the Flavian period, the first cohort was formally doubled in strength, but that this reform was fairly short-lived and ended before the final stone period at Neuss and by *c* 89 at Nijmegen. The reform could have been initiated by Vespasian, and its formal reversal would most logically be placed in Domitian's reign. This confirms the likelihood of a Domitianic date for Hyginus.

This being said, it becomes easier to interpret the first cohort buildings at Caerleon. It would seem that the first cohort barracks, initially built at double strength, were subsequently reduced to normal capacity in the men's quarters, but retained the courtyard houses of the centurions in the same way as at Nijmegen in Period 5. It is perhaps surprising that these buildings should continue in the same pattern right through to the Antonine period at Caerleon without being reformed to the configuration of a normal quingenary cohort as happened, theoretically, at Chester and Neuss. One possible explanation for the situation at Caerleon is that there was never great pressure on space within the fortress and indeed Boon's verdict is that 'it was rarely if ever completely occupied' (Boon 1972, 69). The same cannot be said for Nijmegen and space seems always to have been at a premium at Neuss; but the best explanation for the situation at Caerleon is probably that the centurions, given half a chance, were unwilling to give up their fine courtyard houses.

A very different solution seems to have been reached at York. Here the only evidence is for mid second-century barracks of conventional Type A form and length but of very great width (19,81 m). The width and form of the men's quarters is uncertain. This great width produces the very large area of the centurion's quarters commented on above. Apart from the width, all the features of the barracks are characteristic of cohort barracks including the street width of 5,18 m between the centurions' quarters, the 1,52 m between the rear walls and the concluding walls at the end of the barracks in the manner common at Nijmegen in Period 5 and at Neuss Buildings 7 - 12 and 144 - 149.

There is nothing in the evidence from York which is incompatible with the interpretation that Buildings 1 and 2 form the first facing pair or *striga* of six barracks, together making up the accommodation for the first cohort. Extrapolation of the evidence for the first two barracks produces a cohort-block measuring 75,59 × 137,46 m which fills nicely the space available between the *principia* and the *via sagularis*. The area of such a block (10391 sq m) is very similar to that of the first cohort at Inchtuthil (11253 sq m) and Caerleon (11165 sq m). It seems that at York, in the post- milliary period, in contrast with Caerleon, Nijmegen, Chester and Neuss, *Legio VI Victrix* took the whole space used for the presumably milliary first cohort built by its predecessor and built a standard cohort-block with Type A barracks, but on a very large scale and with the areas of the centurions' quarters very much equivalent to those of their predecessors on the site (Davison forthcoming).

A further question arises concerning the number of centurions in the first cohort. To date, epigraphical sources have given evidence only for five, the *primus pilus* having charge of two centuries; but the possibility of

there sometimes being six remains. For the period of the milliary first cohort the answer is clear. Excluding this period support for five would come from Nijmegen and Caerleon, but the disposition of buildings at York, Gloucester and Neuss suggests six. Even at Caerleon there can be seen to be a small building between Houses II and III. This building is similar in aspect to ordinary centurions' quarters at Caerleon although at 190 sq m it is rather smaller than the standard *c* 275 sq m. In the circumstances it may just be possible to consider this the quarters of the sixth centurion. It should be added that the courtyard houses 7a - 7f possibly for the centurions of the first cohort at Haltern number six (von Schnurbein 1974, 69).

The late evidence from Lauriacum, Carnuntum and Lambaesis on this point also is equivocal as has been pointed out above, but there is no doubt that in this later period the first cohort continued to have six centuries. Lambaesis offers some support for Vegetius' statement (2,8) that the first cohort was led by five centurions. Furthermore, as von Petrikovits points out (1975, 42), the different widths of the maniples in the first cohorts at Lauriacum and Carnuntum gives some support to Vegetius' statement of the differential responsibilities of the first cohort centurions being 400, 200, 150, 150 and 100 men respectively. But at least it can now be seen that the difference in the widths of the 'maniples' of the first cohort in Period 5 at Nijmegen is the product of considerations quite other than seniority.

Concluding Remarks

In the foregoing analysis lies the danger of oversimplifying and overregimenting the history of the cohort barracks. The evidence available for nearly all of them is only a small proportion of the whole; in particular this is demonstrated by recent excavations at Chester and Caerleon. At Goss Street Chester three separate timber phases have now been identified, all dating to the first century, where it used to be thought that there was just one timber phase. The excavator attributes this discovery to the use of area excavation (Mc Peake 1978, 9). Again at Chester the Northgate Brewery barracks are found to have had three timber Phases before *c* 120 followed by three stone Phases. Again the Roman Gates barracks at Caerleon had four Phases before 140, Phases during which the barracks took very different forms.

Later building periods in the barracks do not always mirror the earlier ones. At Caerleon one or perhaps two of the final, regularly-spaced, stone-sill Prysg Field barracks overly foundations of others with different spacings. Again at Myrtle Cottage two *centuriae* of the final Period of Barracks 5 and 8 overly foundations of others differently spaced. At Vine Cottage under a barrack of the final Period there were the well-preserved remains of a stone-based *centuria* which extended under the street metalling to the south-west (Boon 1972, 26). At Chester, Newstead excavated in 1923 what appears to be part of a barrack at variance with the orientation of the fortress (Newstead 1924). On the other hand some solace may be sought from the fact that many stone-sill barracks follow closely the dimensions of their timber predecessors. The Old Market Hall barrack at Chester has provided 'the most complete plan of a timber building in the fortress' and Petch notes that its internal dimensions are similar to those of the later stone built barracks (1978, 22).

It also known that for many years some of the barrack sites were left vacant, or perhaps used for other buildings such as the smithy present on the site of the final Prysg Field barrack until *c* 150. The Vine Cottage barracks may not have been in existence before the Antonine period, while the terminal barrack of the Myrtle Cottage group may not have been erected until the second century. Chester provides a similar story. There is no trace of timber predecessor of the stone barracks at Eastgate Street and the earliest occupation of the Folliot House barracks dates to the second century. The site of the Northgate Brewery barracks was left as open ground betweeen *c* 120 and 160 while the Crook Street area of the first cohort was paved in the third century and left open. Furthermore, from the time of the initial occupation in the 70s to the closing years of the second century there existed a very large open space of *c* 42 × 60 m to the east of the Princess Street/Hunter Street barracks (Strickland 1982, 10).

Such anomalies are readily explained by the absence of legionary vexillations, taking part for example in the Agricolan, Domitianic and Trajanic campaigns or building the Walls in *Britannia*. Such practices make acceptable the notion that fortresses did not always accommodate a whole legion. Boon's verdict on Caerleon is that 'it was rarely if ever completely occupied' (1972, 69). This must have been true of many of the fortresses.

ALBANO

The buildings at Albano are sufficiently unusual as to call for individual treatment. Among those whose plans are at all known there appear to be three quite different kinds (Hassall 1983, 123).

There is very little evidence for the building furthest to the front of the fortress but such as there is is recalls the plan of a *valetudinarium*.

The pair of buildings which follow aligned *per scamna* across the width of the fortress may both be interpreted as double barracks. In their layout these buildings most resemble the Type Z barracks at Vetera I and Bonn. Again the centurions' quarters may be seen at right angles at both ends of two rows of *contubernia*, but here the *contubernia* enclose a central court instead of having a rear party wall. Thus interpreted, in each block there are two centurion's quarters and two sets of men's quarters with 14 *contubernia* in each. The size of the centurions' quarters (448 sq m) and the size of the men's quarters (693 sq m) correspond very closely with those of cohorts D and E at Lambaesis. The number of *contubernia* also is the same and although their internal living area (24 sq m) is not as large, it is a figure quite acceptable for legionary barracks. The proportion of the length taken by the centurions' quarters (29,37 %) accords fairly closely with the 26,02 % of cohorts D and E at Lambaesis.

Hassall sees the barracks in the *retentura* as the same 'divided' type which he has interpreted for Birrens and Ain Sinu I (these latter will be discussed further in Chapters 3 and 6) (1983, 122). If this interpretation is correct there are probably 14 such barracks. The eight nearest to the rampart are slightly shorter than the six in the centre and have eight *contubernia* as opposed to nine. The demarcation of one section of the barracks for the centurion or officers is not apparent.

Eight or nine *contubernia* is a very small number in a legionary context. Equally, to join two sets of barracks and to accord them some 17

contubernia would see them almost without equal. Thus the barracks, if such they are, are very ill-suited to the accommodation of legionary centuries. It is possible that the buildings should be considered as accommodation for auxiliaries where totals of eight and nine *contubernia* are usual.

The internal area of the individual rooms of 12 sq m is only half what might be considered reasonable for a *contubernium* in legionary or auxiliary contexts, thus it is possible that the rooms were 'paired' across the intervening courts, possibly with one or two for the centurion or officers. Yet 12 sq m is a reasonable provision of space for four men. Each small building thus has the capacity to accommodate some 30 men leaving one room for an officer. This would meet precisely the requirements of one *turma* of cavalry. It must be considered possible that the buildings in the *retentura* accommodated 28 turmae of cavalry. Such a number does not accord with the strength of any known unit but there is room for four more such barracks in front of the *aedes* which would give a total of 32 *turmae* or two *alae*. The provision of at least some stabling might be seen in the rooms built against the fortress wall adjacent to these *retentura* barracks.

On the other hand it may be that all these buildings in the *retentura* are better interpreted as stores and administrative buildings.

The Non-Cohort Barracks

Such is the multiplicity and variety of these barracks that it has been thought best to consider them fortress by fortress.

INCHTUTHIL

Buildings A and B

These barracks are located in the right *latus praetorii*, behind the courtyard house of the *primus pilus* and are separated from the *principia* by a row of *tabernae*. They face eachother in the manner of two *hemistrigia*.

Building A is of Type A and Building B is of Type J.

At *c* 60 m their length is equivalent to that of the mens' quarters of the cohort barracks at Inchtuthil. While it is interesting to note that the officers' quarters of Building A still preserve the characteristic Inchtuthil space between themselves and the men's quarters, their proportion of the overall length, 33 %, is quite uncharacteristic of the fortress. On the other hand the size of the officers' quarters is only very slightly smaller than the average centurion's quarters at Inchtuthil. The width of the men's quarters at 8,23 m, if not the length, is directly comparable with that of the men's quarters of the cohort barracks. The nine *contubernia* of A have some five square metres less living space each than the cohort *contubernia*. Overall the men's quarters are typical for auxiliary barracks of the period.

Building B is 7,60 m wide, one metre narrower than the men's quarters of the cohort barracks. In spite of this, the space avaiable in each of the 13 *contubernia* at 22,93 sq m, is very much the same as in Building A. The

overall area of 451,74 sq m is typical of the quarters of legionary *gregales* for the period.

The role of these barracks has been discussed by Pitts and St Joseph (1985, 169-171). It should be added only that Building A is to be compared with the officers' quarters next to the *fabrica* at Exeter (see below). Furthermore (*contra* Pitts and St Joseph) B invites comparison with the Goss Street barrack at Chester (see below). Von Petrikovits interprets these buildings as Unterkünfte von Immunes (Bild 4, 1).

CHESTER

Goss Street

The Goss Street barrack is situated to the immediate right of the *principia* in the *latera praetorii*. Three building periods have been detected, the first of which has three phases (Mc Peake 1978; Richmond and Webster 1951). The presence of officers' accommodation at any time is uncertain and in all periods the *contubernia* lack internal division into rear and front rooms. Both the length of the quarters, 57,00 m, and the number of rooms, 12, are directly comparable with those of Building B at Inchtuthil. Although slightly wider overall in Periods 2 and 3 (12,04 m), the width of the men's quarters also is very similar (8,38 m). In Period 1 the building is only 4,40 m wide. It may be argued that the building should be compared rather to the *tabernae* between Building B and the *principia* at Inchtuthil since the building faces the *principia* for most if not all of its existence. The most recent interpretation of the building is that in Period 2, that is for much of the second century, it formed a stable and in Period 3 living accommodation and offices (Strickland 1978, 26). Von Petrikovits interprets the building as possibly Unterkünfte von Immunes (Bild 4, 9).

EXETER

Officers' Quarters next to the *fabrica*

These quarters, with a shape analagous to centurions' quarters, are positioned away from the rampart and lie adjacent to a building interpreted as a *fabrica* (Bidwell 1980, 31; Henderson 1984, 19, Fig 14). Their width of 11,00 m is the same as that of the centurions' quarters at Exeter, but their length is considerably shorter, 14,00 m as opposed to *c* 18,50 m. In terms of size, these quarters are much smaller than those of Building A at Inchtuthil, 154 sq m as opposed to 218 sq m, but their relationship to the *fabrica* is analagous. On the other hand there is no very clear connection with a series of *contubernia* as at Inchtuthil, for the *contubernia* lying immediately to the west of the quarters most probably form part of the first *hemistrigia* of the cohort in the right hand side of the *retentura*.

LONGTHORPE

Building VIII

The dimensions of this barrack place it mid way between the main concentrations of legionary and auxiliary barracks for the Claudian/Neronian period in terms of length while its width falls in the middle of the

legionary range. The 178.60 sq m of the officers' quarters is much more typical of legionary than auxiliary sizes and the same may be said for the men's quarters of 392,85 sq m, no other men's quarters from auxiliary forts in the period being larger than c 325 sq m. The officers' quarters take up 25,88 % of the overall length and this figure is approporiate to both legionary and auxiliary barracks in this period. Details of the *contubernia* are unclear.

It is evident that this is a barrack which is very large in terms of other barracks from auxiliary forts of the period. On the other hand, it is substantially smaller than Building XIV, assuredly a legionary cohort barrack. The possibility that Building VIII too housed legionaries is probably to be discounted in the light of its associated stable (Frere and St Joseph 1974, 27). Building XIV may only be so large because of its possible connection with the first cohort.

NIJMEGEN Period 5

Barrack to the forward side of the quarters of the *primus pilus* and associated *contubernia*

This barrack stands alone, not connected with those of the first cohort, nor with the cohort in the right-hand corner of the *praetentura*. Similar in overall length to many contemporary barracks at Nijmegen, the 26,25 m of the officers' quarters are three metres longer than any of the other examples. This length produces the percentage of 38,89 % of the whole, a highly unusual figure. The area of the officers' quarters is correspondingly large, but the overall area of the men's quarters does not suffer as a consequence because of their rather greater than usual width of 10,00 m. The men's quarters continue to have 11 *contubernia* like the cohort barracks, although the first two are very narrow, and the greater width of the men's quarters ensures that they are the most roomy at Nijmegen at 25,45 sq m. Indeed they are large in any terms. In spite of this, as a result of the different configurations of the other barracks, the total living space of 279,95 sq m available in the barrack is very similar to that known for the other cohorts at Nijmegen, particularly Cohort D. Thus the most exceptional feature of the barrack is the large officers' quarters; in order to accommodate these dimensions unusual for Nijmegen seem to have been used in the rest of the barrack. Von Petrikovits defines this building as Unterkünfte von Immunes (Bild 9, 2). The position of the barrack would seem to associate it with two large *horrea* adjacent.

VETERA I

Barrack to the south of the *praetorium* in the right *latus praetorii*

Defined as guards' quarters or a stable by the excavator (Lehner 1917, 144), this is a small rectangular building with irregular internal divisions. Its overall length of 57,50 m is similar to that of the men's quarters in the cohort barracks at Vetera and it width of 8,60 m is similar to their width.

HALTERN

Building to the north of Building 3

Probably just 44 m long, this building seems to consist of a series of undivided rooms of varying widths. In terms of length and width it is similar to the men's quarters of adjacent Cohort 11d.

11c

The details of this group of buildings are extremely confused, but to judge by the widths of the cohort barracks at Haltern, there would seem to be here one single and two double barracks with party rear walls. They appear to be of Type M with no clear officers' section. Their length of 67,00 m does not mark them out as being different to the cohort barracks, but their width of 7,50 m is considerably narrower. Their *per scamna* orientation and their configuration speaks against their being cohort barracks of the Haltern type. In all these characteristics and sizes they are very similar to the more northerly barracks south of 'A' at Rödgen. The *contubernium* living space of *c* 18 sq m is also comparable.

10

These barracks grouped round the 'sogennanten Heiligtum' in the left hand corner of the *retentura* present a great variety of lengths and proportions. Only the first two barracks seem to have *contubernia* divided into front and rear rooms. Although the first barrack is of the same length as some of the cohort barracks, the length proportions of the officers' quarters are quite haphazard and range from 7,69 to 43,18 %. Overall widths also are less than the cohort barracks. Perhaps it should be pointed out that the *c* 40 m length of Barracks 2 - 5 is comparable with the 43 m of the more southerly barrack to the south of 'A' at Rödgen. The width of the men's quarters too is similar at c 6,5 m, but the areas of the officers' quarters are very different.

8a, 8b, 8c, 8d

This group of buildings was among the earliest to be excavated and discussed at Haltern (Koepp 1909; 1912; Stieren 1928; 1943). 8a and 8b were interpreted as stables, 8c and 8d as cavalry barracks. Now they are seen rather as stores and accommodation relating to the neighbouring *fabrica* (v. Petrikovits 1975, Bild 5, 9; v. Schnurbein 1981, 70).

8a and 8b appear to be similar buildings with lengths of *c* 40 m and widths of 14,50 m. They are divided into pairs of rooms about a central axis. There is little to suggest that these are double barracks in the manner of 11c and no other example of double barracks with undivided *contubernia* is known. The only building of comparable width is that to the north of Straße IV at Dangstetten and this, admittedly, has been interpreted as a cavalry barrack (Fingerlin 1970-71, 209), but the *contubernia* at Dangstetten are only half the size of those projected for 8a and 8b.

8c, a Type A building with separate officers' quarters, resembles the cohort barracks 11b but is much shorter overall. In terms of area (315 sq m), the

men's quarters are most similar to some of the barracks at Rödgen. Little is known of the internal arrangement of the barrack.

8d consists of a series of 11 undivided rooms. It is both shorter and narrower than the cohort barracks at Haltern. Within Haltern it is best compared with the building aligned *per strigas* and adjacent to the street to the north of Building 3, also with Building 12 on the *via principalis*. The *c* 24 sq m of the individual rooms corresponds closely with Building B at Inchtuthil. Excavation of 8d suggests that it had been used for accommodation.

12

Bordering the north side of the *via principalis*, this small building with five undivided rooms of a similar size to those of 8d may best be regarded as a precursor of the *tabernae* of later fortresses.

NEUSS

15, 16, 17; 23, 24, 25

Von Petrikovits has interpreted Buildings 15 and 16 as Unterkünfte von Immunes (Bild 5 2) and Building 17 as Unterkünfte von Principales von Immunes (Bild 9 3). It is noteworthy that their position adjacent to two *horrea* is very similar to that of the large barrack at Nijmegen Period 5. The dimensions of the buildings are however quite different. In terms of length and width, 15 and 16 most resemble Buildings 32 - 42 and 46 - 51. A similar relationship seem to exist between Buildings 23, 24 and 25.

32 - 42; 46 - 52

These barracks extend across the whole width of the second *scamnum* of the *praetentura* and are discussed by von Petrikovits (1975, 55-57). Their overall individual dimensions place them precisely in the middle of the range for auxiliary barracks of the Claudian/Neronian period and with the lower of the two main concentrations for the Flavian period. Sections for officers are not at all clear in Buildings 32 - 42 and they seem rather to consist merely of nine *contubernia*. Distinct heads to the buildings are more obvious in Buildings 46 - 52, often leaving 5 ordinary *contubernia* for the men's quarters. The area remaining for the officers' quarters of *c* 150 sq m is entirely typical for the auxiliary barracks of the period. On the other hand the proportion of the length taken by the officers' quarters (40,60 %) is untypical and the total of five *contubernia* is a very low one. The total living area of 125,95 sq m is at the bottom of the range for auxiliary barracks of the period.

Given these calculations, it would seem best to regard each barrack as a single unit rather than as a half of a pair and to assume that 32 - 42 followed the same pattern of division, a pattern not readily discernible but for which there is some evidence (Buildings 35, 39). A further problem is the number of these barracks, 18. This is not a number which corresponds to any known size of auxiliary unit except that of a *cohors milliaria equitata* when four of the 18 buildings are deemed to be stables. Koenen identified stables on the site by the presence of dung pits (Koenen 1904,

144) but von Petrikovits doubts that these pits are connected with the building phase under consideration. A better solution, von Petrikovits' solution, may be to see the buildings as the 16 barracks (with two extra) for the 16 *turmae* of an *ala quingenaria*. Usually it is thought that two *turmae* occupy one barrack, but, given the small number of *contubernia*, an exception may bave been made here and a very generous provision of space have been made to the decurions each one of whom would have his own quarters rather than sharing with a fellow officer. Such a suggestion is strengthened by the fact that until the Batavian revolt the *Ala Gallorum Picentiana* was reported by Tacitus to have been part of the garrison (Hist iv 62). But it is known also that *Cohors III Lusitanorum pia fidelis* was part of the army of *Germania Inferior* before the Batavian revolt and Alföldy considers that it may have been stationed in the fortress (1961, 66).

91, 108, 106, 124

Situated to the right of the *principia* (91) and flanking both sides of the *praetorium* (108 and 106), the first three of these buildings are of the distinctive Type K (see Figure A). Their lengths of *c* 73, 88 and 88 m are comparable with those of the cohort barracks, but their widths of 14, 13,5 and 14,5 m are about one metre greater. Particularly clear in 108 is the way in which the veranda wall base comes right round the ends of the building and passes in front of the large open-fronted rooms. The *c* 26 sq m internal free area of these subdivided rooms is considerably more than that of the cohort *contubernia* with the exception of Building 148. The total space available from the (probably) 15 and 17 rooms is 420,00 and 386,25 sq m, much more than the *c* 300 sq m from the men's quarters of the cohort barracks. There are no apparent officers' quarters.

Building 124 shares certain characteristics with the other three with its large open-fronted rooms and porticus columns but here the rooms are even larger, *c* 42,00 sq m. Nissen interpreted these buildings as the home of the legionary cavalry (Koenen 1904, 89) assuming that each *contubernium* would accommodate two cavalrymen, four horses and four grooms. If it is still not accepted that the legionary cavalry are to be found in the cohort barracks with their own centuries, the space available for them here would seem to be much too great unless indeed men and horses are housed together. But the continuous veranda wall base of 91, 108 and 106 would appear to make access for horses impossible, while the open fronts of the rooms do not suggest accommodation. A better interpretation for this group of buildings is that of stores or offices.

BONN

C9, C10, C11

Von Petrikovits interprets these buildings as cohort barracks (1975, Bild 33, 3), but it is now clear that these barracks on the right hand side of the middle *scamnum* of the *retentura* are different to the standard cohort barracks at Bonn. Their probable length of *c* 55 m makes them some seven metres longer than most auxiliary barracks from the Flavian period, while the widths of the officers' quarters are extraordinarily large at 16 and 18 m. They are matched by no other barracks except by U1/K1 and U2/K2 in the North-East Corner at Vindonissa (see below). C10 is best interpreted as a

double barrack with rear party wall, apparently having no projecting officers' quarters on the west side in the Type A mode of the other barracks. The 8,50 m width of the men's quarters is standard but the very wide officers' quarters means that the barracks in their pairs enclose courts much wider than those normally found between cohort barracks. The short length of the officers' quarters (11,50 m) ensures that their areas are not as large as those of the centurions' quarters, but at 184,00 and 207,00 sq m they are the top of the range of examples from the auxiliary forts of the period. The length percentage of 20,18 % concurs with that of the lower concentration of two for the Flavian period. The living space available per *contubernium* of *c* 30 sq m is at the high end of those found in both forts and fortresses in the period. There would appear to be space for 10 or 11 *contubernia*, a number which corresponds to the most common figure from auxiliary forts. Although these barracks are highly unusual, they resemble in some respects contemporary auxiliary barracks and it could be suggested that they accommodate auxiliary troops attached to the legionary garrison. The original excavation report suggests that C10 at least contained stables (von Veith 1888, 20).

VINDONISSA

Dätwiler

Grabung Dätwiler presents the partial remains of three barracks aligned *per strigas* in the right *latus praetorii* (Weiss and Holliger 1979/80). Only parts of the men's quarters have been revealed. It seems most likely that these baracks are of Type S. The *c* 44 m length of the men's quarters is very similar to that of C9, C10 and C11 at Bonn (see above), but it is also a length that is not uncommon in Claudian/Neronian barracks at Vindonissa. On the other hand, the two known widths of 9,00 m and especially of 12,00 m are wider than usual men's quarters. This width, allied to the small number of *contubernia*, 7, produces a very large *contubernium* living space for the western barrack of 40,16 sq m, unequalled in contemporary barracks except by the very large *contubernia* of Neuss Building 124. It must also be said that this number of *contubernia* is a very common one for auxiliary barracks of the period. It is interesting to note also that the width of the court between the two barracks, 28,50 m, is very similar to the c 25 m between C9 and C10 at Bonn. It is a pity that there are not sufficient details of the officers' quarters for further comparison. These barracks have much similarity with auxiliary barracks.

'Immunes' Kaserne, Hispanische Kohorte

Excavations to the south and west of the Baths in 1908 encountered part of a barrack which was interpreted as accommodation for a 'Hispanische Kohorte' on the basis of the very large number of tiles stamped with *Coh III Hisp* (Fels 1909, 35). Although the length of the barrack is not known, it had very large *contubernia* with living space of 33,60 sq m. The accuracy of the results from 1908 were confirmed by excavations in 1976 (Hartmann 1979/80, 14 Abb 9). These revealed another barrack lying to the south and similarly aligned *per scamna*. Again, only a part of the building was revealed, but it seems to have the very wide overall width of 13,40 m and men's quarters of 10,80 m. In spite of the width, the *contubernia* have only the average living space of 23,76 sq m because of the probable narrow *contubernium* breadth of 2,70 m, but the internal arrangements are very

confused. The breadths of the *contubernia* are quite uncharacteristic of the cohort barracks at Vindonissa. The two buildings are only some 3 m apart. Hartmann interpreted the second as probably accommodation for immunes. They do not conform to any obvious barrack proportions revealed in auxiliary forts.

Breite, North-East Corner

The north-east corner of the fortress shows many buildings of very different dimensions, most of which clearly are to be identified as barracks.

Period III Augustan/Tiberian

R1

In the Augustan/Tiberian period this building seems to have taken a highly unusual form, that broadly of one row of standard *contubernia* and an additional row of single cell rooms arranged both sides of a central corridor. R1 would seem to be made up of two of these buildings arranged end to end with two officers' quarters at the opposite ends of the overall complex (Laur-Belart 1937, Abb 1, R1 and R2; Simonett 1938, Abb 2, V1 and V2). If such an arrangement is the correct interpretation, it produces two buildings with lengths of 38,50 and 45,75 m and widths overall of 14,20 m. Such lengths find agreement with barracks to the south of 'A' at Rödgen but not in terms of width unless the *contubernia* are considered on their own with their width of 6,50 m. Such a measurement would put them in the middle of the auxiliary barrack concentration for the Claudian/Neronian period. Certainly the officers' quarters are very small (41,93 and 67,73 sq m) and the same may be said of their length percentages (15,97 and 22,22 %), but they are very similar to others at Rödgen and Oberaden and fall in the middle of the main concentration for the Claudian/Neronian period. The same can be said for the area of the men's quarters when calculated on the width of 6,50 m. The *contubernium* living space of 20,81 sq m is wholly appropriate for legionary and auxiliary barracks at this early period, as is their proposed number of *contubernia*, 8. All that remains is the row of single-cell rooms on the *via decumana*. Laur-Belart suggested stables, and although possibly well-sited, the theory is unprovable. Certainly there would not be room here for all the mounts of the legionary cavalry and no similar building has been located elsewhere in the fortress. The most that can be said is that in some respects, the constituent parts of R1 agree with the dimensions of many barracks from auxiliary forts. The single-cell rooms are best regarded as store rooms, precursors of the formalised *tabernae*.

U1/K1

In the Augustan/Tiberian period this is a conventional Type A barrack with the exception that the line of the veranda is recessed *c* 1,5 m from the line of the officers' quarters. Of a conventional length for cohort barracks, the 14 m width of the officers' quarters is greater than usual. This, together with their considerable length, produces quarters of 319,98 sq m, large in comparison with most centurions' quarters. They also take more than usual of the total length, 43,18 %. The men's quarters fall into

the middle of the legionary range at 413,63 sq m. With 13 *contubernia* of average cohort barrack size, the whole is indistinguishable from a standard cohort barrack.

U2/K2

U2/K2 also is a typical Type A barrack. This time the rear walls of the officers' quarters and the men's quarters are not in alignment, the officers' quarters being wider than the men's overall. This barrack is 5 m longer than U1/K1 but both its length and width fall into the standard cohort barrack range. The officers' quarters and men's quarters are fully consistent with contemporary cohort barracks in terms of size and length proportion (35,21 %). On the other hand, the barrack does have a very large number of *contubernia* (16) and at 18,75 sq m the living space is rather small for legionary barracks of later periods but not for the Augustan/Tiberian period.

To the rear of K2 is a long narrow building made up of single-cell rooms. Its width overall is c 4 m.

Periods V/VI Claudian/Neronian

O1/O2

In this period R1 seems to become a more conventional barrack of Type B, probably without a veranda. The officers' quarters are very large. Their length is some 37,5 m and their area *c* 468,75 sq m. If the overall length of the barrack may be taken to be 85 m, the officers' quarters take 43,72 % of this, a much higher proportion than usual. The dimensions of the men's quarters are not clear, but if they have the same width as in later periods, they will have the very large area of 593,75 sq m, unequalled in the Claudian/Neronian period.

U1/K1

This is a standard Type A barrack with the exception that, like its timber predecessor the line of its veranda is slightly recessed. The lengths and length proportions are the same as for O1/O2. The slightly greater width of the officers' quarters (13,25 m) produces an even greater area of 496,88 sq m. On this occasion, the men's quarters have the more usual width of 8,20 m in Period V although this is widened to 9,10 m in Period VI. Both these dimensions produce areas standard for cohort barracks. The same may be said for the 11 *contubernia* and their living space in Periods V and VI of 24,80 and 28,80 sq m respectively.

Period VII Flavian

O1/O2

The Flavian period sees a great change in O1/O2. Although the same lengths seem to have been retained, the width of the officers' quarters is much reduced from the line of the former rear wall to 8,65 m. The width of the men's quarters remains as before while a light veranda seems to have been

added to the front of the officers' quarters. Thus the men's quarters are wider than the officers' quarters, a wholly unconventional barrack layout. It is possible that the men's quarters, taken over from the previous building period without alteration, have a long undivided room to the rear and a series of single-cell rooms to the front. In spite of the unusual shape of the barrack, the area available to the officers' quarters of 324,38 sq m is still in the middle of the range for legionary centurions and is equalled only by one auxiliary example.

U1/K1

The officers' quarters of O1/O2 suffered at the expense of the very large new officers' quarters of U1/K1. Lengths remain the same, but the width is now increased to 16,50 m to produce an area of 618,75 sq m. This is a size which can be compared only with the courtyard houses of the first cohort centurions and the special examples from York and Longthorpe. The width and internal dimensions of the men's quarters remain the same.

U2/K2

This barrack continues in the same form from the previous timber period but the full extent of the officers' quarters is much clearer, having an average width of 18 m and projecting backwards behind the line of the men's quarters as does U1/K1. The length of 33,25 m out of a total of 84,00 m is less than in the case of U1/K1, but it is still 39,15 % of the whole, while their area of 568,11 sq m is hardly distinguishable from U1/K1. Again the men's quarters are typical for cohort barracks.

U1/K1 and U2/K2 make a very clear and impressive pair, more massive than any barracks with the exception of some examples from the first cohort.

K3

K3 takes the form of a row of *contubernia* situated to the rear of K2 and of the same length without apparent officers' quarters unless it be considered that they are incorporated in U2. At 7,25 m, they are slightly narrower than most contemporary Flavian men's quarters, but they have the approporiate number of *contubernia*, 11, for their length.

U3/K4, U4/K5

Here there seem to be two small detached officers' houses with two attendant men's quarters built with a party rear wall. These barracks are much smaller than the others in this area. The officers' quarters take up 120,13 sq m which is characteristic for officers' quarters from auxiliary forts in the Flavian period. The same may be said for the men's quarters of *c* 335 sq m, especially for the province of *Germania Superior*. The 22,99 % length proportion of the officers' quarters also is typical of barracks from auxiliary forts, as is the number of *contubernia*, 10, and their living space of 22,00 sq m. In every way, these barracks have dimensions typical of those from auxiliary forts.

U5.K6

Such a statement as the above cannot be made with regard to this barrack. Only 55,00 m overall, the officers' quarters take up 44,13 % of the length, while their width of 10,60 m is typical of contemporary centurions' quarters. Thus their total area of 237,44 sq m is appropriate for a legionary centurion, but the rump of the barrack with just six *contubernia* and 220,80 sq m is very small even in terms of barracks from auxiliary forts. The size and proportions of this barrack are not to be seen in any other context.

These barracks of the North-East Corner present a very varied picture. Some of them at least may well be connected with servicing the large and indeterminate buildings A, B and D in this area of the fortress, but the very close agreement of some with the dimensions of barracks from auxiliary forts suggests that here may have been placed some auxiliary troops although there is not sufficient space for complete units. Equally, the very large barracks are shown to be of the scale of cohort barracks and it must be considered that legionary centuries of some kind were placed here, possibly from another legion.

Breite *valetudinarium* Period 3

In the other periods, the barracks from this area have much more the appearance of cohort barracks, but in this period, five out of the seven have two undivided *contubernia* followed by a divided *contubernium*, in the manner so often associated with hospital buildings. This building period dates to the Augustan/Tiberian period and the later positioning of the stone *valetudinarium* in this area may be no coincidence.

Oelhafen Building B

Situated in the *praetentura* of the fortress near the *via praetoria*, this Claudian/Neronian Type A barrack seems to be isolated in this part of the fortress. It is only 29,00 m long, of which the officers' quarters take only 4,70 m (14,44 %). The narrow width of 9,90 m produces an area for the officers's quarters of just 46,53 sq m, small but not without parallels in the auxiliary forts of the period. The same may be said for the men's quarters of 200,48 sq m. The barrack is possibly to be associated with a nearby baking oven (Mossbrugger Leu 1959-60).

Scheuergasse

Scheuergasse provides evidence for two rows of *contubernia* with a rear party wall, built with stone sills and dating to the Claudian/Neronian period. The barracks are situated by the *via sagularis* behind the southern rampart and are aligned *per strigas*. Just six *contubernia* have been revealed extending over some 25 m. Only some 40 m is available for the length of the barracks, thus whatever the further arrangement, the officers' quarters must have been much shorter than those of the legionary centurions. As the excavator states, the whole is strongly reminiscent of the barracks of the second *scamnum* at Neuss (Fellmann 1953/54, 34). But the Scheuergasse barracks do seem to be built on a rather larger scale.

Their probable overall width of 10,33 m and the width of the men's quarters of 8,80 m are not inappropriate for cohort barracks. The same may be said for the *contubernium* living space of 28,67 sq m.

Conclusion

Disparity is the keynote of the non-cohort barracks. They display no clear traits apart from the fact that many show distinct similarities with contemporary auxiliary barracks, similarities which occur perhaps too often simply to be the product of chance. This must prompt the question of whether a number of auxiliaries of different kinds were not always present in the fortresses, and not just during the earliest periods. Very rarely does there appear to be sufficient accommodation for whole units, but the barracks seem to be too clearly delineated according to conventional military proportions to constitute accommodation for fortress servants or grooms. One further possibility is that they sometimes accommodated the *singulares legati* or others who were assigned to the staff office of the legion from elsewhere.

Chapter 3

Auxiliary Barracks

General Description

Building Types

It was shown in Chapter 1 that the variety of barrack Types in the auxiliary forts is much greater than in the legionary fortresses and that this variety is found throughout the periods being considered in this thesis. Figure A sets out the barrack Types in detail. The range of barrack Types is found in fairly equal measure in all the north-western provinces (Fig 44). The principal Types A and B are divided equally in each province. Type A is well known; in Type B the officers' quarters do not project in front of the line of the men's quarters. It will be noted that only *Britannia* stands out in any way, being the only province with examples of Types C, E and F, and showing a marked presence of Type H. Such an apparent discrepancy may be simply the result of the relatively large number of examples deriving from *Britannia*. Provinces outside the north-west show a preference for Types H, J and G at the expense of A and B.

In any event there are very few examples of Types C, E and F. The clearest examples of Type C are to be seen at The Lunt Periods I and II. Type C is a barrack similar to Type B, but narrower with the place of the *arma* apparently being taken by a corridor. This seems to be a Claudian/Neronian Type since the closest parallels come from Waddon Hill (although the barracks there are very difficult to define and may be better ascribed to Type A). It is just possible that the Hadrianic Building X in the right *praetentura* at Caernarvon also is a Type C barrack. Type E is even more problematical. Its clearest presence is at Melandra Castle. These barracks appear to have an enclosed corridor, or partly-enclosed veranda fronting a series of undivided *contubernia*. There appear to be no distinct officers' quarters, rather just ten *contubernia*. The excavator considered that the corridor continued along the whole length of the barracks and round both ends. Furthermore, he found indications that there may have been a corridor along the rear of at least Barracks 1 and 2 as well (Petch 1943, 57). It would seem here that a number of building phases have been confused. This being said, the small barrack in the *latera praetorii* of Corbridge II does appear to take a very similar form. It is possible also that Building X at Caernarvon should be ascribed to this Type.

Type F forms a more substantial group. Plans of the Antonine forts at Birrens show a large number of narrow rectangular blocks. Robertson suggests that these narrow blocks are the two halves of single barracks, the gap or eavesdrip between the two forming a cobbled passage with a width of *c* 0,75 m between *papilio* and *arma* (Robertson 1975, 85-86). This has the effect of creating fairly wide barracks of 9,75 m in Antonine I and 12,50 m in Antonine II, but they do fall within the range for the period. Furthermore, the area-totals fall nicely in the middle of those calculated for the period as outlined in Chapter 1. This interpretation receives support from excavations at Cardean where a similar double midrib was noted (Robertson 1979, 86) and from excavations at Ravenglass. Here, in Phases 2 and 3 the barrack closest to the rampart is of this form. The excavator

suggests that this double median wall was designed to provide additional strong support for a pent-house roof sloping down to either side, the extra support being required here because of the sloping ground and the need for stability. Potter writes that the ground at Birrens also slopes (1979, 31).

There are some further hints that this barrack Type may not have been unusual. At Balmuildy, the plan of timber barrack IX in the left *praetentura* shows what appears to be a Type A barrack with a central corridor 1,50 m in width running the length of the building. The excavator was, however, not certain that the two rows of postholes forming the central corridor were contemporary (Miller 1922, 37). A similar arrangement may be seen in the barrack in the north of the *retentura* at Ardoch.

This general interpretation for the Type F barracks has been doubted by Hassall among others and he suggests that the pairs could be seen facing each other across wide open courts (Hassall 1983, 111-112); but this surely would have the unfortunate effect of divorcing the men, when asleep, from their equipment. Further it should be noted that at Ravenglass in Phases 2 and 3 a barrack of a different Type is just one metre distant from the single Type F barrack; thus an alternative to Hassall's interpretation must be found for this site. Whatever the truth, it is clear that there is here a distinctive barrack Type the evidence for which is so far mainly confined to *Britannia*. The only barracks from other provinces which at all resemble the Type are from Albano (see above) and Ain Sinu I in *Mesopotamia* (see below).

Type I is a further small group this time not confined to *Britannia*. In these barracks officers' quarters of equal size are found at both ends of the barrack projecting in front of a normal row of *contubernia*. Theoretically this barrack Type is best suited to cavalry where the conventional interpretation states that two *turmae* with their decurions are housed in a normal-sized barrack. The best and most elaborate example of this type is from the fort of *Ala II Flavia Milliaria* at Heidenheim. It is possible that a similar barrack may come from Phase 3 South at Heddernheim, which also may have contained a cavalry unit.

In *Britannia*, Type I cavalry barracks have been postulated for Building A6 at South Shields Period I (Dore and Gillam 1979, 34) and for Building IV at Gelligaer. Building A6 at South Shields is not known in any very great detail, but the total area of officers' accommodation of 164,64 sq m falls into the upper region of the range deriving from the province and period, while the remaining area of the men's quarters (252 sq m) is very close to the middle of the range. Such findings would appear to be compatible with the interpretation of the building as a Type I barrack. Building IV in the right *retentura* at Gelligaer is not so promising. The total officers' area of 294,36 sq m, although very similar to the 308 sq m at Heidenheim, is much greater than that of any contemporary in *Britannia* and really is best compared with legionary centurions' quarters. In contrast, the area of the men's quarters amounts to merely 82,10 sq m which is equalled only by the very smallest barracks for the period. The officers' quarters take up 62,73 % of the total length and 76,74 % of the total area. Such figures are unacceptable and unless some alternative and highly unusual partitioning of the building can be suggested, it would seem that Building IV should be interpreted as a *fabrica* or store-building rather than as a barrack.

A problem arises concerning the barrack of Phase 4 at the Upper Station House site at Loughor. The excavator considers this building to be half

barrack and half stable (Owen-John and Marvell 1982-83, 41). Unfortunately, the overall shape of the building is not sufficiently known for it to be ascribed to any existing Type or to define criteria for one. But it does recall the form of the building on the east side of the Augustan fortlet at Nersingen which, partially open to the front, has been interpreted as a stable or workshop building (Mackenson 1987, 44-47); also the partially open-fronted building in Wilson's Yard in the *retentura* of the later fort at Castleford.

Apart from the difficult examples mentioned above, the remaining building Types are relatively easy to distinguish, even though some of them do not occur very often such as Types J and G. Indeed, even the barracks recently excavated at Dormagen and Krefeld-Gellep, which apparently contain dung pits and may have combined the functions of both barrack and stable, also conform nicely to Type Mx. Where there are difficulties, these stem most frequently from old excavations such as Arentsburg, Alteburg, Niederbieber and Hüfingen. In all these cases the palimpsest of walls obscures the original form of the barracks.

It is clear that many forts have their barracks built consistently of the same Type throughout. Of those forts where a reasonable complement of barracks is known, Fendoch and Rottweil Kastell III have Type A, Strageath Antonine I, Crawford, Elginhaugh and Wallsend have Type B, Bearsden and Dover have Type H, and Birrens Type F. But forts often have barracks of different Types immediately adjacent to each other. Very often these are of Types A and B. Examples may be seen at Strageath (Flavian and Antonine II) Camelon, Chesters, Caernarvon, Pen Llystyn, Valkenburg (all periods), Hofheim (Steinkastell), Burladingen, Drobeta and Slăveni. In Period 2/2a Hesselbach has barracks of both Type H and Type G. Sometimes more than two Types are to be found in the same fort. Thus Corbridge II appears to have examples of Types A, B and E, Ellingen has examples of Types A, B and J, although not all in the same Phase, and Bu Ngem appears to have Types A, G, H and J (but it should be noted that the information from Bu Ngem is transposed from an air photograph). Such discrepancies may well have implications for construction practices, seniority and, most important, garrisons. This particularly is true for those forts which probably have more than one unit in garrison, for example both of the Antonine forts at Strageath, Pen Llystyn, Valkenburg and Hofheim (Steinkastell). Such problems will be considered in Chapter 6.

Veranda

The covered veranda with porticus is a feature of the barracks from auxiliary forts, but one which is much less pervasive than in the legionary fortresses. Figure 45 shows that the number of barracks with and without porticus is very much the same in total, but that there is some variation from period to period. In the Flavian period those with porticus are one third again more common than those without; in the Trajanic/Hadrianic period the numbers almost balance. Only in the Antonine period does the number of examples without porticus predominate.

Type A barracks take the form which is most suitable for the inclusion of a porticus in the design. For this Type, the assumption is that a porticus is present, but there is a substantial minority of examples where evidence for the porticus posts or their bases is lacking (Fig 46). It is clear that nearly all Type A barracks have porticus in the Flavian period, but that

this preponderance diminishes in the Trajanic/Hadrianic period and again in the Antonine period. The usual pattern would seem to re-emerge in the Severan period.

In many situations it may be that the evidence for the porticus has been destroyed as at Newstead Periods 3 and 4 in the *praetentura*, Haltwhistle Burn and Watercrook, but the number of times where Type A barracks without porticus are found in the same fort at the same period alongside Type A barracks with porticus, suggests that there is here a substantive difference and not merely shortcomings in the archaeological record. Examples of this situation come from Flavian Strageath, Bar Hill, and Valkenburg Castella 2/3, 5 and 6. To judge from the plan of the fort it might be thought that this could also be true at Gelligaer, but here the excavators did not pursue the porticus uprights in the *retentura* (Ward 1903, 67).

For the other barrack Types, the assumption is that they will not be provided with veranda and porticus, but nevertheless, sometimes these are found, nearly always in forts where barracks of the same Type are present but lacking porticus. This fact may well have significance when seniority within the fort is being considered. Type B barracks XII and X in the left *retentura* at Flavian Strageath have porticus, as does barrack P2 at Pen Llystyn. Valkenburg Castella 4, 5 and 6 all have Type B barracks with porticus set alongside Type B barracks without porticus.

With their projecting officers' quarters Type G barracks most resemble those of Type A and are often found with porticus as at Hesselbach Buildings 1, 2 and 4 in Periods 2/2a. Again the presence of a porticus at the Type I barracks at Heidenheim with their twin projecting officers' quarters is not surprising.

The porticus is a less natural feature of the other building types but examples of Type H barracks with porticus come from Cardean in the *latera praetorii*, possibly from Bainbridge Fort II Period 1 FA, FB, FC, The Lunt on the eastern defences, Dover Fort II B 19, Krefeld-Gellep Period III the Eastern Building, Hesselbach Period 2/2a Building 3, Hüfingen Kastell II Ia Period 1, Drobeta Building 3 in the left *praetentura* and Slăveni Buildings 2, 3, 5 and 6. Bearsden provides examples of Type H barracks both with and without porticus. Of the remaining Types, M has a porticus at Hofheim (Erdlager) Building C Period 2 and at Oberstimm Building 12 in Periods 1b, 1c and 2. Even Type F may have a porticus as is shown in Phase 3 Barrack 6 at Ravenglass.

In Type A barracks, the outside line of the porticus uprights takes the same line as the outside line of the officers' quarters. The spacing of the uprights follows usually that of the dividing walls of the *contubernia*, but occasionally variation occurs as at Flavian Strageath in the facing verandas of Barracks VI and VII. The uprights of Barrack VII follow the number of *contubernia* in the usual way, but those of Barrack VI occur twice as often. Indeed a generous provision of porticus uprights seems to have been the rule in the fort since Barracks IX, X and XII all have more than one per *contubernium*.

Carrawburgh is alone in recalling Longthorpe Building XIV in that the side walls of the *contubernia* probably continued across the depth of the veranda to form a series of open cubicles (Breeze 1972, 92).

The widths of the men's quarters and the corresponding widths of the distance between the outside line of the front wall of the men's quarters and the outside line of the officers' quarters of Type A barracks (ie the width of the veranda), are set out in Figure 47. The graph shows the wide range of widths from *c* 4 to 10 m of the men's quarters and the surprisingly wide range of veranda widths, from *c* 1 to 5 m. In most examples a veranda with porticus columns has been verified, but sometimes such a construction is not proven. On these occasions the veranda column bases may have been resting on top of the ground and were either unnoticed or unverifiable by the excavators. Whatever the truth, it should not be thought that a covered veranda is always present in Type A barracks. Where the veranda uprights are unverified, the equivalent width of the veranda is marked on the graph.

The widths of most covered verandas range from 1,0 to 2,5 m. The number of covered verandas diminishes rapidly when the width exceeds this figure and is overtaken in number by those where no porticus has been verified. The widest covered verandas of over 3 m come from Dover B19 PIII (3,80 m), Drobeta Barrack 3 in the left *praetentura* (3,76 m), Oberstimm Building 12 Period 1c (3,60 m) and Weißenburg (Breitung) (3,40 and 3,60 m). The Dover barrack is a highly unusual one, there are problems about the accuracy of the Drobeta evidence and it is not at all certain that the Weißenburg buildings are barracks at all. Thus only Oberstimm provides strong evidence for covered verandas of this width.

This evidence suggests that the covered veranda is integral to the design of most Type A barracks but that when the officers' quarters extends too far from the line of the men's quarters, the covered veranda may be omitted. This in turn suggests that the construction of these extended officers' quarters is such as to make the building of a veranda difficult. It may be that in these barracks the roof line of the officers' quarters is at right-angles to that of the men's quarters; in those barracks with porticus the roof line is much more likely to continue in the same direction for the whole length of the barrack. This is illustrated in Figure 48. Such a construction would necessitate a generally higher roof line and this leads to the consideration that perhaps those Type A barracks without porticus, but with a veranda space of standard width, also had officers' quarters with their roof line at right-angles to the rest of the barrack. Figure 47 demonstrates that there are many barracks whose dimensions reveal a covered veranda to be feasible but where none has been verified.

Many of the wide 'veranda' widths are from the Claudian/Neronian period, in particular from Hod Hill and Waddon Hill. Sometimes it may be said to be the general policy of the fort is to have Type A barracks without covered verandas. Hod Hill and Hofheim (Steinkastell) Period II may be cited as examples of this. As can be seen in Figure 47 many of the examples at Hod Hill are too wide to have a veranda in the conventional manner. The same may be true at Hofheim where the distance in question in both *praetentura* and *retentura* is 4,00 m.

On occasion isolated Type A examples stand out which have veranda widths too great for a conventional porticus in contrast to other barracks in the same fort. Examples may be seen at Flavian Strageath Barrack I (3,20 m); Newstead Periods III and IV Barrack I (3,15 m); Pen Llystyn Barracks P4 and P5 (2,95 and 3,10 m); Murrhardt Bau B (2,50 m); Petronell Period 2 Phase 2 Western Building (4,00 m).

There are many possible reasons for variation within the same fort, but it must be considered that the provision or non-provision of a covered veranda may reflect status. In particular this is true if such a provision can be seen to imply a different form of construction not traceable in the ground plans alone.

Rear Wall Construction

Like the cohort barracks in the legionary fortresses, the barracks in the auxiliary forts also make occasional use of the rear party wall form of construction, but just how unusual this is in comparison with the normal Type 1 arrangement can be seen in Figure 49. Type 2 sometimes occurs, but there is no evidence for Types 3 and 4 which are very occasionally found in the legionary fortresses. The examples with rear party wall construction form a very small percentage of the whole.

Further examination of Figure 49 shows that this is not a technique which finds favour in any particular period, nor is the evidence sufficient to associate it with any particular province. It appears early in the Claudian/Neronian period at Valkenburg, Rißtissen, Unterkirchberg and possibly at Stanway and continues through to the Antonine period at Inveresk, Carzield and Ellingen. Very striking is the fact that this building form is found at a highly disproportionate number of forts where an *ala* has been suggested as the garrison: Benwell, Carzield, Inveresk, Valkenburg Castellum 2/3 and Unterkirchberg. Furthermore, examples are found at Haltonchesters, Rißtissen and Weißenburg (Breitung) where horsemen of some kind are thought to have formed part of the garrison. While it is clear that this form does occur in barracks which are probably not to be associated with cavalry such as Slack, Ellingen, Moos-Burgstall and Bu Ngem, its frequent association with *ala* cavalry is undeniable.

Figure 49 also makes it clear that rear party wall construction is not associated with any single construction technique. As with the legionary cohort barracks, rear party walls do not favour or disfavour timber or stone construction.

Construction Methods

The construction methods employed in the barracks in the auxiliary forts cover the same range as in the legionary fortresses (Fig 50). It is clear that the most common method overall is that of post-trench construction and that this continues to be very significant until the end of the Antonine period. The use of stone sill walls is found in considerable numbers only from the Trajanic/Hadrianic period onwards, but it is the most common method in this period and in all subsequent ones. Post-trench construction is by far the most significant for the timber barracks, but it should be noted that sill beams are present in not inconsiderable numbers in all periods except the Augustan/Tiberian and the Claudian/Neronian. By way of contrast post-pit construction is important only in the Antonine period when it provides only slightly fewer examples than the post-trench barracks. There are hardly any examples of stone barracks where the excavator considers the building to have been constructed entirely of stone rather than of a timber framework resting on stone sill walls.

When the situation in each province is examined in turn, it is clear that there is considerable divergence. It is *Britannia* which is responsible for much of the stone-sill construction in the Trajanic/Hadrianic period. This method is, indeed, found in the other provices at this time, for example at Florstadt-ober-Florstadt, Wiesbaden and the Saalburg in *Germania Superior*, at Celamantia Fort 2, Adony III in *Pannonia*, Čezava and Tekija in *Moesia Superior* and at Drobeta in *Dacia*. The method is encountered even in the Vespasianic/Domitianic period at Kastell II at Rottweil and in the Flavian at Arlaines, but essentially stone-sill construction outside *Britannia* is a feature of the Antonine if not rather the Severan period. A general move to convert timber barracks into stone seems to have taken place in Dacia at the turn of the second and third centuries since evidence for this has been found at the forts of Bologa, Buciumi, Feldioara and Slaveni, but no such move seems to have taken place in the other provinces, *Britannia* excepted.

Indeed, it is a marked feature of *Germania Inferior*, *Germania Superior* and *Raetia* that barracks continued to be be built of timber even when fort defences were reconstructed in stone. Künzing in Periods 3 and 4 may provide an exception to this rule (Schönberger 1975, 31-4). Furthermore, such barracks as were constructed on stone sills in these provinces also tend to be isolated examples in their forts. Time and again, the ORL commissioners in their reports on excavations carried out in the forts of the Obergermanisch-rätische Limes in the early years of this century remark that the slight remains of wattle and daub barracks had been noted; but the excavation techniques of the period hardly ever allowed the recovery of anything of the plan of these buildings. Even when excavated with the most modern techniques the barracks of these forts remain an enigma. Excavations at the fort of Miltenberg between 1970 and 1975, in spite of extreme care, completely failed to reveal structural evidence for the barracks although large numbers of nails of a type known to be still used locally for external timber cladding were discovered. The opinion of the excavator is that the walls must have been constructed on surface sill-beams so that the whole building rested on top of the ground leaving behind no recognisable remains (Beckmann 1976-77, 89).

The first wholesale use of stone sills in the construction of the barracks is to be seen in the forts of Hadrian's Wall where this technique was used exclusively. But timber barracks continued to be built in *Britannia* after this period, most strikingly in the forts of the Antonine Wall. What is more, these barracks made use of post-pit construction in a concentrated way not to be seen before or since. Thus, of the barracks known from the Antonine Wall, all are of post-pit construction with the exception of those in the first Antonine period at Old Kilpatrick which are of sill-beam or post-trench construction. It is the examples from the Antonine Wall which cause the emphasis on post-hole construction in the Antonine period demonstrated in Figure 50.

The remaining construction methods demonstrate no particular trends, but it should perhaps be noted that sill-beam construction has been identified more often than usual in the north of *Britannia* (eg Fendoch: Richmond 1938-39, 136). It is possible that some of these interpretations are mistaken and are in fact examples of post-trench construction.

The details of construction will be discussed more fully in Chapter 7.

Overall Dimensions

The characteristics and general trends in those barracks from auxiliary forts where both overall lengths and widths are known were described in Chapter 1. It is the purpose of this section to refer specifically to the most significant examples.

According to length, the barracks from four forts are characteristic in the Claudian/Neronian period in *Britannia* (Fig 2.2). Both The Lunt and Waddon Hill have barracks of *c* 47 m in length, while Hod Hill and Nanstallon have barracks of *c* 33 m in length. On the other hand, the widths of these barracks vary considerably both from fort to fort and within the forts themselves. This particularly is true of Hod Hill where the range is from 10,50 to 5,79 m. In turn, this produces a very wide variety when the area of the barracks is calculated. Furthermore, the barracks from these four forts are all of different Barrack Types: C, A, G, H and B. There is no characteristic Claudian/Neronian barrack in *Britannia* in any sense other than that they tend to be generally smaller than those in subsequent periods.

In *Germania Inferior* Barrack 13 at Valkenburg Castellum 1, with 56,00 m, is almost of the length of legionary cohort barracks. In *Germania Superior*, Hofheim (Erdlager) has barracks which conform very well in terms of length of *c* 30 m with the shorter group from *Britannia*, although not in terms of width (but it possible that these dimensions are only those of men's quarters, see below). In *Raetia*, Oberstimm and Rißtissen again reflect the dichotomy with lengths of 47,00 and 30,00 m respectively. The barracks of the period are too divergent in size and form to have any clear implications for garrisons.

In the Flavian period (Fig 2.3), the barracks give the impression of being much more tightly defined in terms of length if not in width. Also much clearer is the number of barracks from auxiliary forts which are comparable in size with the legionary cohort barracks. In *Britannia*, Ardoch (*retentura*) and Newstead (*retentura*) both provide examples, although the apparent width of the Newstead example of 17,37 m must be questionable. In *Britannia* there appears to be a distinctive group of small barracks with lengths of *c* 30 m and widths of *c* 8 m. Isolated examples occur at Cardean in the right *latus praetorii* and at Corbridge IA and IB in the left *latus praetorii*, but, more significantly, groups of barracks of this kind occur together at Crawford, Lease Rigg and Castleshaw. Furthermore, these barracks all appear to be of Types B or H, simple forms consonant with their small size. It should be added that Lease Rigg also has a longer example of 39,50 m and this in turn seems to accord with a group of north British forts all of which have barracks of *c* 41 m in length and c 8 m in width, viz Ilkley Fort 1, Hayton, Melandra Castle and Slack Phase 1. Strageath also has barracks of this length. The remaining barracks demonstrate no such significant groupings although Cardean, Fendoch, Strageath and Elginhaugh all have barracks of *c* 47 m in length (but their widths vary very much, partly as result of the fact that their barrack Types are different). Barrack I at Strageath (12,20 m) is one of the very widest auxiliary barracks although it is almost matched by the barrack in the right *retentura* at Corbridge IA (12,00 m). Again these groupings have no clear connection with garrison types.

In *Germania Inferior*, Arentsburg provides an example of a small barrack *c* 33 × 6 m, while in *Germania Superior* the barracks in the *retentura* at

Rottweil Kastell III coincide with the size of cohort barracks from Vindonissa Breite and are only marginally larger than the barracks from Echzell. All other barracks fall in the normal auxiliary range. In *Raetia*, the overall dimensions of the Heidenhiem barracks of *c* 82 × 11 m are larger than most contemporary legionary barracks. Those at Munningen (*c* 60 × 9,5 m) clearly are longer than most auxiliary barracks even though they are of standard width. Again examples of lengths of *c* 30 m are found at Rißtissen while Straubing (Kastell IV) has examples shorter than average of *c* 36 and 40 m.

For the Trajanic/Hadrianic period in *Britannia* (Fig 2.4), it seems that only the Cripplegate fort in London has a barrack which conforms with legionary barracks in terms of size. The evidence from the St Alban Wood Street site suggests a barrack of *c* 74,00 × 9,40 m. This would be narrower than most legionary barracks, but only marginally so. The most striking feature about the period in *Britannia* is the surprising extent to which the barracks other than those in the forts of Hadrian's Wall conform to the same length. The principal barracks from Old Church, Corbridge Periods IB, II and III, Watercrook, Brough-on-Humber Period IV, Slack Phase 3 and Buckton Period 2, are all *c* 48 m in length although the different barrack Types impose a wide range of widths. The forts in question house a wide range of probable garrisons. This leaves Gelligaer, and Dover with barracks of *c* 45 and 34 m respectively.

This is the period of the building of the barracks of the forts on Hadrian's Wall. It has been pointed out that for barrack dimensions to be seen to be significant, a group of forts of the same period with barracks built in the same materials should be studied (Breeze and Dobson 1969 and 1974). Hadrian's Wall provides such a group, but a preliminary consideration of the barracks there shows a much more divergent picture than that provided by the other contemporary barracks in *Britannia*. Lengths range from 39,62 at Haltonchesters to 49,38 m at Birdoswald and Housesteads with many examples of lengths falling between these two. Indeed, Haltonchesters has barracks of clearly two distinct lengths. As usual, the widths of these barracks vary by some 3 m. In comparison with the apparent relative uniformity from the rest of the province, it seems possible that such divergences have some relevance for the garrisons of the Wall forts. These questions will be considered in Chapter 6.

In *Germania Inferior*, the Alteburg barracks (if they truly be of Trajanic/Hadrianic date) are extraordinarily long at *c* 86 m. The projected length of the barracks at Dormagen of *c* 59,00 m also is very large for any period, very much the same length and width as the Munningen barracks in Raetia. Dormagen is probably an *ala* fort. At the Saalburg in *Germania Superior* Barrack P/R in the central range (72,00 × 10,00 m) is very much of legionary size, while the barracks from Hesselbach (*c* 34,50 × 6,50 m) recall the size of some of the Flavian examples from *Britannia*. Again in Raetia, Ellingen, while having a large double barrack Building B (51,25 × 10,80 m) also has a number of smaller possible barracks with lengths of *c* 10, 20 and 28 m. These may correspond to the possible barrack of 25,50 m from Kapersburg and those of *c* 24 m from Weißenburg (Breitung) (although Weißenburg also has barracks of 46,0 × 11,5 m). The auxiliary fort at Aquincum in this period has a probable cavalry barrack of only *c* 35,0 × 9,5 m).

To an even greater extent than Hadrian's Wall, the Antonine Wall forts have barracks of very varying dimensions ranging from 19,10 × 9,33 m at

Duntocher (although this is not a typical fort) to 53,64 × 9,45 m at Old Kilpatrick (Fig 2.5). It may be possible to divide the barracks into four different groups on the basis of their lengths, namely *c* 51 m at Old Kilpatrick, Camelon and Inveresk, *c* 45 m at Bar Hill and Mumrills, *c* 35 m at Bearsden and Cadder and *c* 25 m at Rough Castle. But this leaves Balmuildy in a difficult position with barracks of *c* 39, 42 and 46 m. These examples also show a wide range of barrack Types. The barrack sizes appear to bear no relation to probable garrisons.

In many ways, the Antonine Wall barracks reflect the disparate nature of the dimensions of the Antonine barracks in *Britannia* as a whole; the dimensions of only one group of these barracks seems to form a coherent pattern. At Crawford, Cappuck and Raeburnfoot are some very short barracks, all with lengths of *c* 20 m and average widths of 8 m, although in fact these do range from 5,18 to 9,00 m. Most of these barracks seem to be of the simple Type B conformation. The geographical connection between these forts is apparent. Not very dissimilar are the barracks of Period 2 at Rough Castle of *c* 26,50 × 6,50 m. The suggestion has been made for all of these buildings that they are 'half barracks' (see below).

The ostensible barracks of *Legio XX* at Newstead Period III indeed fall outside the main concentration of the auxiliary barracks with their length of *c* 60 m, nevertheless they are not as long as most legionary cohort barracks. Rather they resemble very closely barracks from Dormagen and the Saalburg of *c* 60 × 9 m. To be mentioned once more is the barrack of full legionary length of 72,00 m from the Saalburg, but most spectacular is the projected size of 80,00 × 9,50 m for the barrack adjoining the *via principalis* at Aalen. This is accommodation for troopers of the *Ala II Flavia Milliaria* and its size matches that of the barracks at Heidenheim, the preceding home of the unit. Full details of the barrack are not yet known (D. Planck pers comm).

The remaining barracks of the Antonine period exhibit no particular characteristics and conform to the general range. The only exception is provided by the barracks from Niederbieber dating to the time of Commodus. Their dimensions apparently are *c* 78 × 15 m. While such a length is conceivable, such a width is almost unparalleled in auxiliary forts and the excavations may require reconsideration. The exception comes from the Severan period at Petronell (Fig 2.6). Here the barrack known from the *ala* fort measures 77,00 × 16,00 m, much larger than many examples from legionary fortresses. The remainder of the Severan barracks display no clear points of significance except the presence of three examples with apparent widths greater than 17 m. These readings derive from the Dacian forts of Buciumi (B5 and B2) and Feldioara (North and South barracks) and probably should be interpreted as double barracks. Certainly at Buciumi there are four contemporary barracks of half this width. The small fort of Bu Ngem is remarkable for a series of very short barracks ranging from 29,00 to 35,00 m but of standard widths.

When the barrack lengths are studied on their own (Fig 51), it is clear that the consequent greater number of examples does not conflict with the trends outlined above when both dimensions have been available for consideration. In every period there is a wide spread of lengths, but the Claudian/Neronian clearly has the shortest overall. In every period except the Claudian/Neronian there are barracks in auxiliary forts of exceptional length while the Flavian period shows the strongest concentration to any narrow range, that of *c* 45 to 50 m. The concentration round this point in

the Trajanic/Hadrianic and particularly the Antonine periods widens considerably, but clearly recognisable are the lower length concentrations of 30 to 35 m in the Flavian and Trajanic/Hadrianic periods and of 15 to 25 m in the Antonine period mentioned above.

It is clear that there is no apparent correlation between barrack size and garrison type. The most that can be said is that the probable *ala* barracks at Dormagen, Echzell, Heidenheim, Aalen and Petronell constitute one group of very large examples.

The Officers' Quarters

Conformation

Although not conceived on so large a scale, the officers' quarters of the auxiliary forts have many of the same characteristics as their counterparts in the legionary fortresses. Indeed in the right *praetentura* at Burladingen the officers' quarters of timber Building D of the early second century apparently have a small internal courtyard with porticus. Two rows of three post-holes enclosing an area of 3,00 × 1,60 m can clearly be seen (Bersu 1912, 113, Abb 2). Such an feature is very rare even in the legionary cohort barracks and this is the only example to have been found in an auxiliary fort to date. Of course it is possible that courtyards without porticus existed in the officers' quarters.

In the auxiliary forts the officers' quarters also are sometimes divided from the men's quarters by a narrow gap or passage. Figure 52 shows this feature to be very unusual, even more so than in the legionary fortresses. It is an arrangement which occurs in very small numbers throughout the periods under study.

This feature, in the present state of knowledge, seems to be confined largely to *Britannia*. Here it is found at Strageath (Flavian), Maryport, Watercrook, Caernarvon and Hod Hill. It is noteworthy that Maryport, Watercrook and Caernarvon all fall within the command of *Legio XX* at Chester. The strong connection of *Legio XX* with this feature was noted in Chapter 2; thus it seems possible that its presence in these auxiliary forts reflects the planning of this legion. Further examples have been found recently in Period II in both *praetentura* and *retentura* at Hofheim (Steinkastell). It is interesting that the small finds from the excavation include a *fibula* of a markedly British character (H.-U. Nuber pers comm). No specific garrison is attested. The outward form of Buildings 3, 5, 7 and 9 at Valkenburg Castellum 1 is that of Type B barracks with separate officers' quarters, but it appears that the small separate buildings are not officers' quarters but *fabriculae* (Glasbergen and Groenman-van Waateringe 1974).

When this feature occurs, it is not usually found universally throughout the fort in question. This may be so at Hofheim, but Flavian Strageath seems to have detached quarters in the *praetentura* but a mixture of detached and attached quarters in the *retentura*. Recent excavations at Caernarvon have revealed a detached officers' quarters dating to the late first century next to an attached example (Grew 1980, 346-7). At Hod Hill, only Buildings XI, X and IX have detached officers' quarters, all the other examples in the fort being attached. Such differences may again help to identify the

accommodation of the different units in the probably mixed garrisons at Strageath and Hod Hill (see Chapter 6).

The feature is not to be associated with any particular building Type, but is most usually found in Type A barracks. Evidence is insufficient to determine whether the feature continues through building generations at the same fort but certainly this is not the position at Strageath.

Barrack Types J and H bring their own special problems because in both of these Types it can be very difficult to distinguish the officers' quarters from the rest of the *contubernia*, if indeed the officers' quarters are always part of the same building. Complete Type J examples occur in the left *latus praetorii* at Corbridge Periods IA, III and IVA, Hofheim (Erdlager) Buildings B, C, D, E, Hofheim (Steinkastell) Period I Buildings 25, 26, 27, Weißenburg (Breitung) Buildings 4 and 5 and Ellingen Bau B Phases 1 and 2. Ritterling suggested that at Hofheim (Erdlager) the officers were housed separately in Building A. This is discussed in detail later but there seems to be no such simple solution for the other examples. The dimensions of the Hofheim, Weißenburg and Ellingen buildings are plausible either as complete barracks, or as detached men's quarters but in none of these forts do adjacent buildings have internal arrangements or size suggestive of separate officers' quarters.

Type H barracks with similar problems are: Cardean in the right *latus praetorii*; Bearsden Buildings 3 and 7; Raeburnfoot Buildings 6 and 8; Dover, all the barracks of Forts I and II in their first phase; Hofheim (Steinkastell) Building 21; Hesselbach Period 2 Building 3; Zwentendorf Buildings E and F; Slăveni Buildings 2, 3, 5, 6. The problem is solved at Bearsden, Zwentendorf and perhaps at Slăveni by the '*contubernium*' forming the officers' quarters being slightly wider than the others, while at Dover the barracks must be explained in the light of the different organisation of the garrison of the *Classis Britannica* (see Chapter 6). For the others, the solution is unclear.

Dimensions

The most striking feature of Figure 53 is its homogeneity especially in comparison with Figure 19 depicting the legionary centurions' quarters. There is a central concentration of examples which range from 8 × 8 m to 14 × 12 m. Within this main central grouping there are no particular concentrations. Outside this group, the number of examples is relatively few. There is a small cluster of smaller examples, a second group of examples *c* 15 × 11 m, slightly larger than those of the central concentration and a few remaining isolated large examples.

The difference between the different periods within this general distribution is only slight. The Claudian/Neronian period covers the whole range but concentrates towards the lower half of the central group in terms of length, certainly predominates among the lower widths from 6 to 8 m and does not feature at all in the *c* 15 × 11 m group. The Flavian period does not provide any of the very small examples but covers the rest of the range. Its examples are distributed evenly throughout the central group and it has a considerable presence at *c* 15 × 11 m. The Trajanic/Hadrianic examples are as widely and evenly distributed as any, but it must be remarked that they seem to have a clearly-defined minimum width of *c* 7 m. The Antonine examples are also very widely distributed but they do tend to

concentrate among the longer examples in the main central group between lengths of 12 and 14 m. The Severan period provides the two widest examples: 13,50 and 16,00 m.

The relatively short and narrow barracks of the Claudian/Neronian period can thus be seen to have correspondingly small officers' quarters. Outside the central group, the smallest examples come from Barracks III and I at Nanstallon and Barracks X and XI at Hod Hill. By chance it is also Hod Hill which provides some of the largest quarters, from Barracks VIII and XII/XIII. But the exact proportions of this latter building are very hard to assess as are the officers' quarters of the barracks at Waddon Hill, which in this present interpretation approach the size of legionary centurions' quarters. If this is correct, the contrast with the supposed legionary centurions' quarters of Hod Hill Barracks VI - I is very great. The latter all concentrate in the middle of the central group. The remaining very large example from the period comes from Valkenburg Castellum 1 Building 13, the supposed cavalry barrack. Its dimensions are entirely different to those of the other officers' quarters of the fort which again fall in the middle of the main concentration.

The barracks at Hofheim (Erdlager) present an interesting problem for this period. Ritterling excavated five barracks here in the angle between the *via principalis* and the *via decumana*. While Barrack A shows great variety in its internal arrangements, Buildings B, C, D and E have much more uniformity in their division into apparently eight *contubernia*. Ritterling suggested that, in contrast to the normal practice, the officers were not placed at the head of the four barracks, but rather were separated from their men and placed together in the fifth barrack (Ritterling 1913, 65). Barrack A does seem to divide into two clear halves and if this is the case, each half can be seen to accommodate four decurions. The resultant projected officers' quarters of 16,00 × 10,80 coincide with the 15 × 11 m subsidiary concentration mentioned above.

For the Flavian period, the smallest examples of officers' quarters (*c* 8 × 8 m) come from Camelon, Ilkley Fort 1, Hayton and Valkenburg Castellum 4 Barrack 8. No common factor immediately is apparent between them. Once more all these examples are of different barrack Types. Much more interesting is the range of very large officers' quarters for the Flavian period. With a total length of 28 m the Heidenheim officers' quarters stand alone among the auxiliary barracks. There can be little doubt that these quarters reflect the status of the decurions of the *Ala II Flavia Milliaria*. Next in length at 21,00 m come the Form 2 barracks at Echzell. It should be noted that Form 2 has officers' quarters some 6 m longer than Form 1. Echzell is very likely to have had an *ala* as at least part of the garrison. Next in size come the quarters of Barrack I at Strageath (19,50 × 12,20 m). Again the size of these quarters corresponds most closely to those of legionary centurions and it is suggested by the excavator that this barrack indeed housed a legionary centurion (Frere forthcoming). The remaining isolated very large officers' quarters are from the *retentura* at Rottweil Kastell III. Here their size conforms to that of legionary quarters and legionary occupation is proposed by the excavator (Planck 1975, 92).

The important group of officers' quarters with lengths between 15 and 16 m derive from Corbridge IA and IB, Arentsburg, Echzell, Heddernheim, Burladingen, Munningen and Moos-Burgstall. There is no single simple thread that connects these barracks. The cavalry connection is apparent at Echzell and Heddernheim, but at Burladingen and Moos-Burgstall the likely garrisons

seem to have been *cohortes quingenariae peditatae*. At least the last three examples all come from the same province of *Raetia* but they are not all of the same barrack Type and vary considerably in width.

There are few examples which fall outside the main grouping in the Trajanic/Hadrianic period. The three smallest come from Boulogne, Valkenburg Castellum 5 Barrack 7, Hesselbach Building 1 and Čezava (*c* 7 × 7 m). Again the barracks are of different Types. The only examples much larger than the central group come from the left *praetentura* at Caernarvon, while it is possible that the barracks from Moos-Burgstall mentioned above belong more properly to this period. It is striking that the small barracks of Period 2 at Hesselbach have officers' quarters which are of average size for the period

When the forts on Hadrian's Wall and its vicinity are examined separately, it is remarkable how similar in size many of the officers' quarters are. Nearly all the examples available have, to the nearest metre, officers' quarters with lengths of 9 m. The widths of the same quarters vary rather more between 9 and 11 m. Examples come from Haltwhistle Burn, Housesteads, Chesters and South Shields. The evidence from Wallsend is a little different. One of the officers' quarters has the dimensions of 10 × 9 m, but five of 12 × 8 m and two of 11 × 9 m. But in terms of area, it will be noted that these quarters are not very different to the others. Thus, in terms of areas these examples range only between 77,00 and 98,70 sq m. It is quite clear that these figures cover a wide range of garrisons and barrack Types. The only real exception to this pattern is Benwell. Here the officers' quarters measure *c* 10 × 12 m and have an area of 121,40 sq m. Benwell excepted, the Wall officers' quarters are very different to those from Corbridge in Periods Ib, II and III which are considerably larger. In general, the Wall officers' quarters are slightly smaller than average for the Trajanic/Hadrianic period.

The Antonine period has the largest number of apparently small officers' quarters. The validity of four of these examples is rather doubtful. Two are the end sections of the barracks in the *praetentura* at Newstead in Period III where more of the barracks may have been taken for the use of the officers, especially if it is considered that these barracks housed legionaries; the other two are formed by extensions to Dover Fort II Barrack B32 PII and PIII A which may have housed officers. But the other small examples are reliable enough, from Duntocher, Bearsden and Butzbach Period 3 Barracks II and I. It is noteworthy that, in spite of their small size, both the quarters at Bearsden and Butzbach may have housed cavalry officers.

The largest examples for the period come from *Britannia*. Again the largest from Dover B24 PIII is problematical, but clearly over 18 m in length are the quarters from Barracks I and VII in the second Antonine period at Strageath while Buildings XVII and XIX in the left *retentura* at Caerhun are both longer than 16 m. Remaining quarters longer than 14 m come from Carzield, Caernarvon Building XVII (?) and Caerhun Buildings I, IV and VI, indeed all the officers' quarters at Caerhun are very large. There is no obvious connection between these examples and again they are of different barrack Types.

The officers' quarters of the barracks of the Antonine Wall exhibit nothing of the unity shown by their counterparts on Hadrian' Wall. They are as varied as the barracks themselves ranging evenly from *c* 6 × 5 m to 13 × 12 m, from 30,00 sq m to 150,00 sq m. The smallest at Bearsden and the

largest at Inveresk both possibly accommodated cavalry officers (although probably just one decurion at Bearsden: see below).

The few Severan examples give both some of the the smallest and the largest officers' quarters. The small examples are from Butzbach Period 4, Slåveni and Bu Ngem and the large from South Shields III Building C19 and Petronell Period 2 Phase 2. There is doubt about the South Shields examples, but Petronell does appear to provide another very large example from an *ala* barrack.

As is to be expected, examination of the areas of the officers' quarters confirms the spread of values to be seen in Figure 53 (Figs 5.1 - 5.7). The exceptional values stand out clearly while much of the evidence covers a wide range and does not reveal any peak or concentration which has not been referred to above.

It is disappointing that the dimensions of the officers' quarters do not appear to form any groupings according to barrack Type. Figure 54 displays the areas of the officers' quarters according to barrack Type. It is apparent that they cover very much the same range, although, of the two major Types A and B, Type A has more of the largest officers' quarters and peaks between 90 and 120 sq m as opposed to between 80 and 100 sq m for Type B. This is not surprising and suggests that the additional area derives from the extension of the officers' quarters of Type A while the men's quarters are of the same size. Types B, H and the remainder cover very much the same range and there is a noticeable subsidiary peak between 60 and 70 sq m deriving from the smallest barracks.

In general, the picture is one of great variety and only few discernible patterns. As is natural, smaller barracks tend to have smaller officers' quarters and larger barracks larger, but this is by no means a universal rule and there are exceptions to every grouping. Certainly there appears to be no simple rule to connect size of officers' quarters and garrison.

Seniority

A further factor which complicates the picture is the variation in size of the officers' quarters within the same fort. Such a variation has most strikingly been revealed at Hesselbach. Baatz's work at Hesselbach led him to propose that seniority of officers and men within a fort could be reflected in the different sizes of their quarters. He pointed out that the general rule in the Roman army was that the senior should be on the right. When this rule was applied to a fort, it meant that the senior centuries would be positioned to the right of the *principia* and that in any single pair of barracks, the senior would be on the right when looking towards the head (ie the officers' end) of the barrack (Baatz 1973, 54-8).

The sizes of the barracks and particularly the sizes of the officers' quarters at Hesselbach perfectly bear out this theory. It is unfortunate that in no other fort is the evidence so clear-cut. Baatz adduces the evidence from Valkenburg Castellum 1 (Plan 18) to support his case. He points out that in the eight barracks to either side of the *principia*, in each of the four pairs, the smaller head building or officers' quarters is to the left. In this he is correct, but more recent work on Valkenburg has shown that these smaller left hand buildings were, in all probability, not used for accommodation at all but as *fabriculae* (Glasbergen and Groenman-

van Waateringe 1974). Baatz is also right to say that the size of the right hand head buildings diminishes from the right of the *principia* to the left, but this is very marginal, the smallest measuring 71,25 sq m and the largest 86,25 sq m. Indeed the first two (ie Barracks 8 and 6) are both of the same size, 86,25 sq m. The overall difference is only one of two metres in length and such a difference would be very difficult to note during building operations and is much more likely to stem from problems with the ground preparation or shortage of materials rather than nice considerations of seniority.

Baatz is also able to use the evidence from Pen Llystyn to support his argument. Quite rightly he points out that in the *praetentura* where there are four barracks, P1, P2, P4 and P5, those with larger officers' quarters are on the right hand side of the fort; and within the pairs, the larger officers' quarters are on the right hand side in the direction of the heads of the barracks. Thus the areas of the quarters are 93,60, 105,60, 119,44 and 143,55 sq m. The difference in these areas would seem to be sufficiently large to be significant. Unfortunately, details of the *retentura* are not sufficiently known to be able to draw any further conclusions.

Some support for the hypotheses comes from Hod Hill (Plan 16). There Barracks VII - X in the *praetentura* all have officers' quarters of different sizes. The largest, VIII (162,50 sq m) is on the right hand side of the fort, but the second largest, IX (95,30 sq m) is on the left hand side. The third, VII (83,88 sq m), follows on the right and then the smallest, X (67,73 sq m), on the left. In both of these pairs, the larger officers' quarters are on the right hand side when looking towards the heads of the barracks. If indeed these four barracks form a significant group, it would appear that the ordering of their seniority takes a course different to that of Hesselbach. Instead of numbering progressively from right to left, these Hod Hill barracks would seem to divide into two pairs, with the second most senior man taking control over the second, left hand, junior pair. The third most senior officer finding his place with the senior pair and the most junior with the junior. Again, the difference between the areas of the quarters appears large enough to be significant.

Although it may be possible to see some principle of seniority at work in the *praetentura* at Hod Hill, the principle outlined by Baatz does not seem to appear in the so-called legionary barracks of the *retentura*. The officers' quarters of Barracks I -IV are all very much the same size, *c* 70 sq m, with the exception of Barrack II which is 104,75 sq m. Here Barrack II is the left hand of the first barrack pair.

It must be admitted that, in general, the officers' quarters to the right of the *principia* of Castella 4, 5 and 6 at Valkenburg tend to be larger than those to the left, but examination of other forts provides little further support for the first general principle that the seniority of the right hand side of the fort can be demonstrated through the larger size of officers' quarters and barracks on that side. In most forts where a number of barracks is known the intention seems to have been most often to build the barracks and officers' quarters of the same size on both sides of the fort, as at Bar Hill, Elginhaugh (*praetentura*) (Plan 10), Corbridge II, Caerhun, Gelligaer (Plan 23), Hofheim (Steinkastell) (Plan 19), Künzing (Plan 24), Slăveni (Plan 22) and Drobeta (Plan 13). Sometimes, there is a difference between the two sides but when this occurs, it is not always the right which is the favoured side. Barrack XIV in the left *retentura* at Camelon

has officers' quarters larger than Barracks IV an III in the right *praetentura*. At Wallsend, left *praetentura* Barracks 1 and 2 have slightly larger officers' quarters than right *praetentura* Barracks 5, 6 and 7. But these distinctions are very marginal and hardly amount to 5 sq m.

This is not to say that there are not many forts where the sizes of the officers' quarters vary very much within the fort, but rather that they do so without any apparent pattern or reason. The Flavian and both Antonine forts at Strageath (Plans 7-9) provide good examples of this. One of the reasons for the variation is the probable presence of mixed garrisons and the mixture of barrack Types, the variations in which may or may not be connected with the different units of the garrison. But the result is officers' quarters which nearly all seem to be different in size. A great contrast is provided by Echzell (Plan 12) where there are two distinct forms of barrack one of which has officers' quarters much larger than the other. The barracks are set out in pairs of the same form, but their position in the fort does not suggest any scheme of seniority.

The second of Baatz's two general principles, that the senior of the two barracks of a pair will be on the right and may be recognisable in the larger officers' quarters being on the right when looking to the heads of the barracks does receive a little more support from the archaeological record. The officers' quarters of Barrack I probably are larger than those of Barrack II in the *retentura* of the Antonine II fort at Strageath and those of Building 1 in the right *retentura* at Elginhaugh are *c* 33 sq m larger than those of Building 2 (but in all the other nine barracks the pair show no distinctions). At Wallsend, the right hand officers' quarters of Barracks 9 and 10 in the left *retentura* is *c* 10 sq m larger than the left. The Agricolan barracks Buildings 1 and 2 in the left *praetentura* at Caernarvon also accord with the principle, the officers' quarters of Building 1 being nearly 30 sq m larger than those of Building 2. Again at Caerhun (Plan 11), the right hand barrack of Buildings XVII and XIX in the left *retentura* has officers' quarters *c* 20 sq m larger than the left. Certainly there is evidence for such distinctions being made at Valkenburg in Castella 4, 5 and 6. In Castellum 4, the officers' quarters of Barrack 9 are *c* 33 sq m larger than those of corresponding Barrack 8 and the same may be true of Barracks 7 and 6 although the evidence is not sufficient for certainty. In Castellum 5, the officers' quarters of Barrack 9 on the extreme right are possibly *c* 50 sq m larger than those of facing Barrack 8; those of 7 again probably larger than those of Barrack 6. In Castellum 6, the officers' quarters of the end Barrack 11 are *c* 70 sq m larger than those of facing Barrack 10. On this occasion, the officers' quarters of the next Barrack 9 are larger than those of the previous Barrack 10 by *c* 20 sq m and in turn probably are larger than those of Barrack 8, thus the seniority on this occasion seems to be running 11, 9, 10. The theory again may be applied at Butzbach in Period 3 where the officers' quarters of Barrack I are *c* 15 sq m larger than those of Barrack II. But this situation seems to change in Period 4 when the two examples have the same size.

But in spite of this apparent success, it remains true that very often, the left hand officers' quarters of two facing barracks is the larger. This is true of Barracks 1 and 2 in the *retentura* at The Lunt in both Periods I and II, the difference being probably *c* 10 sq m. At Nanstallon, very strikingly, the difference between the officers' quarters of Barracks IV and III is *c* 50 sq m. At Burladingen too the officers' quarters of the facing pair of Barracks E and F give the benefit to the left hand E by *c* 30 sq m.

Thus it is clear that differences do exist, and may reveal the workings of seniority, but the importance of the divisions should not be overemphasised and probably often spring from other causes such as different dates of construction, availability of materials, difficult ground conditions, or the tactical situation of the fort. The distinctions outlined in the Baatz hypotheses, even if demonstrable in the first century, tend to be evened out with the greater standardisation of the second century (for example in the officers' quarters on Hadrian's Wall).

The Men's Quarters

Dimensions

The dimensions of the men's quarters are shown in Figure 55. Their lengths range from 22 to 44m . It will be noted that their variation is the same as that of the officers' quarters of 8 to 16 m, ie 1 : 2. However concentrations of lengths are apparent in the men's quarters, in particular *c* 34 to 36 m, which are not present in the more evenly distributed dimensions of the officers' quarters. The widths of the men's quarters also vary over a range almost as great as that of the officers' quarters, *c* 4 to 12 m. This is surprising considering that the Type A barracks should increase the range of widths of the officers' quarters. But it must be admitted that the most important concentration of widths of the men's quarters is slightly less than the officers' quarters, from 6 to 10 m rather than from 6 to 12 m.

The dimensions of the men's quarters also show greater differentiation from period to period than the officers' quarters. In direct contrast to the findings for the officers' quarters, the men's quarters of the Claudian/Neronian period form a wider and more disparate group than those of the other periods, although most examples are considerably smaller than those of the other periods. This is in spite of covering the full range of widths. This is less remarkable when it is remembered that this is the period with the greatest variety of barrack Types.

In contrast, the Flavian period lacks small, but has some very large examples. The distribution is much more concentrated in the centre of the graph with a marked grouping *c* 35 × 7 m. The Trajanic/Hadrianic period shows a looser distribution than the Flavian and again has a number of small examples similar to those of the Claudian/Neronian period. The Antonine has a few very small examples including some which are surprisingly wide for their length *c* 27 × 11 m, but the main grouping is fairly diffuse and is completed by a few very large examples. The Severan period provides a number of very divergent examples.

The two smallest Claudian/Neronian examples *c* 19 × 6 m are exceptional because they are the truncated Barracks 1 and 2 of Period II at The Lunt. These barracks were shortened to make space for the *gyrus*. Hod Hill and Nanstallon between them are responsible for most of the examples between the lengths of 22 and 26 m (Zurzach supplies one 25,20 × 7,40 m), while the long quarters for the period between 34 and 39 m derive from The Lunt Period I, Valkenburg Castellum 1 Barrack 13 and Oberstimm. It may be possible to associate these long barracks with horsemen of some category, although the barracks themselves are all of different Types. It is interesting that the graph also gives some support to Ritterling's

interpretation of the barracks at Hofheim (Erdlager) (see above). Barracks B, C, D and E fall into the middle of the main concentration for the period.

The isolated very small Flavian example of 19,00 × 10 m is that of the barrack in the central range at Corbridge IB. This is one of those barracks which occur quite often which apparently are not intended as accommodation for the principal garrison of the fort.

Some seven forts supply the quarters falling between the lengths of 28 and 34 m; neither is the concentration on lengths of 34 - 36 m any more informative. Men's quarters of this length derive from Strageath, Elginhaugh, Ilkley Fort 1, Pen Llystyn, Valkenburg Castellum 4 and Obserstimm. Again the information comes from a variety of barrack Types and from a range of probable garrisons and provinces. On the other hand, those between 40 and 46 m from Echzell (Form 2), Hofheim (Steinkastell) Periods I and II and Munnigen may have a connection with horsemen, although there is little evidence for the types of garrison probable at Munningen.

The Flavian examples with lengths greater than 52 m form a special group, Echzell (Form 1), Rottweil Kastell III and Heidenheim. The cavalry connection with Echzell and Heidenheim is clear while the length from Rottweil is appropriate for the legionaries proposed by the excavator (Planck 1975, 92).

As in all periods, there is considerable variation in the sizes of the men's quarters within the same fort, and this is true whether or not different barrack Types are in question. Flavian Strageath, Elginhaugh and Valkenburg Castellum 4 provide ample proof of this; there is difference in area between the largest and smallest men's quarters at Strageath of 129,50 sq m and at Valkenburg Castellum 4 of 113,40 sq m.

The men's quarters of the Trajanic/Hadrianic period with lengths of 21 - 32 m come from a variety of sites: Haltwhistle Burn, Dover Fort I, Loughor, Gelligaer, Valkenburg Castellum 5, Hesselbach, Aquincum, Drobeta and Čezava. No particular traits seem to connect them and they represent a number of barrack Types. Those forming the principal concentration for the period with lengths 34 - 38 m seem to derive principally from *Britannia*. Once more the group is divided evenly between barrack Types A and B and represents a number of different probable garrison types. The longest examples between 39 and 44 m derive from Housesteads, Boulogne, Valkenburg Castellum 5 Buildings 7 and 8, Weißenburg (Breitung) Buildings 4 and 5 and the principal barrack at Ellingen, Building B. Once again, these are different barrack Types and relate to quite different garrisons.

In contrast to the findings for the officers' quarters, when the men's quarters of the barracks from the Hadrian's Wall forts are considered separately, they would seem to cover every variation possible between 30 × 6 m to 36 × 10 m. There is no apparent unity or pattern to the dimensions.

The Antonine period provides some of the very smallest men's quarters, from Duntocher, Rough Castle and Crawford. The main concentration for the period is of men's quarters which are small in general terms. Examples come from Strageath, Bearsden, Balmuildy, Carzield, Birrens and Valkenburg Castellum 6 Building 12. All of these quarters have lengths between 25 and 32 m. This group is also characterised by some very wide examples of more than 10 m. Strageath (Antonine II), Balmuildy and Carzield provide the provenance for these. Once more there is no apparent connection with barrack Type or

garrison, although there may be said to be a geographical connection. The remaining distribution is diffuse and derives from a large number of forts and barrack Types. The longest examples of over 50 m are all from the *praetentura* of Period III at Newstead. These are the barracks identified by Richmond as accommodation for legionaries (Richmond 1949-50, 19-23).

The men's quarters from the forts of the Antonine Wall show even less unity than their counterparts from Hadrian's Wall. Their dimensions vary from 11 x 7 m to 34 x 8 m.

There is little evidence for the Severan period. South Shields III C19 provides one of the very smallest men's quarters and a whole series of quarters from Bu Ngem appear to be not very much larger. Those of average size are from Slăveni and the largest example of all is from Petronell Period 2 Phase 2.

Figure 56 displays the areas of the men's quarters according to barrack Type. This shows that that there is no real difference in the capacities of Type A and Type B barracks. Both Types cover a very wide range, essentially from 175 to 400 sq m. This constitutes an important contrast to the findings for the officers' quarters which emphasised the slight but undeniably greater capacity of the Type A officers' quarters. But, as for the officers' quarters, Type H and the remaining barrack Types offer rather less space for the men's quarters.

Relationship between Officers' and Men's Quarters

Lengths

Given the evidence of the preceeding two sections it is no surprise that when the barrack length taken up by the officers' quarters is plotted against the length taken by the men's quarters, a disparate picture emerges (Fig 57). The only clear concentration is between *c* 35 / 11 m to 37 / 13 m and this is a concentration which does not relate to any one particular period, provenance or garrison type.

The Claudian/Neronian period, as is to be expected, displays the greatest disparity of values and these dominate the lower part of the graph. They reinforce the message that although their officers' quarters are more or less of average length, their men's quarters are often considerably less. The wide distribution of the Claudian/Neronian period also makes abundantly clear the reasons for the great range of values when the length of the officers' quarters is expressed as a percentage of the whole barrack length. As was pointed out in Chapter 1, the percentages of the Claudian/Neronian period are the most varied of any period and give evidence of no clearly definable patterns.

The lengths of the Flavian period, except for quite a large number of exceptions, are found in the upper third of the graph but the concentration is a fairly loose one. The percentage values of the officers' quarters certainly present a more controlled picture than in the previous period. The most important concentrations are at 21, 24 - 26 and 30 - 35 %. The most significant feature about these percentages is that those between 30 and 35 % seem to have a recognisable connection with forts which may have had an *ala* in garrison. The forts in question are: Corbridge IA (30,04 %); Echzell (Form 2) (32,91%); Heddernheim (Phase 1, 27,99 %; Phase 2, 28,85 %);

Burladingen Buildings D and E (30,32 %); Heidenheim (33,90 % = 2 × 16,95 %). But the cavalry connection should not be overstated. The garrison of Burladingen is uncertain while the figure from Arlaines is only 20,10 % and from Hofheim (Steinkastell) Period II the figures are 25,00 and 20,79 %, the barracks at Arlaines and Hofheim almost certainly housing cavalry. But there is an infantry look about most of those barracks whose percentages fall between 24 and 26 %. They include Fendoch and Pen Llystyn but also forts which probably had a mixed unit in garrison such as Strageath, Corbridge IB, Valkenburg Castellum 4 and Künzing. This may indicate that the barracks of the mounted infantrymen resembled those of the *pedites* rather than the *alares*, at least at this period. The problem is illustrated by Elginhaugh were the figures range from 24,10 to 43,95 %.

The evidence from the Trajanic/Hadrianic period forms a great contrast. There are exceptions, but the main group is much more tightly concentrated round the point of *c* 36 / 12 m. A good many of these examples are from the barracks of Hadrian's Wall, but this should not be overstressed. The percentages of the officers' quarters, as might be expected from the distribution of the lengths, are much more closely grouped but perhaps not so precisely defined as in the previous period. Most percentages, but not all (eg Weißenburg (Breitung) Buildings 4 and 5 14,47 %), concentrate between 20 and 27 %. Within this band fall most of the forts on or near Hadrian's Wall: Haltwhistle Burn, Chesters, Benwell, Wallsend and South Shields. Housesteads constitutes an exception with 17,56 %. In this period the possible connection with cavalry with percentage values over 30 % has disappeared for Chesters (18,68 and 20,10 %), Benwell (21,12 %) and Buckton (26.03 %), the most probable cavalry forts, all fall within the standard range.

The examples from the Antonine period revert to a considerably looser grouping. Striking is the group of values which display very long officers' quarters but short men's quarters, *c* 26 / 16 m. Strageath Antonine II provides the provenance for all of these examples. As is to be expected, the wider range of lengths of the Antonine period produces a range of percentages for the lengths of the officers' quarters much more like those of the Flavian period than the Trajanic/Hadrianic with the principal concentrations being 21 - 25, 30 - 33 and 34 - 36 %. But unlike the Flavian period, the forts do not fall into very clear categories. It is true that the percentages of the officers' quarters of the Antonine Wall forts seem to concentrate in the range of 21 - 25 %; examples coming from Balmuildy, Bar Hill and Inveresk, but the Bearsden barracks provide proportions of 16,24 and 15,97 %. On this occasion the cavalry connection with the higher percentage values is not very clear. Although Carzield and Dormagen yield high values (34,50 and 29,18), the possible cavalry fort of Inveresk and the forts of Bearsden and Corbridge IVA, which probably housed horsemen of some kind, all provide barracks with much lower percentages.

There is only slight evidence for the Severan period but the range of small values from Bu Ngem should be noted: 9,89 to 22,26 %.

Areas

Figure 58 contrasts the areas of the officers' quarters and their corresponding men's quarters. Examination of the data makes it clear just how great a range of areas the auxiliary barracks cover in their constituent parts. There are very few groupings and it is noteworthy that

this is true also of the Trajanic/Hadrianic period which showed a marked concentration when the constituent lengths were considered above. The sizes of the officers' and men's quarters broadly correspond although there are many exceptions. For example Corbridge 1A/1B, Hod Hill Barrack VIII and Hesselbach have relatively large officers' quarters, while The Lunt Period 1, Boulogne, and Newstead have relatively large men's quarters.

It has been argued in Chapter 1 that it is the study of lengths and length proportions that are more important diagnostically in defining building plans and practices, but it can also be useful to examine areas and area proportions of Type A barracks in particular. Such considerations may bring out differences hitherto unsuspected and may point even more clearly to the extreme and perhaps most interesting examples. Thus while the lengths of the barracks at Waddon Hill are not very exceptional, the areas and the relationship between them certainly are. The areas of Barracks IV and V are 195,00 / 130,50 sq m and 219,40 / 135,00 sq m. This places them at the lower right hand of Figure 58. Admittedly the length percentages of the officers' quarters are very large, 40,33 and 42,06 %, but the area percentages are truly exceptional, 60,65 and 62,52 %.

The exceptional nature of Barrack 1 at Flavian Strageath also is emphasised by consideration of the constituent areas of the barrack. The length of the officers' quarters of the barrack, 19,50 m, is exceptionally large and this is clear in Figure 132 and the length percentage of 40,38 again is exceptional, but it is large area of the officers' quarters, 237,90 sq m, which place the barrack furthest to the right in the lower half of Figure 58. Compared with the fairly small men's quarters, the area proportion is 48,09 %, a remarkable reading.

The consideration of areas also may help to reveal differences in barracks apparently more or less of the same size from within the same fort, certainly when only a small-scale plan is available. It has been remarked that the ten barrack buildings at Caerhun (Plan 11) are all of about the same size (Webster 1969, 206). In terms of lengths this observation may broadly be true. First it must be said that there is a difference in the officers' lengths proportions, these being *c* 27 % in the *praetentura* and c 32 % in the *retentura*. Furthermore the areas of the constituent parts of the barracks are very different. The officers' quarters of Barracks I, IV and VI in the right *praetentura* measure 141,04 sq m, 149,89 sq m, and 148,81 sq m, while those of Barracks XVII and XIX in the left *retentura* measure 209,26 sq m and 189,17 sq m. The differences between the men's quarters is not so great, *c* 320 sq m in the *praetentura* as opposed to 350 sq m in the *retentura*. This in turn serves to emphasise the different nature of the officers' quarters in the different parts of the fort. This is emphasised by the greater difference between the area percentages: 30,51 %, 30,66 %, and 30,23 % in the *praetentura* and 35,84 % and 35,28 % in the *retentura*.

Many further examples could be given. Clearly differences such as these will be exaggerated when more than one barrack Type is present in the fort at the same time - the Caerhun barracks discussed above are all of Type A - and consideration of the areas will be an important element in the interpretation of garrisons. These questions will be considered further in Chapter 6.

The *Contubernia*

The greater variety of barrack Types in the auxiliary forts means that there are many more *contubernia* without the usual subdivision into *papilio* and *arma* of the legionary cohort barracks. At the same time, as Baatz notes (1965, 142), the less sophisticated nature of the auxiliary barracks allows a much smaller number of special first and last *contubernia*.

Special *Contubernia*

Figure 59 shows that special first *contubernia* are very unusual features of the auxiliary barracks. First *contubernia* other than the standard Type 'a' are found only in the Claudian/Neronian, Flavian, Trajanic/Hadrianic and Severan periods. There is little to unify those Types which do occur. They cover a wide range and occur mainly in isolated examples. Only at Gelligaer is it possible to say that one Type is to be found throughout all the barracks of the fort, here Type 'e' (or possibly Type 'g') extending the first *contubernium* across the width of the veranda. Type 'e' may have a special association with *Britannia* because further examples are found at Flavian Strageath Building II and at Slack Phase 3 Building IX East and West.

The most interesting feature of the special first *contubernia* is that a disproportionate number derive from possible *ala* barracks. Thus examples come from Chesters, Echzell, Heddernheim Phase II and Heidenheim. The remaining examples are from Flavian Strageath, Gelligaer, Dover Fort II and Valkenburg Castellum 1. A further interesting point is that the areas at Echzell, Heddernheim and Heidenheim are not very different in spite of the fact that the examples take different forms. The example from Echzell is of Type 'j' and that from Heddernheim possibly of Type 'i'. The evidence from Heidenheim is more complicated because this a double-ended or Type I barrack. Here Type 'j' first *contubernia* occur at both ends of the barrack next to the officers' quarters. Chesters is again different because here only Barrack 3 in the *praetentura* has such a feature. Here it is of Type 'h' and is very narrow.

Figure 60 displays the internal areas of the special first *contubernia* when compared with the standard *contubernia* from the same barrack (the five examples from Gelligaer are placed at the side of the graph because there is no known *contubernium* area with which to compare them). Like the legionary examples they do not agree very closely in terms of size, although most of them do fall between 25 and 40 sq m.

The interpretation of these features remains very difficult and the excavations to date have not revealed details of the flooring or ground surface which might serve to distinguish them from the other *contubernia* of the barrack. The example from Chesters might best be interpreted as a variation on the theme of separate officers' quarters. The space in question might serve as a passage but it seems more likely that the barrack was constructed in this manner to give greater privacy to the officers.

Very similar observations may be made about the special end *contubernia*; anything other than the standard Type 'a' is highly unusual (Fig 61). Examples of the other Types occur from the Claudian/Neronian through to the Severan periods, but after the Flavian period only minimally. Only in the

Flavian period is the number of examples at all significant. In this period, the Types cover almost the complete range available.

Type 'j' occurs most frequently overall. This is the largest form of end *contubernium* and is referred to as *Schlußbau* in the German literature. It is found most impressively along the whole range of Barracks 2-9 in the *retentura* of Castellum 1 at Valkenburg and again in the barracks of the *retentura* of Castellum 1a. It appears also to be an established feature of both barrack Forms 1 and 2 in Period 1/2a at Echzell. Other isolated examples come from Flavian Strageath Barrack XV, Valkenburg Castellum 2/3 Barrack 6, Heddernheim Phase 1, Murrhardt Bau B, and from Oberstimm Buildings 14, 9, 6, 5 and 4.

Many of the other Types occur only sporadically in just one or two barracks of a single fort period, but 'b' is found consistently in Valkenburg Castellum 6, 'd' in Castellum 4, 'l' in Period 2 of the Steinkastell at Hofheim and 'e' in the eight barracks of the *praetentura* at Rottweil Kastell III. A number of different Types are often found together in the same fort period. This is most strikingly shown at Strageath in the Flavian period when Types 'j', 'b', 'c' and 'f' are all present.

The areas of the special end *contubernia* also are very varied and range from 11,50 sq m (Valkenburg Castellum 4 Building 9) to 126,50 sq m (Echzell Form 2) (Fig 62). No patterns are evident in terms of period or provenance and in contrast to the special first *contubernia*, there is no marked association with *ala* barracks.

In most examples the differences to the other *contubernia* from the same barrack are fairly marginal; usually it a matter of the special *contubernium* being a little larger, a little smaller or perhaps not having the division into *papilio* and *arma*. This statement covers the following examples: Flavian Strageath Barracks XIII and VI; Valkenburg Castellum 4 Barracks 2, 3, 4 and 9; Castellum 5 Barracks 2 and 9; Castellum 6 Barracks 4, 5, 6, 7, and 11; Rottweil Kastell III *retentura*; Oberstimm Period 2 Building 6; Petronell; Drobeta Barracks 1 and 2. It is interresting that while many of those which have an internal subdivision maintain the proportions of the *contubernia* of the rest of the barrack, almost as many change these proportions. Where this happens in the above examples, ie in Strageath Barracks XIII and VI, the *arma* is always increased in size at the expense of the *papilio*. This is perhaps surprising when it might be thought that the fewer men in the *contubernium* would need less storage space. The mobility of the internal cross wall implies also that it is of no great structural importance and is indeed only a partition.

This point may also be made with regard to the Type 'g' end *contubernia* which show considerably more re-organisation of the internal walling in making a suite of three or four small rooms. This is the case in the Type 'g' examples from Flavian Strageath Barracks IX and X, Valkenburg Castellum 5 Barracks 3, 4 and 5, Munningen Barracks 6, 9 and 10 in the *retentura* and Oberstimm Period 1c Building 6.

Occasionally the special end *contubernium* projects in front of the line of the front walls of the other *contubernia*. Examples come fom Housesteads Barrack XIII Period 1 and Pen Llystyn Barrack R1. Again this gives the opportunity to re-arrange the internal division. But even these last two examples are not as sophisticated as those examples defined as *Schlußbauten*. These extend in front of the *contubernia* in the same way,

but have more than two rooms or two rooms which show evidence for considerable subdivision. Again, the area of these varies considerably from 30 to 146 sq m. Most seem to come from the Claudian/Neronian period, but this is an impression which rests largely on the five examples from Valkenburg Castellum 1 and the two from Castellum 1a. Within each Castellum the examples from Valkenburg are of very much the same size, on the other hand there is considerable discrepancy between the evidence from the two barrack forms from Echzell where that of Form 1 measures 80,50 sq m as compared with 126,50 sq m for Form 2.

There is very little evidence to make it possible to go beyond the suggestion made in Chapter 2 that such *contubernia* are provided for the *principales* of the centuries and *turmae*. Certainly it is a feature of the *Schlußbauten* that their degree of subdivision implies strongly their use as accommodation, rather than as special store rooms. Some examples, in particular those from Echzell are large enough to be officers' quarters in their own right. On the other hand, it is possible that some of the large undivided end *contubernia* are better interpreted as a type of store-room. Those of Rottweil Kastell III are probably best so interpreted. They are rectangular rooms without subdivision (Type 'e') and measure 44,00 sq m. Three parallel wall trenches in the *Sclußbau* of Building 6 at Oberstimm in Period 1c may have supported a raised floor for the storage of foodstuffs (Schönberger 1978, 108, Abb 53). Progress in understanding these features must await the results of further excavations.

Contubernium Totals

The *contubernium* totals of the barracks (including the special *contubernia*) were considered in general terms in Chapter 1. When the same material is examined more closely with reference to provenance, no very pronounced trends emerge. The Claudian/Neronian period reveals the greatest variety of small values of up to eight *contubernia*. Given the known size of the barracks of this period, this result is not surprising. The fullest range probably is encountered in the Flavian period which has some of the largest of all barracks, thereafter the range diminishes slightly in the Trajanic/Hadrianic and Antonine periods when the examples with more than ten *contubernia* are very few. The barracks of Hadrian's Wall and the Antonine Wall reveal no characteristics different to those of their contemporaries.

It was seen in Chapter 2 that the number of *contubernia* in the legionary cohort barracks relates to the lengths of the barracks. This is equally true of the barracks from auxiliary forts. Figure 63 displays the relationship between the number of *contubernia* and the overall length of the barracks while Figure 64 does the same for the number of *contubernia* and the lengths of the men's quarters. It is clear from both Figures that there is close relationship between the two variables as the number of *contubernia* increases with the overall lengths, but it is also apparent that the association in Figure 64 is much tighter. Thus, just as with the legionary barracks, the number of *contubernia* relates to the length of the men's quarters rather than the overall length of the barrack.

Given this close association some of the trends will be obvious from the earlier consideration of other elements of the barrack evidence. Thus the Claudian/Neronian distribution is the widest overall. On the other hand it is surprising that it is the Flavian period which seems to have the

tightest distribution in the centre of the graph; it might have been expected to be the Trajanic/Hadrianic on account of the generally more restricted range of sizes of that period. It is also clear that the Flavian, Trajanic/Hadrianic and Antonine periods all have examples of barracks with 8, 9 and 10 *contubernia* in men's quarters of the same length. Thus the dependence of the numbers of *contubernia* to men's quarters length is a general trend rather than a rule following hard and fast measurements. In fact it is the Claudian/Neronian evidence which shows the closest dependence of numbers of *contubernia* and men's quarters length, never demonstrating a difference of more than one *contubernium* over the same men's quarters length. This very fact suggests that the small *contubernium* totals of many Claudian/Neronian barracks for examples Hod Hill (6 and 7), Nanstallon (7) and Brandon Camp (6) may be indicative of outposting at this early period; the detachment being drawn from a number of *centuriae* or *turmae*.

The general trend is for the *contubernia* to have a range of similar breadths throughout the periods under discussion. This can be seen in Figure 65. The breadths of the *contubernia* range from 2,50 m to 4,00 m (with only a few exceptions) and this range is maintained throughout men's quarters lengths from *c* 22 to 44 m. The evidence from the Claudian/Neronian period is a little tighter than that from the later periods. Indeed, it is the Flavian, Trajanic/Hadrianic and Antonine *contubernia* which have the narrowest breadths under 2,75 m. Otherwise all the periods display the full range.

Thus there is no simple rule to govern *contubernium* spacing. Figure 66 shows the distances between the mid points of the side walls of the *contubernia* differentiated according to period. Most of the examples fall betweeen 3,30 and 4,40 m and there is little difference according to period. Only the Antonine period presents a concentration of slightly greater breadths, but with an emphasis on *c* 2,80 m which seems to be absent in the other periods. The evidence for this group derives almost entirely from *Britannia*: Strageath Antonine 1 Barracks XIV, VII and V, Antonine II Barracks VII and IV; Old Kilpatrick Barrack I; Bar Hill Barracks iii, iv and v; Ribchester Phase C B4. Saalburg Building F provides the one continental example

Baatz has emphasised the prevalence of 13½ Roman feet in *contubernium* spacing leaving 13 feet free for the interior breadth (1965, 142), but the above figures show that a number of alternatives must have been employed. Variations on 11 to 14 Roman feet would fit the bulk of the evidence here, while perhaps 9 Roman feet was the measurement used in the group of small values.

The relevance of *contubernium* totals to garrisons will be considered in Chapter 6.

Contubernium Areas

The living space of the *contubernia* in the auxiliary barracks has been considered in general terms in Chapter 1. It will be recalled that the sizes of the *contubernia* cover a range very similar to those found in the legionary cohort barracks. In a similar way the size of the *contubernium* tends to reflect the overall size of the barrack although there is no simple direct correlation.

The evidence for the Claudian/Neronian period is the most of varied of all and displays no recognisable patterns (Fig 10.2). Again the predominantly small size of the material from *Britannia* is apparent.

The range diminishes in the Flavian period and a number of clearly differentiated sizes emerges (Fig 10.3). Patterns in the evidence are not self-evident, but barracks associated with cavalry present some of the largest examples. Thus Newstead Period II, Echzell, Heddernheim (Phase 1) and Heidenheim all have *contubernia* with living space greater than 30 sq m. Corbridge IA and IB, further possible candidates, also have large *contubernia* of 26,81, 27,20 and 26,25 sq m. Hofheim (Steinkastell) which also may have garrisons including legionaries and cavalry in Periods I and II, also has some large *contubernia* in the Flavian period. These include areas of over 30 sq m in Period I and 36,36 sq m in Period II. But the cavalry connection is not a guarantee of large *contubernia* for Buckton (Period I) has *contubernia* of only 21,00 sq m in this period, and Arlaines *contubernia* of 19,20 sq m.

In the Trajanic/Hadrianic period the data range evenly from 17,16 sq m to 30,67 sq m (Fig 10.4). Within this range there are no concentrations which relate to probable garrison types and the cavalry connection with large *contubernia* of the previous period is no longer apparent (in spite of the 30,67 sq m of the barrack in the right *retentura* at Chesters).

The evidence from Hadrian's Wall does not display any particularly strong uniformity although it must be said that Housesteads, Wallsend and Birdoswald all have *contubernia* of similar size, 25,53 and 23,10 sq m, 21,35 and 25,20 sq m, and 26,46 sq m respectively. But this relative uniformity is not surprising considering that the barracks themselves in their overall dimensions are most uniform at this period. Nearly all the *contubernia* fall in the range of 21 - 30 sq m.

The range of barrack sizes increases again in the Antonine period and with it the range of *contubernium* sizes (Fig 10.5). Once more there are no very clear trends, but there is a slight trend which associates cavalry with the larger *contubernia*. Thus Newstead in Periods III housing legionaries and in Period IV *ala* cavalry has *contubernia* of 33,45 sq m in Barracks II - VI (although there are contubernia of only 22,33 sq m in Barrack I). Corbridge IVA also has a barrack with large *contubernia* of 28,99 sq m in the right *retentura* and this barrack again may have housed legionaries or horsemen of some kind. But the cavalry case for large *contubernia* should not be overstated because Carzield and Dormagen have *contubernia* which are of average size for the period c 25 sq m, while Bearsden has *contubernia* of only 12,00 and 11,40 sq m.

Little is known of the internal details of the barracks of the Antonine Wall, but those few *contubernia* known seem to be small. Bearsden has already been mentioned; Bar Hill and Rough Castle respond with areas of 19,00 and 16,90 sq m respectively.

Insufficient evidence exists to speak of any trends in the Severan period.

Probably more significant than general trends in the sizes of the *contubernia* is the very great degree of variation in the sizes of the *contubernia* within the same fort. Often this is much more remarkable than the differences in the overall sizes of the barracks themselves.

In those forts where it is clear that there is great variety in the barracks present such as at Hod Hill, Valkenburg and Ellingen, it is not at all surprising that the *contubernia* vary considerably. Differentiation is also to be expected in forts with apparently mixed garrisons. Examples of such are Strageath in all its periods and Hofheim (Steinkastell) Period I. In the Flavian period at Strageath *contubernium* areas vary from 18,13 to 28,00 sq m; in Antonine I from 16,64 to 29,16 sq m; in Antonine II from 22,25 to 45,65 sq m. At Hofheim the discrepancy is between 22,84 to 31,50 sq m.

Such differences may be important in the consideration of garrisons, but any such considerations will be complicated by those forts which, while apparently housing one unmixed unit, nevertheless have *contubernia* with very different sizes. The examples from Newstead and Chesters have been mentioned above. Fendoch provides another very striking example of the problem. Probably a fort for a *cohors milliaria peditata*, the *contubernia* in the *praetentura* have 25,03 sq m while those in the *retentura* have 19,27 sq m; Corbridge III, apparently with twelve centuries of infantry in garrison has barracks with *contubernia* varying from 21,00 to 31,95 sq m, both of these examples coming from the right *retentura*. Even at Hesselbach the range is from 9,36 to 16,52 sq m. Such questions will be considered further in Chapter 6.

Figure 67 reveals the great variety in the living space of the *contubernia*. Examples ranging from 10 to 40 sq m all occur quite commonly. As with the legionary cohort barracks it is clear that timber or stone sill construction has little effect on the space available in the *contubernia*. Both construction methods cover the whole range of the data and there is only a small suggestion that the stone sill barracks have slightly larger *contubernia*. Considering that the stone sills would have taken more internal space than the half-timber walls, the stone sill barracks may be said to have been conceived on a slightly larger scale, but such a deduction is very marginal considering the limited range of the evidence.

Total Living Space

The total living space of the men's quarters was considered in general terms in Chapter 1. It is the product of the living space of a single *contubernium* and their number. The small and large examples are well-known from previous discussion in this chapter. Once again the Claudian/Neronian period gives the widest range of small values, while the largest examples are again the be seen in Newstead Periods III and IV, Echzell, Heddernheim Phases 1 and 2, Rottweil Kastell III, Heidenheim, and Petronell.

Once more there are no obvious explanations for the concentrations of values which were observed in Chapter 1. From period to period it is not possible to connect the areas with particular garrisons. Again, the *ala* cavalry barracks appear to cover the full range available. On the other hand, it is true that the values from the barracks of Hadrian's Wall do cover a fairly narrow range from 171,60 sq m at Chesters to 257,22 sq m at Benwell with examples in between from Housesteads and Wallsend. But this may not be thought to be a very impressive result. Examples from the Antonine Wall are not sufficient to generate any valuable comment.

In spite of the fact that there is a general balance between the number of *contubernia* and the total living space, the equation can be an unusual one. Sometimes a small number of *contubernia* produce a living space which may

be called standard. Thus the five *contubernia* of Building 9 at Slack Phase 3 produce a total of 255,65 sq m, while the 4, 4 and 5 *contubernia* at Drobeta produce areas of 140,64, 125,72 and 166,19 sq m. But more often a small number of *contubernia* produces a small area for example at Antonine I Strageath where in Building XIV possibly five *contubernia* produce 83,20 sq m and at Raeburnfoot where the five *contubernia* of Buildings 6 and 8 produce 112,50 and 120,00 sq m respectively. This is not to say that a sizeable number of *contubernia* cannot produce a small total living space. The barrack in the *latus praetorii* at Corbridge in Periods IA, II and III has always either 8 or 10 *contubernia*. The living space of the building in these periods is 214,48, 110,00 and 112,00 sq m. At Hesselbach, the nine *contubernia* of Building 3 produce 84,24 sq m and the seven of Building 4 112,42 sq m.

These last are perhaps rather exceptional examples but there remains a number of barracks which have rather higher than usual living space but with only a usual number of *contubernia*. Strageath has examples in both Antonine periods. In Antonine I, Barracks XII, XI and X all probably have ten *contubernia*, but the total living space of these three is 270,60, 283,03 and 270,60 sq m respectively, much more than is usual. In Antonine II, even more striking are Barracks VI and V. With eight *contubernia*, VI has a total living space of 260,77 sq m; with eight *contubernia*, V has a total living area of 257,85 sq m. Ten *contubernia* also produce some very high figures at Corbridge; in IB in the right *retentura*, 262,50 sq m, in II again in the right *retentura*, 262,50 sq m, and in III in the right *retentura*, 319,50 sq m. Also very spectacular are Buildings 25, 26 and 27 in the left *retentura* at Hofheim (Steinkastell) Period 1 which have a living space of 315,00 sq m each.

Many forts have contemporary barracks whose men's quarters vary in their lengths, widths and *contubernium* totals thus producing a wide range of sizes when the living space is calculated. Corbridge and Echzell might be quoted as extreme examples of this while Strageath displays a very wide range of variables in all periods. Perhaps more interesting are those examples which produce very different results from apparently similar buildings. The lengths and number of *contubernia* in the barracks in the *praetentura* and *retentura* at Fendoch are the same and yet the total living space available in the barracks of the *praetentura* is 250,30 sq m in comparison with 192,70 sq m for the barracks in the *retentura*. This is the consequence of a slightly narrower width of the men's quarters in the *retentura*. Wallsend too has different totals in the *praetentura* and *retentura*. At this site, the *retentura* barracks are *c* 1,0 m wider in the men's quarters and this means that their living space is 226,80 sq m as opposed to 192,15 sq m in the *praetentura*. Whether such differences are deliberate it is very difficult to say. It might have been thought that the requirements for all the centuries of the proposed *cohors milliaria peditata* would all be the same at Fendoch, but that requirements might differ between the centuries and *turmae* at Wallsend for the proposed *cohors quingenaria equitata*. It is noteworthy that the barracks with the greater living space favour that area of the fort which might be thought best reserved for the cavalry; such considerations will be taken further in Chapter 6.

Living Space per Man

It is very difficult to define the allocation of living space per man, there being so many imponderables in the equation; this question will be considered further in relation to garrisons in Chapter 6. As with the legionary cohort barracks the most constant factor in the equation is the *contubernium*, the standard unit of accommodation for eight *gregales*. Thus the best way to estimate the living space per man is probably to divide the *contubernium* living area by eight. The result of such a calculation produces a very wide range of values with the main concentration between 1,88 and 3,75 sq m. Any trends will be same as those for the individual *contubernium areas*.

Papilio / Arma

Figure 68 contrasts the constituent areas of the *papiliones* and *arma*; the very wide range of values for each period is apparent. The distribution is very different to that of the legionary cohort barracks; a much greater number of *arma* are larger than *papiliones* and many *contubernia* have *papiliones* and *arma* of the same size. The distribution does not show any marked variation according to period although there is a large number of *arma* with areas from 4,0 to 6,0 sq m in the Claudian/Neronian period. In general there is no indication that the areas of either *papiliones* or *arma* are more constant. The size of the tent in Hyginus' marching-camp (*c* 8,76 sq m) does not provide a fixed point for the size of the *papiliones*.

The proportional division of the *contubernium* into *papilio* and *arma* has been considered in Chapter 1. It far from certain how significant differences in the proportions of *papilio* and *arma* are. In most forts where a number of barracks is known, the proportions of the *contubernia* taken by the *papiliones* regularly vary by some 20 %. For example the range at Strageath in the Flavian period is 48,00 to 76,98 %, in Antonine I 25,20 to 70,68 %, in Antonine II 38,10 to 61,29 %; at Corbridge in Period II 35,63 to 50,00 %, in Period III 36,62 to 50,00 %; at Valkenburg (especially) in Castellum 4 25,74 to 67,57 %; at Hofheim (Steinkastell) Period 1 40,00 to 61,09 %. These forts probably had mixed garrisons but a considerable range of values is found also in forts where the barracks ostensibly all accommodate the same kinds of troops. Thus, at Fendoch, the *praetentura* barracks give values of 46,99 % and the *retentura* barracks 66,67 %, while the range at Pen Llystyn is 50,67 to 70,80 %. The significance of such figures with regard to garrisons will be considered more fully in Chapter 6.

Considerable differences emerge when the *contubernium* proportions are considered according to the barrack Type of their provenance. Figure 69 makes it quite clear that Type B generally favours a central division of the *contubernia* more than Type A. But again, this trend should not be overstressed, the evidence from Type B barracks runs evenly from 36 to 66 % with peaks at 48 % and 56 %. Type A also peaks at 48 - 52 %, but markedly favours the higher percentages from 60 to 72 %. This distinction probably reflects the simpler nature of Type B barracks, nearly always built without veranda. This would leave the *contubernium* without a protected entrance and the division of the room about the middle line is the most natural consequence. Type A barracks on the other hand usually have a veranda and therewith the range of options for the proportions of the building increases. It can be imagined that the dividing wall of the *contubernium* could be conceived to be the middle line of the building, that

is including the width of the veranda. Such a calculation would lead to the *papilio* taking up *c* 75 % of the area or depth of the *contubernium*. It is just such a proportion which can be seen in some of the examples in Figure 69. But it is clear from the same graph that the proportions of such buildings are many and varied.

Papilio / *Arma* / Veranda

Such thoughts lead on to a consideration of the proportions of those barracks where the dimensions of the *papiliones*, *arma* and verandas are known. These proportions, expressed as percentages of the overall width of the barrack, are shown in Figure 70. A very wide range of values is represented which extends from 65/25/10 % to 35/55/10 % to 35/35/30 % to 55/20/25 %. Within this spread there is a clear concentration round at *c* 40/40/20 %, that is building in the proportions of 2 : 2 : 1. But it must be emphasised that many examples fall outside this concentration which itself is only very approximate.

Figure 70 forms a very striking contrast to Figure 33 which displays the same proportions for the legionary cohort barracks. In the first place, the auxiliary distribution is considerably looser and covers a much wider range. This is not very surprising, but it can also be seen that the legionary concentration is quite different, *c* 45/30/25 %. Hardly any auxiliary examples are found at this point at all. In general in the auxiliary barracks, the *papiliones* take up proportionately less room, the *arma* more and the verandas considerably less than in the legionary barracks. Certainly there are exceptions to this rule, but they are rare. These proportions must have implications for the construction of the buildings. The wider veranda (both in proportion and on the ground) of the legionary barracks implies a higher roof-line if the roofs generally had the same pitch. It is not unreasonable to expect the legionary barracks to be more architecturally sophisticated. These questions will be considered further in Chapter 7.

When examined from period to period, the concentrations exhibit differences. The evidence from the Claudian/Neronian period is as usual the most varied and includes most of the examples with very narrow verandas. Again, the distribution of the Flavian period is widespread, but the beginning of the concentration on 40/40/20 % can be seen. This trend continues in the Trajanic/Hadrianic period to reach its peak in the Antonine, but even in this period the distribution is a fairly loose one.

Examination of those barracks which favour this 40/40/20 % division reveals no common factor with regard to province or possible garrison. In nearly all the forts where it occurs, it is not found without other barracks from the same fort displaying different proportions. Examples may be quoted from Fendoch, Strageath in the Flavian and Antonine I periods, Valkenburg Castella 2/3 and 6, Munningen and Moos-Burgstall. Other isolated examples occur where it is not possible to say whether other barracks from the same fort display the same proportions, for example: Flavian Camelon, Carrawburgh, Pumpsaint, and Altenstadt. Occasionally it is possible to see that these proportions are more or less consistent throughout the barracks of the fort. This is true of Echzell, Rottweil Kastell III, and Künzing. There is nothing apparent to connect these three forts. The proportions also seem to have been favoured at Butzbach because although as yet only two barracks provide the evidence, they do so in four successive Periods.

Figure 71 displays the proportions of the *contubernia* and verandas of those barracks where a subdivision of the *contubernium* into *papilio* and *arma* either is not present or has not been found. Much of the evidence comes from the Trajanic/Hadrianic period. It will be seen that most of the examples are to be found between 70 and 90 % with the strongest concentration on 85 %. This means that the veranda most commonly takes 15 % of the overall width of these buildings. This is the same result as that found in Figure 70 and confirms the difference to the legionary barracks. But it must be said that a slightly higher number of the verandas take *c* 25 % of the whole than in the previous Figure and this again may have implications for construction practices; it is reasonable to think that a barrack with undivided *contubernia* will have a veranda proportionally wider than a barrack with divided *contubernia*, especially if their roof-line is of about the same height.

The Barracks in their Forts

Areas

Figure 72 displays the relationship between the areas of the barracks and the areas (over the ramparts) of their forts. The wide variety of barrack and fort sizes is immediately clear; most barrack areas range evenly between 150 and 550 sq m and derive from forts with areas from 1,25 to 3,50 ha. There is one clear subsidiary grouping of small barracks between 100 and 300 sq m from forts of 0,25 to 1,25 ha as well as a number of larger and more isolated examples.

There is only a general correlation between barrack and fort size. The areas of most of the forts are found between 1,35 and 1,85 ha. It is evident that, within forts of this size, the whole range of barrack sizes shown in the main concentration can be found with only a slight bias towards the smaller barracks before the forts become 1,50 ha in size. Furthermore the range of barrack areas remains the same for forts of 1,50 ha to 3,25 ha. The only limitation to this statement is the presence of five large examples in forts of *c* 3,10 ha. This is not to say that forts of these sizes all have barracks which range from 150 to 550 sq m, merely that barracks of this size have been found in forts of this size.

It is no surprise to see that the Claudian/Neronian barracks are smaller than those of the other periods and their fort sizes also concentrate in the smaller sizes. On the other hand they are absent from the concentration of the very smallest forts below 0,75 ha. The other periods each have examples which cover the whole range of barrack sizes and fort sizes, only those of the Trajanic/Hadrianic period lack the very largest barracks over 500 sq m and have forts which have a tendency to concentrate at *c* 1,5 ha. Several of the Hadrian's Wall forts are of 1,50 ha and even the barracks from these forts range from *c* 225 to 425 sq m. There is little unity about the forts and barracks of the Antonine Wall.

The greatest concentration of forts is at *c* 1,75 ha. Forts of this area include: Fendoch, Strageath I, II and III, Old Kilpatrick, Antonine Birrens, Chesters, Brough-on-Humber, Valkenburg Castella 5 and 6, Rißtissen Kastell 1, Drobeta and Čezava. Within this group a very wide range of barrack sizes is found, with variations of over 100 sq m in barracks from the same fort. Particularly large examples come from Old Kilpatrick and Antonine Strageath, while Brough-on-Humber, Rißtissen and Čezava provide the smaller examples.

Flavian and Antonine I Strageath also have examples of barracks in or near the *latera praetorii* (235,02 and 166,63 sq m) much smaller than all the others in the fort. These serve to extend the range of barrack sizes. It is noteworthy that such small barracks coincide with those from the group of small forts.

The group of small forts below *c* 1,25 ha derives almost entirely from *Britannia*; only Hesselbach and Ellingen are the exceptions. The correlation of barrack size to fort size is evident, only Ellingen proving aberrant with the double barrack Building B having areas of over 450 sq m in each half of the building in Phase 3. Twenty small forts provide the examples for this grouping. Even clearer within this group are those barracks from the seven forts of under 0,75 ha: Duntocher, Rough Castle, Cappuck Period IV, Raeburnfoot, Haltwhistle Burn, Hesselbach and Ellingen.

All in all, Figure 72 bears out the trends of the foregoing sections of this chapter. These trends suggest that there are no simple patterns to be found for the auxiliary barracks. Clearly certain sizes of forts correspond in general to certain types of garrison and yet throughout almost the whole range of fort sizes almost the complete range of barrack sizes is to be found.

Lengths

The military surveyors probably calculated barrack length in relation to the overall length or width of the fort. Figure 73 shows that there is no obvious connection between fort lengths and the lengths of those barracks which are aligned *per strigas*. Barracks with lengths from *c* 30 to 55 m are found in forts with lengths from *c* 90 to 200 m. Just a few exceptional examples are to be found in the forts with lengths of over 200 m.

A very much closer correlation is to be seen between the lengths of the barracks aligned *per scamna* and the fort widths. A clear proportion of the overall width which the barrack length only very rarely exceeds is shown in Figure 74. This is not surprising since in a conventionally laid out fort the barracks always take less than half of the overall width, nevertheless it can be seen that most of the barracks take up as much as possible of the space available. But even in the data which conform to this pattern there continues to be great variety and barrack lengths vary by up to 15 m over the same fort widths. Thus there may be considerable differences in the widths of the *viae sagulares*, *intervallum* areas and ramparts. The possible sigificance of this will be discussed in Chapter 6.

In general it may be said that *per scamna* barrack lengths do not exceed more than 38 % of the overall width of the fort and often approach this percentage very closely. Only three examples take markedly more than 38 % and stand out clearly on the graph. These are the barracks from Slack Phases 1 and 3 and from Haltwhistle Burn. The clearest examples of forts whose barracks as a whole take notably less than 38 % are Hofheim (Erdkastell) (although there are here special considerations of the irregularity of the defences and the unusual nature of the barracks themselves which make an unusual result predictable), Hod Hill, and Lyne. Thus the graph confirms the impression given by the Lyne barracks that they are rather wasteful of space, at least in comparison with other forts.

The Claudian/Neronian examples are the most loosely grouped although those from Nanstallon conforms very closely with the 38 % line at 36,99, 32,96 and 36,30 %. The Trajanic/Hadrianic material is the most tightly knit and much of its information derives from Hadrian's Wall. Agreement from many of the forts is very clear. Haltwhistle Burn is exceptional in any event and produces a result of 65,83 %, but the other results agree very closely: Old Church 35,25 %; Birdoswald 40,48 %; Chesters 38,39 %; Rudchester 39,08 %; Benwell 40,46 %; Wallsend 38,46 and 39,32 %; South Shields 36,94 and 36,57 %. It is clear from these forts that the arrangements do not change according to type of garrison.

The evidence from the forts of the Antonine Wall also produces a range of surprisingly close percentages: Old Kilpatrick 38,60 and 37,28 %; Bearsden 35,40 and 36,00 %; Balmuildy 32,13, 36,73 and 37,98 %; Cadder 31,81 and 32,33 %; Bar Hill 34,96 and 35,36 %; Rough Castle 32,05 and 34,00 %. Again the percentages do not seem to be affected by the supposed need of cavalry for greater room in the area of the *via sagularis*. Indeed there is no evidence enabling the detection of different relationships between barrack length and fort width according to garrison. Within the individual forts there is little variation because all the barracks of one orientation take up the full width available; there is no tendency artifically to cut some short. Thus even a fort like Strageath which in all its periods so often produces such various results, here shows much more consistency. Hofheim (Steinkastell) Period 1 seems to be the exception to the rule with results of 30,33, 35,29 and 38,24 % all from the same fort.

Topography

In their shape, size and in the disposition of their buildings the auxiliary forts are often more directly affected by topographical factors than their legionary counterparts. It is true that Vindonissa has an irregular outline which is the direct consequence of its position and that the north side of the fortress at Carnuntum is affected by the course of the Danube, but these are the exceptions to the rule. Usually the site of the fortresses was level, or could be made so, and would allow the construction of a rectangular fortress and the series of regular cohort-blocks.

It must be said that such observations are also often true for the auxiliary forts, but in a substantial minority topographical factors make irregular what might be regular. The fort at Waddon Hill for example is placed on the top of a long narrow hilltop and although only a little of the fort plan has been recovered it is clear that the outline of the fort must have been irregular and consequently the barracks irregularly positioned. The two known are markedly out of line. The Lunt too is confined to a fairly small area of higher ground which decrees an irregular outline with irregular placing of the internal buildings the consequence. Similar observations may be made with regard to Hofheim (Erdkastell). Of course it is true that irregularity of outline does tend to be an early feature and topographical features do not seem important considerations in giving Alteburg its irregular shape, but Bewcastle provides an example of a later fort which has to command an irregular hilltop and does so by adopting a hexagonal form with the consequent disruption of the normal regularity of the barrack dispositions. At Ambleside too, a large rock outcrop at the north-west corner of the defences of the first fort may have led to irregularity in the planning of the interior.

But it should not be thought that difficult topography always enforces irregularity. The fort at Housesteads needs to dominate a long narrow ridge and thus is built in a long narrow form facing east rather than north as is the rule with the other forts of Hadrian's Wall, hence also the *per strigas* alignment of its barracks throughout the fort. The same is true to an even greater extent in the case of Lease Rigg. The fort has to fit on the top of a narrow hillock and only the annexe is allowed to stretch down the hill to the west (Hartley 1982, 211). The width of the fort divides into the length of the fort 2,58 times compared with the 1,69 times of Housesteads. The fact that both of these forts are placed on narrow ridges means that they are elongated but are able to maintain rectangularity both in outline and in the disposition of the barracks.

Any one who has visited the fort of Hardknott and considered how the internal buildings will have been positioned and built in the highly uneven and difficult interior will see that the interior of forts and the disposition of their buildings must often have been much less ordered than the image drawn from the fortresses suggests. Again, the visitor to the *numerus* fort of Osterburken will consider how very difficult it will have been to construct barracks approaching anything like the usual design or pattern on the very steep hillside of the irregular enclosure which the fort was forced to adopt for its position. The effect of factors such as these can be seen at Bewcastle where the barracks were divided to fit the irregular shape of the fort (Goodburn 1978, 44), while at Brough-by-Bainbridge the small square size of the fort caused half-length barracks to be built. Furthermore here there was no room for front entry to the barracks AB and AC in Antonine I and access to the barracks must have been through the end walls (Hartley 1960, 113). At The Lunt the building of the *gyrus* in Period II led to the truncation by some 16 m of Barracks 1 and 2 of Period I. These latter examples are illustrative of auxiliary rather than legionary standards.

Fort Layouts

These considerations raise the question of just what a regular fort layout is. Figure E shows the different configurations but broadly the term must imply a fort of rectangular outline with barracks in regular facing pairs in *praetentura* and *retentura*.

Figure 75 gives a breakdown of the layout Types from period to period. Types A, B, C, D, I, J, K and L are the only ones to define the whole layout of the barracks in a fort, the remaining Types refer to only sections of the fort where a few barracks are known and these may be compatible with more than one of the complete layouts.

It is clear from Figure 75 that it is Type A which is the predominant fort layout, ie the barracks aligned *per scamna* in both *praetentura* and *retentura*. Of the other main Types B, and D have several examples, while C, J and K have only a few. Most examples which refer to just a section of the fort are of Types E and F and both of these would comply with the overall layout being of Type A although it could be Type C (for E) or Type D (for F). But such is the very small number of examples of Types C and D (that is where the barracks are aligned differently in the *praetentura* and *retentura*) that this must be considered much less likely on the grounds of probability. The examples of Type G are quite numerous and these could

imply an overall fort layout of either Type B or Type D, neither of which is very common.

It is predominantly only in the Claudian/Neronian period that Types J and K are found. Examples derive from Hod Hill and Valkenburg. Valkenburg retains the basic layout of its barracks throughout the subsequent periods. These Types comprise the well-known early arrangement of the forts whereby there is no *retentura*. This is the only period in which Type A does not predominate.

Type A emerges very emphatically in the Flavian period. Type B is hardly present although examples are to be seen at Fendoch, Lease Rigg and Celamantia; Hayton provides the Type C example. Type D seems to have a stronger presence outside *Britannia* with examples from Arlaines, Butzbach Period 1 and Rottweil Kastell V. Crawford has a Type K layout which is an interesting survival of the Type typical of the Claudian/Neronian period. Dormagen provides the single Type P example and continues to do so into the Severan period. There is also a large number of Type G examples in this period which implies that there is a greater presence of Types B and D than is revealed by the figures.

The pre-eminence of Type A declines in the Trajanic/Hadrianic period but Type B still has only two examples, that from *Britannia* being Housesteads and Celamantia possibly providing the other example. Although there are no examples of Type C, Type D figures quite strongly with three examples, Haltonchesters in *Britannia*, Saalburg and Butzbach Period 2 in *Germania Superior*. Type F has many examples in this period, all except one from *Britannia* emphasising that nearly all forts seem to have their *retentura* barracks aligned *per scamna*.

The Antonine period sees Type A at its most pre-eminent. There are no Type B examples at all although the mixed arrangement of Types C and D has not been eliminated; Type D continues with a fairly strong presence. Type C examples are from Inveresk and Newstead, Type D examples from Ardoch, Camelon, Caernarvon, Niederbieber, Saalburg and Butzbach Period 3.

The Severan data continue very much in the same pattern, but with two examples Type B emerges once again. Examples are from Housesteads Period 2 and South Shields Period III.

The minority position of Types B, C and D emerges very clearly from this study. Where examples are present, often they are from successive periods of the same fort as in the cases of Housesteads, the Saalburg and Butzbach. But this is not always so since Crawford has a Type A layout in both Antonine forts after having Type K in the Flavian period. It is clear that there is no basis for the suggestion that any of the layout Types are favoured by particular garrison types, nor does the evidence suggest any provincial preferences.

Anomalous Types

Although most of the fort layouts follow one of the general schemes set out above, there is a minority which does not fit the typology. Forts with irregular outlines and irregularly ordered barracks have been mentioned above, but differences do occur even in forts with rectangular outlines. Even the very small forts well accord with the layout Types, but Hesselbach

is different. The fort has a very narrow *praetentura* and very deep *latera praetorii*. The *praetentura* accommodates a number of miscellaneous buildings while the *latera praetorii* have the four barracks aligned *per strigas*, two to each side of the *principia*. Technically this might be said to be a Type K layout, but really it is of a different idiom. It is probable that the same layout is to be imagined for the *numerus* forts of Feldberg and Kapersberg. At Kapersberg a barrack has been found to the left of the *principia*, while at Feldberg two find-spots of reliefs of *genii centuriae* are located to the right and left of the *principia* where the positions of the officers' quarters might be conjectured (Baatz pers comm). Even more unusual is Ellingen. The small fort is dominated by one large double barrack which extends down almost the whole length of the right hand side of the fort.

The probable layout of the large *ala* fort of Echzell is even more surprising. Four pairs of barracks lie *per scamna* at the extreme ends of the *praetentura* and *retentura* while two more pairs lie *per strigas* one on each side of the *latera praetorii* (Saalburg and Oberstimm also have barracks in the *latera praetorii*). It seems that these latter pairs at Echzell have one *hemistrigium* to each side of the *via sagularis* which runs much further inside the line of the rampart than usual. Furthermore it seems that two more barracks aligned *per strigas* and again outside the *via sagularis* are to be found at the two corners of the *praetentura*. Such a complicated arrangement has yet to be parallelled. Slăveni has suggestions of the same with buildings, possibly stables, aligned *per strigas* in the corners of the fort while the barracks follow a Type A arrangement in the rest of the fort.

The very smallest forts such as Duntocher and Haltwhistle Burn with accommodation for no more than one or two centuries are special cases and fall outside the typologies discussed here.

When the orientation of the barracks is considered irrespective of fort layout, it is clear from Figure 76 that, overall, about twice as many of the auxiliary baracks are aligned *per scamna* as *per strigas*. This is the opposite to the normal situation of the cohort barracks in the legionary fortresses. The strength of this ascendancy is the same in all periods except for the Claudian/Neronian where the position is reversed.

Barrack Group Configurations

As has been discussed in Chapter 2, the cohort barracks almost invariably form facing *hemistrigia* pairs. This arrangement is more difficult to achieve in the auxiliary forts because of the necessity of grouping uneven numbers of barracks, but in general the auxiliary barracks show much weaker adherence to the rule that barracks should face eachother, none should face the rampart and the officers' quarters should adjoin the *via sagularis*. The arrangements of two and three barracks most often found in the auxiliary forts are set out in Figure F. Of the Types 1 - 10, only 1 and 6 can be said to be theoretically correct, although Type 2 does contain two facing barracks. It is striking that no examples have been found of three barracks where the two barracks furthest from the rampart face eachother and the third also faces the interior of the fort (Type 4).

Figure 77 displays the prevalence of these barrack arrangements through the different periods. Where the configuration of three barracks can be seen,

Type 1 is the most usual in all but the Claudian/Neronian period where it shares the same number of examples as Type 2, namely three. Type 2 is at its most emphatic in the Flavian period but it is perhaps surprising to see how relatively common it is in the Trajanic/Hadrianic and Antonine periods. Type 3 hardly features at all and achieves its greatest presence in the Antonine period largely through Strageath II and III.

When the barrack pairs are considered, the regular Type 6 predominates. It has by far the most examples from each period and this is particularly true of the Flavian period which, when considering that Type 1 is also at its strongest in this period, marks out the Flavian period as the apogee of conventional barrack arrangement. In spite of this the presence of Type 7 is also strong and is present on half as many occasions as Type 6 in the Trajanic/Hadrianic and Antonine periods. More surprising is the very strong showing by Type 8. This has the same number of examples as Type 7 in the Claudian/Neronian and Flavian periods, only slightly fewer in the Trajanic/Hadrianic period, but falls away rather in the Antonine period where it is matched by the Type 5 examples. This is the only period where Type 5 is significant and much of the presence can be put down to Birrens. Little evidence exists for the Severan period

These comparisons show that the arrangement of the barracks in auxiliary forts is often unconventional. This unconventionality has no obvious cause for on most occasions it would have been just as easy to build the barracks in a conventional pattern. Very rarely does lack of space decree a certain configuration although this might be the case in the use of Type 3 in the Antonine forts at Strageath. Type 3 does perhaps allow greater flexibility than Type 1, but it is difficult to see what difference Type 2 would make. Type 7 might be thought to be less wasteful of space than Type 6 or Type 8, but pressure of space certainly is not the cause of its emplyoment at Cadder, Nanstallon, Ellingen or Bologa. Since both Carzield and Benwell make use of the Type 7 arrangement, it might be thought that this Type has a cavalry connection, but this is not borne out by the other data. In these two examples it is probably a consequence of preference for rear party wall construction.

All in all it is not possible to detect in the data any bias according to province, geographical area or putative garrisons.

Dimensions

Given the range of variables, it is not surprising that the overall dimensions of the triple barrack groups present a very varied picture (Fig 78). With one exception, the lengths of the barracks range from *c* 32 to 56 m while the width taken up by the widths of the three barracks and the intervening fort streets varies from *c* 22 to 44 m. When the areas of these groupings are calculated (Fig 79) they cover the range of 750 to 2150 sq m with the one very large exception of Heidenheim (3116,00 sq m). It is noticeable that the Flavian examples tend to concentrate in the middle of the group while the Antonine data tend to avoid the centre. The smallest examples are from Bearsden and Dover Fort II.

The barrack pairs also present a very varied picture (Fig 80). The lengths range from *c* 20 to 70 m with the main concentration from *c* 30 to 55 m. Surprising is the range of widths shown by the two barracks and the

intervening street. This varies from *c* 12 to 44 m with the main concentration from *c* 16 to 30 m.

The areas of the barrack pairs cover a greater range even than the triple barrack groups, from *c* 350 to 2150 sq m (Fig 81). It can be seen that the Claudian/Neronian evidence concentrates at the lower end of the scale, but that of the other periods is fairly evenly spread and includes the Antonine data. The largest Flavian examples are from Echzell (2131,38 and 1968,50 sq m) and Rottweil Kastell III (1899,25 sq m), while the largest Trajanic/Hadrianic examples are from Buckton Period II (2066,68 and 2098,40 sq m).

The implication of these figures is that there is very great variety in the spacing between the barracks in their different groups. This is very different to the highly ordered dispositions of the legionary cohort groups which was discussed in Chapter 2. The truth of this is borne out by Figure 83. This graph sets the widths of the barrack pairs against the spaces between the opposing officers' quarters and the opposing men's quarters. Where the overall width of the barrack pair is not known, the interval spaces are placed along the bottom of the graph.

Again, the very great range of the widths of the barrack pairs is evident from *c* 14 to 44 m. The spaces between opposing officers' quarters range from 0,50 m at Flavian Strageath in the right *retentura* to 9,00 m at Echzell, while the spaces between the opposing men's quarters ranges from 1,00 m at Melandra Castle to 15,00 m at Hod Hill. These may be extreme examples, but the data cover the range very evenly. The distances between the Type B barracks where the distances between opposing officers' and men's quarters is the same and ranges from 2,50 m at Nanstallon to 9,80 m at South Shields II. There is one further exceptional example of 14,00 m at Severan Slăveni.

Officers' Quarters

Although the barracks show great variation and irregularity in their positioning in the forts, they approach the remaining criterion of rectitude with greater consistency: the officers' quarters nearly always are situated next to the *via sagularis* rather than at the opposite end of the barrack in the central area of the fort. Nevertheless, there are some important exceptions to this rule and a disproportionately large number of these come from provinces other than *Britannia*.

Four forts have barracks which consistently locate their officers' quarters in the interior of the fort rather than round the perimeter. This is true of all the barracks at Hod Hill with the exception of the rather anomalous Building XII/XIII. Valkenburg Castella 1 - 6 all seem to have certain barracks in the *praetentura* which position their officers' quarters in the interior of the fort, and although this is not true of the barracks of the *latera praetorii* in Castella 1 and 2/3, in all the three subsequent Castella, the barracks of the *latera praetorii* have their officers' quarters on the *via principalis*. Echzell is the third example. The layout of the Echzell barracks has been described above and it seems that an effort was made to keep the officers' quarters away from the defences where possible. Thus at the two ends of the fort, the officers' quarters are on the *via praetoria* and *via decumana* rather than at the corners of the fort. The same is true of the two barracks at the corners of the *praetentura*. Their officers'

quarters lie on the forward side of the *via principalis* rather than at the very corners of the *praetentura*. At Bu Ngem five out of seven barracks would appear to place their officers' quarters on the *via principalis* and *via decumana*.

There is a further group of forts some of whose barracks have their officers' quarters towards the centre of the fort. A feature of these barracks is that they are all aligned *per strigas*. These forts are Inveresk, Arlaines, Arentsburg, Niederbieber, Unterkirchberg (?), Murrhardt and Petronell.

Two forts have barracks in or near the central area of the fort with unconventionally-positioned officers' quarters in contrast to the rest of the barracks in the fort. In both examples the barracks are serving troops different to those which are making up the garrison proper for the fort. The first is the small barrack in the left *latus praetorii* at Corbridge IB and the second is Building 18 in the right *retentura* at Künzing.

Just two examples remain. The great size of the fort at Boulogne (12 ha) means that two barrack (*per scamna*) are needed to take up the whole width of the right *retentura*; the interior barracks apparently have their officers' quarters on the *via decumana*. At Straubing (Kastell IV) the pair of barracks in the right *praetentura* have their officers' quarters on the *via principalis* in contrast to their neighbouring pair in the left *praetentura* which are conventionally disposed.

Continuity

It was seen in Chapter 2 that continuity is one of the features of the cohort barracks of the legionary fortresses. Succeeding barracks tend to be built in the same position, to the same dimensions and in the same configuration. Furthermore the outline of the fortress defences does not alter, although once more it must be said that Vindonissa is an exception to the rule. Such continuity is much less a feature of the auxiliary barracks. One of the reasons for this is that single barrack periods tend to be associated with single fort periods which most often imply the wholesale reconstruction of the fort often to meet the requirements of a different garrison. Considerable alteration to the barracks in such circumstances is not surprising.

When forts are reconstructed on the same site the tendency is to make use of the existing defences, thus from period to period, the outline of the fort may not alter very much. This is true of the three periods at Strageath, the three at Crawford and the five at Valkenburg. Newstead provides an exception to the rule. Fort layouts in the successive periods tend to remain the same even if the barracks change very much in detail. This is true of Strageath, Birrens, and probably Corbridge, but it is not always so. The four forts at Newstead all have very different barrack layouts clearly associated with a very complicated series of garrison changes. But in less involved circumstances and while using the same line of defences, the whole orientation and layout of Crawford changes between the Flavian and Antonine I periods. At Valkenburg too, while the barracks of the *latera praetorii* remain aligned *per strigas* consistently through all the fort periods, the orientation of the barracks in the *praetentura* varies regularly from period to period.

Even in those forts which appear to retain the same layout from period to period there can be differences in barrack numbers. The three periods at Strageath see different barrack totals, while even at Valkenburg there appear to be six barracks in the *latera praetorii* during Period 2/3 while there may well be eight in all the other periods.

The dimensions of the barracks and the numbers of *contubernia* certainly vary considerably. The differences between the barrack lengths at Strageath covers a range of some seven metres and the numbers of *contubernia* vary from 8 to perhaps 11. But variation in the number of *contubernia* is not necessarily dependent on changes of barrack length. The barracks in the *retenturae* of all the forts at Corbridge maintain a very consistent overall length c 49 m but the number of their *contubernia* vary regularly between 10 and 8.

It has been seen also that in terms of the proportions of their constituent parts, the auxiliary barracks lack the consistency of their legionary counterparts and this is just as true of the successive periods of the same fort.

Barrack Types certainly vary from period to period. Admittedly, Type F barracks seem to have been maintained through both Antonine periods at Birrens while Type B barracks are used throughout in both Antonine periods at Strageath, but those in the *latera praetorii* at the Valkenburg Castella show little consistency from Castellum to Castellum and in 2/3 employ the rear party wall method of construction. It is not possible to point to features such as the passage between the officers' quarters and the men's quarters as something which occurs in successive forts. The barracks of successive forts are not characteristic of those forts in the same way as the the cohort barracks are characteristic of their legionary fortresses.

Concluding Remarks

In the midst of all the conflicting evidence there are two small group of auxiliary barracks which form entities and should be so discussed. The first is the group of small barracks from small forts of the Antonine period in *Britannia*. The forts in question are Rough Castle, Crawford Phases 2 and 3, Cappuck Periods III and IV and Raeburnfoot. Duntocher may perhaps also be included in the discussion. It is the barracks from these forts which supply many of the small values found for the Antonine period.

With the exception of Duntocher (0,26 ha), all the forts are *c* 0,60 ha in area although Crawford is a little larger in both Antonine periods (0,78 and 0,99 ha). The lengths of the barracks also are very similar, *c* 20 m, although the probable lengths from Period IV at Cappuck are rather different, 29,26 and 15,24 m. Sizes of officers' quarters can be suggested only for Duntocher (74,64 sq m), Rough Castle (55,01 sq m) and Crawford Buildings III and IV in Antonine II (68,00 sq m) while their corresponding men's quarters are 77,70, 98,55 and 140,25 sq m respectively, but the overall area of all the barracks is very similar: Duntocher 152,34 sq m; Rough Castle N Period 2 153,56 sq m, S 165,75 sq m; Crawford Antonine I 170,00 - 172,13 sq m, Antonine II 208,25 sq m; Cappuck 151,57 and 102,26 sq m; Raeburnfoot 110,63 - 171,00 sq m. *Contubernium* sizes are unknown although 17,91 sq m may be the figures for Period 2 of the North Barrack at Rough Castle, 23,48 sq m in Buildings III and IV at Antonine II Crawford and 22,50 and 24,00 sq m for Buildings 6 and 8 at Raeburnfoot. The numbers of

contubernia are unknown although Buildings 6 and 8 at Raeburnfoot have five subdivisions each. Only the North Building at Rough Castle and Buildings 1, 2, 3, 5, 7 and 9 at Raeburnfoot give evidence for division into *papilio* and *arma*. The overall impression of the barracks is that they are simple rectangular buildings either of Type B or Type H.

It has been suggested that the barracks at Rough Castle (MacIvor, Thomas and Breeze 1978-89, 279-80) and at Crawford (Maxwell 1971-72, 175) are in fact 'half barracks' separated by the fort streets. Comparison with the evidence presented in Chapter 1 shows that the areas of the officers' quarters is in the middle of the size range from all periods, while being slightly lower than average for the Antonine period. Indeed the values fall in the middle of the range of those deriving from fortlets. The size of the officers' quarters compares favourably with those from Bearsden (30,00 and 27,30 sq m) and is not very much less than contemporary examples from Strageath III (Barrack II 95,90 sq m), Bar Hill (92,63 and 95,00 sq m), Newstead (58,47 and 56,87 sq m) and Birrens (82,39 sq m). But in terms of overall area, the barracks fall right at the bottom end of the scale of auxiliary barracks when all periods are considered, and are best compared with the areas from the fortlet barracks. The same is true when the Antonine period alone is considered. As for the few known *contubernia*, again they fall in the middle of the auxiliary range, while the 17,91 sq m from Rough Castle falls a little below the mid point of the scale. This is true both overall and for the Antonine period alone.

This evidence suggests that these barracks are normal in every way except for their overall length. They are not scaled down versions of barracks. If their length is doubled to *c* 40 m, they fall in the middle of the main concentration for the Antonine period and the same is true if their overall areas are doubled to *c* 340 sq m. Thus there is nothing improbable in the suggestion that these are 'half barracks'.

Other short barracks have been suggested at Metchley, Heddernheim Phase 3 South, Rottweil Kastell IV and Ellingen, but of these, only Ellingen (0,72 ha) is a really small fort to compare with the examples from Antonine *Britannia* and at Ellingen there is considerable doubt over the nature of the buildings smaller than the large barrack Building B.

The second group is formed by a number of barracks smaller than and different in nature to their counterparts in the same fort. Examples are found at Cardean, Strageath I and II, Corbridge IA, IB, II, III and IVA and Valkenburg Castella 1, 5 and 6.

Building XIV of the first Antonine period at Strageath (Plan 8) is in the left *praetentura* next to the *via principalis*. It is very short, 21,50 m, and has a total area of 166,63 sq m, very similar to some of the 'half barracks' mentioned above; it may have had five *contubernia* although only two are verified. All the other buildings of this group mentioned above are situated in the *latera praetorii* of their forts.

The length of the Cardean barrack is 27,43 m compared with the 48,77 m of the other barracks in the fort and its total area 125,36 sq m. Distinct officers' quarters are not distinguished but the number of undivided *contubernia* or subdivisions, eight, is clear. The 8,79 sq m of each *contubernium* is very small.

Building B at Flavian Strageath (Plan 7) is aligned *per scamna* at the rear of the right *latus praetorii*. Its length is 35,13 m, some ten metres less than the other barracks in the fort. Its total area of 235,02 sq m is similar to the size of the men's quarters of the other barracks. It has nine *contubernia* of 17,43 sq m each and one rather larger (29,13 sq m) possibly for *principales*. The *contubernium* size is slightly less than that of the other barracks.

The length of the Corbridge barrack in the successive forts is always *c* 33 m, that is *c* 15 m shorter than the standard barracks in the fort. The number of its *contubernia* varies between 8 and 10. When the size of the officers' quarters is known, in Fort IB, they are relatively large (164,50 sq m) and this makes their relationship with the rest of the barrack highly unusual, 41,72 % in terms of length and 45,84 % in terms of area. The nature of the officers' quarters is not certain in the other periods and may not exist as such. The overall area of the barrack in IA and IB is large at *c* 330 sq m as is the area of a single *contubernium* at 26,81 sq m in IA. Thereafter the barrack becomes much smaller than the others in the succesive forts measuring *c* 200 sq m overall and having very small *contubernia* of *c* 11 sq m in II and III although this increases to 21,25 sq m in IVA.

The Castella at Valkenburg all have an additional range of rooms to the rear of the *principia*; these rooms form most clearly separate entities in Castella 1, 5 and 6. In Castellum 1 (Plan 18) the length of the building (30,00 m) and its area (225,00 sq m) is not very much less than the other barracks in the fort. The individual rooms do not take the recognisable form of *contubernia*. In Castella 5 and 6 the building is very much smaller, 16,00 m long and with areas of 176,00 sq m and 104,00 sq m respectively. The building has four equally-sized subdivided rooms in Castellum 4 and four undivided rooms in Castellum 5.

The nature of these barracks is difficult to interpret. The small building at Antonine Strageath is perhaps best interpreted as a store or stable but it seems most likely that the other barracks provide accommodation for specialist troops not housed in the conventional barracks. For Cardean it is suggested that perhaps the barrack is for cavalry unless it is the hospital building (Robertson 1979, 74). It is possible that the examples from Flavian Strageath, Corbridge and Valkenburg have associations with fort administration. Certainly the *principia* at Strageath is small in the Flavian period and Building A is adjacent, while the buildings at Valkenburg are actually physically connected to the *principia*. The interpretation of of the building in Castellum 1 as the accommodation of the fort commander surely now may be discounted (Glasbergen 1972, 150; *contra* Schönberger 1979).

These buildings may be compared with Building 18 at Künzing (Plan 24), which although of a standard size with the rest of the barracks of the fort, is isolated in the *retentura* and is superfluous to the theoretical requirements of *Cohors III Thracum CR Equitata*. Schönberger interprets the barrack as accommodation for *exploratores/veredarii* (Schönberger 1975, 112). The different nature of this barrack is emphasised further by the position of its officers' quarters in the centre of the fort rather than on the *via sagularis*, a point which equally can be made with regard to the barrack at Corbrige IB.

These examples of small and unusual barracks serve to highlight the very disparate nature of the auxiliary barracks. It is ironical that they form

one of the very few groupings discernible in the mass of the data. As a whole, the auxiliary barracks exhibit none of the consistency of the legionary cohort barracks. Only in very rare moments is what appears to be a pattern discernible. This is their most striking feature. Certainly there are some very large and spectacular *ala* barracks, but these in turn lay down no strong criteria for their fellows. Just occasionally there are glimpses of planning and uniformity - lengths in the Pennines or officers' quarters on Hadrian's Wall - but these are the exceptions to the rule. The weight of the evidence suggests that for the auxiliary barracks to be understood, they have to be studied in the context of their forts and their every element drawn upon for elucidation.

Chapter 4

Fortlet Barracks

Introduction

The number of examples of fortlet barracks is far fewer than those from auxiliary forts or legionary fortresses; in spite of this it is possible to see that their form is considerably more variable. For example, many of the fortlet barracks in *Germania Superior* are built along two sides of a central court with officers' quarters and/or administrative rooms filling the narrow third side and the fourth side remaining open for access (Barrack Group Configuration Type 10; Building Type X). Evidence for such a layout comes from Kemel (Ältere Schanze), Kemel (Jüngere Schanze), Degerfeld, Neuwirtshaus, Rötelsee and possibly Mainhardt in *Germania Superior* and from Valkenburg (Boven) in *Germania Inferior*.

These Type X barracks may be said to take the form of two small barracks facing each other in a pair and indeed such a pair is the most usual arrangement in the fortlets (Barrack Group Configuration Type 6). Examples are found at Outerwards Antonine II, Barburgh Mill, Gatehouse of Fleet, Poltross Burn (MC 48), Martinhoe, Werthausen, and Haselburg. These pairs often have small associated store buildings.

But very often the fortlets are found to have only one small barrack. Sometimes these single barracks are associated with a second building of very different form interpreted as a store-building possibly with some capacity for stabling. Such is the situation at Outerwards Antonine I, Chapel House (MC 9), Sewingshields (MC 35) Phases 3 and 4, Housesteads (MC 37), Castle Nick (MC 39), High House (MC 50) Periods I and II, Nersingen and Weinberg. Just as often one small barrack is found alone without associated stores buildings: Duntocher, Durisdeer, Milton, Sewingshields (MC 35) Phases 1 and 2, High House (Turf Wall MC 50), Bankshead (MC 52) and Randylands (MC 54).

It will be noted that the milecastles of Hadrian's Wall show great variety in their internal arrangement.

The internal buildings at Pen Llystyn are very different and would appear to take the form of a series of small store buildings; three large buildings of indeterminate form fill much of the interior at Boljetin.

The evidence from the *Kleinkastell* or *burgus* of In der Harlach, *Raetia*, will not be analysed. It is probable that this building dates to the first half of the third century (Baatz 1975, 251). The individual *contubernia* are constructed against the inside of three of the very strong *burgus* walls leaving a central court with one entrance. The garrison was probably one century strong. The closest parallels in the third century are to be found in North Africa. Similarities with the *Kleinkastelle* from *Germania Superior* are undeniable, but its internal arrangement looks forward to the military construction practices of the fourth century rather than back to the imperial period.

General Description

Barrack Types

As has been said, fortlets frequently have two facing barracks and a major complication in their analysis is the fact that, very often, the barrack pair constitutes the two halves of a divided centurial barrack. This principle has been clearly delineated by Breeze (1974c; 1977c). Throughout this chapter, the barracks will first be considered as single buildings and only second (where appropriate) as projected centurial barracks.

It was shown in Chapter 1 that the range of barrack Types found in the fortlets is very different to that of the legionary fortresses and the auxiliary forts. In particular this is demonstrated in the virtual absence of the principal barrack Types A and B and the strong representation of Type H barracks. This indicates clearly that the fortlet barracks tend to be simpler and less substantial constructions.

Noteworthy is the considerable variety in the barracks from the milecastles of Hadrian's Wall. The true Types of many are not discernible but Type H occurs at Housesteads, Poltross Burn and High House Period II. Special to the Wall appear to be Type W barracks. These are very small and their form approximates most clearly to that of a single *contubernium*. Examples are found at Chapel House Periods I and II , High House (Turf Wall Milecastle) and Randylands. This Type is found from the Hadrianic period to the end of the third century.

The Type X barracks constitute a specific group. These barracks have been given a single building Type but in fact they vary considerably in detail: for example in the nature of the rooms at the rear of the barrack court and in the presence or absence of subdivision in the *contubernia*. In order to compare them with the other fortlet barracks the two facing halves of these barracks have been considered as two separate entitities. The result of this is a considerable variety in the barrack forms. Thus the barracks from Valkenburg (Boven), Kemel (Ältere and Jüngere Schanze) and Rötelsee may be said to be of Type H, those from Degerfeld Type B and from Neuwirtshaus probably Type J. These range in date at least from the Flavian (Kemel Ältere Schanze) to the Antonine (Degerfeld Steinkastell, Mainhardt) periods. In all known examples the two barrack tracts are of the same Type.

When there are two separate barracks in a fortlet they are often of different building Types. This is particularly likely when divided centurial barracks are in question, for example at Barburgh Mill (Types G and H), Gatehouse of Fleet (Types B and J) and Haselburg (Types A and J); the reason for this is the presence of officers' quarters in one barrack tract. On the other hand the two barracks at Poltross Burn are undistinguishable in both Periods (Type H) and the two barracks at Werthausen are probably both of Type J although information from the site is limited.

When the two halves of these barracks are put together and considered as single centurial barracks the resultant two examples of Type G make it the most common while only one example of Type A is found (Haselburg). There are further single examples of Types B and H.

Veranda

The incidence of the veranda with porticus is very much the same in the fortlet barracks as in the barracks from the auxiliary forts; that is the number of barracks with and without porticus is fairly evenly divided. There are 11 examples of barracks with a porticus and eight without.

The examples with porticus concentrate very much in the Trajanic/Hadrianic and Antonine periods with a total of ten examples; those without porticus are found mainly in the Flavian, Antonine and Severan periods with a total of seven. There are almost no examples with porticus from *Britannia*, Barburgh Mill being a clear exception; on the other hand, nearly all the examples from *Germania Inferior* and *Germania Superior* have porticus. This is true of both of the Type X barracks and of those of more usual form. Kemel (Ältere Schanze) is the possible exception to the rule in *Germania Superior*. In the Type X barracks the porticus almost always continues across the rear third side of the open courtyard.

The overall widths of the verandas (both verified and unverified) are shown with the corresponding widths of their men's quarters in Figure 83. It is clear that the larger buildings are much more likely to be provided with verandas than the smaller. Even when there are projecting officers' quarters as at Martinhoe, this is no guarantee of the presence of a veranda. On the other hand, although some of the Type X barracks are small buildings, all appear to have a veranda. For example the men's quarters of Neuwirtshaus are only 4,40 m wide, and those of Rötelsee only 3,75 and 3,65 m.

Rear Wall Construction

In the nature of things, the fortlet barracks are separate and usually facing buildings. Thus they have no reason to employ the party rear wall method of construction often to be seen in the legionary barracks and occasionally in the auxiliary barracks. Some fortlet barracks however are distinguished from all other barracks by a form of construction which seems to incorporate the rear walls of the barracks in the rampart. Evidence for this is to be found at Durisdeer, Housesteads (Eastern Barrack), High House (Period I Western Barrack) and Heidenburg. Thus this method is not confined to any one province or excluded from the milecastles of Hadrian's Wall. The technique is found at least from the Trajanic/Hadrianic to the Severan periods.

Of the timber examples, no traces of construction are known to the rear rampart side of the Durisdeer barrack and thus some kind of lean-to construction may be envisaged. At Heidenburg on the other hand, the whole of the rampart is strengthened on the inside by posts and these posts seem to have formed the rear wall of the internal buildings, but the full details are far from clear (Hagen 1931, 203). The milecastle examples are stone barracks and there is evidence that in both, the side walls of the barracks abut the main fortlet wall (Hunter-Blair 1934, 116; Simpson 1913, 325).

Construction Methods

The construction methods employed in the fortlet barracks cover almost the same range as the auxiliary barracks, but have a slightly different

emphasis. No examples are suggested to have been built entirely of stone while the use of stone sill walls has an early peak in the Trajanic/Hadrianic period, diminishes in the Antonine period and re-emerges once more in the Severan. For the auxiliary barracks, the stone-sill method is consistently the most important from the Trajanic/Hadrianic period onwards. The prevalence of stone-sill construction in the Trajanic/Hadrianic period is in spite of the fact that many of the barracks of the Hadrian's Wall milecastles are of timber construction in their earliest phase. Examples come from Chapel House, High House (Turf Wall Milecastle), High House and possibly Housesteads and Poltross Burn. This use of timber construction is in direct contrast to the auxiliary barracks of the Wall forts. The importance of post-trench construction in the Antonine period can largely be assigned to Germany where nearly all the *Kleinkastell* barracks employ the method. As far as can be seen from the limited number of examples, the incidence of post-trench and post-pit construction is about the same as for the auxiliary barracks. It is the Antonine period when post-pit construction occurs most frequently in both. Sill beams are hardly to be found in the fortlet barracks; Pen Llystyn and Rötelsee provide the exceptions to the rule.

Dimensions

The dimensions of the fortlet barracks were considered in general terms in Chapter 1. At first the barracks will be considered according to their actual dimensions on the ground rather than as full centurial barracks (Figs 2.2 - 2.7).

In the Claudian/Neronian period the evidence from Martinhoe and Nersingen agrees fairly closely, both fortlets providing single barrack dimensions of *c* 18 x 5 m. A more disparate picture emerges in the Flavian period. Only the dimensions of the barracks from Kemel (Ältere Schanze) are at all similar to those of the previous period while those from Gatehouse of Fleet are nearly as large as the smallest auxiliary barracks. The Flavian period also sees the largest dimensions proposed for any fortlet barrack. Two barracks from Boljetin appear to measure *c* 21 x 20 m. Such dimensions are quite exceptional and must call into question their interpretation or at least their attribution to the first century.

More evidence is forthcoming for the Trajanic/Hadrianic period. Most of the examples are from the milecastles of Hadrian's Wall, and although all seven barracks except one have widths of between 4,5 and 6 m, their lengths vary from 6 to 17 m. The barracks from Neuwirtshaus in *Germania Superior* appear to be very similar in size to those of Poltross Burn, but the other examples from *Germania Superior* and *Inferior* are considerably larger than those from the milecastles. Most striking are the barracks from Werthausen which at *c* 32 x 10 m are quite easily the largest to be found in the fortlets and, for example, are very similar to the size of the barracks of contemporary Hesselbach.

The Antonine period sees the most disparate group of fortlet barracks. Again, most of the evidence comes from *Britannia*. Nearly all the smallest examples of *c* 10 x 4,5 m derive from the Antonine Wall and Hadrian's Wall, Wilderness Plantation and Randylands respectively. But the Outerwards barracks are also of this size. Durisdeer, Milton, Barburgh Mill and Duntocher provide the other examples from *Britannia* and at *c* 24 x 8 m are similar to the small auxiliary barracks from Crawford, Cappuck, Raeburnfoot

and Rough Castle discussed in the previous chapter. In terms of length, these barracks resemble those from Haselburg in *Germania Superior*, but the Haselburg barracks are considerably wider (*c* 12,5 m). On the other hand, those from Rötelsee are much more the size of those from the milecastles.

All the evidence in the Severan period comes from the milecastles of Hadrian's Wall. Although always between 4,50 and 6 m in width, the eight examples vary in length between 6 and 21 m.

The sole new example from the third century is from Weinberg in *Raetia*. This barrack (if it is a barrack) is of quite a different shape being, at *c* 18 × 14 m, almost as wide as it is long. The details of the interior are far from certain.

Consideration of the lengths of the fortlet barracks by themselves confirms the very disparate nature of the evidence (Fig 84). The variation in the barracks from the milecastles of Hadrian's Wall has been mentioned above and those from the provinces of *Germania Inferior*, *Superior* and *Raetia* display no greater unity. The same may be said when the total areas of the barracks are calculated. These range evenly from 50 to 500 sq m with only a slight concentration on 150 sq m.

Figure 85 gives the theoretical dimensions of the barracks formed from those fortlet barrack pairs which may reasonably be put together to form single barracks. It is clear that there is little unity about the results. The widths of the barracks range from 5,50 to 9 m, and the lengths from *c* 19 to 59 m. There is a slight concentration of six examples with lengths between *c* 28 and 34 m, but these examples have little in common. They date from the Claudian/Neronian to the Antonine period and come from *Britannia* and *Germania Superior*. The examples from *Germania Superior*, Kemel (Ältere Schanze) and Neuwirtshaus, are both of Type X and indeed the calculation is highly tenuous. Equally Poltross Burn provides one of the examples from *Britannia* and it may well be that such a calculation is not supportable for these two barracks with no clear officers' quarters and a total of only six or seven *contubernia*. Nevertheless, it is interesting that the theoretical dimensions here approximate closely to those of Martinhoe.

When these theoretical dimensions are compared with those of the auxiliary barracks in the different periods and provinces there is often considerable agreement. Thus in the Claudian/Neronian period the *c* 32 × 6 m of the barrack from Martinhoe coincides with the principal distribution of the auxiliary barracks, being only a little shorter and narrower than the average. In the Trajanic/Hadrianic period the *c* 42 × 9 m of Degerfeld falls in the middle of the main auxiliary concentration. The same may be said for Barburgh Mill in the Antonine period: *c* 47 × 9 m are average auxiliary barrack dimensions. Haselburg too with lengths of *c* 52 m in Period 1 and *c* 54 m in Period 2 and widths of 12,60 m agrees with a group of the largest auxiliary barracks

But the correspondence with centurial barracks is not always so precise. The Flavian baracks at Gatehouse of Fleet with *c* 53 m would be some two metres longer than all other auxiliary barracks from *Britannia* with the exception of Ardoch and Newstead, but this is a length which occurs in contemporary auxiliary barracks from other provinces. Equally, the smaller *c* 28 × 6 m of Kemel (Ältere Schanze) is some two metres shorter than even the subsidiary concentration of smaller auxiliary barracks to be found mainly in *Britannia* at this period. Again in the Trajanic/Hadrianic period

the dimensions from Poltross Burn and Neuwirtshaus with lengths of *c* 34 m agree with the shortest in the main auxiliary concentration, the *c* 50 m of Kemel (Jüngere Schanze) coincides only with the longest of the auxiliary barracks while the *c* 59 m of Valkenburg (Boven) is almost without auxiliary parallel. The final Antonine example from Rötelsee is very difficult to assess. These Type X barracks yield lengths of either *c* 19 or 30 m depending on how much of the rear section is included. The former would be a highly untypical length for auxiliary barracks of the period, but the latter conforms with the group of small barracks from *Britannia*.

The Officers' Quarters

The very terminology here presents problems, for although some of the fortlet garrisons doubtless were commanded by centurions or decurions, it is very likely (for example in the very small barracks at High House (Turf Wall MC)) that the *praepositus vexillationis* was only of the rank of *principalis* and thus not technically an officer. In spite of this difficulty the term officer will be retained for all buildings where the quarters can be distinguished.

The fortlet barracks are different to the legionary and auxiliary barracks in that there are no examples of officers' quarters divided from the men's quarters by a narrow passage or alley.

In many barracks the officers' quarters can easily be identified, but again barrack Types J and H, which take the form a rows of undifferentiated *contubernia*, bring their own special problems. Thus it is difficult to determine the extent of the officers' quarters in the Type J barracks at Werthausen and in the Type H barracks at Poltross Burn, at least in Period 1. In Period 2, the most northerly *contubernia* of both barracks at Poltross Burn were enlarged at the expense of the others and thus may be accounted accommodation for officers or *principales*.

The evidence at High House (Turf Wall MC) is also equivocal. The barrack in the eastern half of the fortlet here is one which apparently takes the form of a single large subdivided *contubernium* (Building Type W). The smaller northern room may be taken either as the accommodation for the *praepositus vexillationis* or as an ante-room.

The true extent of the officers' quarters is also difficult to determine in the Type X barracks. Mackensen has suggested that the central room at the rear of the barrack court at Kemel (Ältere Schanze) is to be seen as the accommodation and office of the *praepositus vexillationis* (1987, 73). This would seem to be unlikely in the light of the evidence from Kemel (Jüngere Schanze) and Degerfeld, whose barracks most resemble those of Kemel (Ältere Schanze). In the Jüngere Schanze the rooms to the rear of the right hand barrack tract have subdivisions in the manner of officers' quarters while the room apparently completing the rear of the court is quite different. It is not known in full but possibly takes the form of a hall with a higher roof supported by four free-standing timber uprights (Jorns and Meier-Arendt 1967, 28 Abb 5). This form suggests its use as an *aedes* and assembly point rather than as accommodation. This is supported by the evidence from Degerfeld. Here again the officers' quarters are clearly situated at the rear of the right hand barrack tract and the room at the rear of the court is interpreted as a *sacellum* (Jorns and Meier-Arendt 1967, 29). It is thus preferable to see one of the rooms in the side tracts

of the building at Kemel (Ältere Schanze) as the officers' quarters rather than the chamber at the rear of the barrack court (this is a possibility which Mackensen acknowledges (1967, 73)).

On the other hand it should be noted that the rear tract at Valkenburg (Boven) shows every likelihood of constituting the officers' quarters. It has various subdivisions and is framed by the two side tracts, each of which has five *contubernia*.

The composition of the remaining Type X barrack at Rötelsee is more difficult to interpret. Here the room at the rear of the barrack court does not have the unity or pre-eminence of the examples above; it is subdivided and appears to extend across the width of the eastern barrack tract. The subdivision takes the form of another small rectangular room positioned at the apex of the barrack court. It is possible that this room housed some kind of *aedes* in spite of the fact that two cooking hearths were interposed between it and the paving of the barrack court. The best interpretation may well be to consider the large room with subdivision as the officers' quarters and the three sides of the court forming one composite barrack.

Mackensen also suggests that Room 1 of the barrack in the south-west half of the fortlet at Nersingen should not be interpreted as officers' quarters but rather as a room reserved for official duties and paperwork (1987, 38-41). This is very surprising since the room has all the appearances of the officers' quarters of a Type B barrack; it is at the head of the barrack and its area (26,68 sq m) is comparable to that of the contemporary officers' quarters at Martinhoe (32,40 sq m ie in Phase 1 before their extension on the north side). Furthermore it takes a quite acceptable proportion of the overall length of the barrack (27,84 %). The need for such a large area purely for administration also seems surprising in view of the second building in the fortlet interpreted as a *Wirtschaftsbau*. This building would seem to offer ample administrative overflow space, especially when it is considered that fortlets often appear to have little or no specific administrative or stores space at all, eg Barburgh Mill, Martinhoe, Kemel (Ältere Schanze) and Rötelsee.

Mackensen's principal reasons for rejecting the obvious intepretation are that the room has no internal divisions which are to be expected in officers' quarters and that Room 2, the first *contubernium*, is considerably larger than the others and therefore to be regarded as the quarters of the *praepositus vexillationis*. Certainly it is true that officers' quarters usually show some subdivisions, but it is a mistake to think that these are always very extensive. The officers' quarters in the auxiliary forts often show only one internal division while in Period 1 at Hesselbach, the officers' quarters of Building 1 has none. Furthermore, Mackensen states that the contemporary ground surface of the fort had been destroyed and thus the evidence for flooring and the composition of the partition walling was lost (1987, 38). It is possible that the internal divisions of the officers' quarters were very light and rested on such a ground surface in Room 1. Certainly it is true that Room 2 is larger than the other *contubernia* (*c* 11,48 sq m as opposed to 8,10 sq m living space; Mackensen's figure of 14,40 sq m seems to me too large: Tabelle 1, 39), but it has been seen in Chapters 2 and 3 that for the first *contubernium* to be different to the others is a not unusual feature of barracks; this is merely the first to have been found in fortlet barracks. Furthermore, the considerable variation in the sizes of the other *contubernia* in the barrack suggests that the significance of the first ought not to be exaggerated.

Dimensions

Figure 86 sets out the dimensions of the officers' quarters where they are discernible in the fortlet barracks. Comparison with Figure 53 shows immediately that generally their sizes match only the very smallest of the examples from auxiliary forts. The clearest exception to this is found at Valkenburg (Boven) whose quarters of *c* 16 × 5 m are considerably longer and narrower than nearly all other auxiliary officers' quarters. Those of *c* 14 × 8 m at Gatehouse of Fleet fall in the middle of the auxiliary range and the same may be said for those of *c* 11 × 11 m at Haselburg. The *c* 9 × 9 m of the quarters at Barburgh Mill is firmly located among the smallest from the auxiliary forts.

The remaining examples are more problematic, but if the most northerly *contubernia* of the barracks at Poltross Burn are to be regarded as accommodation for officers, it is to be noted that in Period 1 they agree closely with the evidence from High House (Turf Wall MC), Outerwards and Milton, and in Period 2 with the evidence from Martinhoe and Nersingen. But such comparisons span more than a century. The dimensions from the Type X barracks of Kemel Jüngere Schanze and Degerfeld of *c* 8 × 6 m agree in the Trajanic/Hadrianic period.

The Men's Quarters

The lengths and widths of the men's quarters are shown in Figure 87. The lengths cover evenly almost the whole range from 4 to 26 m, there being a gap only between 18 and 22 m. The quarters up to 10 m in length all have widths of *c* 4 m; the widths of those with greater lengths vary between 5 and 8,5 m. There is no apparent grouping according to period or province and the Antonine examples, in particular, cover the whole range. As with the auxiliary barracks, the men's quarters show much greater variety than do the officers' quarters.

The divided nature of many of the barracks has the consequence that most of the fortlet men's quarters are much shorter than those of the auxiliary forts. This is immediately apparent when Figure 87 is compared with Figure 55. On the other hand their widths are very much the same except for those examples whose length is less than *c* 10 m.

Only the examples with lengths of *c* 24 m, ie Barburgh Mill, Gatehouse of Fleet, Degerfeld and Haselburg, can be said to be comfortably in the range of the auxiliary barracks. But here the auxiliary parallels date solely to the Claudian/Neronian and Trajanic/Hadrianic periods while the fortlet examples mentioned are Flavian and Antonine. Furthermore, they are among those most likely to be regarded as divided centurial barracks.

Outerwards, High House (Turf Wall Milecastle), Martinhoe and Rötelsee provide the examples with widths of *c* 4 m. They are united neither by date nor province.

By way of contrast, when the fortlet men's quarters are given their projected dimensions as centurial barracks, the evidence from six fortlets concurs with that of full-size auxiliary men's quarters in their respective periods. The six are Barburgh Mill, Gatehouse of Fleet, Valkenburg (Boven), Kemel (Jüngere Schanze), Degerfeld (Erdlager) and Haselburg Periods 1 and 2. Indeed the evidence in all of these examples places the men's quarters at

the top end of the auxiliary scale. On the other hand, the quarters from Martinhoe would be very small even for the Claudian/Neronian period and this may explain the additional *contubernia* at the front of the right hand barrack. Poltross Burn would also provide quarters of a size to be matched only by two examples from the Trajanic/Hadrianic period.

The areas of these projected men's quarters concentrate between 225 and 350 sq m. This is in the centre of the principal auxiliary concentration in Figure 6.

Relationship between Officers' and Men's Quarters

Given the evidence presented above, it is not surprising that the comparison of the lengths of the officers' and men's quarters gives a fairly diffuse result. Many of the officers' quarters are at the heads of one of the barracks of a pair; thus they take a much greater percentage of the overall length of the barrack than usual. This was noted in Chapter 1.

The corresponding projected lengths in the consolidated barrack pairs form a more coherent pattern. When the officers' quarters' length percentages are calculated they form a clear concentration between 18 and 25 % of the whole. In this they encompass the principal concentration demonstrated by the auxiliary barracks in Figure 7. The clearest examples are Barburgh Mill (18,84 %), Gatehouse of Fleet (26,00 %), Valkenburg (Boven) (27,27 %) and Haselburg Periods 1 and 2 (21,66 and 20,86 %). The percentage from the Type X barracks at Degerfeld Erdlager (20,38 %) also falls within this range, but that from Kemel (Jüngere Schanze) (15,32 %) marginally outside. In spite of their relatively short length, the barracks from the two periods at Martinhoe produce results which fall in the centre of this concentration, ie 19,06 and 24,38 %. It is difficult to know how to deal with the barracks from Poltross Burn, but if the two most northerly *contubernia* of both barracks are taken together for the officers' quarters, their percentage of the whole length in the Hadrianic period is 24,00 % and in the Severan 34,99 %. The former figure at least theoretically provides a satisfactory result.

The theoretical area percentages of the officers' quarters with their concentration between 20 and 27 % also agree with the results for the auxiliary barracks presented in Figure 8.

The *Contubernia*

It has been noted that the building Types of the fortlet barracks are, on the whole, of a simpler form even than most of the auxiliary barracks. Types A, B and J feature little in the fortlets, thus subdivided *contubernia* are an exception rather than the rule. But in spite of the simple building forms, the first and last *contubernia* do sometimes receive special treatment.

Special Contubernia

The only example of a special first *contubernium* to date is from Nersingen in *Raetia* where the first *contubernium* is considerable larger than the others. This has been discussed above.

In Period 2 at Poltross Burn (180-270), out of two *contubernia* in each barrack, the first is considerably larger than the second, 23,40 and 26,13 sq m as opposed to 15,21 and 13,65 sq m. Clearly this is a exceptional case, but technically these are examples of special first and last *contubernia*.

Attention should also be drawn to the *contubernium* next to the officers' quarters of the western barrack at Barburgh Mill. Although of the same size as the others in the barrack, to judge from the plan of the building (Breeze 1974, 134) it seems possible that it was open to the front and that the partition wall between it and the next *contubernium* did not extend across the whole width of the barrack. Thus access to the next *contubernium* could have been from this first *contubernium*. But such an impression may merely rest on shallow and slightly elongated foundation trenches.

The clearest example of a special end *contubernium* is from Martinhoe. The barracks here are of Type G, thus the *contubernia* are not subdivided, but the two most northerly *contubernia* of the barrack on the east side of the fortlet are doubled to form a block of four rooms of equal size. It is clear that the officers' quarters of the fortlet are at the head of the western barrack, thus considering the pair as one barrack, the eastern barrack tract may be said to have a *Schlußbau*, probably for the accommodation of *principales*. It is also possible that this construction is merely a means of increasing the number of ordinary *contubernia* in the fortlet. This interpretation gains strength from the fact that the area of the '*Schlußbau*' (37,50 sq m) is greater than that of the officers' quarters in Phase 1 (32,40 sq m) though not in Phase 2 (44,28 sq m).

In *Germania Superior*, again when the two barracks at Degerfeld (Erdlager) are considered as a single whole, the end *contubernium* of the western barrack is clearly an enlarged end *contubernium* of Type 'g'. Its living area of 34,38 sq m is almost twice as large as the 19,13 sq m of the other *contubernia* of the barrack.

Conversely, at Barburgh Mill the end *contubernium* of the right hand barrack is smaller than the others and at Haselburg in Period 2 the end *contubernium* of the left hand barrack is markedly smaller, having an internal area of 12,16 sq m as opposed to 29,60 sq m.

Breeze has suggested that the end *contubernium* at Barburgh Mill may have been used for stores (1975, 145). The space would have been especially necessary at Barburgh Mill where there appear to be no separate store buildings; there is no such lack at Haselburg. Haselburg is an interesting example because the small room appears to have been added in the second building period; furthermore the central partition wall is set further forward than in the other *contubernia*. This might suggest that the room was intended for only one or two soldiers who required less space for their equipment than the usual eight *gregales*.

Contubernium Areas

The living space of the *contubernia* of the fortlet barracks was considered in general terms in Chapter 1. It will be recalled that their sizes cover a wide range from *c* 7 to 30 sq m (Fig 10). The number of fortlets where the *contubernia* of the barracks are divided into *papilio* and *arma* is relatively

few. These subdivided *contubernia* have larger areas than the others of less sophisticated design; this is in spite of the subtraction of the area of the partition wall. Not surprisingly, the largest *contubernia* are to be found at Barburgh Mill (24,44 sq m), Gatehouse of Fleet (21,13 and 22,32 sq m) and Haselburg (29,60 and 28,00 sq m). The smallest come from Martinhoe (7,05 sq m) and Nersingen (8,10 sq m). It is striking that Type X barracks all have *contubernia* with areas very close to 17,00 sq m. The only exception to this is the 10,20 and 10,50 sq m of Rötelsee.

Three of the milecastles of Hadrian's Wall have very small barracks which, more than anything else, resemble single *contubernia*. These are Chapel House (right hand side), High House (Turf Wall Milecastle) and Randylands. The internal living areas of these buildings are 22,29, 36,19 and 29,03 sq m respectively. When these areas are compared with those of *contubernia* of the Trajanic/Hadrianic period and more specifically with those from the Wall forts (Figs 10.1 - 10.7), it will be seen that only the evidence from High House being rather too large does not comply with a living area which would be considered typical for a *contubernium* in an auxiliary barrack. This evidence would suggest such small groups as the garrisons of these milecastles.

Taking 2 sq m as the minimum requirement of space for one man (Hyginus' provision for the *papilio* plus *arma* would suggest 2,46 sq m), it is clear that often the individual *contubernia* of the fortlet barracks did not have space enough for eight *gregales*. This is most clearly true at Martinhoe where three or four would seem likely, while five is the probable maximum at Rötelsee. In these two examples the *contubernia* are not complicated by partition walls, but those at Nersingen are divided into *papilio* and *arma*. The size of the *papilio* (1,8 × 2,3 m) would allow room for only one double or perhaps triple bunk. There would be space for a similar arrangement in the *arma* (1,8 × 1,8 m) but such would seem unlikely, hence Mackensen's estimate of two men per *contubernium* (1987, 40). But to house only two men in a *contubernium* of 8,10 sq m is rather a waste of space by the standards of legionary and auxiliary *contubernia*. The eight *gregales* of Hyginus slept in an area of 2,96 × 2,96 m giving each one an area of 1,10 sq m. If the *papiliones* at Nersingen did not have bunks, there would be room for four men on the ground and the *arma* for their equipment. This seems to be a more balanced solution.

Contubernium Totals

The total numbers of *contubernia* in the individual barracks were considered in Chapter 1. They cover the whole range up to seven but the largest totals come from Werthausen where there is space enough for ten or eleven, one or two of which may be considered to have been set aside for officers. These are the only single barracks from fortlets where the number of *contubernia* is suitable for the accommodation of a whole century.

Centuries may be perceived as garrisons of the fortlets where the barrack pairs constitute a full centurial barrack and where the *contubernia* are large enough to accommodate eight *gregales*. A satisfactory total of ten *contubernia* can be achieved for Barburgh Mill, Valkenburg (Boven), Kemel (Jüngere Schanze) and Haselburg (Period 2); it is possible that there are as many as 12 *contubernia* at Gatehouse of Fleet. A total of eight may be thought sufficient for a reduced century at Degerfeld. All of the above have *contubernia* of a size to accommodate eight *gregales*.

Martinhoe has an apparent total of six very small *contubernia*. This number may be increased to ten if the four rooms of the '*Schlußbau*' are added and to 12 if the two rooms of the building at the south end of the fortlet are added. Poltross Burn has totals of six and four small *contubernia* in Periods 1 and 2 respectively.

It has been shown in Chapters 2 and 3 that the number of *contubernia* is broadly dependent on the length of the men's quarters. Figure 88 displays the relationship between the number of *contubernia* and the length of the men's quarters, considered both as single fortlet barracks and as theoretical centurial barracks. The correlation is not as precise as in the barracks from auxiliary forts and this is confirmed in Figure 89 which shows that the spacing of the *contubernia* ranges sporadically from 2,25 to 4,40 m.

Total Living Space

The total living space of the individual fortlet barracks was considered in Chapter 1, but when the barrack pairs are considered as single barracks, only Barburgh Mill, Gatehouse of Fleet, Valkenburg (Boven), Kemel (Jüngere Schanze), Degerfeld and Haselburg have totals of 160,00 sq m and over which may be considered reasonable for a century on the basis of the evidence from the auxiliary barracks. The total of *c* 70,50 sq m from Martinhoe which includes the area of the '*Schlußbau*' shows just how small the accommodation there is. Even the single barrack at Nersingen has a total of 60,08 sq m.

Living Space per Man

As with the auxiliary barracks, the disparity in the sizes of the *contubernia* and in their totals makes it impossible precisely to define the amount of living space allocated to each man or to establish a norm for any period. But similarity in size to those of the auxiliary barracks suggests that many were constructed on the basis of regular units of eight men per *contubernium*.

Papilio / Arma

There are only some 11 examples of subdivided *contubernia* and three of these are the barrack Type W examples from the milecastles of Hadrian's Wall. The areas of the *papiliones* and *arma* are shown in Figure 90. Putting to one side these three examples, the evidence from the other fortlets shows that the proportion of the *contubernium* taken by the *papilio* ranges from 42,86 (Haselburg right hand Barrack Periods 1 and 2) to 62,12 % (Saalburg). This agrees with the evidence from the auxiliary barracks (Fig 12), but it must be said that the marked auxiliary concentration precisely on 50 % is absent. The three special examples produce results very much in tune with this evidence; only High House (Turf Wall MC) with 70,02 % is exceptional.

Papilio / *Arma* / Veranda

Figure 91 displays the proportions of these three elements of the barrack. Evidence is slight, but a different emphasis to the evidence from the auxiliary barracks may be noted. In the fortlet barracks, the *papilio* tends to take rather less of the whole, the *arma* rather more and the veranda also rather more. The proportion taken by the *arma* seems now to be the most constant factor. In all examples it falls between 30 and 40 %. Thus the trend has again moved further from the proportions of the legionary barracks. The range of these few fortlet examples is also very much wider.

Again there is a different emphasis in the proportions of the *contubernia* and verandas of those barracks where the *contubernia* are not subdivided. Most of the evidence derives from the Antonine period but is sufficient to show that there is a concentration round the point of just below 75 %. This confirms that at *c* 25 %, the veranda is taking proportionately more of the width than in most of the barracks from auxiliary forts.

The Barracks in their Fortlets

Areas

In Figure 92 is compared the areas of the barracks and their corresponding fortlets. The graph shows a much more consistent picture than the same comparison for the auxiliary barracks (Fig 72). The narrow range of fortlet sizes is emphasised; essentially they vary between 0,02 and 0,15 ha. The areas of the barracks can be seen gradually to increase with that of the fortlets. Within this range of fortlet size only Claudian/Neronian Martinhoe and Nersingen have larger areas than usual in relation to the areas of the barracks. Of the larger fortlets which cover *c* 0,30 ha, Duntocher and Gatehouse of Fleet nevertheless have buildings very much the same size as the smaller fortlets. This may be said also of the two smaller buildings at Boljetin, but not of the two larger (*c* 400 and 450 sq m). It is to be noted that the Hadrian's Wall milecastle barracks and the Type X formation barracks also conform to the overall distribution pattern.

Lengths

A very similar correlation is to be seen when the barrack lengths are compared with the overall length of the fortlet (Fig 93). Again the larger fortlets of *c* 0,30 ha stand out as different, but for the others, as the length of the fortlets varies by *c* 25 m so does the length of the barracks vary correspondingly by *c* 25 m. On this occasion the examples from Martinhoe are not exceptional. The general rule is very clear, the length of the fortlet increases with the length of the barrack leaving the barrack to take up some *c* 60 % of the whole. The exceptions are to be found only in the larger fortlets with lengths of *c* 55 m and over and in some of the Wall milecastles with clearly much shorter barracks. But the rule does apply, for example, to Poltross Burn where the result is 61,82 %.

Topography

Because of their relatively small size, the builders of the fortlets were usually able to avoid the very difficult topographical conditions which

occasionally had to be confronted in the auxiliary forts. Most fortlet barracks were built on fairly level ground, but this was not always possible. The demands of regular spacing on Hadrian's Wall meant that, very often, milecastles had to be built on very uneven and sloping land. Certainly this is true at Poltross Burn where the two barracks run straight up a 20 % slope. The excavators found that there was a fall of over 2,74 m in the c 17 m length of the buildings. This necessitated a terracing of the *contubernia* and of the paths in front of the barracks (Gibson and Simpson 1911, 422-3, 433-4). In spite of the difficulties at Poltross Burn the builders were able to build what appear in plan to be regular buildings. Very similar problems must have faced the builders at Cawfields milecastle. In general the fortlets do not present the same problems of irregularity as the auxiliary forts.

Layout Types

Again the small size of the fortlets restricts the variety of ways in which the barracks can be laid out in the interior. In almost all examples where there are two barracks, or a barrack and an ancillary building, they are set out in facing pairs, the main road of the fortlet passing between the two barracks whether the fortlet has two entrances or just one. Pen Llystyn and Boljetin most clearly do not follow this pattern. But in not all examples are the pairs of buildings of the same size. On Hadrian's Wall, Sewingshields Phases 3 and 4 and High House Period II both have contemporary buildings which have different lengths. Where the fortlet has a single building, it is situated to one side of the central fortlet road with its long axis parallel to the road.

Dimensions

It is not surprising that the overall dimensions of the building pairs cover a very wide range (Fig 94). But it can at least be seen that the configuration usually comes very close to forming a square. There are no particular concentrations according to period or province. This variability is reflected in the areas covered by the pairs, which concentrate between 200 and 500 sq m, but range from 80,52 sq m at Chapel House Period I to 934,11 sq m at Werthausen.

In spite of this great range, the distances between the opposing barracks display considerably more discipline than those of their auxiliary counterparts (Fig 95). This is not to say that the distances are the same and indeed they vary from 3,40 m at Outerwards to 16,60 m at Valkenburg (Boven), but the graph shows that the distance between them increases in step with the overall width of the barrack pair. The only very clear exception to the rule is the 13 m between the men's quarters at Martinhoe whose overall width is only 20,25 m, but here it must be added that the 8,50 m between the officers' quarters of the West Barrack and the '*Schlußbau*' of the East Barrack conforms to the norm. It will be noted that this behaviour is quite different to that of the legionary barracks where the distances between the barracks remain constant irrespective of the widths of the cohorts.

Officers' Quarters

The positioning of the officers' quarters displays considerable variety in the fortlet barracks. In those examples where there are two separate barracks, it seems to be the general rule that the officers' quarters shall be adjacent to the gate of the fortlet in those cases where there is only one gate (Outerwards, Barburgh Mill, Martinhoe), or adjacent to the apparently more important gate in those fortlets where there are two gates (Gatehouse of Fleet, Poltross Burn, Haselburg, Nersingen). The officers' quarters of the single barrack at Milton again appear to be nearest to the only gate. It is possible that High House (Turf Wall Milecastle) provides an exception since the senior part of the very small barrack would appear to be adjacent to the south gateway of the fortlet, but no great reliance should be placed on this example. The position with the Type X barracks is quite different. In all examples known it appears that the accommodation for officers is situated towards the rear side of the fortlet.

According to the principles laid out in Chapter 3, it might be thought that the right hand barrack of the pair would be considered the senior of the two and thus the appropriate one for the location of the officers' quarters of the divided centurial barracks. The fortlets exhibit no agreement over this matter. Indeed it is true that Gatehouse of Fleet and Haselburg favour the right, but Barburgh Mill and Martinhoe favour the left. At Poltross Burn, both sides receive the same treatment. In the Type X barracks at Kemel (Jüngere Schanze) and Degerfeld Erdlager it is clear that the officers' quarters are situated to the rear of the right hand barrack tract.

Conclusion

In the introduction to this chapter it was stated that comparison of the fortlet barracks would be made as wide-ranging as possible. This comparison has been justified by the surprising degree of agreement between barracks of apparently very different form. But the study has also made clear the great disparity of this group of buildings; in particular this is true of the barracks of the milecastles of Hadrian's Wall. Their further consideration must wait until the discussion of garrisons in Chapter 6.

Chapter 5

Stables, Stores and Horses

Introduction

One of the principal purposes in examining barrack blocks is to help with the interpretation of fort garrisons; certainly it is clear that fort sizes in themselves do not provide a sufficient guide, a fact emphasised recently by Bennett (1986). The identification of stables provides further important assistance, especially in the light of the previous chapters where it has been shown that fine distinctions between the barracks of different kinds of auxiliary regiment are very difficult to recognise.

Richmond (Simpson and Richmond 1941, 30-33) proposed that fort garrisons could be studied on the basis that two cavalry *turmae* occupied the equivalent of one infantry centurial barrack and that each barrack for two *turmae* required a stable of the same size. This hypothesis has been generally accepted and consequently it becomes possible to draw up a table of the six types of auxiliary unit and their requirements in terms of barrack and stable accommodation. Table A reproduces the figures calculated by Breeze and Dobson (1974, 13). It will be noted that a *cohors quingenaria equitata* and a *cohors milliaria peditata* both have a complement of ten buildings but that only the part-mounted unit will have stables in that number. Thus it can be of crucial importance to distinguish stables from barracks and stables from stores and workshop buildings.

It is the purpose of this chapter to see whether the possible stables from Roman fortresses and forts have any recognisable and common characteristics in terms of size, layout or construction. Given the fact that barracks are fairly readily recognisable, it is not unreasonable to think that the same may be true of stables and stores. Certainly we are here concerned with long rectangular buildings of a similar type to the barracks placed in analagous positions in the forts. Excluded from consideration here are small buildings from the *latera praetorii*. Some of these very occasionally may have been stables (for the CO's mounts perhaps) or stores. Granaries also are not considered.

The Problems

There is no doubt that the subject of stables presents very great difficulties. Breeze and Dobson have stated that in Britain 'no certain stable has been identified and excavated sufficiently to make the complete plan and internal arrangements clear' (1974, 13). This remains generally true today in spite of exciting results from Dormagen (Müller 1979) and Krefeld-Gellep (Reichmann 1983-84 and pers comm). The fact remains that there is very little evidence to suggest what the practices of the Roman army were in relation to the housing of cavalry mounts or of baggage animals either in the legionary fortresses or in the auxiliary forts and fortlets.

Reason suggests that in most forts the horses must have been housed inside the ramparts. In some forts clearly there are buildings enough for some to

be stables according to the calculations delineated above (Newstead, Birrens, Caerhun, Künzing) while the very size of many of the forts where an *ala* is suggested or proven as garrison in comparison with forts housing infantry or part-mounted units leads to the same conclusion. Nevertheless some forts which ought to have provision for mounts (as opposed to baggage animals only) do not seem to have the requisite stables inside the fort defences. This is true of all three successive forts at Strageath.

Wells has suggested the possibility that the horses were left out to grass in enclosures near the forts in the manner of the US cavalry (1977, 662). Corrals rather than stables were a normal part of the layout of the US frontier forts (Utley 1973, 81-82). Utley goes on to say that the Indian frontier shifted so frequently and was expected to disappear so soon that the expense of substantial buildings could not be justified. In the terms of this study such a comment could be applied only to the early Augustan period.

In this connection fort annexes, particularly those of the Antonine Wall forts, come to mind. These enclosures could have been used for the corralling of animals, cavalry mounts among them, but the provision of stables in them is unproven. On the other hand investigation has been limited and lightly-constructed timber buildings need only leave the slightest of traces. But the provision of military stables in the annexes seems improbable especially in view of Sommer's findings that the nature of the annexes was primarily civilian rather than military in character (1985, 21-22).

It must be said that most horses would not relish being without cover during the worst weeks of a Scottish winter or during the more prolonged cold on the Taunus or Odenwald heights, although tolerance to the conditions would vary very much according to breed - a point which will be returned to later.

Perhaps it is possible to envisage a compromise whereby, in very severe weather, the horses could be given shelter in the *intervallum* area of the fort; again light shelters would leave little archaeological trace. In many forts this area is quite extensive and its size at Petronell (9 m) coupled with a very large and well-built drain round the inside of the *via sagularis* suggests to its excavator that the horses of the garrison at least sometimes were quartered here (H. Stiglitz pers comm). The buildings at the four corners of the fort at Slăveni are interpreted as stables (Tudor 1977, 401) and if correct this may reflect a tradition of such use of the *intervallum*.

In spite of the fragmentary nature of the evidence, it remains difficult to imagine that a crack cavalry regiment would not have immediate access to its mounts at times of need, and such access could be rendered only through stables situated inside the fort perimeter; this notwithstanding the point that the horses may at times have been left free to graze in the vicinity of the fort. The image of cavalrymen, laden with saddle and other tack, pursuing reluctant horses round large enclosures, possibly at night, is not a very edifying or likely one.

On the other hand it is possible that a distinction is to be made between the true cavalry and the part-mounted units. The great strength and purpose of the cavalry units lay in its horses while the horsemen of the part-mounted units were essentially mounted infantrymen and furthermore

constituted only a relatively small part of their units. It may have been considered acceptable in these latter units that the horses were not so readily accessible. We have Hadrian's words to the *Cohors VI Commagenorum Equitata* at Lambaesis for the fact that the two types of unit performed to different standards (CIL VIII 18042 Aa = ILS 2487).

This rather nebulous evidence for the stables contrasts markedly with that for the barracks. This is surprising given the degree of knowledge about horses and their care demonstrated in the classical literature. This knowledge might have been expected to consolidate into a number of features or types recognisable in the archaeological record.

Classical literature contains extensive references of all kinds to horses. There are many detailed descriptions of the qualities to be looked for in a good horse. The most extensive passages are to be found in the writings of Aelian, Columella, Diodorus Siculus, Nemesianus, Oppian, Palladius, Varro and from an earlier age, Xenephon; the Theodosian Code also lays down important criteria (for full references see Table B). In the same way there is a far-reaching awareness of the different breeds of horse and the respective strengths and weaknesses of each breed. Reference to such differences are to be found in Herodotus, Xenephon, Aelian, Ammianus Marcellinus, Appian, Arrian, Caesar, Diodorus Siculus, Frontinus, Grattius, Horace, Jerome, Hadrian, Livy, Martial, Nemesianus, Oppian, Pausanius, Philostratus, Pliny, Plutarch, Polybius, Posidonius, Strabo, Tacitus, Varro, Vegetius, Virgil, also the Theodosian Code (for full references see Table C). Many of the same authors give advice on the care of horses in the stable and reference will be made to these later, but for the moment it is worth recalling that Xenephon composed a whole work on the 'Art of Horsemanship'.

It is clear from the same literature that horsemanship was a feature of the ancient world in many of the areas which were to become Roman provinces or whence auxiliary cavalry was to be drawn. There are many references to barbarian cavalry often accompanied by remarks which point out their particular characteristics or specialist skills. Examples are to be found in Herodotus, Xenephon, Ammianus Marcellinus, Appian, Caesar, Frontinus, Hadrian, Livy, Lucan, Martial, Pliny, Plutarch, Polybius, the *Scriptores Historiae Augustae* (Severus Alexander), Strabo, Tacitus, Vegetius, Virgil, (for full references see Table D). These examples cover a very wide time span but the fact that real horsemanship reached and was endemic in the ranks of the auxiliary units of the Roman army of the principate and considered to be Roman is confirmed by Arrian's *Ars Tactica* of *c* 136/137 in which he relates in great detail the various very difficult manoeuvres practised on the parade ground by cavalry regiments of the Hadrianic period. Arrian begins his description with the words: 'I shall now describe the riding exercises which belong to the training of the Roman cavalry'. He goes on to say that many of the skills and movements he describes originated in different parts of the Empire; but the point is that horsemanship was not seen as an exotic fringe skill. It is in the presence of this tradition and awareness of horsemanship that we should expect to find a proper and well-organised provision for the care of horses in the Roman army.

Horse Numbers

For the legions we have the testimony of Josephus that 120 cavalry were attached to each (*BJ* III 120).

Davies (1969) has dicussed the numbers of horses required by the different auxiliary units and these are very considerable. In Chapter xvi of his *de munitionibus castrorum* Hyginus explains that a *decurio* has three mounts, each *duplicarius* and *sesquiplicarius* has two mounts. The strong implication is that the remaining troopers have just one mount each. Hyginus' own figure for the number of mounts required for an *ala quingenaria*, 564, corresponds often fairly closely with the figure of 592 calculated on the basis of there being 16 *turmae* and 32 troopers in each *turma*, the *decurio* counting as extra. This means that the number of mounts required by a *turma* is 37 and that the number of horses to be accommodated in a standard stable is 74. Hyginus' figure of 1096 for the mounts of an *ala milliaria* seems to be too high given that there were 24 *turmae* in the troop; a figure of 888 is more likely unless the milliary *turmae* were larger, in number perhaps 40 men. This would mean that each *turma* required 45 mounts giving a total of 1080, very close to Hyginus' figure. The totals of horsemen for the *cohortes equitatae* given by Hyginus are 240 for the milliary and 120 for the quingenary unit (xxvi, xxvii). Given that these numbers represent eight and four *turmae* respectively, the requirements for mounts are 296 and 148.

It is clear also that additional mounts would have been required for the various senior officials and officers in the legions and in the infantry units, but a further very important consideration in all types of unit would have been the animals used in transportation. It seems likely that one baggage animal was assigned to each officer and one to each *contubernium* group, but this would have been far from meeting the needs of the whole unit, least of all the whole legion.

The term baggage animals covers horses, mules and oxen. It is likely that more of the baggage was carried on pack-animals that we might have expected; the principal reason for this is the very undeveloped form of harness in use in the Roman world. Much has been written on this subject and it seems clear that the harness used with horses and mules would have exerted a choking pressure on the trachaic artery when the animal pulled hard (Lefebvre des Noëttes 1931, 184; Goodchild and Forbes 1956, 515; Jope 1956; Burford 1960; Vigneron 1968, 108-37; Toynbee 1973, 177). It has been calculated that each animal could pull a maximum of 62 kg, only one quarter of the modern figure. There also were defects in the methods of attachment of the draught animals to their vehicles with the result that antique harness could put to good use no more than two animals. Certainly the maximum weight limits for the loading of vehicles set out in the Theodosian Code appear very low. For example, the *raeda*, a four wheeled cart with mules (eight in summer and 10 in winter) was allowed a maximum load of 1000 Roman lbs (330 kg). By way of comparison, a single pack mule could carry 150 kg.

The pack animal *par excellence* of the ancient world was the mule. The advantage of the mule over the horse is that it has a smaller foot, is more sure-footed in difficult conditions and is capable of greater endurance. Certainly the qualities of mules were much appreciated and breeding asses could be very valuable. Varro quotes examples of 300 or 400 thousand sesterces (*De Re Rustica* II viii 3). Both Varro and Pliny write at length about mules (*De Re Rustica* II vi, vii; Natural History VIII lxviii, lxix). Literature records that mules were used to carry the baggage of the armies of Cestius Gallus, Vespasian and Severus Alexander (Josephus *BJ* II 546; III 90, 125; *Scriptores Historiae Augustae*, Severus Alexander 47).

Mules were also the principal draught animal in the Roman world. Suetonius states that Nero's wife Poppea never set out on a journey with less than 1000 carriages all drawn by mules shod with silver (Nero xxx). Two mules were required to haul the *carroballistae* of the legionary centuries while two more probably were needed to haul the cohort onagers (Davies 1967, 68). But the role of yoked oxen in heavy transport should not be forgotten. It is the heavy ox waggons (*clabularia*) which are allowed the greatest burden of 1500 Roman lbs in the Theodosian Code.

Oxen and mules were the draught beasts of the Roman army to judge by Trajan's Column and the Column of Marcus Aurelius. Draught oxen are shown on Trajan's Column in Cichorius (1896) XLIX 124 125 and in Romanelli (1955) Figs 35 xxv xxvi, 47 xxxviii, 48 xxxviii, 111 xciii; on the Column of Marcus Aurelius in Becatti (1957) Plates 15 and 59. Mule traction is rather more frequent: Cichorius XLIX 123 124, CVI 280 281, CVII 285; Romanelli Figs 35 xxv xxvi, 38 xxviii xxix, 49/50 xxxix, 112 xciii, 121 ciii; Becatti Plates 15 and 59. The use of mules as pack animals is to be seen in in Cichorius XLIX 125.

This is not to say that horses could not have been used for the above purposes. It is possible that Romanelli Figure 38 shows horses pulling a cart, while Cichorius CXXXVIII 367 368 appears to show cavalry horses with their saddles heavy-laden with the treasure of Decebalus (Dio lxviii 14, 4). Davies quotes the purchase by C. Valerius Longus, *eques* of *Ala Apriana* from a legionary centurion named Rufus in AD 77 of a Cappadocian horse. On this occasion the horse clearly was not intended to be a cavalry mount but rather to carry baggage (1969, 435). Furthermore Varro states specifically that one of the uses of the horse is for transport (*De Re Rustica* II vii 15).

Transport of various kinds has been put forward as the principal occupation of the animals mentioned above, but an additional use of the ox could well be the ploughing of the *prata* of the fortresses and forts.

The implications of the above are that a range of specialised animals is to be expected in the vicinity of Roman fortresses and forts and that there must have been a sophisticated system for their supply and care. Davies (1969) has dicussed these questions and has shown that there was standard procedure for the supply of cavalry horses at least for the *Cohors XX Palmyrenorum Milliaria Equitata* in the early third century. A process of *probatio* existed for horses in very much the same way as for men. The procedure for the supply of other animals is less clear.

All of these animals would require specialised attention, including veterinary care. It is possible that the *pridianum* of *Cohors I Hispanorum Veterana* records that some of its men were guarding mules; furthermore men of the *Cohors XX Palmyrenorum* are attested with herds of mules (Davies 1967, 69). In the marching camp. Hyginus (iv) places the *veterinarium* for sick horses next to the men's hospital while the soldiers who attended the legionary cavalry mounts and baggage animals and who were also responsible for the animals used in sacrifices were known as *veterinarii* and *pecuarii* (Davies 1970, 87). The provision of care for the horses in auxiliary forts is largely unknown although a horse doctor, *hippiatros* assigned to the *Cohors I Thebaeorum Equitata* is recorded (Davies 1970, 87). Furthermore Vegetius wrote a whole treatise on the subject of *Mulomedicina* and there is evidence for a mule veterinary physician whose cremation urn was found in the Thames (Wright 1977).

It is probable that the individual cavalryman had the prime responsibility for the care of his mount for it is clear from the Dura papyri that the new horses were assigned to the individual troopers and not to their unit as a whole (Gilliam 1950). Furthermore grooms and horse-trainers are included in the lists of *immunes* (Paternus, Digest L 6, 7) and it has been seen in Chapter 2 that *immunes* are to be considered among the numbers of the *centuriae* and *turmae*. But the presence of specialist grooms should not be ruled out although there is no evidence for their numbers. Grooms frequently accompany their masters on cavalry tombstones.

Sufficient space would be required also for the storage of fodder, bedding, harness and other equipment. Often this must have been placed in the various store buildings of the fort.

Given the above evidence, it remains surprising that the evidence for stables from Roman fortresses and forts has been so fragmentary and without pattern. But there is a wealth of classical and nineteenth-century literary sources which give many indications of what the salient features of a Roman military stable might be. It is the purpose of the following section to examine these possibilities.

Characteristics of Stables

Configuration and Dimensions

The characteristic configuration of stables which have to house any considerable number of horses at all is that they are long, rectangular, single-storey buildings. There is evidence for double-storey stables from Carthage where horses were housed on the first floor of the stables built into the city walls with elephants occupying the ground floor (Appian VIII xiv 95), and double-storey stables are well known from nineteenth-century London; but it seems safe to assume that only single-storey stables are likely to have featured in Roman forts.

Inside these long buildings, it is envisaged that there should be either one or two rows of horses facing the longitudinal walls at right angles with a gangway to their rear. An arrangement whereby two rows of horses face each other on two sides of a central partition or wall is not encountered in the literature. It would seem that in any such arrangement the central partition should be solid to prevent the horses from annoying each other and possibly from taking each other's food. Certainly the War Office in its Manual of Horse and Stable Management of 1904 states that there should be a gangway of five yards between the horses' heads.

With two rows of horses there are usually doors at both ends of the building. This may also obtain with a single row of horses, but in this situation a door in one of the long sides is also possible.

Virgil specifically conjures up the image of a number of horses tethered in stalls in an army stable (Georgics III 179) and Columella (I vi 5 6 7), Pliny (VIII lxviii 169), Faventinus (13), Palladius (I xxi) and Vitruvius (VI vi 1 2) all refer directly to the use of stalls in stables for different animals. But the physical presence of a stall is not always to be assumed for Varro suggests that poles should be set up in the stable to separate mares in foal so that they do not fight each other (*De Re Rustica* II vii 15). The Victorian literature on the other hand, while confirming the

widespread use of the stall, makes clear that the use of bails between the horses also was very common, especially in military stables, and was more economical of space as well as of materials. Giraud (1891, 71) emphasises that the cavalry makes much use of the bail. These same sources also emphasise that most stables will have one or two loose boxes, or extra stalls, for sick horses or possibly for valuable but particularly difficult animals: Fitzwygram (1894, 6) 'In cavalry barracks it is usual, when circumstances admit of it, and that is nearly always the case, to allow one or two spare stalls in each stable'. A similar additional allowance should be considered likely in the Roman military stables.

The classical sources give little information for the overall sizes of stables. On the other hand the Victorian literature demonstrates remarkable unanimity with regard to the desirable overall width of the stable. When a single row of horses is to be considered Giraud (1891, 13) states that 16 ft 6 ins (5,03 m) is the minimum width for a stable with a single row of stalls leaving 7 ft (2,13 m) for the passage to their rear, while Fleming (1886, 48), Coleman (1897, 67) and Axe (1905, 323) all recommend an overall width of 18 ft (5,49 m) with a passage again of 7 ft (2,13 m) leaving some 11 ft (3,35 m) for the stalls. For double rows of horses Giraud recommends an overall width of 29 ft (8,84 m) (although 27 ft (8,23 m) may be sufficient if the stable is open to the roof) with a central passage of 10 ft (3,05 m) while Axe says that a stable with a width of 25 ft (7,62 m) will accommodate two rows of horses.

The length of the stables will depend on the number of horses and the width accorded to each horse. Again the authorities agree very closely with regard to the desirable width of the individual stalls. 6 ft (1,83 m) is the figure agreed upon by Giraud (1891, 14), Tattersall (1841, 32), Fitzwygram (1901, 21), Coleman (1897, 67), Miles (1860, 15), Axe (1905, 323) and Hayes (1968, 189). Fleming (1886, 53) says that stalls should be from 5 ft 6 ins (1,68 m) to 6 ft (1,83 m) in width, but this width may be less with swing bails which are also more sanitary. In the Manual of Horse and Stable Management of 1904 the War Office says that, in horse lines, the horses will not lie down unless there is 5 ft (1,52 m) between the headropes. It repeats this advice in 1937 (20) and stipulates that, when picketed, a horse requires a frontage of about 5 ft (1,52 m) and a distance of about 12 ft (3,66 m).

From 10 to 12 feet square are the dimensions recommended for loose-boxes.

The authorities were writing with horses of some 16 hands in mind and their recommendations represent an ideal often far removed from a military context. They often remark upon the very wide range of stable sizes and conditions they have encountered and Coleman and Hayes in particular comment on the very different practices current among the different national armies of the day.

Internal Features

Closely related to the question of dimensions is that of ventilation. The advance of scientific knowledge meant that the Victorians were able to calculate the volume of fresh air required by the horse per hour in order to prevent the air of the stable from becoming foul with too much carbonic acid gas. Working on the basis of the Army Sanitary Commission's findings that each man required 600 cu ft, Fitzwygram estimated that each horse

required *c* 12,000 cu ft (339,60 cu m) of fresh air per hour and that this implied a ground area of 87 sq ft (8,08 sq m) in a properly ventilated stable (1901, 5). These findings are supported by Giraud, Fleming, Coleman and Adam and Boone (1940, 20). At the same time the stable should not be draughty.

The classical authors also are aware of the advantages of well-ventilated but warm stables. Palladius writes:

> 'Stables, like cow-sheds should be open to the south but also have windows to the north which, in winter, will be of no nuisance to the animals provided that they are closed fast, and which will refresh them in summer, if they are left open' (I xxi).

Columella speaks of the advisability of having both summer and winter stables and says that they should be neither too warm nor too cold (I vi 4). Vitruvius urges that the stables should be located so that of all the farm buildings they have the warmest position, but that the draught horses should not be stabled next to the fire (V vi 4). Varro also advises that pregnant mares should not be kept in cold places (II vii 10).

It is largely on the basis that the foul air of the stable could damage fodder stored in lofts that such a use was not recommended by the Victorians (Giraud 1891, 66; Fitzwygram 1901, 9-10; Lupton 1896, lxix-lxx). Columella on the other hand does not appear to have been worried by this arrangement and recommends that grain and cereals be stored in well-ventilated lofts (I vi 9-17). Lupton adds that for the reason of the foul air, the lofts should not contain living rooms (1896, lxv). Certainly lofts and rooms should not communicate directly with the stable and Miles stipulated that grooms should not have sleeping quarters over the stables because they would disturb the horses at night (1860, 14).

By way of contrast, all authorities both ancient and modern agree that it is of vital importance to keep horses' feet dry so that their hoofs remain strong and sound. Indeed this is true not only in the case of horses for Columella makes the same point with regard to cattle (I vi 5,6,7) while Palladius says that stables and cow sheds should be raised up in order that they should not be wet which would be bad for the beasts' hoofs (I xxi).

But it is not enough that the horses' feet should be dry, the hoofs should also be strong and this is achieved by standing and exercising on hard and dry surfaces. The importance of the strength of the hoof is of even greater significance when dealing with horses which do not have horse shoes and this is true of most of the horses of the Roman period. In a famous passage Xenephon sets out the requirements of the stable:

> 'Now damp and slippery floors ruin even well-formed hooves. In order that they may not be damp, the floors should have a slope to carry off the wet, and so that they may not be slippery, they should be paved all over with stones, each one about the size of the hoof. Such floors, indeed, have another advantage because they harden the feet of the horses standing on them. And this will be the best arrangement for the outer stable, and will best strengthen the feet, if four or five wagon loads of rounded oval stones of about a pound's weight are thrown down at random and an iron rim put round them so that they do not scatter. For when the horse stands on them, it is as good as walking for part of

every day on a stony road. And both when he is groomed and when he is troubled by flies, he has to make use of his hoofs just as when he is walking. And stones scattered in this way harden the frogs of the feet too' (*Cyropaedia* IV 3, 4, 5,).

Xenephon had already set out his ideal in I 3: 'Horses with good feet are recognised by the sound: for the hollow hoof rings the ground like a cymbal'. The same principles apply also to other animals for Varro recommends that mules born in swampy or damp ground should be driven into the mountains in the summer to harden their hoofs (II viii 5).

From this it follows that the stable floors should be hard, dry and if possible impervious to liquid. Columella says that wet hoofs will be avoided if the stable is floored with boards of hard wood (VI xxx) while Palladius recommends that oak boards be laid at the bottom of the stalls so that they are hard for the horses when they are standing (I xxi).

The modern authorities also recommend hard stable floors. Wooden flooring again finds favour in Giraud (1891, 58). He points out that wooden blocks are relatively warm but he warns against their absorbtive tendencies. He says that cobbles are satisfactory when they are carefully laid but that they can be unsanitary. Ordinary bricks are not good because they wear unevenly and are absorbent. The most far-reaching discussion of the subject is to be found in Hayes (1968, 191-6). He says that floors should be durable and waterproof but free from slipperiness. They should be bad conductors of heat if possible. Wood forms an insanitary surface. Cobblestones are cheap and reasonably effective but they give an uneven bearing to the horses' feet and they are less comfortable to lie upon. Moisture gets between the stones and they are difficult to clean and they also tend to cut up the straw and bedding laid upon them. In general he favours, rather than concrete, the new purpose-made products of the Victorian age such as the characteristic hard, grooved, blue bricks. He goes on to say that a makeshift floor of clay can be satisfactory provided it is covered with sand or peat moss. The depth of clay should be some 18 inches. Rammed chalk is also fairly effective and is not slippery. In general, most of the Victorian authors are content to recommend concrete or the purpose-made tiles.

For the promotion of warmth, comfort and and for soaking up urine the stable floors were covered with bedding. The ancient sources are not very forthcoming on this subject but Xenephon says that the groom should be instructed to carry out the droppings and bedding every day (*De Re Equestri* V 2). Pollux recommends that the horse's dung should be taken out and his bedding aired every day (*Onomasticon* I 183) while Columella writes that chaff may be thrown over the stable floor (VI xxx). The modern authorities in turn emphasise the usefulness of bedding and the importance of clearing it out often. In 1904 the War Office said that the bedding should be dried in 'wind rows' 12 inches deep every morning (for very few troop horses care to lie down in daytime) and similar advice is given in 1937 (8). Hayes emphasises that all bedding should be taken outside the stable to dry (1968, 247).

Wheat straw is generally considered to be the best bedding; sawdust and wood shavings are also good. Peat moss has some special advantages in that it deodorises urine and on account of its highly absorbent properties may obviate the need for drainage. Furthermore it is to be preferred where the floor is made of rough cobbles. Unfortunately, where there are drains, it

tends to fill and block them. Rimington reminds us that this ideal picture is often very far from the truth. He writes:

> 'The system advocated some years ago in the cavalry of placing clean straw, layer upon layer, until a thick cake is formed should never be adopted. Under this system the horses' feet and constitutions suffer, saddlery, logs etc get lost and the stable which ought to be clean and sweet-smelling is converted into a series of dunghills' (1897, 18-19).

The modern authorities consider at length the best form of drainage for stables. Almost universally they recommend open drains with cast iron covers. There should be a drain down the centre of each stall connecting at right angles with one running along the passage at the heel of the stalls. Youatt (1866, 126) points out that it may be more useful to have a central drain for horses and a rear drain for mares. There can be a slight slope from front to rear of the stalls to aid in the escape of the urine, but it is emphasised that this slope should be no greater than 1 in 30 so that stress should not be thrown onto the hind quarters. Giraud (1891, 38) says in summary:

> 'The most perfect system of drainage is that which carries away most completely the largest volume of sewage in the shortest space of time and affects the surface level of paving the least'.

It is stressed that at all times the drains should be cleaned regularly.

Grooms are to be kept constantly occupied with such duties which are taken to promote the health of the horses and they are also to groom the animals themselves. These points are emphasised in the ancient authors: Xenephon *De Re Equestri* IV 2,4; V 2, 6-10; Varro II vii 14; Columella VI xxx; Pollux I 183. Hayes (1968, 284) writes that it takes two men at least half an hour to groom a horse and that a horse can require to be groomed some four times a day. The horse's feet should be picked out at least three times every day. The War Office Manual of 1937 (9) says that a horse's feet should be picked out at the beginning of every stable hour.

The chemical decomposition of urine produces a pungent ammoniacal vapour which is an irritant to the eyes and breathing of horses and has a bad effect on harness and saddlery. Thus it is recommended that harness should be stored separately from the horses where possible. Furthermore, in storage the harness will require to have the parts separated from each other and the saddle in particular will have to be hung up so that it can dry.

With regard to stable fittings, Columella advises that feed racks should not be too high for the ox or pack-animal (I vi 7) and the modern authorities make very much the same point stating that the manger at the head of the stall should be some 3 ft (0,91 m) from the ground in order to prevent particles falling into the eyes of the horses.

The implication of all the sources is that there should be a neighbouring and abundant supply of water.

Pictorial Representations of Roman Stables

In searching for the Roman military stable some assistance is given by a number of pictorial representations. The most useful are to be found on the *Piatto argenteo di Cesena* which is dated to the end of the fourth century (Arias 1950). Three representations of stables are to be seen. On the central *tondo* is depicted a stallion being led out of a stable, which appears to be a rectangular, brick-built building with doors taking up the whole width of one end. The upper section (two thirds) of the building before the tiled roof is of openwork. The two stables depicted on the rim of the plate are both long rectangular buildings with doors taking up the whole width of at least one end. The upper two thirds of these buildings are occupied by a series of some five individual openings with architectual surrounds which, it may be assumed, correspond to the positions of the horses' heads.

The Roman mosaics of North Africa dating from the second to the fourth century are of further assistance (Bernard 1906). Plate VI (= Dunbabin 1978, Pl 88), a mosaic from Dougga, depicts the horses of a *quadriga* with a stable-like building in the background. The building comprises a number of stalls, or perhaps rather loose-boxes, set side by side. These boxes have immediate access to the outside through openwork wooden doors which extend only half way up arched openings. It seems unlikely that there are additional passages behind the boxes. But Dunbabin (1978, 97) argues that the mosaic represents the *carceres* at the race-course and is of Valentinianic date; thus the mosaic should probably not be regarded as depicting a stable. The mosaic of the '*Thermes de Pompeianus*' (Plate XX) shows the stable at a race-course or at least for race-horses. Here the shape of the building and the distribution of the horses is not clear, but two horses are to be seen facing each other either side of a manger and tethered from the same point above their heads while a third horse stands alone on the far side of another similar manger. The mosaicist seems to have made a point of showing the floor surface to be very irregular. This same scene occurs twice. A mosaic of the *Fundus Bassianus* (Plate XXI) where two horses are to be seen facing each other in stalls is similar. There appears to be a solid wall between the horses which, however, extends upwards only as far as the level of their eyes.

It is clear that these representations form an important contrast to some of the assumptions which might be made on the basis of the literary sources alone. In particular it is important to see that it is possible for the stalls or boxes to open immediately onto the stable court and that it is feasible for horses to be placed head to head inside the stable. It must be said that this evidence derives only from Africa but this was an area of great tradition and expertise in horsemanship.

Roman Civilian Stables

Very few Roman civilian stables have been found and excavated but one may be cited from the house of Pompidius Secundus at Pompeii. This consists of four stalls separated from each other by woodwork with a forecourt which communicates with the street (Vigneron 1968, 21). Others have been preserved largely because they have been cut into rock and identified by mangers cut into the rock wall. This is true of a stable in the village of Mondjeleia in Syria (de Vogue 1867, 83 Pl 34) and of a little stable in the ruins of Tiddis in Numidia (Vigneron 1968, 21-22). Vigneron reports also

that another stable was found in Kokanaia, again in Syria, where bins served as mangers and that these were situated between the columns which held up the roof.

The most important evidence for late Roman stables in Africa has been discussed by Christern in his work on Tebessa. He confirms the identification of the very large aisled building in the corner of the basilica precinct as a stable (1976, 90). Following Gsell (1901, 286) he interprets two long rows of stone troughs (76 in total) as mangers and supports this by the identification of smooth holes in the interval walls between the troughs as tethering holes and of grooves cut in the floor as a means of preventing the horses from slipping. The top edge of the mangers, resting on a sill wall, is a little over one metre from the floor. They are 0,7 m long and 0,5 m wide and the internal hollow is 0,24 m deep. The intervals between their centre points is about one metre and this must have been the spacing of the horses in the stable. This is very important in confirming the small size of the horses. It should be noted that the stable has no apparent drainage system and only one door, its width being 2,4 m.

This interpretation is supported by many such buildings in North Africa (including another small stable at Tebessa) (Christern 1976, 231). Although they have different ground plans the hollowed stone trough is ubiquitous and always very much of the same size. Many of these buildings approximate in plan to churches and it must remain possible that they are not all to be identified as stables. The troughs might be receptacles for natural products such as olives brought by pilgrims or by those who were paying rents in kind, or they might be for use in ritual. But for many of the buildings their intepretation as monumental stables is preferable. In this connection it is important that the number of the troughs is often uneven and thus it cannot be suggested that each horse was allocated two troughs. This confirms the very narrow spacing of the horses in the stable.

In the rows of two-storey rooms of the Byzantine fort at Timgad, two stone mangers of characteristic size have been built into the walls of the ground floor rooms. Tethering rings are often still in place and the distance between the mangers is only a little more than at Tebessa. The obvious interpretation is that horses were stabled on the ground floor and soldiers in the rooms above. One larger stable is also to be seen along the north wall with six stone mangers in a row (Lassus 1981, 177). The dimensions of the mangers are as at Tebessa.

Examples of stone mangers and associated tethering holes of a considerably earlier date are known from Mampsis (Negev 1977, 653). Here Building XII, a private house of the early second century, has a stable of basilical form for perhaps some ten horses. The centre-points of the mangers are 1,5 m apart; more appropriate for one horse rather than the two suggested by Negev. Surely also the appropriate place for the horses is in the central hall of the building rather than in the narrow oblong side-aisles as proposed by Negev. It would be very difficult to manoeuvre the horses in the aisles and they would be obscured from view from the gallery. Thus re-arranged the disposition of the horses agrees very closely with Tebessa. A similar stable is also known in Building XI. Negev writes that numerous stables of a similar type occur throughout the Hauran as well (1977, 655).

The greatest significance of these buildings for Roman military stables is the very close one metre spacing of the horses.

Conclusion

It is clear from the above that the criteria of the good stable do not vary very much; it should be clean, dry and warm and in particular it should be made possible for the horses' hoofs to remain as dry as possible. But it is equally true that such results may be obtained by a number of different methods, ones that lead to the deposit of very different materials in the archaeological record. The same comments may be made with regard to the internal organisation of the stables. The literary evidence suggests a fairly standard arrangement, but the representational evidence presents alternatives with a consequent complication of the evidence.

The Horses of the Roman Army

The Faunal Remains

Luff (1982) has summarised the faunal evidence for horses in the north-western Roman provinces. In spite of the absence of a great quantity of material, it is clear that the horses to be found in Roman military contexts vary considerably in size and in type or breed. The horse sizes range from under 11 hands to some 15 hands. 11 hands is the size of a small pony not much larger than a Shetland, while 15 hands is that of a small horse. The differences in size may, but do not necessarily, reflect the presence of different types of horse.

On the basis of the evidence from Corbridge, Meek and Gray (1911) claimed that the Romano-British horse was of three sizes: a type of 14,5 hands, a type approximating to the size of the New Forest pony of *c* 12,5 hands and a small animal approximating to the size of the Exmoor pony of *c* 11,5 hands. They also acknowledged the presence of larger animals. Tibia and metatarsal bones from the Corbridge collection indicated an animal of 14,5 to 15 hands.

Ewart (1911) also found that the material from Newstead fell very much into the same size-groups. He identified animals of 12 hands and under, those of between 12 and 13 hands, those of 14 hands and those of 15 hands. He also found evidence for an ass of 13 hands. Similar findings come from the faunal material from Valkenburg where Clason (1967) found that there was evidence for small, medium and large horses.

The evidence from Krefeld-Gellep and the Saalburg forms an important contrast, for it covers very much the same range of sizes without dividing into the three groups. Nobis (1973) describes the burial of 31 Roman horses at Krefeld-Gellep killed after a battle with the insurgent Batavians in AD 69. Two graves contained animals of 11,5 hands and 12,5 hands while the other horses varied from 13,6 hands to 15,3 hands. The average size of the horses was 14,4 hands.

Earlier work by Hilzheimer (1913, 151) has shown that the faunal remains from the Saalburgmuseum suggest horses ranging in size from 12,5 to 15,3 hands. He has also shown the presence of a large horse of 15 hands from the site of the Roman fort in Cannstatt.

In conclusion, Luff said that the mean withers height of the horses from Roman military sites varies from 12,7 to 14,9 hands. In this they cover very much the same range as those from villa and civilian sites, but the civilian sites tend to favour the larger horses.

Thus it is clear that the Roman military horses cover a wide range of size. But it is not the size of the horses alone that is of interest: it is apparent that these horses often are of very different breeds.

Horses differ mainly in the form and relations of the face, in the size of the metacarpals and in the teeth. Of these it is the skulls that are most clearly indicative of horse breed or type. The most striking collection of horse skulls remains that from Newstead analysed by Ewart (1911). Intact horse skulls are rare items and apart from Ewart's work on the Newstead horse skulls, very little analysis has been carried out.

Ewart considered that at Newstead were housed horses of probably pure 'plateau', 'forest' and 'Sivalik' types. The plateau is a fine-headed horse of some 12 to 13 hands with slender limbs as in the desert Arab. The forest type is long and low with a short, broad, dished face, short, broad cannon bones and wide hoofs. Sivalik horses are broad-browed and have a long and tapering face bent on the cranium and they have fine limbs. They are horses of some 15 hands. Also present were two ponies of probably unimproved British breeds. The one was not more than 11 hands and was most akin to the forest pony type rather like a Shetland pony. The other is best represented by the small slender-limbed Exmoor ponies and by the ponies of Celtic type occasionally met in Northern Ireland.

In addition there were also present at Newstead both slender and coarse-limbed ponies of 12 to 13 hands built on the lines of the smaller modern Arabs. Ewart considers it possible that the 12,2 hands slender-limbed ponies were brought to Scotland by Gaulish cavalry from a district where the native breeds had been improved by foreign horses originally brought from Spain or North Africa. The coarse-limbed 12 to 13 hands ponies link the forest type and the small horses represented in the Elephant Bed at Brighton and in the palaeolithic settlement at Solutré.

In addition to well-bred ponies under 13 hands, the auxiliaries also had 14 hands horses as fine in the head as the Arabs.

Thus the garrison had in its possession broad-browed, big-boned ponies of the forest type of 11 to 12,2 hands, slender limbed ponies of the Celtic variety of the plateau type from 11,2 to 12,2 hands and 14 hands ponies of the Libyan variety of the plateau type built on the lines of the finer Arabs.

A second series of skulls of the *equus sivalensis* suggests that horses of this type at Newstead were of little more than 14 hands.

Finally there is a number of cross-bred skulls. Two are broad-browed and dished and have a long face. They are the blend of the Steppe and forest varieties. Similar skulls have come from the Swiss lake dwellings and from Upper Alsace. The majority of those remaining belong to coarse-headed animals which may have been a blend of the Sivalik and Steppe types. In some cases the skulls are as large as those of well-bred 15 hands horses, but probably they are mainly barely 14 hands at the withers.

Thus some of the horses measure nearly 15 hands, but the majority is below rather than above 14 hands. It would seem probable that the better bred ponies of *c* 14 hands were used by the cavalry known to have been part of the garrisons, while the coarse headed animals were used for transport. It is more than possible that the finest animals were the mounts of officers.

Different contemporary horse types have been found at other Roman military sites and the different types usually imply a difference in size. This is so at Vindonissa where eastern and western horse types were found, at Cannstatt (Hilzheimer 1924) and at Altenstadt (Habermehl and Badawi 1967, 89). The presence of a very wide metacarpal index of 17,5 from Dormagen should also be noted for it is approximately the same as that of modern cold-blooded horses and implies the presence of the type in the Roman fort. But it should not be thought that difference in size always implies a difference in horse type.

Although the sizes of the horses from the Saalburg varied a good deal in size, they all seem to be of the same small-footed type (Hilzheimer 1913, 150-51). Similarly there were considerable differences between the horses from Krefeld-Gellep; the smaller ones were considerably thinner than the larger ones. In spite of this Nobis (1973) was able to show that in fact there was much similarity between the smaller and larger horses and that the larger ones had been bred from a specialised selection of the smaller ones.

It is clear that the faunal picture is a very complex one, but it would seem possible to say that the evidence from most forts implies the presence of at least two different sizes and types of horse. The smaller and lower breeds are probably to be seen as transport animals (in addition to the mules and oxen mentioned above), but the cavalry mounts are finer animals and ones which may vary considerably in size.

There is little basis for conclusions with regard to the age and sex of the cavalry horses on the base of the faunal evidence, but the results from Krefeld-Gellep (surely all cavalry mounts) is very interesting. Nobis (1973) said that hardly any of the animals was more than seven years old. Four to five years was the preferred age and more than half of the horses were male, probably stallions.

It should be said that gelding may be responsible for some of the larger horses. The practice delays the fusion of the long bone epiphyses, thus the bone grows longer and the animal taller. Certainly the practice was well known in the ancient world (Xenephon *Cyropaedia* VII v 62; Strabo III 249; Varro II vii 15). Xenephon states expressly that gelding does not diminish the value of the horse in war although Varro implies that such horses are used more for the *cursus publicus*, 'for a spirited horse is what is required for war'.

Sculptural Evidence

There is no shortage of sculptural representations of horses in the Roman military context. The largest group is that depicted on military tombstones. The horses represented are predominantly small animals, and although often the sculptor is saying no more than 'this is a horse', it is also possible to recognise many features which are special to different breeds or types of horse. Such features are the shape of the head, whether

it is long and the profile concave, convex or straight, and the way in which it is set on the neck; the shape of the neck, whether it is thick or narrow and its setting on the body, whether it is upright or sloping. The type and extent of mane can be indicative of type also whether there is a pronounced forelock. The body of the horse is very important, whether it is long or short, whether it is deep or shallow. Further significant points are the legs and feet, whether the legs are fine and slim with small or broad hoofs or heavy, poorly-defined and with large hoofs. Again the lower leg may show more or less feathering. Also the rump of the horse is very indicative, whether it is round and full or rather flattened. Added significance is given by the set of the tail which can be high or low. The combination of all these features is indicative of different horse breeds and does not just show that a horse is well-bred or not. There are many other features which the specialist would recognise, but the above list is sufficient to show that the examination of Roman cavalry tombstones may denote a number of different horse types in a way which has already been revealed in the faunal material.

The mounts of the Roman auxiliaries on Trajan's Column may be taken to represent the typical ideal cavalry mount. The horse is middle-sized, perhaps some 14 hands, and has a heavy body but light legs. The mane is light and some feathering is to be seen on the feet, which have broad and flat hoofs. The neck is set high, the head is long and has a very straight profile. The withers are not strongly developed and the hind quarters are round in profile. The tail is set fairly high. On the Column the Roman cavalry horse is always depicted thus although its size may vary; Trajan's mount is a larger and more noble version of the same horse.

By way of contrast, the fleeing Sarmatians are riding very different horses. They are noticeably smaller and lighter and have small concave heads (Cichorius XXXVII 92-94) (Hilzheimer 1913, 183). The fleeing Dacians also are depicted as riding different horses. They have shorter necks and longer faces and the horses' manes are shorn (CXLIII-CXLIV 380-383). But it is not only the enemies of Rome who are depicted riding different horses, for this is true also of the Moorish cavalry. Again these are smaller; their faces are perhaps longer and are clearly concave and they have rounded noses. Their necks are a little longer and they have much longer and more flowing manes (LXIV 155-156). All this is sufficient to show considerable awareness of different horse types.

Sculptural representation can say little about age, but it is clear that many of the horses depicted are ungelded, and these are often horses not shown in isolation but in a group. In general this is true of Trajan's Column, but the best representation of a group of ungelded cavalry horses together comes from the Column of Marcus Aurelius where the body-guard before the Emperor contains four ungelded horses in a row (Romanelli Fig 91 LXXXIV).

There are difficulties in judging the real sizes of the horses depicted in the different sculptural contexts for art-historical reasons, but it is clear that the horses are of predominantly small types. More often than not the feet of the riders are shown to reach to about the knee-level of the horses. This indicates that the horses were the size of large modern pony of *c* 14 hands. There are exceptions to this rule. For example RIB 538 from Chester shows a tall horse with the rider's feet well above the knees of the horse, whereas in RIB 1481 from Chesters the feet of the rider do not extend below the belly of the horse. This size is not confined to

Britannia for again the legs of the rider are seen to extend not far below the belly of a large, well-formed horse in a grave-stone from Chalon (Espérandieu Vol III 2150). Many other examples are to be found, but it is enough to say that the sculptural evidence corresponds well with the faunal evidence.

The value of the sculptural evidence is very difficult to assess. Certainly it may not be assumed that the sculptures are portraits of the horses, yet they are unlikely to represent something outside contemporary experience. In particular the depiction of different horse types on Trajan's Column shows an awareness of and the use of different breeds of horse.

Literary Evidence

Certainly the classical authors did not expect the cavalry mounts to be very large because Fronto complains that the soldiers, demoralised with luxury, immorality and idleness were no longer able to vault upon their steeds (*Ad Verum Imperium* II i), while Vegetius emphasises the importance of constant practice at vaulting onto and mounting horses from both sides (*Epitoma Rei Militaris* I xviii).

Larger horses were needed if they were to carry armour and a heavily-armoured rider and in especially high regard were held the great horses of Nisaea, Parthia. These horses probably formed the base stock from which the cataphract horses of Asia were developed (Tarn 1930, 76-92). But they were not the horses of the Roman cavalry. Tacitus (Hist i 79) writes that the Sarmatian cataphracts were rather helpless if knocked off their horses and Roman tacticians always advise to take the cataphract sideways (Plutarch *Luc* 28)

Modern authors also emphasise the value of small horses in warfare; indeed Gilbey (1900) wrote a book under the very title. Other authors writing in the same vein have been Hinde (1778), Nolan (1853) and most recently Rogers (1959). Their general consensus is that small compact horses of 13,2 to 14,2 hands are to be preferred for almost all military functions. These horses have greater strength, are more hardy, are more manoeuvrable and can subsist on much lower rations than larger and artificially-bred horses. They give many examples of the superiority of smaller native breeds over larger English horses. One famous illustration from Nolan must suffice. Speaking of the English cavalry in India, he cites the case of a small Persian horse of 14 hands carrying a man of some 22½ stone. The horse was able to carry this weight with ease and to keep its condition well throughout a march of 800 miles. On one occasion the horse carried his rider across the river Kristna without difficulty (1853, 334).

Small horses have the greatest strength relative to their size, the Shetland being the strongest of all pound for pound. Hayes writes that the 12 hands ponies of Sumatra are full of spirit and simply balls of muscle. They can trot away with a four-wheeled cart containing five or six heavy men (1969, 470). Gilbey notes that the Korean ponies are the smallest of the eastern breeds, but that they have great weight carrying power. This is in spite of the fact that they are only 10 hands and are slightly built. Nevertheless they are ridden by full grown men with saddles secured over a pile of rugs to compensate for the small size of the horse. With this arrangement they are able to do a long day's work (1900, 28).

This shows that many of the horses found in Roman forts would have been highly suitable cavalry mounts. Some of the smallest are more likely to have been used as baggage animals, but there is nothing to make it impossible for them to have served as mounts. This may be said even for the horses from Hod Hill, if indeed they were of only a little more than 10 hands (Wells 1977, 661).

The modern sources also make it clear that it is perfectly possible to have a troop of horse made up entirely of stallions. Rogers (1959, 201) writes of the equipping of the 10th Hussars in India in 1846. The bulk of the horses were Arabs but there were also a few Cape horses. All were stallions and although the troopers at first were disappointed by their biting, kicking and occasional fighting, in the end the men became devoted to them. One imagines that a mixture of horses, both stallions and mares would be more difficult to control, but it should be noted that both stallions and mares may have constituted the remounts of *Cohors XX Palmyrenorum* (Davies 1969, 454).

Thus the evidence for Roman military horses shows that the picture is a very complicated one. It confirms that there were many different types of horse and that these were used in different ways according to their nature and to local custom. As has been pointed out above, many different breeds were known to the Roman world and often these are recognisable, but by virtue of this very knowledge the make-up of the horses could rapidly change with trade and breeding. Caesar pointed out that:

> 'whereas the Celts imported foreign horses and paid huge prices for them, the Germans do not import them at all. They use only their homebred animals, which, though small and ugly, are made remarkably strong and efficient through daily training' (*BG* IV 2).

This suggests that horses were being transported from south of the Alps and the Pyrenees. Livy (XLIII v 5) describes how C. Laelius and M. Aemilius Lepidus, consular envoys to Cincibilis, a transalpine Gallic king, brought gifts and granted his request to buy horses in Italy. Celtic horses must have been reasonably good because Germanicus received a supply of them in AD 15 when he was campaigning against the Germans (Tacitus Annals II 5) and there is also evidence that Gallic horses were exported to Rome (Horace Odes I Ode 8 to Lydia).

Stables, Stores, Sheds and Workshops

Conformation

Figure 96 sets out the Types of those buildings interpreted in the excavation reports on the one hand as stables and on the other as sheds or stores. The most significant Building Type in both sections of the graph with a total of some 37 examples is Type O. These are long rectangular buildings with no known internal subdivisions and may be appropriate for many general purposes. With nine examples the next most important stable type is Type H. This Type is interpreted as stores or sheds much less frequently, only five times. With Type R the trend is reversed. By nine examples to seven, it is more often interpreted as a store or shed. These are buildings with a single longitudinal subdivision. The only other Types to be found in significant numbers are N and Jx in the stables section. A number of examples of Type N are to be expected, but those of Type Jx are

much more surprising. These buildings have a number of subdivided rooms in the manner of *contubernia*. For the remaining twelve Types, the greatest number of examples is three and no further real patterns emerge.

When these Building Types are studied according to period, it is clear that Type O is pre-eminent in every period but in none more so than in the Antonine for here there are very few other Types at all. The Flavian period is marked by the greatest number and widest distribution of Types; it is also the time when Type O is least prominent.

The porticus is not a notable feature of stables or stores. With regard to buildings interpreted as stables, it seems that in 42 examples it is uncertain whether or not there is a porticus, while there are eight examples certainly with porticus and three without. For the buildings interpreted as stores there are 18 examples of uncertainty while three certainly have a porticus and three do not.

Nearly all stables and stores are independent buildings and do not use the rear party wall method of construction. Exceptions among the stables occur at Longthorpe Building XIV extension, Inveresk, Haltonchesters, Benwell and Ilkley; and among the stores at Gatehouse of Fleet.

A real dichotomy emerges between the construction methods used for the stables and stores (Fig 97). The most common form of construction for those buildings interpreted as stables is the stone sill while for those buildings interpreted as stores this method features very little and in fact is the fourth most common. Post-trench construction is almost as common in the stables as stone sill construction while it occurs twice as often as any other method for the stores. Sill beam and post-pit methods are well-balanced in both groups with a slight bias in favour of post-pit construction in the stores. The prevalence of stone sill construction in the stables suggests that these building in general were of more substantial constriction than the store buildings.

When the position of the stables and stores in the fortresses and forts is considered a remarkably balanced picture emerges. Considered as a whole they occur 35 times in the *praetentura* and 36 times in the *retentura*. Taken separately the stables have 20 examples in the *praetentura* and 22 examples in the *retentura*; the stores have 15 examples in the *praetentura* and 14 examples in the *retentura*.

Overall Dimensions

The overall dimensions of the stables and stores were discussed as a group in Chapter 1. When the dimensions of those buildings interpreted as stables are considered separately (Fig 98), it is clear that they cover very much the same range of sizes as the ancillary buildings when considered as a whole. The most significant difference is the relative paucity of the small buildings between *c* 8 × 4 and 28 × 12 m which as stores take their provenance from *Germania Superior* and *Raetia* during the Trajanic/Hadrianic and Antonine periods.

The stables themselves fall into three main groups. There are a few isolated examples *c* 85 m long and similarly some small examples of *c* 14 × 5 m. The remaining examples form a fairly loose group in the centre of the graph ranging from 36 × 4 to 64 × 12 m. Contrary to what might have been

expected, these groups do not reflect provenance from fortress, fort and fortlet. Indeed there are only some three examples from fortresses on the graph and no fortlet buildings has been sufficiently clearly intepreted as a stable to be included. Thus the variety reflects that of the stables from the auxiliary forts.

It can be seen that the stables cover very much the same range of widths as the auxiliary barracks but that the main concentration of their lengths at *c* 48 m is set at the top of the length range of the barracks. Furthermore there is a considerable number of stables with lengths from 52 to 62 m matched by only exceptional barracks. The stables from Hod Hill are largely responsible for this concentration which appears markedly Claudian/Neronian. With the exception of this group the distribution of the stables does not vary according to period.

In Figure 98 Newstead provides three of the examples over 84; the fourth is the possible stable from Chester Goss Street Period 2. The stables with lengths less than 22 m come from a number of sites: Bearsden, Newstead 3 and 4, Ilkley Fort 3, Nanstallon, Hesselbach and Murrhardt. The very wide buildings of over 16 m are from Newstead 3 and 4, Valkenburg Castellum 2/3 and from the north-east corner of the fortress of Vindonissa in the Flavian period. Indeed it is clear that these are all highly unusual buildings, particularly that of Newstead with dimensions of c 18 × 16 m. The remaining buildings concentrate largely in the central group, but the two stables from Niederbieber are very much on the fringes with lengths of 71 and 31 m. The very great variety in the stables from Newstead should be noted for there is still one further isolated example to add with a length of 67 m.

As is to be expected, the overall areas of these stables covers a similar range to that of the auxiliary barracks (Fig 99). The greatest concentration from between 250 sq m to 400 sq m is also that of the auxiliary barracks. No characteristic area for the stable emerges.

It has been shown in the typology above that many of the buildings interpreted as stables have internal subdivisions. When these are considered separately it will be seen that there is no simple agreement with regard to dimensions (Fig 100). The breadths of the compartments vary from 2,30 to 7,25 m and the depths from 2,50 to over 10 m. Breadths of *c* 3,50 m are the most common and there is one major concentration *c* 3,50 × 3,50 m which derives mainly from Dormagen and Krefeld-Gellep (see below).

Conclusions

This statistical summary of the evidence shows that there are no clear patterns in the evidence for stables either in the form of the buildings or in their dimensions. This is true to a much greater extent than for the barracks. The best method of interpretation will be to consider the individual examples in the light of as wide a range of evidence as possible. The following section will consider those examples with the most specific evidence for their intepretation as stables.

The Legionary Fortresses

The legionary fortresses provide very few buildings which are to be interpreted convincingly as stables. Possibly the strongest candidate is to be found in the north-east corner at Vindonissa dating to the end of the first century. Building B consisted of a series of long rectangular rooms arranged round a courtyard which had a drain round its four internal sides (Simonett 1939, 140). The rooms had an internal depth of 5 m, suitable for one row of horses. There seem to be no very strong reasons for considering the building in the corner of the right *praetentura* at Lambaesis as a stable (Ballu 1905, 83). Certainly the walls of the building are very massive and also buttressed, quite unncessary for a stable.

Von Petrikovits (1975, 50-54) proposed that the *tabernae* of the legionary fortresses served as stables, at least in the *retentura*, largely on the basis of a reference from Polybius (vi 28) that the cavalry of the consular army of the second century BC had their tents on both sides of the street now referred to as the *via decumana*. Von Petrikovits suggested that the *tabernae* at Inchtuthil and Neuss could accommodate three horses and three men together with harness and baggage in each cell. Some 75 *tabernae* would be required to meet the total probable requirements of the legion.

The findings from Dormagen and Krefeld-Gellep discussed below show that there is nothing inherently impossible in the accommodation of men and horses in the same building, but it must be questionable whether the main and grandiose thoroughfares of the fortress are to be imagined choked with horses and with the processes of mucking out and grooming. Further doubt on this interpretation is cast by the surviving *tabernae* from Lambaesis. Their floor level is considerably higher than that of the adjacent street; a feature most unsuitable for horses. It must be considered probable that the *tabernae* housed more inanimate stores.

Figure 100 shows that the internal dimensions of the legionary *tabernae* are very varied and are considerably larger than most of the proposed stable compartments.

The Probable Stables

Building Type O

It has been shown that these long, open rectangular buildings imply one row of horses and a rear gangway, or two rows of horses facing the external long walls with a central gangway. The modern authorities would suggest that these elements should be in the proportions of *c* 2 : 1 and 1 : 1 : 1 respectively.

It has been argued plausibly that Building VII at Longthorpe was the stable for the horses of the two *turmae* accommodated in neighbouring Building VIII (Frere and St Joseph 1974, 26-7). The space available here is 40,33 × 6,10 m. This implies depths of *c* 2,00 m for the two rows of horses and the central passage. Working on the basis that there would be 37 horses in each row, this means that the width allowance for each horse is 1,09 m.

It would seem very likely that at least Building 1 at Bearsden was a stable (Breeze 1984, 46). The internal dimensions are 34,70 × 3,65 m. It cannot be certain how many horses were to be housed here. If it is thought that

this is the stable for the horses of one *turma*, the length is not sufficient for 37 horses for this gives a width allowance of just 0,94 m. The *turma* might of course have been under strength. On the other hand an allowance of 2,43 m for the depth of the horses and 1,22 m for the passage would seem reasonable.

Building 11 at Wallsend is a very strong candidate to be a stable in this fort of (probably) a *cohors quingenaria equitata*. The dimensions of this building are similar to the barracks but the foundations were much less deeply set; furthermore present in the building was a network of drains (C. Daniels pers comm). Considering again that the stable was intended to accommodate the horses of two *turmae*, the internal dimensions of 44,40 × 7,20 m would allow 2,40 m for the depths of the horses and the width of the central passage and 1,20 m for the widths of the horses.

In the left *praetentura* of Fort 3 at Ilkley a Severan double stable has been revealed (Hartley 1966, 36-37). Identification as a stable was aided by the presence of a central longitudinal stone-built drain in each half of the building. At least on one side the drain was flushed by water conveyed from the eavesdrip surrounding the building through a conduit under the stable wall. Also helpful for identification were two troughs which stood on the thick gravel and cobblestone floor, and possible tethering posts. The presence of pottery may indicate that grooms had accommodation in the loft space. The dimensions of the two halves of the stable are probably 20,50 × 5,15 m and 20,50 × 5,46 m. It might be thought that the widths of both halves of the building are not sufficient each to contain two rows of horses each (but see Frere and St Joseph 1974, 27 Note 48 where it is shown to be quite conceivable for a stable with a width of 10,67 m to contain four rows of horses of 13 to 14 hands). Supposing the building to be designed to take the horses of one *turma* this implies depths of 2,58 and 2,73 m and a width allowance of 1,08 m (on the basis that 19 horses were to be housed on each side of the stable). Supposing that the horses of two *turmae* were to be accommodated, the depth allowances become 1,72 and 1,82 m. A metalled yard was provided between the stable and the *via principalis*. The yard could have been used for the assembly of horses or for grooming.

A third-century stable has been identified at Maryport at the southern end of the western building Period III excavated there in 1966 (Jarrett 1976, 38-39). The flooring of the stable was of rammed stones and the building was provided with a central longitudinal drain. The length of the stable is not known but the internal width was 4,50 m. This implies an allowance of 2,25 m for the length of the animals and for the width of the passage.

Building Type R

A Flavian/Trajanic stable was identified in the left *retentura* of Fort I at Ilkley (Hartley 1966, 30). This building had a series of rooms along its eastern side while the western part of the building was open and had internal measurements of 41,26 × 5,79 m. It is thought that the single rooms provided space for grooms, fodder and equipment. A single row of horses tethered to the internal long wall would receive a length allowance of 2,90 m but a double row with an allowance of 1,93 m is conceivable. In either event the most likely requirement for each row is 37 horses and this produces a figure of 1,11 m for the width of each horse.

A very similar stable of early fourth-century date was found at Brough-on-Noe (Jones and Wild 1968, 91-92). Again a long building seemed to be divided into an area of occupation on one side and a stable on the other. On this occasion the identification of the stable area was aided by a longitudinal drain and horses' teeth in the filling of the drain. The drain was set rather closer to the external wall of the stable than to the interior longitudinal wall and gives a length allowance of *c* 2,70 m to horses tethered to the internal longitudinal wall. The total internal width of the stable section is 3,96 m which would give a length allowance of 1,98 m for the horses when calculated on the basis outlined above. The length of the building is not known.

Gelligaer Building IX is probably a stable for the pack-horses of the *cohors quingenaria peditata* in garrison. There would seem to be sufficient other buildings to be stores and the presence of a water tank next to Building IX is suggestive of the presence of animals. The widths of the two sections of the building are 5,16 and 5,18 m; the lengths of both are 43,25 m. It might be possible to fit four rows of horses into this building (see note above), but two rows tethered to the central wall is more likely. Thus the length allowance for the horses may be said to be 2,58 m. It is difficult to assess the number of horses which the stable accommodated, but on the supposition that it was for the 60 pack animals of the infantry *contubernia*, the width allowance per horse is the rather generous 1,44 m.

Building Type T

The Hadrianic fort of Haltonchesters had a double stable in the right *praetentura*, the eastern or right hand half of which was of Type N (Simpson and Richmond 1937, 165-67). At least at the southern end the large open building had a very wide doorway of 3,05 m which showed no wheel ruts. The internal dimensions of the building are 38,22 × 7,64 m. If it is assumed that there were two rows of horses facing the longitudinal walls, the allowance for the length of the horses and the width of the central passage is 2,55 m. On the assumption that the garrison of the fort was a *cohors quingenaria equitata*, this stable was probably intended for the horses of two *turmae*. The consequent width allowance for the horses is a very narrow one of 1,03 m.

The *numerus* fort of Niederbieber has two stables (Buildings 125 and 160) dating to the late second century (Ritterling 1936, 46-48). The presence of dung pits on the south sides of both of these buildings assisted their interpretation as stables. They are of different sizes. The internal dimensions of Building 125 are 29,60 × 9,20 m and those of Building 160 are 69,60 by 9,60 m. Thus the length allowances for the horses and the widths of the central passages are 3,07 m in Building 125 and 3,20 m in Building 160. The horse requirements of a *numerus* are unknown thus it is not possible to estimate the number of mounts these stables would have been required to house.

A very similar, substantially-built second-century building (Building E) was found in the *retentura* of the Saalburg (Jacobi 1937, 24). The internal dimensions of the building are 47,40 × 8,80 m. This would allow lengths of 2,93 m to the horses. It is possible that the stable was to accommodate the horses of two *turmae* of the *Cohors II Raetorum CR Equitata* and here the width allowance per horse would be 1,28 m.

Building Type S

A small open-fronted building at the front of the *praetentura* at the Neronian fort of Nanstallon has been identified as a stable (Fox and Ravenhill 1972, 83). Of assistance in the identification was the churned up pebbly ground in front of the building. The internal dimensions are 17,70 × 2,86 m. The allowance for the length of the horses may be said to be 2,50 m. It is not possible to estimate how many horses the stable was to accommodate. Although the garrison was probably a reduced *cohors quingenaria equitata*, the stable clearly was not intended for the horses of a *turma* or even half a *turma*.

Building Type H

Sharing the same rear party wall with the Type H stable discussed above at Haltonchesters is a probable second Hadrianic stable in the right *praetentura* (Simpson and Richmond 1937, 164-67). This building appears to have been made up of a series of small boxes whose internal dimensions are 3,66 × 7,62 m. Ten such compartments would fit exactly into the overall length. Given that the stable theoretically would need to house the 74 horses of the two *turmae* of the adjacent barrack, this would mean that each compartment would need to house seven or eight horses. Taking the number as seven this would give a width allowance of 1,09 m and a length allowance of 1,83 per horse if they were tethered to one of the long walls of the compartment.

It may be objected that it is far from certain that this building is a stable. The doorway appears to be rather narrow and the internal dimensions would be equally appropriate for a *contubernium*. But there can be little doubt concerning the third-century building overlying this but built on a slightly different alignment. A series of five small rooms was found from which the flooring had been removed leaving only the remains of an open drain running along the central axis of each room. The flooring probably was of stone flags. The internal dimensions of the rooms are 3,35 × 7,92 m, very little different to the Hadrianic evidence above. A total of ten such rooms again may be postulated. Again such rooms would most comfortably house seven horses with a width of 1,13 m and a length of 1,68 per horse. Certainly this would appear to be one of the stables required by the garrison of *Ala I Pannoniorum Sabiniana* attested for the third century.

At Benwell two very similar Hadrianic double blocks to those at Haltonchesters were traced in the *retentura* (Simpson and Richmond 1941, 30-33). These buildings clearly are different to the double barrack immediately to the north. The details of those in the left *retentura* are the most clear and the block nearest the rampart is composed of boxes with internal dimensions of 3,66 × 9,91 m. Again this would agree with the division into ten seen at Haltonchesters, although here the boxes are some 2 m deeper. This size would allow eight horses to be housed in each box tethered to one of the long walls with widths of 1,23 m and lengths of 1,83 m. The Hadrianic garrison of Benwell was almost certainly an *ala*.

The six stables at Hod Hill occupy the whole space to the left of the *principia* in the *latus praetorii* (Richmond 1968, 82-84). Stables I, III and VI have projections at one or both ends, but the basic form may be said to be of Type H. Richmond identified the buildings as stables from the

patches of wear caused by the trampling of the animals' hooves in the chalk subsoil as they were tethered in the stable. In Building I these were found in two distinct rows running parallel with one of the transverse partition walls; the row further from the partition wall was substantially more stained and darkened than the other. Thus it seems that the animals were tethered to the partition walls and not to the long walls of the stables. The complete arrangement on the internal partitions was traced only in Building II. This building had a total of 11 compartments; five larger ones in the central section and three smaller ones at both ends. The internal dimension of the compartments are 5,49 × 3,35 m and 3,68 × 3,35 m. Thus six horses could be accommodated in the larger with a space of 1,12 × 1,83 m each, and in the smaller with 1,12 × 1,84 m each. Each stable then would have a capacity of 48 horses. Wells' observations (1977, 661) on these dimensions are discussed below.

Recent excavations in the forward left *retentura* at Krefeld-Gellep have revealed, among others, a Type H building (possibly to be interpreted as a Type C building) in Period III dating to the beginning of the second century (C. Reichmann pers comm) (Plan 4). The building is aligned *per scamna* and with its western end abuts the *via sagularis*. Its full length is not known but its internal width may have been *c* 6,5 m. It has a porticus to the front and a number of subdivided compartments to the rear of which some seven have been revealed. The identification as a stable rests largely on the presence of large sump pits or drains just to the west of the central axis in the front half of at least five of the compartments. These pits are analagous to those found at Dormagen (see below). It appears that the compartment side walls may not have extended to the apparent rear wall of the stable and the excavator considers that here was a passage for the horses with access from the end of the building. Thus the horses probably did not take up the whole depth of the compartments but occupied only the forward sections measuring 3,50 × 3,00 m. The position of the drains suggests that the horses were tethered to the easterly partition walls. The presence of three horses in each box would give allowances of 1,00 m for widths and 1,75 m for lengths.

A building with very much the same dimensions, plan and purpose was found in Period IV a (Plan 5). The sump pits again were present. Further pits were found with a different arangement for Period IV b. Period IV dates from the early second century to the third century. The garrison of Krefeld-Gellep during Periods III and IV was *Cohors II Varcianorum Equitata CR.*

Building Type G

Building XIV at Valkenburg Castellum 1 has been identified as a stable largely on the basis of associated evidence. The building was constructed in a clearly less sophisticated way than the contemporary barracks with large widely-spaced posts in contrast to the smaller posts with traces of wattle and daub infill of the barracks. The full details of the building are unknown, but two large rooms were excavated flanked by narrow passages with an internal drain. Outside the building lay a sunken trough in which was found a small pottery lamp in the form of a horse's head. Horses may well have been tethered to a row of deeply-set posts which ran parallel to the outside eastern wall of the building and which were adjacent to the trough. An open space (14 m wide) was left between this building and the rampart. This area might have been used for exercise, grooming or for the

assembly of pack animals (Johnson 1983, 178). The internal dimensions of the room whose size is most clear are 5,50 × 7,50 m. If the horses once more are tethered to one of the partition walls, there would be room here for some six horses with an allowance of 1,25 × 2,75 m each.

Building Type J

Not very far upstream from Krefeld-Gellep, at Dormagen, recent excavations have revealed the presence of four stables all dating to the second century during which time the *Ala Noricorum* formed the fort garrison (Müller 1979, 27-35) (Plan 2). Three of the stables were aligned *per strigas*. One was to the immediate left of the *principia*; the other two were side by side, again in the *latus praetorii* but adjacent to the *via sagularis*. The fourth was aligned *per scamna* at the rear of the right *retentura*. Again the identification of the buildings as stables was based largely on the presence of large sump pits in each of these buildings.

The best preserved example was on the right hand side of the *latus praetorii*. The building was similar to a normal barrack with a series of rooms subdivided into front and rear sections. Only five sets of rooms could be excavated. The rooms next to the *via sagularis* were the deeper, 4,50 m, and in each room the remains of a hearth were found some 0,50 m in front of the middle wall. Apparently one had a chimney built into the middle wall. Characteristic of the other tract of rooms was a series on oblong trenches. These had a length of 2,90 to 3,30 m and a width of 0,60 to 0,90 m. In section they were trapezoidal and had a rounded bottom up to 0,60 m below the Roman upper layer. The usual yellow-brown soil was discoloured to grey-green up to 0,50 m below the ground surface and the fillings of the pits often contained lime. Chemical investigation showed that the phosphate and nitrogen content in these areas was much greater than in other areas of the buildings. It is probable that animal discharge caused the alteration in the ground conditions (Schröder 1979, 129). Furthermore, study of the recognisable plant remains revealed carbonised hay seeds and oats entirely consistent with the fodder of horses (Knörzer 1979, 131-134). Apparently the pits had had timber covers. The excavator interprets these smaller rooms as the accommodation for horses and the larger rooms as accommodation for men. This implies that egress for the horses was not directly onto the *via sagularis* which is perhaps surprising.

The internal dimensions of the smaller rooms are 3,30 × 3,40 m. The stable drains are set at right angles to the building as a whole and nearly always in the centre of the individual compartments. An exception is found in the most easterly room excavated where there is a second drain next to the eastern side wall. The excavator suggests that this implies the presence of stallions in each box with the exception of the most easterly where mares were to be found (Müller 1979, 28). Although this reflects nicely Youatt's comments on the placement of drains (1866, 126), in the light of the evidence from the other stables it seems likely that this interpretation is mistaken. If the horses are to be seen tethered to the side walls of the boxes, the middle of the horse would not be in the middle of the box to make use of the central drain, but rather to one side of the central drain. If on the other hand the horses are to be seen tethered to the central longitudinal wall the centrally placed drain would be of equal use for both mares and stallions unless the box is for one single stallion. But this would imply a provision of space much more extravagant than would be expected from the other stables. A better intepretation would see the

horses tethered to the partition walls which would give length allowances of 1,65 m and, if three horses were present, width allowances of 1,13 m.

With regard to the most easterly room, there appear to be the remains of fairly insubstantial partitions to either side of the two longitudinal pits (Müller 1979, Taf 15). It may be that these were stalls for individual horses. The two stalls then would have widths of 1,20 and 1,50 m respectively.

This building was destroyed by fire some time between AD 120 and 140 and replaced by another of a similar kind. The details of this Period 3 building are not clear but the stable pits are again present, on this occasion rather longer and narrower (*c* 5,00 × 0,50 m) than before. It is not possible to say whether the building again had two sets of rooms or just the single rooms of Building Type F.

In Period 2 there would seem to have been another mixed building to the north of that described above. According to the evidence of two stable pits, the horses were in the southern tract of the building, while a single hearth points to the presence of men in the northern tract. The single complete box found had a breadth of 4,00 m and a depth of 2,80 m.

The building in the right *retentura* dating to Periods 1 and 2 again was divided into two tracts of rooms of unequal depth. On this occasion stable pits were found in both tracts suggesting that the building accommodated only horses. Again much lime was found in the filling of the pits. The pits and the partition walls do not correspond on either side of the partition wall, but their positioning would suggest boxes with breadths of some 4,00 m in both tracts. Most of the pits, as usual, appear to be in the centre of the boxes, but one in the eastern tract lay close to one of the dividing walls. The pit closest to the rampart had a second pit set over it at right angles. The positioning of these pits must be related to the arrangement of the animals. The internal depth of the western tract is 2,40 m and that of the eastern tract 3,20 m. If the apparently conventional arrangement of the horses is followed, this gives an allowance of 2,00 m for the lengths of the horses in both tracts and width allowances of 1,20 m for two horses in in western tract and 1,07 m for three horses in the eastern tract (in fact the depth of these boxes may have been rather more than 3,20 m which would give a little additional space).

A further series of stable pits was found to the left of the *principia*. According to the evidence of the pits, the real stable began *c* 20 m west of the *via principalis*. There were only very slight remains of walls and posts. Ten pits were found. The two revealed in full had lengths of 3,60 m, breadths of 0,60 to 0,80 m and depths varying from 0,50 to 1,00 m. Again the ground beside the pits was coloured green over a distance of one metre. It seems that according to the evidence of possibly contemporary fireplaces, this building also housed men on the other side of a central partition. A problem is that fireplaces were found to both sides of the stable pits. Since it seems improbable to say the least that fires are to be imagined in the horse boxes themselves, these finds probably represent two building periods. The pottery from the stable pits would suggest that the building was probably destroyed by fire *c* AD 200. To judge from the spacing of the stable pits the internal breadth of the boxes was 3,50 m. Their depth is not known but it was at least 3,60 m. This would suggest that the length allowance per horse was 1,75 m.

Some of the most recent finds from Krefeld-Gellep agree very closely with the evidence from Dormagen (C. Reichmann pers comm; other examples from Krefeld-Gellep of Type H were described above) (Plan 3). In Period II a Flavian building in the left *retentura* took the form of a series of compartments subdivided into front and rear sections. The full length of the building is not known but the overall width is 9,50 m. In each of the smaller front rooms was found a pit very similar to those in Dormagen. They were situated in the middle of the room and were placed at right angles to the building as a whole. They were some 2,50 m long, and 0,50 m wide and 0,50 m deep. In cross section they were fairly rectangular. It seems that the pits had been covered by timber boarding which extended some 10 cm to either side of the pit. This timber boarding was secured by a long stake in the centre which extended through the depth of the pit and into the subsoil beneath. The flooring of the room was made up of clay with a depth of *c* 10 cm. This clay extended across the width of the rooms from the eastern wall but stopped 0,60 m short of the western walls in each instance where the natural subsoil was allowed to come to the surface. The area surrounding the pits was heavily stained green and yellow. In front of the smaller rooms was a space of 1,70 m before the fort street surface. The larger rooms were characterised by a fireplace positioned very nearly in the middle of the room but slightly closer to the central wall than the outside wall.

It is interesting to note that the cross walls of this building appear to be much more substantial than the central longitudinal wall which takes the form of a number of partitions between the front and rear sections of the individual compartments.

The excavator follows the same interpretation of the building as for Dormagen. He considers that the smaller rooms accommodated horses and the larger rooms men. Following this interpretation it seems clear that the horses were not expected to walk close to the western walls of their boxes which were unprotected by the clay floor. It is reasonable to imagine therefore that here were placed mangers and that it was against this wall that the horses were tethered. The internal dimensions of the smaller rooms are 3,30 × 3,70 m. This would give a length allowance for the horses of 1,85 m and, if there were three horses in the box, a width allowance of 1,10 m. The internal dimensions of the larger rooms are 3,70 × 5,20 m.

Two further very similar buildings, both with the characteristic pits follow to the south.

It should be noted that in Period III, on the opposite side of a fort street from the Type H stable discussed above there is a building with a series of double rooms. Only the more northerly of these series of rooms is at all well known, but present in these rooms appear to be hearths analagous to those discussed above. Thus it would appear possible that there is here another dual purpose building. Equally it may be possible that these rooms relate to the adjacent Type H stable rather than to the other half of their own building. Further to the south is another building with sump pits.

The Remainder

There are many forts where there is some evidence for stabling but where the known details of the buildings are not sufficient for an assessment of the internal arrangements to be made. Künzing provides perhaps the

clearest example. The requisite barrack accommodation in the fort is clear and left for consideration as stables are the very different Buildings 15, 16, 19 and 20 (H. Schönberger 1975, 58-70). The presence of a water tank in Building 19 may give support to its interpretation as a stable. These buildings do not all take the same form and it is possible to consider that here were separate specialist buildings for the storage of harness and saddles (the excavator has told me that the remains of these buildings were very slight and therefore the purely theoretical internal arrangements outlined in the excavation report will not be discussed).

Very much the same comments can be made with regard to the buildings in the *retentura* in the second Antonine period at Newstead. Again there is a variety of shapes and sizes (Curle 1911, 70). In Period 1B at Heddernheim a water tank was found which appeared to form the centre-point of a court surrounded by buildings on three sides. The full extent and nature of the buildings could not be determined but the purpose of the tank was perhaps revealed by bronze horse harness fittings (Fischer 1973, 40-42). Similarly the presence of a water-holder beside Building 9 at Hesselbach in both Periods 1 and 2 gives some support to its interpretation as a stable, but the true nature of the building remains unknown (Baatz 1973, 51).

By way of contrast, Caerhun shows that theoretical barrack and stable calculations should be treated with care (Baillie Reynolds 1938). According to the theory of barrack and stable requirements set out above, Buildings XVI and XVIII in the right *retentura* should be the two stable buildings required by the *cohors quingenaria equitata* probably in garrison. There are at least eight other buildings which are clear candidates for Type A barracks. Although Buildings XVI and XVIII take a different form to the barracks, they are still not convincing stables. Both long rectangular buildings were divided into three compartments by two transverse walls. One hearth was found in the most southerly compartment of Building XVI and another in the middle compartment of Building XVIII. Attached to the north-east corner of Building XVIII was a small external porch the threshold of whose door remained *in situ*. It is not impossible for horses to be kept in the vicinity of open fires, but on balance it is unlikely; equally the porch seems to be unnecessary in any building used as a stable. It may be argued that the two (differently-placed) rooms with fireplaces could have been used by grooms, or possibly for smithing, but the rooms seem to be unnecessarily large for the purpose, internally 8 × 14 m and 8 × 17 m respectively. This interpretation would leave two rooms in each stable of rather inconvenient shape for the housing of horses. At least two wide doors, for which there is no evidence, would have to be placed in the longitudinal walls of the building and the tethering of horses to the three remaining walls would be very wasteful of space at the corners. Furthermore one of these compartments would have had the additional small porch which does not seem reasonable. It would have been possible to house some horses in these buildings, but general store buildings would seem to be a better interpretation, especially in the light of the fort's good sea access from Chester. The general absence of small finds in the buildings would also support this hypothesis.

It is possible that the drainage pits of the Dormagen/Krefeld-Gellep type are not such isolated examples as at present appears. Similar pits have been found in the building interpeted as a stable in the right *retentura* at Gilău (D. Isaac pers comm). Pits of a similar appearance from Barrack 6 at Oberstimm in Period 2 on the other hand are likely to be small examples of a canalised heating system (Schönberger 1978, 112).

Conclusions

When the widths of the above stables without internal subdivisions are compared (Table E), it will be seen that they agree fairly closely with the widths recommended by the modern authorities for stables with either one or two rows of horses. The average figures of 4,85 m and 8,09 m compare with the recommendations of 5,50 m and 8,40 m. In both cases the discrepancy is about half a metre, a difference entirely consistent with the smaller horses of the Roman military.

If the results of the above calculations with regard to the arrangement of the horses are presented in tabular form (Table F), it is clear that there is very considerable agreement with regard to the width allowance per horse in the stable. The average figure is 1,16 m. It must be admitted that the argument in attaining this figure has been somewhat circular but it is striking that very similar results have been obtained from a series of buildings with very different ground plans.

The allowance for the lengths of the horses does not present quite such a unified picture but the overall result perhaps is distorted by one or two particularly high values, from Niederbieber for example, while most of the others are of *c* 2,0 m. The average is 2,6 m and if the alternative lower readings are accepted instead, then the average is 2,13 m. Exactly the same comments may be made with regard to the passageways. The average is 2,21 m and the lower average 2,06 m.

These findings are broadly consistent with the faunal evidence discussed above. The width allowance of 1,16 m is narrow but it is conceivable for small horses arranged in a stable without bails or stalls. It is worth referring once more to the comments of Remount Officer McLaughlin noted in Haverfield's personal copy of his Military Aspects of Roman Wales (Frere and St Joseph 1974, 27 Note 48). McLaughlin said that 60 horses of 13 - 14 hands would fit into a length of 275 ft. This allows a width of 4 ft 7 ins (1,39 m) per horse. On the basis of the faunal evidence it would seem that as many of the horses would be under as over 13 hands, thus the slightly narrower width allowance is possible.

It is to be noted that the allowance per horse at Hod Hill of 1,12 × 1,83 m is lower than the average. Wells observed that the distance between the centre points of the diagnostic patches of wear was just three feet (1977, 661). This implies that the horses in question were of just over 10 hands. In fact the distance between the front and rear hoofs of the horses may have been a little more than three feet since horses tend to stand with their legs slightly cramped together rather than at the perpendicular, but the size of these horses at least suggests that probably they were transport animals.

If the allowance of space seems rather restricted on the whole, it should be remembered that the horses would be able to spend a considerable amount of the time out of the stable exercising or simply grazing in the vicinity of the fort. The Roman military stables were not the Victorian stables of the Express Dairies or of Messrs Crosse and Blackwell in the middle of London whose horses had nowhere else to go.

It was suggested at the beginning of this chapter that it was the cavalrymen themselves who had the prime duty for the care of their mounts. This is supported by apparent absence of additional accommodation for

grooms in or in the vicinity of the stables. Such accommodation of course is very hard to distinguish, but the evidence for the presence of grooms from Ilkley, Brough-on-Noe and Hod Hill is very tenuous. Equally the men's living accommodation in the combined barrack/stables at Dormagen and Krefeld-Gellep, surely is too generous to be assigned merely to grooms. There are as many compartments for the men as for the horses while in themselves the men's compartments are the size of small *contubernia* and are larger than those for the horses. Indeed the areas assigned to grooms at Brough-on-Noe and Hod Hill may equally well be seen as storage space for harness and bedding; certainly the cavalry barracks do not appear to have larger *arma* or *arma* larger in proportion to the *papiliones* than other barracks for the reception of equipment (Chapter 3). Some of the 'stable' buildings at Newstead and Künzing may have been accommodation for grooms, but this remains unproven.

Discussion

In spite of the limited amount of agreement noted above, the clearest feature of the evidence for stables is its disparity. This contrasts with the more regular picture presented by the barracks. Various reasons may be put forward which may help to explain this.

It has been shown that a number of different breeds of horses have been found in Roman forts, often in the same fort. The different characteristics of the different breeds are bound to have implications for their stabling. For example the Celtic ponies are likely to have been far less susceptible to bad weather conditions than high-bred Arab type horses. Thus Celtic ponies would be much better suited to a corral beside forts in the north of Britain than the Arabs. Equally corrals would suit even-tempered horses which could be rounded up without too much difficulty, while very high-mettled horses would be best suited to a stable.

It is possible to say that the charateristics of the different breeds have implications for the internal lay-outs of the stables. More docile horses would be well-suited to a large open stable, while more high-spirited horses might be better cared for in smaller groups in loose boxes. The sexes of the horses have further implications. Numbers of horses all of the same sex might well be better suited to a large open stable than the same numbers of horses of both sexes. Smaller compartments in the stables would make much easier the segregation of the sexes. Many stallions together might appear to be a recipe for trouble but their tendency to bite and fight could be countered by the construction of partitions in the stables or by hanging bails. Thus the troopers would still have available mounts of the highest mettle. Varro says that whole horses were preferred for the army (II vii 14). Some of the problems could be overcome by gelding with additional complication of the archaeological record. Strabo reports:

> 'All the Scythians and Sarmatian tribes have the peculiar custom of gelding their horses to make them docile. For their horses though small are very spirited and difficult to manage' (VII iv 8).

Ammianus confirms that the horses of the Sarmatians and the Quadi mostly were gelded (XVII xii 1).

These last remarks raise the question of the degree to which national practices survived in the units of the Roman army. The cavalry arm was made up largely of Celts, Iberians, Scythians, Sarmatians and Parthians. In a famous passage Arrian says that the explanation of individual technical terms relating to cavalry exercises is difficult because the terms have been taken from the Iberians and the Celts (*Ars Tactica* XXXIII 1). Similarly, it is possible that some traditional practices survived with direct implications for the stables. A case in point is that of the Numidian cavalry.

In the ancient world Numidian or Moorish cavalry and horses were renowned. Their cavalry was particularly remarkable because they rode without reins and bridles preferring to guide the horse with a short stick or switch. This practice is reported by Caesar (*Bell Af* 20, 48), Virgil (*Aeneid* IV 41), Livy (XXXV xi) and Arrian (*Cynegitica* XXIV 2-3) in miltary contexts, and by Oppian (*Cynegitica* IV 44) and Nemesianus (*Cynegitica* 240) in later civilian contexts. Numidians with their bridleless horses are also clearly to be seen in action on Trajan's Column (Cichorius LXIV 155-156). Thus it is clear that this practice survived at least from the first century BC to the end of the third century when Nemesianus was writing. It is important to note that Nemesianus was describing a current practice rather than reporting on a historical one. Furthermore he makes it clear that Numidia still had its own characteristic breed of horse:

> 'Besides you may select the courser sent by Mauretania (if he be a stout desendant of good stock) or the horse which the dusky Mazax tribesman has reared in desert fields and taught to undergo ceaseless toil. No need to repine at their ugly head and ill-shapen body, or at their lack of bridles, or because both breeds have the temper of freedom, or because the neck lashes the sloping shoulders with his mane. For he is an easy horse to guide, and, following the turn of an unconfined neck, complies obediently under the control of a limber switch: its strokes are the orders for speed, its strokes are as bridles too'.

Clearly bridles have no very great implications for stables (except that there would be less harness to house and care for), but other traditional practices such as gelding might.

When considering horses and stables in the Roman army it ought to be remembered at all times that there was a considerable difference between the elite cavalry of the *alae* and the mounted infantry of the *cohortes equitatae*, a point emphasised by Cheesman (1914, 29). Hadrian pointed out as much in his address at Lambaesis in AD 128 to the *cohors VI Commagenorum equitata*: 'It is difficult for the cavalry of a part-mounted cohort to give satisfaction in any case ..... the quality of the horses and your arms correspond with your lower pay' (CIL VIII 18042 Aa = ILS 2487). Furthermore Davies (1971, 757) points out that Vegetius I 5 may be quoting the *constitutiones Hadriani* when he says that *equites alares* should have better physique than *equites cohortales*. These differences could conceivably have important implications for the types of horses used by such regiments and for their respective stabling requirements.

Just as different elements of the Roman army had different requirements, so those requirements could change and develop over time, and such changes might affect the stables more than the barracks of the men. One of the most important changes in the cavalry arm was the development of the heavy

cavalry, *cataphratarii* and *clibanarii*. There is no doubt that the heavily-armoured horseman would require a heavier and stronger horse involving a different regime of management. It is true that this is mainly a development of the later Empire and was most important in the eastern provinces but the first regular unit of auxiliary mailed cavalry was formed under Hadrian of Gauls and Pannonians *viz Ala I Gallorum et Pannoniorum Cataphractatae* (Eadie 1967, 167). In the third century it may be that heavy horses were bred for the Sarmatians at Fylde, Lancashire and that the post was administered from the settlement at Ribchester by a legionary *praepositus regionis* (Davies 1969, 453) although this is pure supposition. The point is that horses such as these might well require stables with strong individual stalls.

Certainly it seems that the dealings with horses themselves became more regularised with the passage of the centuries. The later Roman Empire had Imperial stud farms in Spain, Thrace and Asia Minor, while regulations covering the build, height and age of military horses were laid down (*Cod. Iust.* VI xxxi i).

Thus there are many contradictory elements in the history of Roman military horses and stables. Much of the evidence points to an increasing standardisation, but that this was not necessarily so is shown by the Numidian cavalry. Within the forts themselves different, changing and developing requirements might lead to a whole range of different buildings. Thus the very mixed archaeological record contrasts with the apparent greater regularity of the men's barracks, at least until the late third century when fundamental army reforms led to changes.

Chapter 6

Garrisons

Introduction

In his Albert Reckitt Archaeological Lecture Ian Richmond outlined his thinking on the Roman military antiquities of Britain and in so doing set out a number of objectives:

> 'The time is ripe, indeed overdue, to undertake a series of selective excavations with a view to illustrating by examples the field-work of the Roman army. The result would be a modern *de munitionibus castrorum* which, unlike the ancient work once attributed to Hyginus, was not composed on theoretical rather than practical vein, but was based throughout upon contact with reality' (1955, 298).

Richmond went on to speak about fort sizes and concluded:

> 'Once the sizes are defined, upon Roman evidence and not upon arbitrary modern intepretation, a norm can be established and inquiry can begin' (1955, 306).

With these words Richmond made clear his assumption that norms did indeed exist and awaited discovery. Further to this end he proposed a number of type-sites for the various auxiliary army units, identification resting largely on fort sizes and the details of the internal buildings.

Since Richmond wrote, the expected norms have stubbornly failed to materialise and the identification of many of his type-sites has been questioned. Certainly it has become clear that fort size alone does not provide a guide in itself sufficient for the identification of garrison-type. This point has been emphasised most recently by Bennett (1986). This is disappointing especially in the light of Vegetius' statement that:

> 'The dimensions must be exactly calculated by the *agri mensores*, so that the extent of the camp may be proportioned to the number of troops. A camp which is too confined will not permit the troops to perform their movements with freedom, and one which is too extensive divides them too much' (*Epitoma Rei Militaris* III 8).

Standard auxiliary units might have been expected to provide standard fort sizes. Richmond himself had already noted that the forts of *Germania Superior* although apparently garrisoned by the same type of unit often were much larger than those of *Britannia*.

Following Richmond's lead the requirements of theoretical garrisons in terms of barrack and stable accommodation have been calculated and applied with varying success to different sites (Breeze and Dobson 1969 and 1974; Hassall 1983), but many problems are apparent not least with regard to stables as discussed in the previous chapter.

The accumulated evidence of successive excavations and epigraphic information has shown that the real situation is a very complex one. It has been clear for some time that legionary fortresses sometimes contained a number of auxiliary troops in addition to the legion itself (see Chapter 1). More recent is the understanding that a number of legionary cohorts were on occasion brigaded with an auxiliary unit or units in the same 'vexillation fortress' in size considerably larger than an auxiliary fort, but smaller than a full legionary fortress (Frere and St Joseph 1974, 6-7). In particular this would appear to be a feature of the conquest period in Britain, but may reasonably be expected to be found elsewhere and at different periods. Maxfield has expressed doubts over the identification of Building XIV (Barrack I) at Longthorpe as a legionary barrack (1986, 65), but it has been shown in Chapter 2 that the composition of this building corresponds with contemporary developments in the legionary barracks.

Furthermore, the single-unit auxiliary fort has been shown to be by no means the norm. In recent years, even if not always without subsequent challenge, a very great variety of garrisons for auxiliary forts has been suggested by archaeologists. Thus legionaries alone have been proposed as the garrison of Zwammerdam Period I, Rottweil Kastell I and Celamantia while there is definite epigraphic evidence for their occupation of Bu Ngem; a combination of legionaries and auxiliaries has been proposed for Strageath (the first preliminary occupation), Ardoch, Newstead II and III, Corbridge IB and IVA, The Lunt I, Great Casterton Fort I, Hod Hill, Waddon Hill, Hofheim (Steinkastell) Period I, Rottweil Kastelle III and IV, Schlögen; two complete auxiliary units together have been proposed for Newstead I, Pen Llystyn, Bonn (Boeselagerhof), Echzell Period 1, Heddernheim, Rottweil Kastell II, Gnotzheim, Bologa (Steinlager), Buciumi (Erdlager), Jupa; scouts additional to the auxiliary unit in garrison have been proposed for Miltenberg and Künzing; vexillations of more than one auxiliary unit have been proposed for Strageath I and III, Lease Rigg, Hofheim Steinkastell Period III, Rißtissen Kastelle 1 and 2 and Ellingen; vexillations of single auxiliary units have been proposed for Duntocher, Bearsden, Crawford Phases 1, 2 and 3, Cappuck, Haltwhistle Burn, Carrawburgh, The Lunt IIb, Valkenburg Castella 1, 1a and 2/3, Zwammerdam Period II, indeed many of these last are much too small to hold even the smallest complete auxiliary unit. In addition there are the supply bases of Cramond and South Shields with their very different internal requirements (for full details of these interpretations see Table XIII).

Some of these results should not be surprising because the brigading together of legionaries and auxiliaries is well known from literary evidence (Tacitus *Annals* xii 45 Gorneae, Armenia; Josephus *Bellum Iudaicum* 4. 486 Adida, Jericho).

It should be acknowledged that Richmond himself was quite aware of all these possibilities and indeed his are the interpretations for Newstead and Hod Hill, but it remains true that the hoped-for norms have not appeared. If they had then it might have been easier to identify characteristics of barracks which relate to the different auxiliary units. Nevertheless, it is the purpose of this chapter to see whether the barracks have any characteristic features which may be related to the troops occupying them and which thus may be of help in the elucidation of garrisons.

Theoretical Unit Strengths and their Implications

Following Vegetius above, it may be logical to suggest that there can have been no standard unit strengths since the dimensions of the forts have been seen to vary so considerably, but this would be to take the argument too far especially in the light of Hyginus who writes very much with the understanding that there was a standard organisation for each of the six different auxiliary units.

The evidence for the theoretical strengths and organisation of the different auxiliary units, as well as the epigraphical and papyrological evidence for their historical strengths have been surveyed by Holder (1980) and Hassall (1983) and much detailed comment has been made by Davies (1967; 1971; 1977 with Thomas). It is not the intention here to reiterate this evidence, but rather to point out the areas still at issue and to consider their implications for the composition of the barracks.

There is general agreement only concerning the organisation of the *cohors quingenaria peditata* and the *ala quingenaria*. For the *cohors milliaria peditata* the numbers of men per century is in dispute; for the *ala milliaria* the number of men in each *turma* is questioned. The composition of the *cohors quingenaria equitata* is much more problematic. The numbers of men in each infantry century is uncertain while the evidence for the numbers of *turmae* and their strengths is conflicting. Again the numbers of *turmae* and their strengths is questioned for the *cohors milliaria equitata*.

When considering the make-up of barracks it is considered that the normal complement of men for each *contubernium* was eight since there is the direct testimony of Hyginus for this (*de Munitionibus Castrorum* I 4). Again, following Hyginus, the normal strength of the century is taken to be 80 (I 4). There is conflicting evidence for the usual numbers of men in the *turma*, either 30 or 32, but the implications of this difference are not very far-reaching. 32 probably is to be preferred, especially as it is the theoretical product of four *contubernia*. Further, following Richmond, it is generally accepted that, in the fort, two *turmae* with their decurions occupy a single building analagous to the single centurial barrack (Breeze and Dobson 1974, 13).

Working on these assumptions, the barrack requirements of a *cohors quingenaria peditata* are six barracks, each with accommodation for one centurion and ten *contubernia*. That for an *ala quingenaria* will be eight barracks, each with room for two decurions and eight *contubernia*.

The needs of the *cohors milliaria peditata* might not seem to call for much comment. The most simple statement of its requirements is ten centurial barracks with ten *contubernia*, but it has been suggested that this unit should approach more closely the numbers in its title (Birley 1966, 54). This would imply ten *contubernia* with ten men in each, or possibly twelve *contubernia* with the standard complement of eight men.

The 24 *turmae* of the *ala milliaria* require 12 barracks each with room for two decurions and eight *contubernia*. Eight men per *contubernium* produces well under titular strength. Again it is possible to consider that the *turmae* were in fact 40 or 42 men strong. If 40 they would comprise five standard *contubernium* groups implying a barrack with ten *contubernia*.

The composition of the *cohors quingenaria equitata* presents the most problems. The six *centuriae* and four *turmae* would seem to call for six standard centurial barracks and two standard twin *turma* barracks. In fact this produces a total rather above the titular 500. Thus it has been suggested that number of infantrymen in the centuries should be reduced. It would be possible to reduce the number of men in the centuries by having ten *contubernia* but with just six men in each; alternatively the barracks could have either nine or eight *contubernia* with the standard complement of eight men. Hyginus implies indirectly that such a unit has 120 troopers. The total of 128 produced from two twin *turma* barracks with eight *contubernia* in each would seem to be a close enough approximation to this figure, but Hassall has suggested that five *turmae* with 24 men in each is a possibility (1983, 97). Hyginus states also that the quingenary unit had half the number of *turmae* possessed by its milliary equivalent and there may be some grounds for thinking that this latter figure was ten. If the *contubernium* groups number eight, it will be possible to accommodate the five *turmae* in two barracks, with eight *contubernia* in one and seven *contubernia* in the other. Hassall himself suggests two barracks with ten *contubernia* in each but with the complement of each *contubernium* being reduced to six men. There would now be five decurions to be divided between two officers' quarters.

Very similar problems occur with the *cohors milliaria equitata*. Hyginus specifies ten centuries, thus ten centurial barracks. The 800 men of the ten centuries added to the 240 horsemen specified by Hyginus comes close to the titular strength of 1000. But there is dispute over how many *turmae* go to make up the horsemen. Eight *turmae* of 32 men housed in four twin *turma* barracks with eight *contubernia* each would seem to be the simplest solution and gives a total only 16 greater than that specified by Hyginus. Eight *turmae* of 30 arranged in the same way would produce the precise total. Hassall points out that there are indications in the text that Hyginus (XXVII) may have written or have meant to write '*turmae* X' or '*decem*'. Such is the reading accepted by Domaszewski in his standard edition of 1887. This would mean that each *turma* would have had 24 men. In this situation the troopers could have been housed in five twin *turma* barracks with six *contubernia* each housing eight men, or eight *contubernia* each housing six men. This latter would seem to be rather more likely since barracks with only six *contubernia* are uncommon and usually small buildings. The connection of barrack size with fort size has been stressed above (Chapter 3) and, of necessity, the forts for *cohortes milliariae equitatae* are large. But the total of five barracks goes against the Roman army tradition of doing things in pairs. On the other hand Lenoir in the most recent edition of Hyginus (1979) gives the reading '*turmas, decuriones VI*'. Six *turmae* of 40 men each produce the required total of 240 men. They could be housed in three twin *turma* barracks of ten *contubernia* with eight men per *contubernium*. Again the objection here is that three barracks is an uneven number.

Hassall's suggestion that there may have been five and ten *turmae* in the mounted cohorts presents a number of problems. The most important of these is that again it goes against the whole tradition of the Roman Army for doing things in pairs and in the proportions of 10 : 6. This is true both of the arrangement of barracks in the legionary fortresses and auxiliary forts where the facing pairs of barracks recall the Republican tradition of the maniple. Furthermore, within the legions at least, the system of centurions' ranks and promotion was calculated in name at least on the pairings of the centuries of the cohort. It seems likely that such a

system formed the basis of seniority in the auxiliary units. This is partly confirmed by the system of seniority noted between the officers' quarters of barracks from at least some forts (Baatz 1973, 54-8).

On the other hand it is only fair to point out that the double strength legionary first cohort with five double centuries departs from the principle of paired officers; furthermore this change may well have been instituted under Vespasian at a time when the milliary auxiliary units were coming into existence (see Chapter 2).

Hassall envisages that the five *turmae* of a *cohors quingenaria equitata* are to be accommodated in two barracks. This means that at least one *turma* will have to be split between two buildings. Such an arrangement would not be conducive to good discipline, and could lead to conflicts of responsibility among the decurions of the barrack. Indeed it must be said that the same problems could well occur with only two decurions in a barrack but on this occasion one of the barracks would have to house three decurions. This would present further problems in the arrangement of rooms and implies that the officers' quarters of one barrack would be considerably larger that those of the other. This is not impossible but it is unusual (see Chapter 3). It would of course be possible to have officers' quarters of the same size with an unequal distribution of space according to the seniority of the officers.

It has been pointed out that barracks are usually arranged in pairs in the the auxiliary forts. Often there is an uneven number of barracks in any one quarter of an auxiliary fort, but they are nearly always matched by a corresponding uneven number in the adjacent quarter of the fort and the result is the continuing existence of an even total number of barracks. Hassall suggests that the possible ten *turmae* of the *cohors milliaria equitata* may be accommodated in five barracks. Since the number of infantry centurial barracks is ten, the overall total will be an odd number. This is not impossible, for example Künzing has a total of nine barracks; but it is not a probable standard arrangement.

Problems

Numbers

The calculations above are complicated by many further considerations. In the first place it is almost always impossible to specify for whom the barracks were built. They may have been built according to the theoretical strength of the unit concerned, or according to the actual strength of the unit at the time. Alternatively barracks might have been built with the prospect of some increase of numbers in mind which nevertheless would not have brought the unit up to full strength, or they may have been coping with over strength numbers in times of campaigning. The possibilities are almost endless. The papyrological evidence referred to above makes it quite clear that the numbers of men in the same kind of auxiliary unit could be very different; furthermore that within the same unit the numbers could vary very much over quite a short period of time.

Vexillations and Outposting

The implications of vexillations and mixed garrisons go further than the fort size and barrack numbers referred to above. It is often true that vexillations did not comprise simply one complete section of the unit (ie a number of discreet *centuriae* or *turmae*), in which situation the individual barracks should follow the theoretical norm for that kind of unit, but rather soldiers contributed by each or some *centuriae* or *turmae* of the parent unit or units. This means that the vexillation barracks may differ considerably from the theoretical norm. At the same time any new barracks built by the parent unit in the parent fort may have the same number in total, but may be scaled down in size and thus defy interpretation.

Crawford illustrates an interesting development of the problem. There the four barracks of the Flavian period are too small for the accommodation of a normal auxiliary century but they do suit the requirements of one *turma* of 32 troopers very well. Five of the *contubernia* could have held six troopers, the sixth could have held the two *principales* while the larger space at the end would have been for the *decurio* (Maxwell 1971-72, 168-169). Any doubling-up of the barracks would produce a total of too many *contubernia* (12) to be a realistic number in an auxiliary infantry context, thus the garrison is likely to have been the four turmae of a *cohors quingenaria equitata* or a detachment from a cavalry unit. Thus it can be seen that the theoretical twin *turma* barrack could be divided. The *turma* barracks in the parent fort thus may have been only half occupied; on the other hand they may have been left empty or occupied by different troops, each *turma* now having its own individual barrack at Crawford. Again at Crawford in Antonine I two *turmae* may have had two small barracks, but their internal details are unknown.

The small Antonine half-barracks from *Britannia* which were discussed in Chapter 3 come to mind in this connection. Although two of them together make the equivalent of one centurial barrack, it is possible that their separateness reflects their origin from different centuries, even if now they served under the same centurion.

Similar consequences follow from the need for the outposting of small numbers of troops from parent units. The garrisons of fortlets have been shown to consist often of an infantry century, but also of a number considerably less than a full century; similarly the garrisons of the milecastles on Hadrian's Wall. The implications of this practice are the same as for the larger vexillations mentioned above. If an auxiliary unit has to garrison a fortlet, it may use one of its own complete centuries, alternatively it may draw the garrison from several centuries. Thus the total number of barracks may be reduced by one, or the barracks may be scaled down in size. On the other hand, the barracks of the parent unit may not be affected at all: one barrack may simply be left empty while the century undergoes its turn of outposting, the barracks being built large enough to take the parent unit's full complement. These considerations remain the same when the auxiliary unit is having to garrison perhaps two or three fortlets, but the alteration to the theoretical picture is likely to be the least, and thus the most difficult to recognise, when only a single fortlet comes into question.

The manning of watchtowers has the same consequences. The towers of the Gask Ridge or of the *Limes* in the Wetterau and Odenwald, in total must have required a large number of troops. Frere (forthcoming) has discussed the

implications for the barracks of Strageath I of the manning of the Gask Ridge watctowers. Wahl, Schallmayer and Wahl (1975) have shown that the space available for accommodation in stone tower Wp. 4/5 on the Wetterau is very similar to that of the *contubernium* in barracks (that is including both *papilio* and *arma*), furthermore that the likely duties of the troops could not reasonably be carried out with less than the normal *contubernium* group of eight men. The likely watchtower garrison of one *contubernium* group is confirmed by the presence of an inscription reading *contuberii Au* on the outer edge of a broken piece of a hand-mill. This find again confirms the residential nature of the watchtowers; for many of them it is a mistake to think of their garrison marching out from their parent fort each day and in any event some of their most important work is likely to have been carried out at night.

Wahl, Schallmayer and Wahl take for an illustration the section of the *limes* under the control of *Cohors II Raetorum* at the Saalburg, ie from the Feldberg to Saalburg and from Saalburg to Kapersburg from Ap 3/35 to Wp 4/2. In this section are nine watchtowers and two *Kleinkastelle* which means that the cohort would have had to give up at least 15 *contubernia*, one quarter of the whole contingent, to watch duty.

That outposting of considerable numbers of troops was a normal practice is demonstrated in the papyrological records of *Cohors XX Palmyrenorum* where one quarter of the unit's strength is in watch-posts and one further quarter is away on various commands, leaving only one half behind in garrison. There is little need to emphasise the fact that such practices render very difficult the task of using barracks as a means of interpretation of garrisons.

Changes of Garrison

Changing strategic requirements often led to the replacement of one type of garrison by another. This might or might not be reflected in changes in the barracks. Rebuilding might depend upon how well the overall requirements of the new unit could be met in the existing buildings in terms of space, as well as upon how well the individual barracks suited the composition of the new unit, for example in the number of *contubernia*. Other considerations might be the age of the existing barracks and the extent of the resources both material and labour for their replacement, or simply the resolve of a new unit commander to impose his authority on his men and his desire for a properly-ordered fort. In times of stress such activities would not be the first of his priorities. Corbridge provides an oft-quoted example of activity of this kind where the barracks in the right *retentura* were rebuilt five times between 87/90 and 163. The number of *contubernia* of at least one of the barracks changed in the sequence of 8, 10, 8, 10, 8 and 8. The changes have been taken to reflect the different needs of first the troopers and then the infantrymen of successive garrisons. These have been interpreted as: *ala*; *cohors milliaria equitata* with a legionary vexillation; *cohors milliaria equitata*; 12 centuries of infantry; *ala quingenaria* or *cohors milliaria equitata*, possibly a legionary vexillation; *cohors milliaria equitata* (*Cohors I Fida Vardullorum Milliaria Equitata CR*) (Gillam 1977,).

Corbridge illustrates the range of troops which may have garrisoned a single fort at different times. Among other forts, to date only Strageath and Valkenburg have provided such a sequence of barrack buildings to

correspond with garrison changes. It is unfortunate that in these forts the epigraphical evidence for the garrisons is very limited. The changes at these forts are very clear because the barracks were completely rebuilt to suit the needs of the new garrison. On many occasions the incoming garrison must have had to make do with existing barracks which perhaps offered only limited scope for adaptation. Certainly there is a considerable number of other forts where the epigraphical evidence demonstrates a succession of different unit types in garrison. Unfortunately, the impact of these changes on the composition of the barracks is not sufficiently well known to enable judgement of how automatic was their alteration to suit the new garrison. At least it can be said that on many occasions a change of unit type does not appear to have been accompanied by alterations in the size of the fort itself although the theoretical requirements of the units were very different. This must at least raise the question of the extent to which the barracks of the old garrison were altered for the new, both in terms of total numbers and in their individual composition. This is a further reflection of the flexibility which governs the composition of the garrisons.

Thus at Beckfoot a *cohors quingenaria peditata* was probably succeeded by a *cohors quingenaria equitata* in the second century (RIB 880). This is very surprising because Beckfoot is a small fort and air photographs would seem to show the six barracks of the initial garrison taking up the whole of the internal area available. There is no room for all the buildings of the secondary garrison. Wallsend too seems at different times to have been manned by these two different types of unit. At Birdoswald a *cohors quingenaria peditata* was succeeded by a *cohors milliaria peditata* in the third century (RIB 1909). An even larger expansion is implied at Asciburgium and Gemellae where a *cohors quingenaria peditata* was succeeded by an *ala quingenaria*. The increase from *c* 2,25 to 2,85 ha at Asciburgium, before the end of the first century, would hardly seem to be sufficient for the new requirements. Butzbach also had to accommodate sucessively larger garrisons: *cohors quingenaria peditata*, *cohors quingenaria equitata* and *ala quingenaria*. The initial size of the fort is not known, but it increased from 2,85 to 3,42 ha in the mid second century to meet the needs of the *ala*. An even greater exapansion should have been required at Albertfalva where an *ala quingenaria* was replaced by an *ala milliaria* in the Hadrianic period.

On occasion the space required by the new garrison would be less than those of the old, for example at Mumrills where the *ala quingenaria* of Antonine I was succeeded by a *cohors quingenaria equitata* in Antonine II and at Ribchester where an *ala quingenaria* was succeeded by a *numerus* between Phases B and D in the second century. A more drastic reduction of forces is to be seen at Old Kilpatrick between Antonine I and Antonine II where a *cohors milliaria peditata* was succeeded by a *cohors quingenaria peditata* (Holder 1982, 113). Maryport was built to house a *cohors milliaria equitata* and yet for most of the second century the garrison was a *cohors quingenaria equitata* and no clear use was made of the resultant free space within the ramparts (Jarrett 1976, 88). Although originally built for an *ala*, at Benwell also a *cohors milliaria equitata* is attested in the reign of Marcus Aurelius to be replaced by an *ala quingenaria*. But on this occasion Holder points out that only part of the former unit may have been in garrison since RIB 1328 is a dedication by a prefect rather than a tribune (1982, 123).

The succession of garrisons at Vechten between the Augustan period and the middle of the second century is more complex: *cohors milliaria equitata*, *cohors quingenaria equitata*, *ala quingenaria*. Throughout these changes the area of the fort seems to have remained at 2,82 ha. More complex still is the succession at Chesters between the reigns of Hadrian and Commodus: *ala quingenaria*, *cohors quingenaria equitata*, *cohors milliaria equitata*, *ala quingenaria*. In spite of these changes the area of the fort seems to have remained constant at 1,71 ha.

But it should not be thought that units of the same kind never succeeded each other at the same fort. Successive garrisons of *cohortes quingenariae peditatae* are attested for Bar Hill, Greatchesters, Holzhausen, Wiesbaden, Heilbronn-Böckingen and Adony (*Vetus Salina*); *cohortes quingenariae equitatae* at Stockstadt; *cohortes milliariae equitatae* at Birrens; *alae quingenariae* at Altkalkar. Of these sites only Birrens has provided details of the two periods of barracks and here the Antonine II barracks followed very much the same lines as the Antonine I barracks. Unfortunately the evidence for the *contubernia* comes only from Antonine II. It is to be noted that it is the *cohortes quingenariae peditatae* which most often succeed each other at the same fort. This may well be connected with the small size of their forts which often make them impracticable for the other theoretically larger units, also with the large total number of such units.

Builders and Intended Occupants

Thus far it has been assumed that the identity of the future occupants of the barracks was known at the time of their construction, but it is possible that this is not always true. At a time of uncertainty and considerable troop movement plans must have been subject to change at very short notice. It is possible even that forts were constructed the identity of whose future garrison was not known. The occupation of Scotland or *Dacia* could provide just such occasions. The general all-purpose barrack is not inconceivable.

An important factor in these considerations is the identity of the builders of the barracks. The barracks are more likely to be constructed according to a theoretical basis if they were constructed by a working party executing the designs of a legionary architect, rather than by the future occupants of the barracks who might feel no need to do anything more than meet their immediate requirements. The question of who built the barracks will be considered in the following chapter.

Contubernia* and Special *Contubernia

There are many additional variables within the barrack, in particular with regard to the *contubernia*, which have a bearing on the intepretation of that barrack. It is not known where the *principales* were accommodated. It is possible that on occasion they had rooms in the officers' quarters at the head of the barrack. Richmond considers that this was the situation at least at Carzield for in one half of the officers' quarters of the double barrack was found a furnace suitable for the working of metals and also nearby a broken spear and a broken bronze statuette which would have been suitable scrap material. The only man likely to have been working metals there was the *custos armorum* who probably was a *principalis* rather than an *immunis* (1938-40, 160-61). On the other hand furnaces have been found in

the special end *contubernium* of Building XVII of Antonine II Strageath, which, according to Richmond's hypothesis, suggests a different location for the *principales*.

On these occasions the metal-working seems to have been localised, but there are many other examples where metal-working was taking place in several different places in the barrack. Whatever the situation at Carzield, certainly it is possible to imagine that, if space were sufficient, the *principales* together might occupy one or two *contubernia*. Those which come to mind most readily are the special elaborate first and end *contubernia* (which would tend to be confirmed by the findings at Strageath) and *Schlußbauten*. Equally they could occupy two or even three ordinary *contubernia* or a combination of these and the special *contubernia*.

Indeed it might be thought that the arrangement of the special *contubernia* ought to shed some light on the organisation of the *contubernium* groups. If the *principales* are to be regarded as separate from the *contubernium* groups, according to the theory of barrack composition and the considerations outlined above, in infantry barracks there would be ten or more standard *contubernia* and additional special *contubernia* while in cavalry barracks there would be eight or more standard *contubernia* and additional special *contubernia*. Precisely this combination is found at Echzell where in the Form 1 barracks there are ten standard *contubernia*, a special first *contubernium* and a *Schlußbau*; in the Form 2 barracks there are eight standard *contubernia* and a *Schlußbau*. It is thought the garrison at Echzell comprises an *ala quingenaria* and a *cohors quingenaria peditata*.

There are unfortunately very few other examples where the numbers conform to this pattern; in particular this is true of the probable infantry barracks. Rottweil Kastell III has barracks with 13 standard *contubernia* and a special large end *contubernium*, while the Munningen barracks have ten standard *contubernia* and a special end *contubernium*. But Housesteads (xiii), Pen Llystyn (R1), and Bu Ngem (5, 6, 14, 7) all have nine or less ordinary *contubernia*. The other barracks from Housesteads and Pen Llystyn all have ten standard *contubernia*.

The results from possible cavalry barracks are more promising. The Type I *ala* barracks at Heidenheim have ten standard *contubernia* and two special first *contubernia*. The following examples all have eight ordinary *contubernia* and one additional special *contubernium*: Strageath I (XV), Valkenburg Castellum 5 (3, 4, 5, 9), Valkenburg Castellum 6 (5, 6, 8, 11), Oberstimm (13, 9, 6). The probable garrisons of all these forts involve *cohortes quingenariae equitatae*. The Phase 1 probable *ala* barrack at Heddernheim has the same configuration; in Phase 2 it has nine standard *contubernia* and a special first *contubernium*. Valkenburg Castellum 4 Barrack 9 and Castellum 6 Barrack 10 have nine standard *contubernia* and a special end *contubernium*. The *ala* barracks at Petronell in the left and right *praetentura* respectively have 11 and ten standard *contubernia* with a special end *contubernium*.

There are in addition many examples of smaller standard *contubernium* totals. Strageath I (XIII, IX), Elginhaugh (1), Valkenburg Castellum 1 (*latus praetorii*), Valkenburg Castellum 2/3 (7, 8), Hofheim (Steinkastell) Period II (3, 4) and Drobeta (1, 4, 10, 11, 13) are all examples of barracks with seven or less standard *contubernia* coupled with one special *contubernium*. The lowest number is four from Drobeta.

In truth there is very little pattern to these numbers. It is clear that in no way are the special *contubernia* a feature only of the larger barracks or of those with a large number of *contubernia*. Certainly they are not present only where there are already sufficient standard *contubernia* for the theoretical needs of the garrison. This can mean only that the special *contubernia* accommodated on occasion a full eight man complement, or that the barracks were built for under strength *centuriae* and *turmae* and that the special *contubernia* were occupied by the *principales* or were taken up with some other function. The best examples of this are the barracks from Strageath I (xiii, ix), Hofheim (Steinkastell) Period II (3, 4) and Drobeta (1, 4) which have seven standard *contubernia* and one special *contubernium* each.

The occurrence of special first *contubernia* is too slight for it to be possible to draw any conclusions on their significance.

Even *contubernia* which are of the same appearance as the others in the barrack were not always used for accommodation. There is no reason why they should not have been used as ancillary store rooms; certainly storage pits have been found in *contubernia* which would render their use as accommodation very difficult. A clear example is Pit 6 which lay within the end *contubernium* of Barrack v at Bar Hill (Robertson, Scott and Keppie 1975, 22). Similarly, a latrine was identified in the *arma* of the barrack south of the *via sagularis* at Carrawburgh. Breeze believes that the pit could only have been constructed and used when the garrison was below full strength (1972, 92). Clearly this is the most probable explanation but such a use might conceivably have been part of the original plan. The occurrence of metal-working in the *contubernia* has been mentioned above. There is no reason to think that rooms intended for such use would necessarily have had different internal proportions. The form of construction of the building probably would have decreed otherwise.

These features of the barracks will be discussed in the following chapter, but for present purposes the above examples are sufficient to show that the interpretation of a barrack according to its size or according to the number of its *contubernia* is fraught with problems. With regard to the *contubernia* alone it will be particularly important to examine the use to which every room was put and to determine whether this use was a part of the original conception of the barrack.

Distinctions between Barracks in Auxiliary Forts

1 - Legionary / Auxiliary

Previous Suggestions

The understanding that legionaries and auxiliaries often were brigaded together in the same fort makes more important the task of discovering distinguishing elements between their barracks. Baatz (1965) and Planck (1975) have undertaken general reviews of the evidence and Maxfield (1986) has considered evidence from the pre-Flavian period. In addition the question has been raised in general terms in many excavation reports.

Size

It may be incorrect to assume that, if legionaries are to be found in auxiliary forts, their barracks necessarily will be distinguishable from those of the auxiliaries. A standard auxiliary infantry barrack would be perfectly capable of housing a legionary century at its theoretical strength of 80 men plus centurion. The size and disposition of the fort are likely to have been the primary considerations and it has been shown in Chapter 3 that the sizes of barracks are dependent of the size of their fort. Yet there are barracks which by virtue of their very size raise the question of whether they housed legionaries.

The general question of barrack sizes has been discussed in the previous chapters. Here it is sufficient to say that the exceptions to the general patterns are so clear-cut as to suggest that they are significant. Thus, for example, the dimensions of the barracks from Newstead II and Rottweil Kastell III agree with those of the barracks from legionary fortresses to such an extent as to suggest that they too housed legionaries. Indeed legionaries are attested at Newstead (RIB 2121 *et al*) and legionaries are proposed by Planck (1975, 87-92).

Given that the overall size of barracks is important, a difference in the sizes of barracks from within the same fort is likely to be significant. It has been shown that in addition to the legionaries, auxiliaries often were housed in the legionary fortresses and their barracks have been discussed in Chapter 2. It is no surprise to find barracks of considerably different sizes in vexillation fortresses and Buildings XIV (Barrack I) and VIII at Longthorpe correspond in size with contemporary barracks from fortresses and forts repectively (this is in spite of the very great size of Building XIV).

More difficult to judge are barracks of considerably different sizes from the same auxiliary fort. Examples for which a legionary occupation has been suggested may be quoted from Ardoch and Newstead III (Breeze 1983, 233-4; Richmond 1949-50, 20). Flavian Ardoch has barracks with a length of 62 m in the *retentura* and shorter barracks of *c* 48 m in the *praetentura*. The longer barracks are comparable to Neronian barracks at Exeter but the shortest contemporary barracks from fortresses come from Nijmegen and are some 5 m longer. On the other hand there are very few contemporary auxiliary barracks longer than 52 m and the shorter Ardoch barracks coincide with the strongest length concentration of 48 m. Certainly the size of the longer Ardoch barracks is enough to raise the presumption that they may have housed legionaries.

The situation at Newstead III is more difficult to judge. The barracks in the *praetentura* have a length of *c* 60 m. The lengths of those in the *retentura* is unknown, but it seems certain to have been less. Again the lengths of the known barracks may be compared with those from Exeter, but there are no contemporary Antonine barracks from legionary fortresses less than 72 m in length. On the other hand very few Antonine barracks from auxiliary forts attain a length greater than 54 m. On the basis of size alone they cannot be called legionary. But the barrack of 68,28 m from the *retentura* of Newstead II agrees with several contemporary barracks from fortresses and is a good candidate for the accommodation of legionaries as Richmond suggests. It is unfortunate that this barrack is not known in detail; certainly its width of 17,37 m is some six metres greater than the legionary norm and a double barrack must be considered probable.

Some of the barracks from auxiliary forts which have the best claim to be legionary are of a size very similar to ordinary auxiliary barracks. There is no immediate epigraphic evidence for the garrison of Hofheim (Steinkastell) Period I but Nuber has proposed a legionary presence on the basis of two inscriptions (1986, 229-30). The first is a lead seal. On one side is written the name Iustinus and in the place of his century on the other side is the attribution SCORPIONARI. It is considered that only legionaries had the use of such weapons. The second inscription is that of a soldier with citizenship, Valerius Nivalis in the century of a Sabinus. The slightly longer barracks at Hofheim are in the *retentura*, thus Nuber places there the legionary vexillation. Bu Ngem provides an example of an auxiliary-sized fort built and occupied by legionaries throughout its existence. This is confirmed by the very large number of legionary inscriptions from the site (Mattingly 1984).

The Flavian barracks in question at Hofheim with a size of 52,00 × 9,75 m are just a little longer than the main contemporary auxiliary concentration on 48 m, and are of typical auxiliary width. They are quite different to the smallest legionary barracks from Exeter of c 60 × 11 m. The same may be said for the Severan barracks from Bu Ngem. Their lengths range from 28 to 38 m, extremely small for auxiliary barracks of any period, while their widths of *c* 7,50 m are of standard auxiliary size. The evidence from Hofheim and Bu Ngem is sufficient to show that large size is not a prerequisite for a legionary presence.

Figure 101 shows the lengths of those barracks which have the best claim to have been occupied by legionaries in auxiliary forts. It will be seen that they cover very much the same range as the auxiliary barracks from the forts with attested garrisons.

Officers' Quarters

The size of the officers' quarters has also been thought to be very significant and it has been shown that there is a very strong division between the sizes of centurions' quarters from fortresses and of officers' quarters from auxiliary forts. Thus in spite of the very large size overall of the Rottweil barracks, the relatively small size of the centurions' quarters was a cause of concern to Planck (1975, 90). With dimensions of 18 × 11 m they are among the largest to be found in auxiliary forts, but in spite of this they are very much below the legionary norm for the period although matched by examples from Nijmegen. Similarly, the very large size of the officers' quarters of Barrack I at Flavian Strageath (19,50 × 12,20 m) agrees with that of the smallest contemporary examples from legionary fortresses and this, coupled with the fact that the other contemporary officers' quarters at Strageath are much smaller, has led the excavator to suggest the presence of a legionary centurion in spite of the fact that the remainder of the barrack was small (Frere forthcoming).

Against this it must be said that centurions' quarters of the postulated legionary barracks at Newstead III of 5,33 × 10,97 m are among the smallest of all from auxiliary forts, and with a total of ten *contubernia* in the barrack theoretically there is none spare which could be counted with the centurions' quarters to increase their size. Furthermore, the centurions' quarters from Hofheim of 7,88 × 9,75 m and 8,63 × 9,75 m are smaller than the average from auxiliary forts and the same may said for Bu Ngem where the centurions' quarters have an average size of 6,50 × 7,50 m.

If the problem may be approached from the opposite end, the only officers' quarters from an auxiliary fort to be comparable in size with average centurions' quarters from legionary fortresses are those from Heidenheim. With total dimensions of 28 × 11 m these fall in the middle of the legionary range for the Flavian period. The lengths of centurions' quarters in legionary fortresses only very rarely fall below 20 m. The occupants of the quarters at Heidenheim were not legionary centurions but the decurions of the *Ala II Flavia Milliaria*.

The remaining officers' quarters longer than 20 m in auxiliary forts come from Elginhaugh, Caernarvon, Waddon Hill, Dover and Echzell (Form 2). It is possible that legionaries were present at Waddon Hill, but the plans of the barracks there are very difficult to interpret and no great reliance can be placed on the above measurement. The 'officers' quarters' at Dover Fort II (B24 PIII) are formed by additions to the original building and their identification is speculative. There is nothing to suggest the presence of legionaries at Elginhaugh, Caernarvon or Echzell except the existence of these large officers' quarters and it must be concluded that they do not necessarily do so.

Contubernium Totals

The number of *contubernia* in the barrack has also been taken to be an important indicator. Planck writes (1975, 88) that legionary barracks as a rule have more than ten *contubernia*. Baatz makes the same point. At the same time Planck is not correct to say that auxiliary barracks with more than ten *contubernia* have not been found (even in 1975), but it has been seen in the previous chapters that their number is relatively small. Thus the 14 *contubernia* at Rottweil Kastell III (13 excluding the special end *contubernium*) give rise to the strong presumption that the barrack was for legionaries.

Once more however the evidence is full of contradictions. It is true that Barrack 21 in the *retentura* of Hofheim (Steinkastell) Period I has 13 *contubernia* while Barracks 22, 23 and 24 have 11 *contubernia* each; thus they conform to the presumption outlined above. But the numbers of *contubernia* from Bu Ngem are very different and range from six to nine.

There can be no assumption that a larger number of *contubernia* indicates the presence of legionaries. The presence of 12 *contubernia* in the barracks at Heidenheim and Petronell, both cavalry forts, shows as much. Furthermore it is also highly probable that the barracks in the *retentura* at The Lunt in Period I with 11 *contubernia* and the Form 1 barracks at Echzell with 12 *contubernia* housed auxiliary infantry

It has been shown in Chapters 1 and 3 that barracks from auxiliary forts may have more than ten *contubernia*. Figure 102 sets out *contubernium* totals from those forts where the identity of the garrison is fairly certain. It includes also the same information for those barracks most likely to have housed legionaries. It will be seen that evidence for the legionaries covers the same range as the auxiliaries and has no significant concentrations.

Contubernium Size

Baatz writes that the *contubernia* of the legionary barracks ought to be larger than those of the auxiliary barracks (1965, 142). Planck makes this same point (1975, 91). It has been shown in Chapter 1 that on the contrary the internal living space of the *contubernia* from the fortresses and forts is very similar in range and this is true of every period. There is only a very slight trend showing larger *contubernia* to have derived from the fortresses. Thus size of the *contubernium* alone is not sufficient for the diagnosis of legionary barracks in auxiliary forts.

By way of illustration, the internal free living space of the *contubernia* at Rottweil Kastell III is 22,50 sq m, in the *retentura* at Hofheim (Steinkastell) Period I it is 30,98 and 31,50 sq m, while at Bu Ngem the average of a wide range of values is *c* 16,50 sq m. The area from Rottweil is precisely average for both fortresses and forts and the areas from Hofheim and Bu Ngem are respectively higher and lower than the average. In spite of the large difference between them, none is particularly unusual either in fortress or fort (compare Figure 10).

Baatz writes that barrack measurements conformed to a certain scale over a long period and apparently were laid out according to some kind of army service prescription. He states that the spacing of the side walls of the *contubernia* often measures 13½ Roman feet (4,00 m) and that the clear space remaining after the subtraction of the width of the walls is 13 Roman feet (3,85 m). It was shown in Figure 66 that, on the contrary, there is no discernable norm for the spacing of the auxiliary *contubernia* and the same may be said of the legionary *contubernia*. They cover a very wide range principally from 2,6 to 5,2 m. Baatz also states that the legionary breadths tend generally to be greater than the auxiliary.

Again it is impossible to lay down hard and fast rules for possible legionary barracks in the auxiliary forts. The spacing of the side walls of the *contubernia* from the barracks in the *retentura* at Hofheim (Steinkastell) Period I is 4,15 m, at Rottweil Kastell III 3,40 m and at Bu Ngem it ranges from 3,20 to 4,70 m. Comparison of these figures with Figure 66 shows that they agree with the broad mass of the evidence from the auxiliary forts.

Living Space per Man

Maxfield has recently written from the standpoint of a notional space allocation per man in the different barracks, legionary and auxiliary. Speaking of the Flavian and post Flavian period she suggests that the legionary's allocation was some 5 - 6 sq m per man and that of the auxiliary infantryman considerably lower, some 2,84 - 3,82 sq m. The allocation for the cavalryman she places at the larger figure of over 6 sq m (1986, 63-65). Unfortunately Maxfield does not explain precisely how she arrives at her figures, but she does say that she is working from the basic premise that there are 80 men in an infantry *centuria* and 32 in a cavalry *turma* (1986, 63).

The first section of this chapter will have made clear the multifarious problems involved in calculations of this kind and it is probable that the living space per man calculated on the basis of the eight man *contubernium* group is the most realistic measure (and it was seen in Chapter 1 that the difference between legionary and auxiliary accommodation thus calculated is

small). For the moment the allocation of the living space per man will be calculated on the basis of the total free living space of the men's quarters divided by 80 for infantry barracks both legionary and auxiliary, and by 64 for cavalry barracks.

When this calculation is applied to the examples given by Maxfield the results are rather different. For the legionary fortresses, the areas from Inchtuthil are 5,03, 5,44 and 5,48 sq m, from Caerleon 3,54, 3,69 and 3,73 sq m, and from Gloucester 3,82 sq m. From the auxiliary forts, the areas are for Fendoch 3,12 and 2,41 sq m (this difference being between the barracks in the *praetentura* and *retentura* respectively), for Housesteads 3,01 and 3,19 sq m, and for Pen Llystyn a range of ten values between 2,23 and 3,05 sq m. The calculations for the cavalry forts give 2,76, 2,68 and 2,89 sq m at Chesters and 6,32 sq m at Heidenheim.

It is apparent that the difference between the legionary and auxiliary barracks is not as great as that perceived by Maxfield. This is confirmed by an examination of Figures 103 and 104. Figure 103 illustrates the the living space per man in the legionary fortress barracks according to period when calculated as explained above. It is clear that from the Claudian/Neronian period to the Severan the space per man concentrates between 2,75 and 5,25 sq m. The Claudian/Neronian values are a little less than those of the subsequent periods and most values overall fall between 3,00 and 4,00 sq m. Figure 104 sets out the living space per man of those barracks from auxiliary forts where the garrisons are best known. Here the values concentrate principally between 2,00 and 4,50 sq m. Thus there is a considerable overlap with the legionary figures; it is only surprising that the legionary barracks with their greater length and width should not offer a greater advantage. Figure 104 also gives the space per man of those barracks which most probably house legionaries in auxiliary forts. These values cover very much the same range as those of the auxiliary barracks. Thus it is not possible to diagnose the presence of a barrack accommodating legionaries in an auxiliary fort on the basis of calculations such as these.

Conformation

Both Baatz and Planck comment in general terms that the legionary barracks tend to be more elaborate in conformation than the auxiliary barracks. This elaboration manifests itself most clearly in the different form taken on occasion by the first and end *contubernia*. This impression is confirmed when the numbers of examples is examined. There are nine legionary fortresses where examples of a special first *contubernium* are to be found; the auxiliary fort figure is 11. Two legionary fortresses have examples of special end *contubernia*; again the number of auxiliary forts is 11. Six legionary fortresses have examples of full *Schlußbauten*; the same are found only in four auxiliary forts. A noticeable feature of the evidence is the relatively few examples of special *contubernia* from the legionary fortresses in *Britannia*. The province provides no examples of *Schlußbauten*. The spread of evidence from the auxiliary forts on the other hand reveals no such dichotomy.

From the above it is clear that the barracks from the fortresses, taking into consideration their smaller numbers, tend to be more elaborate than those from the auxiliary forts. But elaboration of the barracks in the auxiliary forts cannot be taken as an indication there of legionary accommodation. The relevance of these special *contubernia* to auxiliary

garrisons has been discussed above. Here it will suffice to say that special *contubernia* are found at Housesteads and Heidenheim where auxiliary units are epigraphically attested.

Construction

In a similar vein it has been remarked that high quality of construction is indicative of a legionary occupation. Referring to the first Antonine occupation of Newstead, Richmond reported that the walling (including that of the barracks) constructed by the vexillation of *Legio XX* was far superior to the contemporary work of the *alares* in the same fort. What is more, the legionary vexillation was positioned high and dry at the summit of the fort while the auxiliaries occupied a swampy hollow (1949-50, 23). On this occasion the interpretation of the legionary presence may well be correct, but it is not possible to make general rules on the basis of building quality nor did Richmond claim to do so. Certainly it seems likely that legionaries often constructed barracks in auxiliary forts which were not for their own occupation (see Chapter 7).

It is not the purpose of this chapter to discuss the many other factors (eg different items of military equipment) which have been taken to indicate the presence of legionary troops.

Further Suggestions

Men's Quarters

It was shown above that a large number of *contubernia* possibly may be indicative of a legionary presence in an auxiliary fort. It has been shown in previous chapters that the number of *contubernia* is dependent on the overall length of the men's quarters. Thus barracks with long men's quarters may on occasion indicate the presence of legionaries. Such a recognition may particularly be of help when the number of *contubernia* is unknown.

In the legionary fortresses the lengths of the men's quarters do not fall below 40 m, furthermore the only examples below 46 m are either Augustan or from the small fortresses of Exeter and Nijmegen. Typical legionary men's quarters are of lengths greater than this and have a width of 9 m. The only men's quarters from auxiliary forts to match these with lengths of 52 m and over are from Newstead III, Echzell (Form 1), Rottweil Kastell III, Heidenheim and Petronell. The widths of the quarters are also those of the legionary norm. A legionary presence is known at Newstead and claimed at Rottweil, but Heidenheim and Petronell housed cavalry. The remaining men's quarters from auxiliary forts with lengths greater than 40 m come from Strageath II (XI, X), Camelon (IV, III), Housesteads, Boulogne (B, D-G), Valkenburg Castellum 5 (7, 8), Echzell (Form 2), Hofheim (Steinkastell) Period I (22-27), Munningen, Ellingen (B Phase 3), Celamantia and Gemellae. It is noteworthy that the widths of these examples concentrate round the more typical auxiliary width of 8 m. Of these examples, a legionary presence is claimed only for the Hofheim and Celamantia barracks, while there is epigraphical evidence for quite different garrisons at Housesteads, Boulogne, Valkenburg and Gemellae. Finally it should be noted that the men's quarters from Bu Ngem with an average size of 25 × 5 m are among the smallest from auxiliary forts although the garrison was legionary.

Thus large men's quarters may indicate the presence of legionaries but do not necessarily do so.

Relationship between Officers' and Men's Quarters

It was shown in Chapter 1 that there is a very strong trend in legionary barracks for the centurion's quarters to take up *c* 33 % of the overall length of the barrack and that the auxiliary concentration is much more towards 25 %. It might be thought that this legionary relationship would persist in barracks occupied by legionaries in the auxiliary forts. Officers' quarters taking up between 30 and 35 % of the overall length are found at Strageath III (XIII, XII), Rough Castle (left *praetentura* North Barrack Period 2), Carzield, The Lunt (Period 2, Barracks 1 and 2), Hod Hill (IX, II), Echzell (Form 2), Heidenheim and Aquincum (Steinkastell). The Heidenheim and Aquincum barracks certainly housed cavalry and Carzield and Echzell probably did so. The Rough Castle and Hod Hill barracks are small and very unusual while those from The Lunt are shortened from their original length. It is not likely that Strageath housed legionaries in Antonine II.

The barracks which are most likely to have housed legionaries conversely give percentage values which do not agree with those from the fortresses; thus Newstead III 7,77 %, Hofheim (Steinkastell) Period I 14,50 and 15,95 %, Rottweil III 24,93 % and Bu Ngem a range from 9,89 to 22,26 %. Thus it is clear that a length proportion of 33 % is not necessarily indicative a legionary presence in an auxiliary fort.

***Contubernium* Proportions**

It was shown in Chapter 1 that in the proportion of the depth of the *contubernium* taken up by the *papilio*, the legionary barracks concentrated most strongly at *c* 66 %, while the auxiliary barracks often concentrated at *c* 50 % This is by no means a hard and fast rule but it is interesting to compare the evidence from those barracks from auxiliary forts most likely to have been occupied by legionaries. Thus the proportions from Strageath I (I), from the *retentura* at Hofheim (Steinkastell) Period I and from Rottweil III are all 50,00 % while from Bu Ngem they are 50,00, 63,64 and 66,67 %. This does not suggest that the proportions of the *contubernia* are likely to be of great value in the identification of barracks occupied by legionaries in auxiliary forts.

Again it was remarked in Chapters 1 and 2 that the depth proportions of *papilio*, *arma* and veranda are different in legionary and auxiliary barracks. The legionary barracks concentrate closely on the proportions of *c* 45/30/25 % while the auxiliary barrack proportions range more widely but concentrate *c* 40/40/20 %. Unfortunately these proportions are not avilable for most of the barracks from the auxiliary forts which have been identified with legionaries, but of those which have, the proportions at Rottweil III are 41,20 / 41,20 / 17,60 %, precisely typical for auxiliary barracks. The corresponding proportions at Strageath I (I) are 32,99 / 32,99 / 34,02 % and at Bu Ngem (5) are 44,84 / 25,66 / 29,50 % but in both of these examples a veranda was not definitely present. Once more these proportions cannot be used to predict the presence of legionaries.

Conclusion

Thus it is clear that there are no clear rules for the identification of legionary barracks in auxiliary forts. Those which have best reason to tbe associated with legionaries tend to agree in detail with other barracks from auxiliary forts rather than with barracks from the legionary fortresses. Sheer size remains perhaps the best indicator, but intepretation must rest on as broad a range of the evidence as possible.

Distinctions between Barracks in Auxiliary Forts 2 - Infantry / Cavalry / Mixed Units

Previous Suggestions

Building Types

Features which may distinguish between the barracks of different auxiliary units and between infantry and cavalry have also often been suggested. Building Type I has a configuration very well suited for the accommodation of two *turmae* with two decurions in the two opposing ends of the barrack and has often been so interpreted. But it was shown in Chapter 3 that buildings with this configuration are not always barracks, only Heidenheim provides an undoubted example.

Schönberger uses the argument of this building form to intepret Building 14 in Phase 1b at Oberstimm (Plan 21) as accommodation for the troopers of a *cohors quingenaria equitata* (1978; 120, 140, 137-141). The question of this intepretation is raised by Maxfield (1986, 62). In fact Barrack 14 is not a true Type I because the areas of the two projecting end sections are not the same. These two elements of the barrack measure 95,69 and 77,40 sq m, making a total of 169,61 sq m. This would be a much larger area than usual for the officers' quarters of an auxiliary barrack, especially for one of such a modest size as the Oberstimm example, just 44,80 m long. Furthermore the proportions of first the overall length and then the overall area taken by the officers' quarters when only the larger end section is taken to accommodate officers, ie 22,70 % and 27,15 %, agree with the evidence from the rest of the auxiliary forts and according to the theories outlined above many of the 'normal' officers' quarters must have housed two decurions. The inclusion of both end sections of the barrack would inflate these percentages and make them quite exceptional, for example raising the length percentage to *c* 41 %. The comparable figure from Heidenheim is 33,90 %. Of course it remains possible that the Oberstimm barrack accommodated cavalry, both decurions being quartered at one end of the barrack. The same argument may be presented with regard to Building 6 in the *latus praetorii*.

Following the same argument, the only special last *contubernia* clearly of sufficient size to accommodate a decurion are those of Type 'j' from: Strageath I Barrack XV (88,56 sq m); Valkenburg Castellum 1a Buildings b and c (81,34 sq m); Valkenburg Castellum 2/3 Buildings 7 and 8 (81,34 sq m); Echzell Barrack Form 1 (95,94 sq m) and Form 2 (145,14 sq m); Oberstimm Buildings 6 (98,58 sq m) and 5 (104,32 sq m) . To these should be added the Type 'b' end *contubernium* from the barracks of the right *praetentura* at Petronell with an area of 103,24 sq m.

In all of these examples the size of the officers' quarters at the 'normal' end of the barrack is at least average for the officers' quarters of auxiliary barracks, and sometimes much higher than average for example at Echzell and Petronell. At the same time, the smaller examples already take up a large percentage of the overall length of the barrack, for example *c* 28 % at Valkenburg Castellum 1a. The addition of the section from the other end of the barrack would make either the size of the officers' quarters unacceptably large, or their percentage of the overall length unacceptably great. It must be concluded that Type 'j' end *contubernia* are not to be seen as officer accommodation.

There remains the question of whether any of the other Barrack Types are to be associated with particular types of garrison, infantry or cavalry. Figure 105 sets out the Barrack Types from those forts where the garrison is either epigraphically attested or where the identification of the kind of unit in garrison is very probable. It is not surprising that the Building Types cover the range of units in a balanced way. As has been stated before, the most important Types are A and B. For the attested garrisons the two Types are balanced with the exception of the *cohortes milliariae equitatae* where Type A predominates. The addition of the evidence from the probable garrisons does not change the balance with the exception of the *cohortes quingenariae equitatae*. Here the number of examples of Type B is greater than those of Type A, a very different picture to that for the other units. When it is considered that there is one more example of Type B for the attested garrisons of *alae quingenariae*, it is reasonable to say that Type B may have a bias towards cavalry.

Of the other Types, Jx shows the most significant concentration. It features most strongly with the *cohortes quingenariae equitatae* and the *alae quingenariae*. Since these examples are in most cases incomplete examples of Type A, they may in fact restore the imbalance between Types A and B referred to above. There are many examples of Type O. This Type denotes only the recognition of a rectangular building. They are balanced evenly between the different auxiliary units.

Size

Baatz considers that the measurements of the barrack accord not only to the number of soldiers but also to their rank. Thus legionaries come before auxiliaries and cavalry before infantry (1965, 142). He writes also that cavalry need more room on practical grounds to cope with their harness. He does not explain in detail the way in which these requirements will affect the auxiliary cavalry barrack. But it clear from his own Abb 2 that the cavalry barracks there illustrated are no larger than most of the other auxiliary barracks and that there is no distinction between the different infantry barracks. The only exception is the subject of his study, the barracks from the *retentura* at Echzell. This concurs with the findings in Chapter 3 where it was shown that sizes of the barracks have no obvious connection with the type of auxiliary unit in garrison.

Anne Johnson writes:

> 'Comparison between barrack lengths from different forts may give a clue to the type of garrison housed in them, although one of the most interesting features to emerge is not the variations in

> barrack lengths between different forts, but between barracks in the same fort' (1983, 295).

In order to examine the first point, Figure 101 sets out barrack lengths according to the attested and probable garrisons. It is apparent that the lengths cover very much the same basic range from 30 to 60 m irrespective of garrison. The only exceptions are the barracks of the *alae milliariae* which have two very long examples (Aalen and Heidenheim). It is possible that the lengths of the attested *cohortes quingenariae peditatae* concentrate at a slightly lower point that the others, but this is marginal. The *alae quingenariae* also have some examples over 60 m which are lacking for the other garrisons. Certainly it is clear that no simple guides to garrisons may be drawn up on the basis of barrack length.

Johnson's second point arises from the study made of the barracks of the forts of Hadrian's Wall made by Breeze and Dobson (1969 and 1974). In their articles they suggest that, for the stone forts of Hadrian's Wall, *c* 49,30 m was the planned barrack length for a *cohors milliaria peditata*, this being the length of the Housesteads barracks where the garrison is agreed. As Birdoswald has a similar barracks of 48,70 m and also ten *contubernia*, it is accredited with the same type of garrison. The Type I barrack at South Shields is identified as the standard *ala quingenaria* barrack with a length of 41,50 m, the different lengths at Housesteads and South Shields reflecting the different needs of infantry and cavalry. Thus in a mixed unit of infantry and cavalry, barracks of two lengths are to be expected. Barracks of different lengths, 45,72 and 39,60 m, occur at Haltonchesters which therefore is proposed as a fort for a *cohors quingenaria equitata*. It is suggested further that because Rudchester and Carrawburgh are of a similar size to Haltonchesters and have barracks of 45,72 and 45,70 m, the Haltonchesters barracks are the standard ones for the quingenary mixed unit, their shorter lengths reflecting their lesser status than the *cohors milliaria peditata* and the *ala quingenaria*.

Unfortunately the scheme falls into trouble on its own doorstep. The authors themselves point out that the barracks at Benwell are 45,72 m long and probably were built for an *ala quingenaria*. This makes them the same length as the 'infantry' barracks at Haltonchesters, Rudchester and Carrawburgh. Conversely, the fort at Great Chesters, which on the basis of size ought to hold a *cohors quingenaria peditata* has barracks with lengths of 41,70 - 42,70 m, more suitable for cavalry rather than infantry according to the scheme.

Breeze and Dobson also write that the length of the barracks at Chesters, *c* 48,70 m, supports the view that they were designed for a unit partly or wholly infantry, possibly a *cohors milliaria*. Since this article was published an inscription has come to light which shows that the fort's Hadrianic garrison was the *Ala Augusta ob virtutem appellata* (Austen and Breeze 1979). In fact, on the basis of the DoE Official Handbook, the length of the barracks in the right *praetentura* would appear to be *c* 43 m rather than *c* 49 m. The shorter length would agree with that suggested for *alae* by Breeze and Dobson.

Since the Breeze and Dobson articles, plans of the stone Hadrianic fort at Wallsend have been published (Frere 1985, 269). Here the most likely garrison is a *cohors quingenaria equitata* and the plans give every appearance of this having been the case with eight barracks and possible

stabling. The length of the barracks varies by only one metre; thus no distinction has been made here between the needs of infantry and cavalry.

And yet there is a clear distinction between the barracks at Haltonchesters (Breeze and Dobson 1974, 17). It is possible that the reason for this may lie in the configuration of the fort rather than in any distinction between infantry and cavalry. The fort of Haltonchesters is fairly unusual in having a Type D barrack arrangement, that is aligned *per strigas* in the *praetentura* and *per scamna* in the *retentura*. The shorter 'cavalry' barracks are in the *praetentura*. The area of the fort (1,65 ha) is very similar to that of Wallsend (1,61 ha) (where all the barracks are aligned *per scamna*), but the *via principalis* at Haltonchesters is set further forward leaving only *c* 39 m of building space in the *praetentura* as compared with *c* 49 m at Wallsend. The only way to accommodate the five buildings of the right *praetentura* is to align them *per strigas*. In fact, in this way the entire theoretical needs of the mounted element of the garrison could be provided in one quarter of the fort, the *balneum* taking up considerable space in the left *pratentura* (at least in the third century). The reasons for the short *praetentura* are unknown, but they may relate to topographical considerations.

Apart from Haltonchesters there is a large number of forts with barracks of markedly different lengths. It is true that many of these may be associated with *cohortes quingenariae equitatae*: Strageath I, II and III, Valkenburg Castella 1, 4, 5 and 6. Saalburg, Oberstimm and Weißenburg (Breitung), while the probable garrison of Lyne is a *cohors milliaria equitata*. But there are many other forts with barracks of different lengths apparently garrisoned by troops of only one type: thus Bu Ngem with a garrison composed entirely of legionaries; Balmuildy, Cappuck, and Drobeta probably with garrisons of *cohortes quingenariae peditatae*; Bologa with two *cohortes quingenariae peditatae*; Valkenburg Castella 1a and 2/3 with garrisons of possibly half *alae quingenariae*. It is true that the distinction between cavalry and infantry may be responsible for the different lengths at Echzell, and the same may be true at The Lunt Periods I and II and Hod Hill, but it is probably legionaries who are housed in the longer barracks at Ardoch, Newstead III and Hofheim (Steinkastell) Period I. There remains a small group of forts, concerning whose garrison very little is known, with barracks of different lengths, viz Raeburnfoot, South Shields II, Templebrough, Ellingen, Straubing (Kastell IV) and Celamantia.

In some two-thirds of the forts where barracks with different lengths are found, the barracks are on the same alignment and in one half of these examples the difference lies between barracks in the *praetentura* and *retentura*. In the remaining one third of the examples, the difference is between barracks of different alignments in the *praetentura* and *retentura* in the manner of Haltonchesters. It is noteworthy that most of these examples come from forts with garrisons probably of *cohortes quingenariae equitatae*, but this cannot be taken as an indicator of this type of garrison for there is an equal number of examples of forts with the same probable garrison where the barracks, in spite of differences in lengths, are all of the same alignment.

Figure 106 illustrates the Layout Types of those forts where the garrison is attested or probable. Little distinction is to be seen between the different units; all units favour Type A, also Types E and F denoting *per scamnum* barracks. *Alae quingenariae* show some liking for Type D, but so do *cohortes quingenariae equitatae* and *cohortes quingenariae peditatae*. *Alae*

quingenariae have the only two examples of Type C but this is not enough to be significant. Fort Layout Types cannot be taken to be indicative of garrisons.

Contubernium Totals

Some of the difficulties concerning the intepretation of the *contubernia* have been discussed above, nevertheless the suggestion remains that their number should reflect the needs of the infantry or cavalry in garrison. Figure 102 displays the number of *contubernia* of the barracks of the attested and most probable garrisons. Special *contubernia* are counted in the total as one *contubernium*. It will be seen that the numbers cover very much the same range for each type of unit. In particular the *cohortes quingenariae equitatae*, *cohortes milliariae equitatae* and *alae quingenariae* give very similar results. It is true that the infantry units show a greater tendency to concentrate on 10 *contubernia* and that the mixed units range more widely which may be thought to reflect the difference between their infantry and cavalry, but in turn their range is no greater than that of the units composed wholly of cavalry. Even the legionary examples give totals from 6 to 14.

Certainly the results do not suggest that the infantry of the *cohortes quingenariae equitatae* had fewer *contubernia* to accommodate a possible century strength of 60 men. Their totals are very similar to those of the corresponding milliary unit which presumably had a century strength of 80 men.

The figures for the *alae milliariae* stand out as being higher than the others but here the only attested evidence comes from Heidenheim. When the two special *contubernia* are deducted from the total, ten *contubernia* remain. This would suggest the possibility that the size of the *turma* here could have been 40 rather than 42. The projected length of the barracks at Aalen also would suggest a similar result. Yet there are other *ala* barracks with 12 *contubernia* where the presence of elements of a milliary *ala* is unlikely, for example at Petronell, while the barracks with 12 *contubernia* at Echzell probably housed infantry.

If distinctions based on the numbers of *contubernia* are to be seen to have any validity, it ought to be true that forts housing a part-mounted unit or units should have barracks with different *contubernium* totals. Of such forts, Strageath I and II, Corbridge II, Nanstallon, Valkenburg Castella 1, 4, 5, 6 and Weißenburg (Breitung) all comply with this pattern, even if sometimes the difference in the totals is only one. Hofheim (Steinkastell) Period III may provide a further example. On the other hand Wallsend and Künzing seem to have been served by barracks all with the same number of *contubernia*, respectively nine and ten throughout. *Cohors III Thracum Quingenaria Equitata* is attested at Künzing and the number of barracks and the presence of stables would seem to leave little doubt concerning the nature of the garrison at Wallsend.

It is perhaps to be expected that forts with probable composite garrisons will show variations in the *contubernium* totals. Thus Echzell has barracks with 9 and 12 *contubernia* possibly for auxiliary cavalry and infantry. Similarly, the garrison at Elginhaugh is unknown, but recent excavations have revealed barracks with ten *contubernia* in the *praetentura* and 6, 7, 8 and 9 *contubernia* in the *retentura*; the excavator suggests that this may be

connected to the differences between infantry and cavalry (Hanson 1987, 6). On the other hand all the barracks at Hofheim (Steinkastell) Period I have 11 *contubernia*, with the exception of Building 10 which has ten, in spite of the legionary presence in the *retentura*. It is to be noted that here the requirement may have been for infantry throughout. The rebuilding of some of the barracks in Period III with only eight *contubernia* seems to be connected with the presence of cavalry (Nuber 1986, 230).

Conversely it should be true that forts where only infantry or cavalry are present, should have barracks all with the same number of *contubernia*. This is indeed true at Fendoch and Pen Llystyn. Bar Hill, Dover, Rottweil Kastell III and Slăveni also show great consistency in their *contubernia* numbers. On the other hand Drobeta and Bu Ngem show very great variations among their centurial barracks while Hesselbach has barracks of 7, 9, 5 and 6 *contubernia* for the *numerus* troops.

These figures should be sufficient to demonstrate that there are no simple rules to govern the number of *contubernia*. Different numbers of *contubernia* may be significant but they are not necessarily so.

Contubernium Size

It was mentioned above that Baatz considered that cavalry would need larger *contubernia* than infantry. Figure 107 shows the internal living space of the *contubernia* of those forts were the garrison is attested or highly probable. Once more it is clear that the range covered by the different units is very similar, that is principally from 15 to 31 sq m. Within this range the attested *cohortes quingenariae equitatae* show a marked concentration at the lower end of the range. Thus the troopers of these units were not favoured with large *contubernia*. The same is to be said of most of the cavalry of the *alae quingenariae*. But it is the *alae quingenariae* and *milliariae* which, with one exception, provide all the examples over 30 sq m. These large examples come from Newstead IV, Chesters (right *retentura*), Echzell, Heddernheim Phase 1, Heidenheim, Aalen, Petronell, and Slăveni.

In a way similar to the numbers of *contubernia*, if there is any significance in the sizes of the *contubernia* they may be expected to vary in forts with part-mounted units in garrison. There is a variation of at least 5 sq m among the barracks at Strageath I and II, Corbridge II, Nanstallon, Valkenburg Castella 1, 4, 5, 6, and Saalburg. On the other hand the difference between *praetentura* and *retentura contubernia* at Wallsend is only 4 sq m while those at Künzing maintain a remarkably uniform size. This also is true of the several known at Weißenburg (Breitung). Similarly the *contubernia* of both barrack Forms 1 and 2 at Echzell is 30,86 sq m. This is striking since other factors suggest that the two barrack forms of the fort may be differentiated according to the needs of infantry and cavalry.

But the truth would seem to be that a wide variation in *contubernium* size is to be expected in all forts for there are many occupied solely by infantry or cavalry where considerable differences are found: Fendoch, Newstead III and IV, Chesters, Corbridge III, Pen Llystyn, Valkenburg Castella 1a, 2/3, Hesselbach, Slăveni, Drobeta. In this context the difference of *c* 5 sq m between the *praetentura* and *retentura* at Fendoch is not so great when

it is considered that the variation at Corbridge III is from 21,00 to 31,95 sq m and that even at Hesselbach it is from 9,36 to 16,52 sq m.

Living Space per Man

Maxfield's comments on the living space available to each man have been referred to above. *Inter alia* she claims that the provision for cavalry is considerably greater than that for infantry. Figure 104 sets out the space available to each man in forts where the garrisons are attested and most probably identified. According to the arguments previously presented, it is very difficult to distinguish between the barracks occupied by the infantry or troopers of the part-mounted units. Thus for these units, each barrack has been counted twice, the total available living space being divided first by 80 and then by 64. This may have the effect of spreading the distribution more widely than in reality it ought to be.

This Figure shows greater variation than some of its predecessors in this chapter. The range covered by all units is considerable, but with the modest exception of the cavalry regiments, it is fairly uniform, that is from 1,50 to 4,00 sq m. The values for the *alae quingenariae* concentrate at a higher point from 2,25 to 4,50 sq m and there are a few isolated much higher values from Echzell and Petronell. Not surprisingly, Heidenheim gives a high figure: 6,32 sq m. If the *turma* strength were 40 a high value would still result: 5,05 sq m. Certainly the difference between the cavalry and other units is not usually as marked as Maxwell claims (1986, 63).

It is not possible to calculate the variations within the forts of the part-mounted units largely because nearly always it is uncertain where the infantrymen and cavalry were placed. But it is interesting to note that at Echzell, the different barracks produce exactly the same result, 3,86 sq m, if Form 1 is taken to be for infantry and Form 2 is taken to be for cavalry and the areas of the special *contubernia* are not included in the calculation. This contrasts with forts, apparently housing wholly infantry or cavalry where there is considerable variation among the barracks. Examples come from Fendoch where the area in the *praetentura* is 3,13 sq and in the *retentura* 2,41 sq m. There is considerable variation between the individual barracks at Pen Llystyn and Valkenburg Castella 1a and 2/3. Nevertheless it remains possible for the values from forts to remain very consistent, for example Bar Hill and Slăveni. But the verdict must be that differences between the theoretical living space per man within the same fort is not necessarily significant.

Contubernium Proportions

It has long been considered a possibility that in cavalry barracks the *papilio* might take up a smaller proportion of the *contubernium* than in infantry barracks, the reasoning being that the cavalry would require more space in the *arma* for their equipment. This argument has been expressed most recently in relation to the garrisons of Valkenburg Castella 1a and 2/3 (Glasbergen and Groenman-van Waateringe 1974, 13, 18-19). Figure 108 displays the proportions of the *papiliones* of the barracks from those forts where the garrison is attested or fairly certain. Once more the evidence given by each of the units is remarkably similar. It is true that there is a trend for the *alae quingenariae* to concentrate between 40 and 60 %, and for the *cohortes quingenariae equitatae* to have a large number of values

between 60 and 80 % as well as a further concentration round 50 % which may be thought to represent the different needs of cavalry and infantry. On the other hand this latter distribution is almost exaclty the same as that for the *cohortes quingenariae peditatae*.

Once more it is true that many forts garrisoned by part-mounted units display considerable variations among their own barracks, for example Strageath I (48,00 to 76,98 %), II (25,20 to 70,68 %), Valkenburg Castellum 4 (25,74 to 64,29 %), Castellum 5 (41,67 to 88,10 %), Castellum 6 (46,15 to 71,43 %), Saalburg (50,00 to 72,73 %). But precisely the same is true of forts garrisoned by the same type of troops throughout, for example, Pen Llystyn (51,61 to 70,80 %) and Petronell (31,58 to 59,46 %). On the other hand some part-mounted garrisons show great consistency in the proportions of their *contubernia*: Nanstallon, Valkenburg Castellum 1, Weißenburg (Breitung) and Künzing. Furthermore, the proportions of the *papiliones* at Elginhaugh and Echzell are 50 % throughout. The same 50 % proportion was planned for all the barracks known for the infantry garrisons at Bar Hill and Rottweil Kastell III and for the cavalry at Celamantia. Certainly no general rule can be established for the proportions of the *contubernia*.

Further Suggestions

Officers' Quarters

It ought to be true that the officers' quarters constitute the most important part of the barrack and thus may demonstrate differences and similarities not shown in the rest of the barrack. It may be thought that at least there might be a difference between the size of quarters theoretically occupied by two cavalry decurions and those occupied by one infantry centurion, although gradations according to the type of cavalry or infantry barrack might be too much to hope for.

Figure 109 shows the areas of the officers' quarters of those forts whose garrison is attested or at least very likely. No very radical differences between the different units are to be seen. Most of the officers' quarters of all units are to be found ranging fairly evenly between 62,50 and 150,00 sq m. But it should be noted that the few examples over 175 sq m come almost exclusively from *ala* barracks, namely from Carzield, Corbridge 1A, Echzell (Form 2), Heddernheim Phase 1 and Petronell. The largest example is the 308,00 sq m of the barracks at Heidenheim.

Once more forts with part-mounted units in garrison show officers' quarters with considerably different sizes from the same fort, viz Strageath I and II, Corbridge II, Nanstallon, Caerhun and Valkenburg Castellum 1. It is not easy to detect any clear patterns at Strageath, but it would seem to be signficant that the officers' quarters in the *praetentura* at Caerhun measure *c* 150 sq m while the two in the *retentura* measure *c* 200 sq m. Against this it must be said that the officers' quarters at Wallsend and Künzing show no real variation throughout their forts and the same is true as far as is known for Weißenburg (Breitung). Many forts apparently garrisoned entirely by infantry or cavalry as far as is known have officers' quarters of surprisingly uniform size: Fendoch, Bar Hill, Pen Llystyn (the single real exception being P5), Gelligaer and Slăveni. On the other hand some such forts have considerable variations: Chesters, Hesselbach, Petronell and Drobeta. Elginhaugh shows large differences between the officers' quarters

of the *praetentura* and the *retentura* while the areas of the quarters of Forms 1 and 2 at Echzell are 172,50 and 241,50 sq m respectively.

Men's Quarters

It was seen in Chapter 3 that the sizes of the men's quarters varied much more than that of the officers' quarters. It is possible that these differences relate to different garrisons. Figure 110 sets out the areas of the men's quarters from those forts where the garrison is attested or fairly certain. It can be seen that the areas do not vary very much from unit to unit but rather all cover the range from 200 to 375 sq m. To this must be added the examples of over 400 sq m from the *ala* barracks at Newstead IV, Echzell, Heddernheim, Heidenheim and Petronell. Further it should be noted that the quarters of the *cohortes milliariae equitatae* do not fall under 287,50 sq m and that the quarters of the *cohortes quingenariae equitatae* have a concentration under 200 sq m lacking for the other units. In fact this concentration derives entirely from the *latus praetorii* barracks of Valkenburg Castella 1, 4 and 5. These barracks are atypical and, in spite of attestation, the identity of the garrison of Castellum 1 is far from certain (see below).

When the variations among the barracks of the individual forts is examined a familiar picture emerges. Many of the forts with part-mounted garrisons have men's quarters which vary considerably in size, viz Strageath I and II, Corbridge II, Wallsend, Caerhun, and Valkenburg Castella 1, 4, 5 and 6. On this occasion it is interesting to note that at Wallsend, Caerhun and Valkenburg Castella 1, 4 and 5, the variation is between the *praetentura* and the *retentura*. But Künzing has men's quarters of the same size throughout the fort, while those known from Nanstallon are very uniform. Equally forts occupied by infantry or cavalry only also show variations in the sizes of their men's quarters (Fendoch, Slăveni, Drobeta); on the other hand these too can be very consistent (Bar Hill, Gelligaer). Echzell again shows great differences between its Form 1 and Form 2 barracks, respectively 521,30 and 420,00 sq m. Elginhaugh also has comparable differences between the barracks of the *praetentura* and *retentura*.

Thus the sizes of the men's quarters do not give any clear indications of garrisons. The results are very similar when the total living space for the same barracks is calculated. This is shown by a graph of very much the same shape (Fig 111).

Relationship between Officers' and Men's Quarters

The difference in the proportions of the overall length taken up by the officers' quarters in the legionary fortresses and in the auxiliary forts has been discussed above. There remains a possibility that this proportion may vary among the auxiliary barracks themselves in relation to the type of unit in garrison. Figure 112 sets out the proportions in those forts where the garrison is attested or at least very likely. Again no very conclusive pattern emerges. Most striking is the fact that the *ala* barracks provide a very wide range of readings from *c* 16 - 32 % which is almost exactly the same as the range for the *cohortes quingenariae equitatae*. The *cohortes milliariae equitatae* concentrate at the rather lower point of 19 - 25 % and the *cohortes quingenariae peditatae* at a rather higher point of *c* 20 - 30

%. Thus the proportions would seem to make no clear distinctions between the unit types or between infantry and cavalry.

Again some of the forts with part-mounted garrisons show considerable differences in the proportions within the one fort. Perhaps most significant are Wallsend and Caerhun where the differences are between the barracks in the *praetentura* and *retentura*, furthermore among barracks all aligned *per scamna*. The distinction is particularly clear at Caerhun between *c* 27 % and *c* 32 %. Yet, as usual, Künzing maintains the same proportions throughout the fort. Again forts with troops all of the same kind have barracks with considerable variation, for example Drobeta and Slăveni, while others show great consistency, for example Fendoch, Bar Hill, Gelligaer. Again the proportions of the barracks at Elginhaugh show great variation as do those of Form 1 and Form 2 at Echzell. Thus these proportions again do not follow any rules but are merely a further factor to be taken into consideration.

Contrasting Barracks

It is clear that very few of the elements of the barrack which might have been thought to be significant can be linked with any certainty either to garrison types or even to infantry or cavalry. Yet there are forts where the different characteristics of the barracks within the same fort are sufficiently clear cut to suggest that they are significant.

FENDOCH

Differences between the barracks of the *praetentura* and *retentura* at Fendoch (Plan 6) have been cited to question the interpretation of the garrison as a *cohors milliaria peditata* which would require ten, presumably similar, infantry barracks (Breeze and Dobson 1969, 19; Holder 1980, 11; Hassall 1983, 114). The differences in question here are in the proportions of the *contubernia* between the *praetentura*, where the *papiliones* take 46,99 % of the whole, and the *retentura* where they take 66,67 % of the whole. The foregoing analysis in this chapter has shown that the different proportions of the *contubernia* have no necessary association with infantry or cavalry. But there are other differences between the two sets of Fendoch barracks. They are all of Type A, of the same length and have the same number of *contubernia*. Their officers' quarters also are of the same length, but the barracks in the *praetentura* are about one metre wider. This has the effect of making the areas of officers' quarters, men's quarters, *contubernia* and total living space proportionately larger. These differences have been shown not to be significant in terms of garrisons and the explanation for them here must lie in the different buildings to be accommodated in the two halves of the fort. The *retentura* needed six barracks, the *praetentura* four barracks and two narrow store buildings. All the buildings were aligned *per strigas* and in order for the buildings to fill the rectangular space, the width of the *praetentura* barracks was increased. There is no need to search here for a composite garrison to explain the differences. In any event it is possible that the senior centuries would be placed in the more spacious barracks of the *praetentura*.

STRAGEATH

The forts at Strageath have often been cited above as illustrative of the fact that forts housing *cohortes quingenariae equitatae* might be expected to have barracks of different composition for infantry and horsemen. Frere (forthcoming) notes that the four barracks at the corners of the Flavian fort (Plan 7) (Strageath I) (XV, VII, IX, I) are very different to the others in the fort. Their officers' quarters are considerably larger, *c* 135 sq m as opposed to *c* 85 sq m (that of I is much larger, 237,90 sq m and has prompted the suggestion that it was occupied by a legionary centurion); further they have fewer *contubernia* seven or eight rather than nine or ten, although VI has only seven. Also these *contubernia* may be extra-large in comparison with those of the other barracks. In fact in terms of internal living space, this is true only of VII which has *contubernia* of *c* 27,30 sq m. Most of the other barracks have *contubernia* of *c* 22 sq m, but those of III and IV have *c* 28 sq m. The officers' quarters of I and IX take a greater proportion of the overall length of their barracks than all the others which are fairly uniform at *c* 25 %, while all four take a greater proportion of the overall area of the barracks, *c* 30 % as opposed to *c* 25 % (that of I is much larger still at 48,09 %). Finally it should be noted that all four are Type A barracks while all the others in the fort are of Type B (with the possible exception of VI).

These are the clearest ways in which these barracks may be distinguished from the others. But there are ways in which they themselves vary. Barrack VII is some six metres shorter than the others, while the *papiliones* of all the barracks in the *praetentura* take a much higher proportion (*c* 70 %) of the whole of the *contubernium* than those in the *retentura* (*c* 50 %). But on balance the four barracks seem to be sufficiently different to the others to warrant the assessment that they were designed for a different purpose. There is no epigraphical evidence for the garrison, but to see in XV, VII and IX accommodation for six *turmae* of two *cohortes quingenariae equitatae* is reasonable.

The accommodation of the two different units would appear to be identifiable on the basis that Buildings XV, XIV, XIII, VII, VI, IV, and III have their officers' quarters separated from the men's quarters by a small gap. This leaves XII, XI, X and IX with integral officers' quarters. Of course such differences may merely reflect different building groups.

The eight barracks of the Antonine I fort at Strageath (Plan 8) (Strageath II) lead to the interpretation of the garrison as a *cohors quingenaria equitata* (Frere forthcoming). Thus two of the barracks ought to accommodate the four *turmae* of the unit. Frere assigns Buildings V, VII, X, XI and XII to infantry on the basis that they have ten *contubernia* each. Of the remaining barracks, VIII and XVI have seven *contubernia* each and XVII a maximum of eight. XVI is assigned to horsemen on the grounds of its larger officers' quarters. In fact it is doubtful that the greater size of these quarters is significant. My figures give an area of 129,25 sq m as opposed to the 107,25 sq m of adjacent XVII. Buildings V, VII and VIII in the right *praetentura* all have officers' quarters of c 100 sq m and VIII is thought to have housed horsemen. The greater size of the officers' quarters of XVI is the product of the greater width overall of the barrack, by about 1,50 m. In fact the longitudinal wall lines of XVI are not parallel and this has the effect of making the barrack larger than was intended. The length proportions of the officers' quarters in the *praetentura* are all very much the same at *c* 30 %.

Thus the only basis for the recognition of barracks for the horsemen here is the number of *contubernia* and Buildings XVII, XVI and VIII all come equally into question. It must be considered that the smaller numbers of *contubernia* are merely the consequence of an under strength garrison. In fact the three barracks of the *retentura* (XIII, XI, X) appear different in that they are all *c* 9,50 m in width, much greater than those in the *praetentura* (with the exception of XVI). It is possible on the balance of the barrack evidence that once again there is here a composite garrison. Of course the difference between the barracks might merely be the consequence of different builders.

The barracks in the *praetentura* and *retentura* of the Antonine II fort at Strageath (Plan 9) (Strageath III) appear to form two distinct groups. All the barracks of the *praetentura* have eight or nine *contubernia* while all those in the *retentura* have ten or more. The *retentura* barracks also are generally rather narower by *c* 1,50 m. In consequence the officers' quarters of the *praetentura* are considerably larger with the exception of Building I. A typical size would be 160 sq m (although those of XIII and VI are smaller *c* 130 sq m). In the *praetentura* the officers' quarters of XII and VII are larger than the others; again in XII some of this extra size is the consequence of non-parallel longitudinal barrack walls. The proportion of the overall length taken by the officers' quarters generally is very large, over 35 %, those of VII being the greatest with 38,15 %. The internal living space of the *contubernia* varies from barrack to barrack from 22,25 sq m (VII) to 45,65 sq m (VI) without apparent pattern. All the barracks are of Type B.

Building I is different to the other barracks in the *retentura*. It has a width similar to the barracks of the *praetentura* and the largest officers' quarters in the fort (193,73 sq m). Frere believes that this barrack is for horsemen. It is probable that these officers' quarters take up 42,37 % of the length of the barrack, leaving just six *contubernia* whose internal living space of 35,60 sq m is similar to the larger examples in the *praetentura*. The length proportion of the other *retentura* barracks is *c* 29 %.

The composition of the barracks would suggest that the *praetentura* barracks housed six similar bodies of men, either *centuriae* or *turmae*. If Building I indeed housed horsemen, then it would seem likely that the other *retentura* barracks housed infantry. This group could then be seen to be four *centuriae* and one and a half *turmae* of a *cohors quingenaria equitata*.

ELGINHAUGH

Elginhaugh (Plan 10) provides one the clearest examples of a fort with two clearly differentiated groups of barracks although all are of Building Type B. The four barracks in the *retentura* are some three metres shorter that the probable seven in the *praetentura*; all the barracks are of very much the same width. In spite of this the officers' quarters in the *retentura* are considerably longer in three of the four barracks there ranging from 17,50 to 20,00 m, while all in the *praetentura* are *c* 12 m long. The length proportions of the officers' quarters in the *praetentura* are all 25 % and those of the three longer examples in the *retentura* range from 38,34 to 43,95 %. Only in Building 2 are the officers' quarters comparable to those in the *praetentura*. From these dimensions it follows that the numbers of *contubernia* in the *retentura* barracks are considerably less than those in

the *praetentura*. All the barracks in the *praetentura* have ten, while the numbers in the *retentura* are six, seven, nine and eight. Except for those of Building 4 which are slightly larger, there is no difference in the size of the *contubernia* nor in their proportions.

The layout of the fort is of Type D, that is with the barracks in the *praetentura* aligned *per strigas* and those in the *retentura per scamna*. This may explain the differences in the overall lengths but not the larger officers' quarters in the *retentura*. It is difficult to escape the conclusion that these barracks were for different troops, probably horsemen while the infantry were accommodated in the *praetentura*. In spite of this there would appear to be no clearly identifiable stables. Only Building 8 takes a different form and probably is a store while the others are clearly recognisable Type B barracks. If it is accepted that eight *turmae* are accommodated in the *retentura* (with their mounts possibly in the fort annexe which unfortunately could not be examined), the garrison could be part of a *cohors milliaria equitata* or two under strength *cohortes quingenariae equitatae*.

On the other hand it might be preferred to consider that the fort was occupied entirely by infantry, the more elaborate officers' quarters of the *retentura* merely reflecting the status of the senior centurions. In this connection Buildings 3 and 4 are particularly interesting. The officers' quarters here appear to have been joined together. If this were in fact to be occupied by just one centurion, the remaining 13 *contubernia* of the two barracks added to those of Buildings 1 and 2 would make a total of 30 in the *retentura*, the theoretically correct total for three centuries. There are seven good centurial barracks in the *praetentura* making a total of ten centuries. In this way the accommodation meets exactly the requirements of a *cohors milliaria peditata*. It might be noted further that the length of the *praetentura* barracks is the same as those of Fendoch.

CAERHUN

Webster remarked that the ten barracks at Caerhun (Plan 11) 'are all of about the same size' (1959, 206), and Breeze and Dobson stated that Caerhun had 'ten buildings of equal size' (1974, 14). In terms of lengths this observation may be broadly true, but it is not true of their widths. First it must be said that there is a difference in the lengths of the officers' quarters, these being *c* 14,5 m in the *praetentura* and *c* 17 m in the *retentura*. These figures give proportions of the whole respectively of *c* 27 % and *c* 32 %. Furthermore the areas of the constituent parts of the barracks are very different. The officers' quarters of Barracks I, IV and VI in the right *praetentura* measure 141,04 sq m, 149,89 sq m, and 148,81 sq m while those of Barracks XVII and XIX in the left *retentura* measure 209,26 sq m and 189,17 sq m. The differences between the men's quarters is not so great, *c* 320 sq m in the *praetentura* as opposed to *c* 350 sq m in the *retentura*. This in turn serves to emphasise the different nature of the officers' quarters in the different parts of the fort. This is shown by the greater difference between their area percentages: 30,51 %, 30,66 %, and 30,23 % in the *praetentura* and 35,84 % and 35,28 % in the *retentura*. These differences cannot be explained by different barrack Type or alignment since all barracks are of Type A and are aligned *per scamna*.

These differences would seem to be significant when the possible garrison is considered. There would appear to be a total of six very similar

barracks in the *praetentura* (although the officers' quarters of those in the left *praetentura* are unknown) and two barracks in the *retentura* with two further buildings, possibly stables. This is precisely the theoretical requirement for a *cohors quingenaria equitata* and it may be suggested that the differences between the barracks reflect the different needs of the infantry and cavalry. The fact that the two further buildings in the *retentura* may be interpreted rather as stores than stables (see previous chapter) does not affect this argument. If this hypothesis is correct, it has been shown above that it applies in detail only to Caerhun and cannot necessarily be applied to other forts with the same type of garrison. It is unfortunate that the numbers of the *contubernia* of the Caerhun barracks is unknown.

ECHZELL

The Echzell barracks Form 1 and Form 2 may also very interestingly be compared (Plan 12). On this occasion the two Forms are not divided between the *praetentura* and *retentura*, but as far as is known are distributed in pairs round the fort. Form 1 is some four metres longer than Form 2 but their widths are the same. The officers' quarters of Form 2 are six metres longer than those of Form 1; a difference in area of 241,50 sq m as opposed to 172,50 sq m. The proportion of the overall length taken by the officers' quarters of Form 1 are 21,88 % and by Form 2 32,91 %. The corresponding area proportions are 23,79 % for Form 1 and 34,97 % for Form 2. Form 1 has ten standard *contubernia* with additional special first *contubernium* and end *contubernium*; Form 2 has eight standard *contubernia* and an additional special end *contubernium*. Both Forms have *contubernia* of the same size and proportions. All the barracks are of Building Type A.

The identity of the garrison at Echzell is not known, but it is thought to have been an *ala quingenaria* and a *cohors quingenaria peditata*. It is reasonable to suggest that the cavalry were accommodated in the barracks with larger officers' quarters and eight standard *contubernia* while the infantry were accommodated in the barracks with the smaller officers' quarters and ten standard *contubernia*. The only other element of the barracks which distinguishes between the two types is the special first *contubernium* in the Form 1 barracks. Of Type 'd' this is reminiscent of examples from the legionary fortresses and raises the question of whether a legionary cohort was present; certainly the Form 1 barracks are much larger than standard auxiliary barracks. Once more it must be said that although the distinctions between the two kinds of barrack at Echzell are very clear, these distinctions cannot be made into a rule for the recognition of infantry and cavalry barracks elsewhere.

DROBETA

Hassall has discussed the fort of Drobeta and, largely on the basis of the probable presence of ten barracks has suggested that it was designed for a *cohors milliaria peditata* (1983, 102-103). Since Hassall wrote, a new plan of the fort has been published which complicates the analysis (Davidescu 1980, 74) (Plan 13). It would now seem that the fort has a total of only eight certain barracks; the two buildings (9 and 12) lying across the width of the fort behind the *latus praetorii* now take the form of Building Type H, that is they no longer have projecting officers' quarters. They now have much more the aspect of stores and this impression is furthered by their

internal divisions which do not clearly suggest a division between officers' quarters and the rest of the barrack. Indeed they are similar to the two narrow store buildings next to the *via principalis* in the *praetentura*.

In his analysis Hassall does not comment on the very considerable differences between the barracks of the *praetentura* and *retentura*. The barracks in the *retentura* are 4,50 m longer than those in the *praetentura*. The differences in widths is more complicated. All the barracks in the *praetentura* have widths of 9,00 m. In the *retentura*, Buildings 10 and 13 have widths of 10,00 m while Buildings 11 and 14 have widths of 8,00 m. The length of the officers' quarters in the *praetentura* is a little longer than those in the *retentura* and this has the effect of making their areas in Buildings 1, 2, 4, 5, 10 and 13 very much the same, *c* 120 sq m. Those of Buildings 11 and 14 are considerably smaller, 96,00 sq m. The proportions of the overall length taken by the officers' quarters consequently is very different, 29,91 % in the *praetentura* and 23,89 % in the *retentura*.

A further problem concerns the *contubernia*. The new plan now shows eight separate *contubernia* in Buildings 1 and 4 at the front of the *praetentura*, although the other barracks still show the four or five double breadth *contubernia* commented on by Hassall. It must be considered at least possible that all the *contubernia* should be divided which would in general produce eight *contubernia* in the barracks of the *praetentura* and nine in the barracks of the *retentura*. In this event those in the *praetentura* would be quite small, 13,26 sq m; those in Buildings 9 and 14 rather larger, *c* 18 sq m; while those of Buildings 11 and 14 would be *c* 15 sq m. These figures produce considerable differences in the total living area available to the men in the different barracks, respectively 106,08 sq m, *c* 162 sq m and *c* 135 sq m.

It will be noted that the eight barracks now constitute the theoretical requirement for a *cohors quingenaria equitata*. It is even possible to consider that Buildings 9 and 12 provide the necessary stabling; certainly they are large enough. But, of the eight barracks, no two stand out as being significantly different to the other six in a manner analagous to those at Caerhun. The four barracks in the *praetentura* are all very much the same, thus one of the pairs in the *retentura* is most likely. The balance of probability would seem to go with Buildings 10 and 13, these are the barracks facing the possible stables and the ones with the largest officers' quarters. This would leave two infantry centuries at the back of the *retentura*. It may be objected that infantry should be placed in the longer *retentura* barracks, but it has been shown that infantry is often to be found in barracks with eight *contubernia*. It must be questioned whether the differences between the barracks at Drobeta are significant at all. The reduced length of those in the *praetentura* may be explained simply by the desire to construct a rather elaborate and impressive colonnade along both sides of the *via praetoria* and the *via principalis*.

Hassall also suggests that Buildings 7 and 8 to the rear of the *latus praetorii* may also have been barracks. These buildings also were redrawn for the new plan. In both examples, the room nearest to the *principia* now projects to both sides of the remaining four *contubernia* like rooms rather in the manner of a hammer-head. The overall shape and dimensions of the these buildings is not like those of any other known barracks. On the other hand the area of the projecting rooms (91,00 sq m) is the same as the officers' quarters of Buildings 11 and 14. Furthermore, the internal areas

of the other rooms (24,40 sq m) is quite suitable for *contubernia*. It must be considered possible that each of these barracks housed one *turma*.

Thus it seems possible that the fort accommodated the six centuries and four *turmae* of a *cohors quingenaria equitata* with two additional *turmae*. Alternatively, a total of eight centuries and two *turmae* is possible. It should be noted that among the troops said to have been stationed there by Davidescu are *Cohors I Sagittariorum Gordiana Milliaria Equitata* and *Cohors II Hispanorum Scutata Cyrenaica Equitata*. Indeed Hassall notes the former, and in spite of the evidence for *Cohors III Campestris CR*, the interpretation of the fort as one designed for a *cohors milliaria peditata* now has many difficulties.

Conclusion

Thus several examples of forts where the make-up of the barracks would suggest that they were occupied by different kinds of soldiers. It will be noted that no general rules can be deduced from them, but rather every example must be considered on its own merits.

More Problem Garrisons

BEARSDEN

Breeze has suggested the possibility that Buildings 2 and 3 and Buildings 5 and 7 in the *praetentura* at Bearsden form two pairs of buildings, each pair constituting the equivalent of a full barrack (1984, 43) (Plan 14). Breeze is here drawing by analogy on Hassall's pairing of facing buildings at Birrens across the intervening access street (Hassall 1983, 111-112).

If Buildings 3 and 7 are considered as separate barracks certainly it is true that they are much smaller than the average. At *c* 35 m they are among the shortest auxiliary barracks, but by no means like the 'half barracks' of *c* 25 m (eg Rough Castle, Crawford). In spite of this, they still have eight *contubernia* which means that the officers' quarters are among the very smallest of all examples, just *c* 30 sq m. Furthermore the internal living space of their *contubernia* of *c* 12 sq m is only about half that of contemporary 'normal' barracks, and is very similar to those of the half pairs at Birrens. Thus it is entirely reasonable to see the complement of each *contubernium* as four men rather than eight and for one decurion to be accommodated in the officers' quarters rather than two. Given this, there is nothing unreasonable in Breeze's suggestion.

It might be thought that this conformation would be well-suited to *turmae* for each decurion could be housed separately and the two *turmae* could be housed, four per *contubernium* on separate sides of the dividing street, but it is very probable that some infantry were present in the garrison at Birrens and infantry alone formed the garrison at Ravenglass where the same Building Type has been noted. At Bearsden the internal details of the buildings are not sufficiently well known for it to be possible to proceed further with the argument, but it would seem preferable to see two or three small and separate barracks rather than 'paired' buildings. The small barracks could accommodate one *turma* each and the remaining buildings would appear to provide suitable stabling space.

BIRRENS

The barracks at Birrens (Plan 15) are of the very unusual Type F. Professor Robertson's interpretation of them, supported by her findings from Cardean, is that of a building with a double central wall or 'median rib' (1975). So envisaged, it has been shown that the barrack is of a size and composition entirely reasonable for the context. Again this interpretation is supported by the single Type F barrack from Ravenglass Phases 2 and 3.

Hassall has argued persuasively that the buildings here should be paired across the intervening access streets rather than across the narrow spaces between them (1973, 110-112). The resultant *contubernium* (25,52 sq m) is of normal size and it has been shown that the 1 : 1 proportion of *papilio* and *arma* is the most common in auxiliary barracks. Such an interpretation at Birrens allows nicely the accommodation of the epigraphically-attested garrison, including stabling for the troopers' horses.

But questions still remain with this type of barrack. Most of all it continues to seem strange that the '*papiliones*' and the '*arma*' of the men should be separated by a street. This problem could be resolved if four men each occupied one half of the '*contubernium*', but this would lead to a division in the officers' quarters which might be thought to be unacceptable to the centurions. On the other hand such a division would be appropriate for two decurions. As pointed out in the discussion of Bearsden, one half of the pair in barracks of this Type is very suitable for the accommodation of one *turma*.

Little is known about the internal divisions of the buildings at Birrens, but Buildings XVII and XVIII have, following Hassall's interpretation, eight half *contubernia* each. Each of these buildings would be appropriate for the accommodation of one *turma* with one decurion in quarters of 38,03 sq m (precisely half the area of the officers' quarters at Chesters) and four men in each *contubernium* of 12,76 sq m (internal living space). There are 32 long buildings at Birrens divided equally between the *praetentura* and *retentura*. Hardly any indication of internal division of these buildings was found in the *praetentura* in contrast to the *retentura*. Given that the horses of each *turma* require a stable of the same size as the barrack of its troopers, the buildings at Birrens suit prefectly the requirements of an *ala quingenaria*. The length of the buildings is ideal for the reception of 36 horses tethered to the rear walls and would give each a width allowance of 1,10 m and a very adequate depth allowance of *c* 2,5 m.

It is possible that not all the buildings in the *retentura* are barracks, in particular the two on the *sinister* side which are some seven metres shorter than the others and which are referred to by Hassall. This would imply that the '*ala*' was two *turmae* under strength and that one or two of the buildings in the *praetentura* could be used as general stores.

The main problem with this interpretation is that *cohortes milliariae equitatae* are attested at Birrens: RIB 2093, 2097, 2100. But these three inscriptions are all dedicatory inscriptions to deities and do not relate to construction in or of the fort; they need not necessarily denote the garrison.

Relating these arguments briefly to Ain Sinu I, it will be seen that the distance between '*papilio*' and '*arma*' there is some 30 m which seems excessive (even for recruits (Hassall 1983, 121)) in comparison with the

standard *c* 5 m of Birrens. On the other hand, the '*papiliones*' are twice as large as the '*arma*' which would tend to support the pairing hypothesis. Certainly the blocks are arranged in complementary pairs although the row of '*papiliones*' in the south-east corner of the fort appears to take a different form thus spoiling the pairing. Certainly this final block is placed considerably closer to its 'pair' than the others in the fort but this need not be significant since special stores could have been housed in this area. If the rooms are to be considered as *contubernia* the internal area of a 'pair' of some 45 sq m makes them considerably larger than any other *contubernia* including those of Lambaesis. The wide spacing of the buildings would facilitate the movement of vehicles or horses in the fort and yet the very narrow gates speak against such possibilities as a stores-base or specialist cavalry depot. The likelihood remains that the buildings were designed to accommodate troops of some kind.

HOD HILL

The barracks at Hod Hill (Plan 16) divide into two groups: those in the *latus praetorii* (I - VI) interpreted by Richmond (1968) as accommodation for legionaries, and those in the *praetentura* (VII - XIII) interpreted as accommodation for auxiliary cavalry.

The Hod Hill barracks have long been considered to be very unusual, but in terms of their overall lengths and widths they are in not exceptional for the Claudian/Neronian period. Their overall dimensions of *c* 35 × 8 m fall in the middle of the auxiliary concentration for the period. To deal first with the barracks of the *latus praetorii*, their officers' quarters of *c* 11 × 7 m again are typical of contemporary auxiliary barracks. On the other hand the men's quarters of *c* 25 × 4 m are exceptionally short and narrow for any period. Thus the length proportions of the officers' quarters at *c* 32 % are very large, while even more so are their area proportions of *c* 40 % (51,53 % in Barrack II). Only contemporary Waddon Hill is comparable, but there the dimensions are very uncertain.

The number of six *contubernia* can be matched at Brandon Camp Building II and at Zurzach while seven *contubernia* is quite common in the period, for example at Nanstallon and Valkenburg Castella 1a and 2/3. But the small size of the men's quarters means that the size of the *contubernia* is very small: 12,08 sq m in I and II, 5,84 sq m in IV. But contemporary *contubernia* of *c* 12 sq m are not so unusual. They are to be found at Waddon Hill, Brandon Camp (Building II), Great Casterton Fort I, Waddon Hill and Hüfingen (Kastell 2 Ia Pd 1). No examples compare with the 5,84 sq m of IV. Most contemporary auxiliary barracks have *contubernia* of *c* 20 sq m. The total living space of Barrack I is 72,48 sq m.

If these barracks contained a full century (as their excavator believed) the living space per man would be a mere 0,91 sq m. This is much less than the figures discussed earlier in the Chapter and, as Maxfield points out, even compares poorly with the 1,16 sq m allowed per man in the tented accommodation of the temporary camp (1986, 65). But it has been shown above that very small *contubernia* are not uncommon at this early period. Assuming that eight men occupied each *contubernium* of the small barracks at Nanstallon, the living space per man is *c* 3 sq m. If each *contubernium* at Hod Hill accommodated four men, their living space would be 3,02 sq m each. The dimensions of the barracks suggest that they accommodated an auxiliary centurion with a reduced century, perhaps of just 24 men. But it

has been shown that size alone is a very poor guide. The size of the *contubernia* in Building 6 at Bu Ngem is only 10 sq m and the total living space of the barrack 76,50 sq m.

Barracks VII - XIII were thought to be be for cavalry accommodating seven *turmae* on the basis of one troop per barrack. Their officers' quarters are much more varied in composition and this has been discussed in relation to seniority in Chapter 3. Those of Barracks X and XI are among the smallest in all auxiliary barracks. Of contemporaries, only Buildings III and I at Nanstallon provide smaller examples. Certainly it reasonable to suggest that each contained just one decurion rather than two. Again the men's quarters are among the smallest of all examples. There are two smaller examples from The Lunt but these in fact have been reduced from their original length. The six or seven *contubernia* have internal living areas of *c* 8 - 12 sq m, very similar to those of the right *latus praetorii*. The same reasoning as that above would suggest that each *contubernium* housed four men. On the other hand, if each barrack housed 32 men, the living space per man would be in X 1,57 sq m, in VIII 2,27 sq m, and in VII 2,64 sq m. These figures are small but acceptable.

It is clear that the Hod Hill barracks are unusual, but the parallels cited above show that, during the Claudian/Neronian period, such small barracks are to be expected for reduced centuries or single *turmae*

DOVER

The *Classis Britannica* Forts I and II Period 1 at Dover (Plan 17) have very distinctive barracks. They are all of Building Type F, but their length of 35 m is considerably less than that of most auxiliary barracks. Furthermore they do not appear to have any officers' quarters and are divided into eight equal *contubernia* which are not subdivided. The internal areas of the *contubernia* in Forts I and II is *c* 18 sq m. This is a little less than that of most contemporary barracks but could still accommodate eight men. Neither fort could be excavated in full, but Philp believes that each one had a total of ten such barrack buildings.

Roman naval personnel served in a warship under a trierarch. Starr (1960) has shown that these crews were referred to as *centuriae* in the Mediterranean; he has also suggested that ten ships made up a squadron. Thus Philp proposes that each of the ten barracks constitutes the accommodation for one ship's company. It has been seen that a certain flexibility governs the term *centuria*. In turn, the ten barracks suggest that one squadron of the *Classis Britannica* was based at Dover.

Philp uses the form of the barracks themselves to give force to this intepretation. If the men at Dover were sailors, it is probable that most of their equipment would have been stored on board ship hence the absence of *arma* in the *papiliones*.

Starr explains that each crew had naval and additional military functions. The captain (trierarch) had command of the ship, but a centurion was responsible for military duties together with several other junior officers and clerks; certainly the centurion did not have the close relationship with the men of his century as did the infantry centurion. Philp writes that this is shown in the barracks by the apparent absence of officers' quarters. Philp believes that senior and junior officers were more likely to share

other accommodation such as the more elaborate B19 and B28 next to the *via principalis*. It is only in Periods 2 and 3 that more normal military practice is to be seen in the extensions to barracks B24 and B32 which may show that the centurion has joined his century. It is possible that this indicates a more important shore role for the troops than before and presages the military patrols of the Saxon Shore defence.

Breeze (1983a) has suggested that the barracks at Dover should be interpeted in the same way as that proposed by Hassall for Birrens and that the estimate of the garrison should be reduced to at least half the 600/700 suggested by Philp. He also states, reasonably, that B19 may in fact be a hospital and that the officers of Fort II may be accommodated in the intervallum buildings B34 and B32. This would reduce the number of barracks to eight. If Breeze is to be followed the internal living space of the *contubernia* in Fort I will be 34,66 sq m and that in Fort II *c* 36 sq m. *Contubernia* of such size would be extraordinarily large, much larger than most legionary *contubernia* and matched in contemporary *Britannia* only in the St Alban Wood Street barracks in London and by the double breadth *contubernia* at Slack. It is better to regard the barracks as separate buildings. Furthermore the pairing of the barracks still does not solve the problem of the missing officers' quarters. If two of the *contubernia* are taken for an officer, which would give the quarters the acceptable length proportion of 25 %, this would leave only six for the men which would be a very low figure. Perhaps more likely is the quartering of the officer in one *contubernium*. The area of his quarters would then be *c* 30 sq m if the barrack were single or *c* 60 sq m if the barracks were paired. In either event these are very low figures.

One scheme which would produce acceptable figures is to imagine the barrack paired on both sides of the *via praetoria* rather than across the access streets. If four of the *contubernia* are taken for officers' quarters to give them 25 % of the total length, the area of the quarters will be *c* 100 sq m. The 12 *contubernia* remaining will have a total living space of *c* 204 sq m. The fort would then accommodate some five centuries. But the two barracks in the intervallum would be anomalously placed for any such interpretation. It probably is best to regard the barracks as individual buildings and Philp's analysis must remain at least a possibility.

It appeared at one time that the barracks of the *Classis Britannica* at Boulogne took a very similar form (Philp 1981, 109), but now it is clear that the barracks so far excavated there are of Type A and that their size is that of conventional auxiliary barracks (Gosselin and Seillier 1981). But the fort at Boulogne is very large (12 ha) and it is possible that barracks similar in form to those in Dover lie elsewhere in the fort.

VALKENBURG Castellum 1

The composition of the garrison at Valkenburg Castellum 1 (Plan 19) has long been in dispute but has most recently been discussed by Hassall (1983, 108-110). There is evidence for the presence of the *Cohors III Gallorum Equitata* in this period in the form of a writing tablet, but it is evident that the buildings do not accord easily with the theoretical requirements of the garrison. In particular there are eight barracks of the same size in the *latus praetorii* when six might have been imagined for the infantry if the horsemen were accommodated in the *praetentura*. Building 13 in the

praetentura is a much larger building and has been interpreted as a barrack for horsemen. Its adjacent Building 14 probably was a stable.

The overall dimensions (39,50 × 7,50 m) of the barracks in the *latus praetorii* are typical for the auxiliary barracks of the Claudian/Neronian period. The same may be said for the sizes of the officers' and men's quarters. The number of *contubernia*, eight (or seven with an additional *Schlußbau*), and their size of *c* 18 sq m, also is typical for the period. Thus the dimensions of the buildings suggests that they are ordinary auxiliary barracks.

But it has been suggested that these barracks are in fact 'bi-partite' and should be regarded as pairs, each pair forming the equivalent of a legionary barrack (Glasbergen and Groenman-van Waateringe 1974). One of the main impulses for this proposition is the interpretation of the smaller and less complicated 'officers' quarters' of Buildings 3, 5, 7, and 9 as *fabriculae*. The archaeological evidence for such a use of these buildings is strong; furthermore, unlike the officers' quarters in the other barracks, they are separated from the neighbouring men's quarters by a space of about 1,5 m.

If the bi-partite intepretation is accepted, it should be noted that although the barrack thus formed would be of legionary length, some 70 m, it would still be rather less than legionary width. More important perhaps is the fact that the size of the, now, centurion's quarters, their proportion of the overall length and overall area of the barrack would be much less than the corresponding examples from any legionary fortress. The bi-partite barracks of the fortlets display a quite different principle. There the officers' quarters are the same size as those from auxiliary forts and take the normal auxiliary proportions when the two halves of the barrack are considered as one whole. Furthermore the living area of the *contubernia* of *c* 16 sq m each is much less than normal in legionary barracks and the total of 16 (including special *contubernia*) is almost unmatched in the fortresses. The total living space available to the men, *c* 310 sq m, would now find its place among the highest legionary examples for any period, considerably greater than that usual in the Claudian/Neronian period. The same objections apply to Hassall's suggestion (1977) that the bi-partite barracks are indeed those of over-strength centuries of *Cohors III Gallorum Equitata*.

But if the buildings are still to be seen as single barracks there would appear to be only one officers' quarters for every two barracks. One solution to this might lie with the elaborate *Schlußbauten* at the opposite ends of the barrack to the *fabriculae*. They occur also at the ends of the barracks with the officers' quarters, but these latter appear to have less complicated internal divisions than their counterparts. The area of the *Schlußbauten* is *c* 35 sq m. This is small (but not without parallel in terms of contemporary officers' quarters and might be sufficient for the living quarters of an officer), but if the areas of the two facing *Schlußbauten* is added together, the resultant *c* 70 sq m is almost the same as that of the certain officers' quarters. It is possible that living and administrative areas could be divided, the living quarters being located at the end of the barracks with *fabriculae*. Of course this is very speculative, but the eight barracks could then accommodate six *centuriae* and four *turmae*. It has been shown that there need be no difference between the barracks of infantry and horsemen and the small number of *contubernia* is quite possible especially at this early period. In the

praetentura could then be accommodated horses, grooms and possibly additional troops. The very presence of the *fabriculae* in the *latus praetorii* would seem to bear witness to an impulse to keep the troops there as separate and as self-sufficient as possible.

The argument put forward by Hassall in support of his contention that there may have been five *turmae* present is ingenious but cannot be conclusive. He obtains nine *contubernia* in Building 3 by including the *Schlußbau* which in this barrack has a central division. But the internal proportions of the two *contubernia* this obtained are quite different to those of the original seven. It must be admitted that the seventh *contubernium* of Building 8 does not seem to have a central partition, rather a central hearth, but to see five decurions in one barrack is very improbable and the area allocation to the three at the 'wrong' end of the barrack (*c* 20 sq m) would be very small even, in contemporary terms. The same could be said for the centurions who now have to share the three remaining officers' quarters. This is particularly troubling considering the normal sizes of the other elements of the barracks

As Hassall points out there is enough room for at least 500 men in the known barracks. Probably it is preferable to see a complete unit in garrison but it may be that their distribution follows no obvious recoverable pattern.

HOFHEIM (Steinkastell) Period I

The barracks of the right *retentura* at Hofheim (Plan 19) are some four metres longer than those of the *praetentura*, but in spite of this their overall dimensions and those of their constituent elements are entirely usual for auxiliary barracks of the Flavian period. A point of interest arises from the probable occupation of the *retentura* barracks by legionaries and Buildings 25, 26 and 27 of the left *retentura*. Each one of these building seems to comprise ten *contubernia* but, unlike the adjacent Buildings 22, 23 and 24, they do not have associated officers' quarters. The neighbouring Building 28, which might have been seen to accommodate all three centurions, is interpreted as a *valetudinarium* by the excavator (Nuber 1983). Thus there would seem to be in garrison six legionary centuries, or three double centuries, with only three centurions. In the Flavian period the first cohort of the legion was doubled in size. It can hardly be suggested that part of a legionary first cohort is here in garrison, but part of the impulse to double size units of the period may perhaps be seen. The garrison as a whole is very difficult to determine because there are seven very similar barracks in the *praetentura* which number does not accord with the theoretical strength of any unit.

ROTTWEIL Kastell III

The overall length and width of the *retentura* barracks at Rottweil Kastell III (Plan 20) fall precisely in the middle of the range of legionary barracks, both in *Germania Superior* and in the other provinces in the Flavian period. The dimensions are larger than nearly all other auxiliary barracks in all periods. The officers' quarters, although they fall in the lower half of the legionary range, also are *c* 75 sq m larger than comparable quarters in most auxiliary forts. The men's quarters, on the other hand, fall in the upper half of the range of legionary men's quarters.

It must be said that the length of the officers' quarters, 17,60 m, is small for legionary barracks. This measurement has the effect of producing a length proportion of 24,93 % and an area proportion of 29,04 %. These proportions are more classically auxiliary than legionary, but *Britannia* has several early legionary examples with just these proportions (Colchester, Gloucester, Inchtuthil). The *contubernium* living space of 22,50 sq m is equally applicable to legionary and auxiliary contexts, but the number of *contubernia*, 14, suggests legionaries. The total living space available to the men of 336,50 sq m falls towards the higher end of the legionary examples. This would seem to be the classic example of legionary barracks located in an auxiliary fort. This is very much the conclusion reached by Planck (1975).

OBERSTIMM

Only two of the barracks (Buildings 14 and 6) are known in any detail at Oberstimm (Plan 21) and the position of the others is largely conjectural; thus to base any conclusions with regard to the garrison on this slight evidence is very difficult. Schönberger (1978, 137-141) suggests that there may be six infantry barracks in the *latera praetorii* and two twin *turma* barracks together with stabling in the *praetentura*. This would nicely meet the requirements of a *cohors quingenaria equitata*.

Schönberger bases his argument for cavalry barracks in the *praetentura* on the fact that Building 14 appeared to have officers' quarters at both ends. It has been shown above that the aggregate size of such quarters is too great to support this analysis. Rather the barrack should be interpreted as having normal officers' quarters, eight standard *contubernia* and one additional special end *contubernium*. Such a confirmation may be expected to have housed either infantry or cavalry. Precisely the same argument may be put forward with regard to Building 6 in the right *latus praetorii*. Its configuration is the same.

It must be admitted that Building 6 is some two metres longer than Building 14 this extra length being taken up mainly by the officers' quarters. The widths of both are very much the same. Thus the area of the officers' quarters of Building 6 are slightly larger, 110,40 sq m as opposed to 95,68 sq, and they constitute a slightly greater proportion of the overall length, 25,05 % as opposed to 22,70 %. But these differences cannot be taken to be significant, the Buildings are after all on different alignments. The size of the *contubernia* in both barracks is the same and the total living area available to the men also is very similar, 206,40 and 225,88 sq m in Phase 1b and 206,40 and 204,92 sq m in Phase 1c.

Thus there is no necessary distinction between the barracks of the *praetentura* and the *latera praetorii*. A total of ten barracks may still be envisaged, and on the basis of barrack evidence alone the possibility that the garrison was a *cohors milliaria peditata* cannot be excluded.

SLĂVENI

Hassall suggests that Slăveni (Plan 22) may be taken as a type-site for an *ala milliaria*; in this he is much influenced by the large size of the fort, 3,50 ha (1983, 105). Hassall notes that Tudor's plan is largely hypothetical and that the *retentura* is unexcavated. In fact the total of 16 buildings

on his plan accords better with the requirements of a quingenary than a milliary *ala* and this would accord with the epigraphic evidence for the Severan garrison.

If the buildings of the *retentura* can be assumed to bave been set out in the same way as those of the *praetentura* but if only two of them were in fact barracks and the others stables, then there would be eight barracks and eight stables in the fort, precisely the theoretical requirement of an *ala quingenaria*. The 12 barracks of Tudor's reconstruction are sufficient to house 24 *turmae*, but the four stables are only sufficiently large to house 288 horse with an allowance of 1,24 × 2,53 m each. One further point is that the barracks, although quite wide, are of only average auxiliary length and have only eight standard *contubernia*. Something more elaborate might have been expected of a milliary cavalry unit. On the other hand it must be said that the internal area of the *contubernia* of *c* 30 sq m is very similar to that of Heidenheim.

It is admitted that the area of the fort is considerably more than that of Chesters, but the two are separated by many years and not a few kilometres. The size of the fort is perhaps best explained by the desire to build a comfortable fort which would allow easy access for the many horses of the garrison.

Type-Sites

After this examination of the conflicting evidence there remains the question of whether there are any 'type-sites' which confirm the existence of the theoretical establishment for the different units following the lines set out by Richmond in 1955.

Cohors Quingenaria Peditata

There is every likelihood that Gelligaer II (Plan 23) was built for a *cohors quingenaria peditata*; the clearest proof of this is in the evident six centurial barracks. It is not unreasonable to attribute Building IX, if a stable, to baggage animals. It was shown in Chapter 3 to be highly improbable that Buildings III and IV in the *retentura* are barracks. Beckfoot continues to give evidence for such a fort with six centurial barracks, albeit from an air photograph.

Again the best interpretation for Pen Llystyn remains that it was designed for two quingenary cohorts of infantry with a total of 12 barracks.

Cohors Milliaria Peditata

As discussed above, questions have been raised about the nature of the *praetentura* barracks at Fendoch. But it has been argued that these are not enough to deny here the presence of the ten centuries of a *cohors milliaria peditata* and its accreditation as a type-site. Housesteads usually is thought to have had the same garrison. The Hadrianic barracks are not known in full, but it appears from later building that there may have been a total of 13. In spite of this, the best intepretation for the basic garrison is a milliary infantry unit but it cannot really be called a type-site.

Cohors Quingenaria Equitata

Caerhun comes closest to providing a pattern for this type of unit. The probable eight barracks meet the conventional theoretical requirements. There may also have been sufficient stabling inside the fort in Buildings XVI and XVIII but this interpretation has been disputed in Chapter 5. Wallsend also has eight barracks and at least one stable, but here the buildings are not distributed about the fort with the same apparent logic as at Caerhun. Thus there are three certain barracks and one stable in the *retentura*. But there seems little reason to doubt the nature of the garrison.

Künzing (Plan 24) has a total of nine barracks and the presence of sufficient stabling is highly probable. The ninth barrack stands out as being different to the others; it is the only barrack in the *retentura* and its officers' quarters are in the interior of the fort rather than at the rampart end. Schönberger's suggestion that it contained scouts is entirely plausible.

In contrast to the above forts, the buildings at Oberstimm are not known sufficiently to form the basis for further argument. Valkenburg Castellum 1 also cannot come into consideration as a type-site.

Cohors Milliaria Equitata

It is probable that Birrens had this type of garrison but the unusual barracks render the term of 'type-site' inappropriate and none other with this garrison may be offered.

Ala Quingenaria

Chesters (Plan 25) is now known to have been designed from the outset for the *Ala Augusta ob virtutem appellata* and the probable lay-out of the fort is described by Hassall (1973, 103-104). Hassall disagrees with Richmond's restoration of the barracks as having officers' quarters at one end and ten *contubernia* and writes: 'it is more likely that there were quarters for the decurions at both ends and only eight *contubernia*, sufficient for two *turmae* of four *contubernia* each'.

The areas of the known officers' quarters at Chesters is *c* 85 sq m. This figure is typical for the known officers' quarters from Hadrian's Wall and to double them to 170 sq m would make them highly unusual, although as *ala* barracks they might be expected to be different. Perhaps more telling is the point that their proportion of the overall length of the barrack is already *c* 20 %. If the quarters were to duplicated, the proportion would be *c* 43 %. Such a figure would be quite unparalleled and much greater than the 33,90 % in the Type I *ala* barrack at Heidenheim. As has been said before, the number of *contubernia* and their proportions cannot predict their occupants. The area of the men's quarters assuming ten *contubernia* is exactly typical for the period in *Britannia*. On the balance of the evidence it would seem that Richmond's plan should be retained.

Chesters may be taken as a type-site, for although Inveresk, Carzield and Benwell probably were all designed for an *ala quingenaria*, only little of their internal buildings is known.

Ala Milliaria

If the claims of Slăveni to be a type-site for this type of garrison are rejected, there would appear to be none other which can be suggested. Aalen and Heidenheim certainly held this type of garrison, but their internal buildings are only partly known. The same may be said for Stanwix while the barracks at Newstead IV were not originally designed for this type of garrison.

Discussion

Thus only Gelligaer II, Beckfoot, Pen Llystyn, Fendoch, Caerhun, Künzing and Chesters may be said with any certainty to have a number of buildings appropriate to the theoretical establishments of their garrisons. Of these the number of *contubernia* is known only at Pen Llystyn, Fendoch, Künzing and Chesters, ten in each fort although they all had different garrisons. This is a measure of the difficulty of the problem.

All in all it must be said that the analysis of the barracks has shed little light on the composition of the different units, least of all on the numbers of *turmae* and strength of the *centuriae* in the part-mounted units. The ten *contubernia* at Künzing offer Hassall some support for his contention that there may have been five *turmae* of 24 men each in the *cohortes quingenariae equitatae*, but his argument in support of this theory at Valkenburg and Caerhun is far from proven. Further the nine *contubernia* in the barracks at Wallsend suggest that the organisation there was different. The strength of the infantry centuries is more difficult to judge because it would have been easy to reduce the number of men in each *contubernium* from eight to six. But it is possible that the barracks at Valkenburg Castellum 1 had centuries of only 56 men. At Wallsend and Oberstimm they could have had 72, while at Künzing they probably had 80. The length of the men's quarters of the *praetentura* barracks at Caerhun of *c* 37 m also would suggest a total of ten *contubernia*. They are about the same length as those at Künzing and longer than those at Wallsend and Oberstimm.

This conflicting evidence bears out that presented earlier in the chapter which suggests that the theoretical establishment of the units is very difficult to recognise in the archaeological record and that every fort must be interpreted on its own merits.

Conclusion

Thus the barracks alone are of only limited use in the interpretation of garrisons. One further line of investigation is to consider the sizes of the streets and gates of the forts. It often has been remarked that forts with cavalry will require streets and gates of greater width than those with a wholly infantry garrison. In particular it is thought that the *via sagularis* and the whole *intervallum* area might well show greater size in cavalry forts. This view was expressed with regard to the depth of the *intervallum* in the *retentura* at Longthorpe (Frere and St Joseph 1984, 35).

Figure 113 contrasts the widths of the *viae sagulares* of probable *ala* forts with those of all other forts. The overall distribution is very much the same. Figure 114 makes the same comparison of the *intervallum* space. On this occasion it is possible to discern a slight difference. The *ala* fort

concentration is from 5,5 to 11 m, that of the other forts from 4,5 to 10 m. By way of contrast the *ala* forts do not have any of the very wide examples. There are few examples of the widths of the *viae praetoriae*, *viae principales* and *viae decumanae* of the *ala* forts, but when they are compared with those from the other forts (Figs 115, 116, 117) there is a little evidence that they tend to have greater widths. The range of widths covered in all kinds of forts is very much the same. This result confirms the conclusions in Chapter 3 which stressed the general dependence of all the barracks on the overall size of the fort.

Slightly different conclusions may be drawn from a comparison of the internal widths of the gates (for these purposes dual portal gates have been treated as single portal openings). The widths of the *portae praetoriae* of the *ala* forts cover the same range as that of the other forts (Fig 118). There is a concentration on *c* 7 m, although the *ala* forts lack the concentration on *c* 3,5 m. Comparison of the widths of the *portae principales* shows a greater difference (Fig 119). The gates of the *ala* forts concentrate between 5,5 and 8 m. These widths are also common in the other forts, but their greatest concentration is rather between 2,5 and 4 m. It is possible that a similar distinction is to be made for the *portae decumanae* (Fig 120). In the *ala* forts there is some evidence for a concentration at *c* 7,5 m. This concentration also is present in the other forts, but their greatest concentration is between 2,5 and 4 m. Thus it is possible that wide gates may be indicative of the presence of cavalry.

There are yet many other factors which may help in the identification of garrisons: the rank of the commanding officer, the size of the *principia*, the size of the *praetorium*, the capacity of the granaries, the presence of specialist equipment, but it is not part of the present purpose to consider these. It is clear that the barrack evidence provides no simple answers, rather conclusions will have to be reached on the balance of all the evidence.

Chapter 7

Construction and Amenity

Standard Units of Measurement

Introduction

Walthew has recently drawn attention to the possible use of standard units of measurement in Roman military construction (1981). Although he has achieved some very interesting results, the subject is still fraught with problems. The first of these is the difficulty in recognising the exact points of measurement intended for the buildings; these points may be on the inside, on the outside or on the centre-line of the walls. Additionally there were at least two different measurements of Roman feet in use by the Roman army, the *pes Monetalis* (0,296 m) and the *pes Drusianus* (0,332 m). Millett's conclusion is that it is impossible to distinguish between the use of the two (1982). The combination of these variables makes it very difficult to distinguish intended dimensions and this is particularly true when only small measurements are in question, for example in the breadth of the *contubernium*.

On the other hand it may sometimes be possible to recognise the use of standard units in longer distances such as the lengths of barracks or the dimensions of the cohort-blocks. Possible units are 1 *actus* (120 ft), 1½ *actus* (180 ft), 200 feet, 2 *actus* (240 ft) and 2½ *actus* (300 ft). In *pedes Monetales* their metric equivalents are: 35,52 m, 53,28 m, 59,20 m, 71,04 m and 88,80 m; and in *pedes Drusiani*: 39,84 m, 59,76 m, 66,40 m, 79,68 m and 99,60 m. It will be noted that the values for 200 Roman feet (*pM*) (59,20 m) and 1½ *actus* (*pD*) (59,76 m) are particularly close.

In order for the use of these units on the ground to be demonstrated, variation from the theoretical dimension should be no more than *c* 0,50 m. Such a variation will compensate for the use of different points of measurement for the walls and for inaccuracies of drawing and measurement. In the dimensions discussed below, measurement is to the centre-lines of the walls.

Fortresses

The different lengths of many of the fortress barracks approximate reasonably closely to various of the units, but those which fall within the narrow limits defined above are few. Those which correspond best are, for *pM*: 2 *actus*, Nijmegen Period 5 cohorts A and B (70,55 m), Haltern cohorts 11f, 11e, 11d (70,50 m) and Oberaden (69,50 and 70,50 m); 2½ *actus*, Lambaesis cohorts B and C (89,30 m). Furthermore the auxiliary barracks in the *praetentura* at Neuss have lengths approximating to 1 *actus* (35,52 m). Those which correspond to units of *pD* are: 200 Roman feet, Nijmegen Period 5 cohorts C and D (66,80 m); 2 *actus*, Vetera I Barracks N and O (81,30 m). Both Exeter and Haltern provide examples of barracks which correspond to units of 200 feet *pM* or 1½ *actus pD*. Lengths from Exeter are 57,50, 59,60 and 61,60 m and that of the barracks of cohort 11g at Haltern is 59,50 m. In addition to these there are others which fall within *c* 1,5 m of the

theoretical requirements. Examples for *pM* come from Gloucester, Oberaden, Aquincum, Chester, Colchester, Bonn, Lauriacum, Carnuntum, and for *pD* from Haltern, Novae, Chester, Neuss, Bonn and Dangstetten.

The widths of the cohort-blocks in which the barracks mentioned above are found also sometimes correspond to units of Roman feet. The best examples come from Haltern cohort 11g with a width of *c* 59,50 m which agrees with the *c* 200 feet *pM* of the length thus forming a square for the block, and Bonn where the cohorts are *c* 80 m in width thus making squares of *c* 2 *actus pD*. The 59,20 m width of the cohort at Dangstetten corresponds to 1½ *actus pD* and its length to *c* 2 *actus pD*. Further examples fall within *c* 1,5 m of the theoretical requirements from Colchester and Oberaden.

The widths of a number of cohorts correspond to units of Roman feet when the same is not so clear for their lengths. Thus 2½ *actus pM* may be seen at Potaissa (88.80 m); 2 *actus pM* at Nijmegen Period 4 cohorts C and D (71,60 m). Further close examples may be seen at Chester, Neuss, Regensburg, Nijmegen and Lambaesis.

But problems are always apparent. The width of cohort 11b at Haltern of 72,00 m corresponds well with 2 *actus pM*. But the length of the barracks (67,50 m) measures *c* 200 feet *pD*. At Carnuntum the width of cohorts D and E is 66,80 m, *c* 200 feet *pD*, but the width of cohorts G and H is *c* 73 m, *c* 2 *actus pM*. The width of the cohort next to the *valetudinarium* in the left *praetentura* at Novae measures 71,30 m, again *c* 2 *actus pM*, but the length of the barracks (67,30 m) is *c* 200 feet *pD*. It seems hardly conceivable that two systems of measurement should have been in use at the same time.

The general approximation to rather than agreement with units of Roman feet suggests that the barracks themselves were not intended to be of such dimensions but rather were being built within a framework which had employed such units in its setting out. The discrepancies suggest strongly that *ad hoc* principles obtained. It was pointed out in Chapter 2 that there is considerable variation in the dimensions of the barracks not just from cohort to cohort but also within the cohorts. This is expecially true when the outline of the defences is irregular as at Vindonissa and Carnuntum; the barracks were built to fill the space available rather than according to pre-ordained dimensions.

If it is imagined that the barracks were laid out according to rule of thumb pacing by centurions it is easy to see that the dimensions will vary from any theoretical norm. Taking an average pace to be *c* 5 ft (1,52 m), this measurement often seems to produce a good round number when divided into the lengths of the fortress barracks. The following random results may be quoted: Inchtuthil Building 18 55,19, Chester Deanery Field 50,86, Caerleon Prysg Field 48,03, Nijmegen Period 5 first cohort 50,53, Haltern cohorts 11f and 11c 46,38, Neuss Buildings 110-115 48,36, Buildings 122-119 50,99, Bonn cohort A 53,62, Aquincum *retentura* 47,24, *praetentura* 48,88, Lambaesis first cohort 63,36, Novae 44,28. The emphasis on fifty paces will be noted. Discrepancy from the whole numbers may easily be explained by differences in the length of the pace of the individual, by tall or short centurions. Thus the result from Inchtuthil Barrack 18 with paces of 4 ft 6 ins (1,37 m) is 61,15 and with paces of 5 ft 6 ins (1,68 m), 49,87.

Such a procedure would make it a simple matter to set out the proportion of the barrack to be assigned to the centurion so often emphasised in previous chapters. Furthermore it does not contradict the findings set out

in Chapter 2 that the roads of the fortresses maintained a more constant width than the barracks. Again it would appear that the fortress had been laid out and the barracks were built to fill the space remaining for them.

It has already been shown in the previous chapters that the breadth or interval spacing of the *contubernia* shows no strong recognisable adherence to any particular measurement in Roman feet

In Hyginus, the centurion's tent occupies exactly twice the width of a single *contubernium* tent and Walthew, with special reference among legionary barracks to Haltern and Longthorpe (1981, 22-23), has shown that the whole barrack may be considered as a multiple of the breadth of a *contubernium*. Thus the *contubernium* breadth should divide into the length of the centurion's quarters an even number of times. Figure 121 shows that such a relationship is not immediately apparent in the cohort barracks. The values in the main do not concentrate more round the whole numbers than between them but such relationships may be obscured by the considerable length of the cohort barracks. There is a concentration on the figure of 7 in the Flavian period which is largely the product of the evidence from Neuss and Bonn, and the results from these fortresses are enough to confirm that relationships of this kind should continue to be explored.

Forts

In Chapter 3 was emphasised the great variety in the lengths of the auxiliary barracks and the dependence of these lengths on the dimensions of their forts. Granted this, it is unlikely that many of the barracks were built according to predetermined units, although it remains possible on occasion to perceive the overall planning of the fort in terms of Roman feet, for example at Bearsden where Breeze has shown that a grid of 5 × 4 *actus* fits neatly over the fort (1984, 41), and at Gelligaer (Ward 1903, 22-24).

The barrack lengths from Bearsden conform closely to one *actus pM*, 35,10 and 35,70 m. This is also true (within the parameters set out above) for barracks at a number of other forts: Hayton (35,60 m), Hod Hill (35,87 m) and Hesselbach Period 2 (35,20 m). About the same number conform to one *actus pD*: Birrens (40,14 m), Beckfoot (39,84 m), Valkenburg Castellum 2/3 *latera praetorii* (40,30 m) and Stockstadt (39,50 m). The barrack lengths at Straubing of 35,60 and 39,60 m present a particular problem in that they both conform to one *actus* but of different Roman feet. Again the simultaneous use of two systems of measurement seems most unlikely.

Units of *c* 1½ *actus pM* (53,28 m) may be seen at Old Kilpatrick left *praetentura* (53,24 m) and Hofheim (Steinkastell) right *retentura* Building 3 (52,80 m). It is interesting that the buildings interpreted as stables at Hod Hill approximate to lengths of 200 feet *pM* (59,20 m) since these range from 56,29 to 58,58 m. This compares nicely with the one *actus pM* length of most of the barracks there. A further example of *c* 200 feet *pM* may come from Munningen (59,70 m).

The lengths of some of the largest auxiliary barracks also approximate to units of Roman feet. Those of the barracks of Rottweil Kastell III (70,60 m) correspond closely to two *actus* pM (71,04 m). It is interesting that those of Heidenheim (81,70 m) and Aalen (79,60 m) may be seen as two *actus*

pD (79,68 m), the forts being successively garrisoned by the *Ala II Flavia Milliaria*.

In contrast lengths at Raeburnfoot (17,70 m) may be seen as one half *actus pM* (17,76 m) and at Crawford (19,55 m) as one half *actus pD* (19,92 m).

More barracks, very often from the same forts as those above, fall within *c* 1,5 m of the theoretical units. Examples for *pM* may be quoted from Bearsden, Cadder, Raeburnfoot, Dover, Hod Hill, Hofheim (Steinkastell), Dormagen, Hesselbach Periods 1 and 2, Aquincum and Bu Ngem; for *pD* from Crawford, Birrens, Haltonchesters, Lease Rigg, Ilkley, Valkenburg Castella 1 and 4 and Arlaines. But it should be stressed that there are many more examples which do not accord with the dimensions of the theoretical units. Indeed it may be of more significance that the lengths of those barracks named above whose lengths correspond to one *actus*, also correspond to between 23 and 26 paces taking the pace as before as 5 ft (1,52 m). 24 or 25 paces would provide a good working frame for the barracks.

The width taken by pairs of barracks also often seems to correspond to one half *actus*. Measurements approaching closely one half *actus pM* can be seen at Brough-on-Humber (17,60 m), Melandra Castle (17,89 m), Hesselbach Period 2 (17,10 m), Straubing (17,10 m) and Friedberg (17,10 m). Comparable measurements of one half *actus pD* derive from Strageath II (19,60), Cadder (19,60 m), Hod Hill (21,10 m), Pen Llystyn (20,60 m), Boulogne (19,60 m), Valkenburg Castella 1, 1a, 2/3 and 4 (19,60 m), Hofheim (Steinkastell) *praetentura* (19,84 m). Again there is a number of other barracks, very often from the same forts, which approximate to the standard units. The difference between *pM* and *pD* at this shorter distance is very little and it must be considered whether more significant for all these pairs is the number of paces of 5 ft (1,52 m) into which they divide. All examples mentioned above fall between 11 and 14 paces which suggests that 12 may have been the rule of thumb dimension.

The evidence for the *contubernium* spacing in the auxiliary barracks has been discussed in previous chapters and it is clear that no certain norms emerge.

It is possible that the shorter lengths of the auxiliary barracks will allow the relationship of the *contubernium* breadth to the dimensions of the barrack to emerge more clearly. The following forts have barracks where the breadth of the *contubernium* divides nicely into the length of the officers' quarters: Wallsend (3,05; 2,92; 2,85), Pen Llystyn (2,97; 3,16; 3,97; 3,12; 3,11), Nanstallon (1,87; 0,92; 1,04), Hesselbach Period 1 (1,03), Period 2 (2,03; 3,00; 2,27), Burladingen (4,00; 4,00; 3,23), Künzing (3,12). But it can be seen from Figure 122 that such close relationships are not a feature of most of the auxiliary barracks.

Fortlets

A striking feature of the fortlets is the number of barracks whose lengths correspond with *c* one half *actus pD*, 19,92 m: High House Period II West (19,72 m), Degerfeld Erdlager (19,60 m), Nersingen (19,80 m) and Boljetin (20,05 m). Further fairly close examples may be quoted from Valkenburg (Boven) and Boljetin while examples for *pM* are to be found at Poltross Burn and Neuwirtshaus.

It has been noted above that the barracks in their pairs in the fortlets often form a square, thus it is not surprising to find that the overall widths of the pairs at Poltross Burn (17,30 m) and Neuwirtshaus (18,00 m) also conform to one half *actus pM*, 17,76 m; similarly that the width at Degerfeld (20,40) corresponds to one half *actus pD*, 19,92 m. The widths of the pairs at Martinhoe (19,85 m) and Kemel (Jüngere Schanze) (19,35) also correspond to one half *actus pD*.

Once more it must be pointed out that the approximation of all these measurements to 12 paces may be more significant than their relationship to theoretical units of Roman feet.

Conclusion

It is clear that there are many barracks whose dimensions correspond to different units of Roman feet, but it must be stressed that there are many more which do not. It is not denied that the overall planning of the forts may have conceived the barracks, or the space for the barracks, according to units of Roman feet, with which measurements the barracks on the ground sometimes agreed, but it is probable that the actual construction of the barracks took place according to rule of thumb procedures to take advantage of the space available. In particular this is likely when the defences and the internal buildings were constructed by different bodies of troops (see below).

Construction

The Builders

The significance of the identity of the builders of the barracks has been discussed in the previous chapter, but only very rarely is it possible to identify them. The specific epigraphical evidence is limited to two examples.

It may be assumed that the legionaries constructed their own barracks. RIB 34 (CIL VII 107) records such work at Caerleon where the legionaries of *II Augusta* restored from ground level the barracks of the seventh cohort. This inscription is dated AD 225-60.

The identity of the builders of the barracks in auxiliary forts is by no means so certain. The only inscription specifically to refer to the building of barracks in an auxiliary fort records that the work was carried out at Bainbridge by the *Cohors VI Nerviorum* (Wright 1961, 192). The inscription is dated AD 205.

By way of a sample for the forts of the whole Empire, Table G sets out the epigraphic evidence for construction work in auxiliary forts in *Britannia*. It will be seen that most of the centurial, cohortal and simple building stones are legionary. It cannot be certain to what kind of construction these stones refer, but it is probable that most of them relate to the defences; certainly they have not been found *in situ* in the stone sills of internal buildings. Only rarely is it possible to date these stones. The numbers of the more elaborate dedicatory inscriptions, which in their form and wording suggest that they refer to buildings inside the forts, are divided approximately evenly between legionaries and auxiliaries. The

remaining inscriptions which refer specifically to the defences, to internal buildings or to other buildings such as bath-houses are predominantly auxiliary. This evidence would suggest that the usual pattern was for the legionary troops to construct the defences of auxiliary forts and for the auxiliary troops to build the internal buildings.

The pattern of the inscriptions from Hadrian's Wall accords very much with that of the rest of the province. Those from the Antonine Wall on the other hand show almost exclusive legionary activity.

But when the dates of the inscriptions are considered (where known), it is clear that the above interpretation is too simple. Of the total of 17 datable legionary inscriptions for unspecified internal buildings, only five belong to after AD 150 (two of these to the much later period after Gordian). The corresponding comparison of the auxiliary inscriptions shows that, out of a total of 19, only eight give dates before AD 150. Of the 12 inscriptions referring to the construction or repair of specific internal buildings, only two are dated to before AD 200; while only one of the six inscriptions relating to other construction work (bath-houses and aqueducts) falls before AD 200. The one possible legionary example comes after AD 297 from Birdoswald (RIB 1912). Similarly the five dated examples relating to work on the defences all belong after AD 200. The one legionary example is of AD 122-6 at Halton Chesters (RIB 1427).

This evidence shows that construction-work on auxiliary forts predominantly was carried out by legionaries until the second half of the second century. It is true that the stone inscriptions refer only to stone forts and no definite conclusions can be drawn for the earlier timber forts, but it would seem most likely that legionary troops were predominantly responsible for their construction.

Unfortunately this evidence does not answer the question of who built the barracks. It is reasonable to assume that the auxiliaries built their barracks at least from the time when they were mainly responsible for the major internal buildings, that is from the second half of the second century; but before that date it can be only an assumption. On the other hand, if the legionaries were occupied with the defences and major buildings, the construction of their own barracks would be a task which the auxiliary garrison could usefully perform. The contrast in the standard of construction of the barracks at Newstead Period 3 between those of the legionaries in the *praetentura* and those of the auxiliaries in the *retentura* suggests that precisely this process had taken place (Richmond 1949-50, 23); both kinds of troops had built their own barracks.

Tents

Tents must have provided the first accommodation for the men on most sites. Tell-tale indicators such as series of small postholes are often noted by excavators as at Mainz (Baatz 1962, 15), Rough Castle (MacIvor, Thomas and Breeze 1978-80, 240) and Bergheim-Wiedenfeld (Bogaers and Rüger 1974, 155). In his excavations at Vindonissa Königsfelden in 1961-1962 Wiedemer found a series of trenches which he intepreted as a drainage system for tents. The trenches were at distances of 3,0 - 3,5 m apart which agrees quite well with the size of an army tent (1962, 19). Trenches under the oldest buildings at Hüfingen also were found to be some three metres apart.

The evidence of small postholes and possible drainage trenches also suggests that the men at Oberaden and Dangstetten continued to be accommodated in tents at a time when more permanent structures had been built for their officers (Kühlborn 1982, 506; Fingerlin 1970-1971, 209). Similarly Frere proposes that the 'proto-Flavian' garrison at Strageath built a granary to high (legionary) standards of workmanship for its provisions and that the legionaries lived in tents while building the ramparts and gates of the fort for the full Flavian garrison (Frere forthcoming).

Subsequent activities on the site usually must have destroyed the necessarily slight evidence for the tented occupation but tent pegs are fairly frequent finds, for example in the excavation above at Vindonissa and in the area of Praetoriumstraat in Nijmegen (Bogaers and Haalebos 1977, 103). A number of tent pegs are to be seen in the museum at Krefeld-Gellep. Pieces of the leather tents themselves also have survived, the best-known being from Vindonissa, Valkenburg and Birdoswald (Groenman-van-Waateringe 1974; Mc Intyre and Richmond 1934). Fragments have also been found in a pit in the Turf Wall Milecastle at High House (Simpson, Richmond and St Joseph 1935, 227). Of course such finds may represent merely part of the general equipment of the soldiers in store.

Site Preparation

The preparation of the site before the building of the barracks usually was very thorough and doubtless back-breaking work. If the site was wet or waterlogged it had to be drained and small trenches found on the New Market Hall site at Gloucester may have been for this purpose (Hassall and Rhodes 1974, 20). Only rarely did it prove impossible to protect the site from the influx of water and the line of stone slabs running east-west at Bar Hill positioned to prevent water running down a slope was a most unusual measure (Robertson, Scott and Keppie 1975, 18).

Having been drained and cleared, the site was levelled and natural depressions filled. It was very unusual to terrace the barrack sites, but the steepness of the slope may have led to such an undertaking at Bar Hill and at Loughor (Owen-John 1981-82, 24). The very steep site at Poltross Burn made it necessary to construct the barracks, presumably their roofs as well, in a series of terraces corresponding to the individual *contubernia* (Gibson and Simpson 1911, 421). The individual *contubernia* in Period 2 at Hesselbach were stepped to accommodate the fall of one metre over the length of the barracks (Baatz 1973, 41). But such severe problems did not face the builders of Kaserne II in Period 4 at Butzbach and the terracing of the floors of the *contubernia* leaving one *c* 0,40 m higher than the other was, in contrast, the result of poor workmanship (Müller 1962, 20).

The material used for levelling was often clay, one of the key components of Roman military building. When an old fort site was to be re-used it was common practice to cover the remains of the former fort with a thick layer of clay. At Caerhun clay to a depth of 0,20 m was spread over the remains of the timber fort in preparation for the stone period. At Maryport the Period I remains were covered with red clay; at Ilkley a packing of clean clay overlay the Antonine surface. The initial phases at Brough-on-Noe were covered by a layer of dumped clay, the whole area of the fort at Pen Llystyn was levelled with clay before rebuilding and the ground surface at Caernarvon was levelled with a thick layer of clay in preparation for the massive Severan reconstruction. Sand was used for the same purpose at the

Northgate Brewery barracks in Chester, on the New Market Hall site at Gloucester and at Königsfelden-Breite Vindonissa where it is suggested that the outline of the barracks was first drawn in the sand (Ludin 1966, 28). Van Giffen writes that one of the three characteristic layers of each Castellum at Valkenburg was an equalisation layer of turf sods or earth (1940-44, 305). But clay was considered the best means of establishing a firm platform.

Many later activities would mark such a surface and traces intepreted as scaffolding poles have been found at the Deanery Field, Chester (Droop and Newstead 1931, 7-8) and Heidenheim (Cichy 1971, 27).

The natural concomitant of this activity is that the barracks should be carefully dismantled on evacuation of a fort. Evidence for such care comes from Dangstetten and Fendoch.

Construction Techniques

Nearly all the barracks were of some form of timber framework which could be constructed according to a number of different techniques.

Post-Pit

The most simple technique sets the timber uprights in individual post pits. The bottoms of the timbers were not pointed and were not often driven into the ground (Strageath Antonine II provides an exception) but rather were placed at the bottom of the prepared holes. The most careful examples show the placing of a base-plate in the form of a flat stone at the foot of the post and often this is interpeted as legionary work. Such post pits were excavated at Ardoch and these also exhibited the careful positioning of packing stones round the uprights. Such is also true at Templebrough. Wooden base-plates were found at Verulamium. There is no evidence that the bottom of the timbers was charred in an attempt to increase their longevity.

Bar Hill provides a clear example of this kind of construction (Robertson, Scott and Keppie 1975, 16). Here the post pits were *c* 1,30 m deep and *c* 0,60 m in diameter. The stumps of the posts themselves had a diamater of 0,20 m; they were roughly dressed. The main uprights at Bar Hill were spaced neatly in relation to room dimensions. Thus each *contubernium* was framed by five uprights along its longer sides and by three along the shorter at spacings of *c* 0,90 m. Few barracks can show such regularity.

Post-Trench

As has been seen above, the post-trench technique was that used most often for timber barracks. The post-trenches were usually some 0,30 m wide and 0,30 to 0,45 m deep, but size varied according to the conditions. Thus trenches with widths of 0,75 m have been found at Nijmegen, and of 0,50 m at Haltern, Butzbach and Hesselbach. Trenches with depths of 0,60 m occur at Pen Llystyn and Hesselbach, and of 0,50 m at Butzbach.

Sometimes the ground was very difficult for the digging of the foundations and on these occasions the trenches could take the form of short

disconnected lengths. This is the situation at Martinhoe while at Ilkley the trenches often diverged from their line in order to avoid boulders. This may indicate either that work was taking place late in the season and in a hurry, or that discipline in the construction unit was lax (Hartley 1966, 30).

Even when the ground was easy, often the construction trenches did not quite meet at the corners, for example at Chester Abbey Green, Red House Corbridge and Pen Llystyn. In particular, as at Heidenheim, the trenches for the dividing walls between the *contubernia* did not extend across the whole width of the barrack but stopped short of the longitudinal trenches. Richmond interpreted this practice as a means of preventing the breaking down of the sides of the trench (1961, 22).

Excavations at Melandra Castle gave an insight into the way in which the trenches were laid out. Barracks III and IV lay back to back. The post-trench for the rear wall of IV ran in a true straight line. In contrast, the post-trench for III adjacent was highly irregular. This led the excavator to suggest that the one had been dug with the help of a line and the other by eye subsequently (Petch 1943, 58); equally the second could have been laid out after the first was *in situ*.

The posts themselves again were not pointed but rather had flat bottoms. In section they could be round, rectangular or square. Most examples show the use of all these types in the same barrack with the stronger timbers being placed at the most important points such as as the corners or at the corners of the individual *contubernia*. In general the size of the posts in cross-section was *c* 0,20 × 0,15 m. The diameter of the round posts at Butzbach was 0,30 m and the dimensions of the rectangular posts were 0,18 × 0,16 m.

The Period 2 barracks at Hesselbach show a highly systematic use of uprights of different sizes. Here square timbers of *c* 0,20 × 0,20 m in cross-section were used at corners and where more strength was required such as in the cross walls and for the porticus posts. The remaining wall posts were *c* 0,11 × 0,17 m in cross-section. Furthermore the spacing of the posts shows five to the breadth and six to the depth of each *contubernium*, the distance between all the posts being about one metre (Baatz 1973, 38-40). Such a distance between the posts was usual, but it could be more or less, for example 0,80 m at Munningen, while the spacing in Building 12 in Period 1 at Oberstimm varied from 0,60 to 1,00 m and showed no detectable regularity (Schönberger 1978, 116). The spacing between the uprights at Pen Llystyn also was irregular. But Hesselbach was not alone in its regularity for the spacing of the posts at Valkenburg Castellum 1 shows five posts for the breadth and eight for the depth of the *contubernia*. Here the spacing between all the posts generally was one metre with the exception of the dividing walls between the *papiliones* (as opposed to the *arma*) where it was rather less, *c* 0,80 m.

With the posts in position, the trench was back-filled, usually with the original earth, but where wet and shaley clay is returned to such a trench and is tamped down, it turns into a soft spongey mud, giving poor support to the uprights. In order to avoid the problem the trenches were often filled with cobbles as at Brough-on-Noe, or at least the surrounds of the posts were so filled. At Throp and High House the posts were packed in this manner (Richmond 1961, 22).

Sill Beam

Timber ground sills occur less frequently but are not uncommon in the barracks. Their rigid platform would have been particularly well suited to coping with unstable or soggy ground conditions as is suggested by the excavator at Beckinghausen (Albrecht 1938, 19). But the technique was also employed in ordinary circumstances. At York excavations near the north-west corner of the fortress in 1925 revealed timber barracks whose uprights of 0,30 × 0,22 m in section were finished at the foot with a tenon and mortise joint into the timber ground sill (RCHM 1962, 41). The best illustration of this construction method comes from the *praetorium* in the right *praetentura* at Valkenburg Castellum 1, but the contemporary barracks were of post-trench construction.

Ground sills usually were placed in a construction trench, but this did not need to be as deep or as wide as the post-trenches. The trenches for the sill beams at Rötelsee were only *c* 0,10 m deep. On the other hand it had to be level and straight and thus was a construction method unsuited to very difficult ground. The uneven construction trenches at Great Casterton and Hod Hill could not have been used for sill beams. It is possible that sometimes the sill beams rested directly on top of the ground surface for only in this way can the complete absence of barracks in recent excavations at Miltenberg be satisfactorily explained. Certainly there must have been buildings in the fort for a large number of nails of the type still used locally for the fixing of timber cladding to walls was found (Beckmann 1976-77, 89). It is interesting to note that Papcastle also seems to be been devoid of barracks. Tents are a possible but unlikely explanation: sill beams also should be considered.

At Fendoch it is possible to see that the trenches were dug before the framework of the barracks was assembled. The most north-westerly barrack is irregular because the trench for the barrack wall next to the rampart follows the line of the rampart rather than that of the other long wall of the barrack. Had assembly taken place before digging, the mistake could not have occurred (Richmond 1938-39, 136). This very fact suggests that Richmond's identification of sill beams was incorrect and that the barracks in fact were of post-trench construction.

Stone Sill

The vulnerability of the wooden uprights to rot must have been the principal factor which led to their replacement by stone sill walls. On top of these a timber superstructure would be built as before, usually with a sill beam as base.

The foundation trenches for the walls were typically *c* 0,70 m deep and 0,80 m wide. Usually they were filled with broken stones or cobbles and bonded with clay. Examples may be cited from York, Vindonissa (Hispanische Kohorte), Lauriacum and Brough-on-Noe. Vetera I on the other hand had wall foundations of clay mixed with gravel and broken tile (Oelmann 1934, 270). It was also possible to make the foundations without the binding element of clay. Dry stone foundations were found at Strasbourg (St Étienne) (Hatt 1949, 169), rounded river stones at Vindonissa *valetudinarium* (Simonett 1937, 206) and the foundations at Caerhun are described as consisting of two or even three courses of boulders set in trenches dug in the earlier levels (Baillie Reynolds 1938, 32).

The use of mortar in the foundations was very unusual but it has been found at the Deanery Field, Chester. Here the first course of the footings consisted of a layer of cobbles set in hard mortar; a layer of broken sandstone 0,20 m thick followed which also was evenly coursed with a good bed of mortar. But no mortar was used to hold the broken rock together between the cobbles and the surface layer, sand was used as a substitute (Newstead 1928, 4). There is a further instance of the use of mortar at Vindonissa North-East Corner (Simonett 1939, 111). A most elaborate preparation for the sill wall was found at Caerleon Myrtle Cottage. The foundation trench was 0,60 m deep and 0,90 m wide. It was filled with two or three layers of river cobbles and levelled on top by thin flat sandstone slabs forming a plinth for the sill wall (Fox 1940, 108).

There is some evidence that a timber ground sill sometimes was placed on prepared foundations without the use of sill walls. At Goss Street Chester the earlier foundation was one foot deep and composed of broken rubble brought to a level finish by a 50 mm bed of mortar. It was the interpretation of the excavators that this can have been intended only to take the sole plate of timber framed building. Later the woodwork was removed and the sill itself became the foundation of a masonry wall (Richmond and Webster 1951, 5). Koenen suggests similar practices at Neuss (1904, 230).

One further variation was to establish the foundations as above up to floor level and to insert the uprights into the rubble foundations. An example of this very unusual technique comes from Antonine Corbridge (Richmond 1961, 24).

The width of the sill walls was rather less than that of the foundations, but the range found is quite considerable: 0,40 and 0,60 m at Strasbourg, 0,50 m at York, 0,60 to 1,00 m at Vindobona, 0,80 m at Brough on Humber and 0,90 m at Caerhun.

The standard height of the sill walls cannot be known but at Chester Deanery Field five wall course reached 0,30 m above the foundations. When describing the sill wall construction of the barracks at Neuss, Koenen wrote that, as a rule, the height of the sill wall corresponded to one third of the breadth of the foundation and that they were sealed on top with a layer of tiles. This gave walls with a height of some 0,30 m (1904, 230). On the other hand walls of at least 0,80 m in height were found in the barracks at Lauriacum (von Groller 1925, Sp 15; 1924, Sp 32).

The walls themselves usually consisted of courses of stones whose faces were roughly dressed and set in clay with a clay and rubble core. The bottom one or two courses were often given a greater overall width than those above. The standard of masonry varied. At Caerhun, just one face of the stones was roughly dressed and at Chester the Deanery Field barracks had stones quite unworked except for levelled top and bottom faces. In contrast the stones for the Prysg Field barracks at Caerleon seem to have been worked carefully on five sides. Here the inspired use was made of a moulded freestone block to form the north angle of Barrack 4. It was always important to have a rough internal face to key strongly into the clay core. Strasbourg St Étienne provides a contrast for here the Trajanic walls were constructed in flat stones in *opus spicatum* or 'hérisson' pattern. Tile sometimes was included in the walls as at Vindonissa *valetudinarium*, while at Slăveni the foundation walls of the barracks were made of bricks (Tudor 1977, 401). It was always easiest to use local

materials, thus the sill walls for the barracks at Dover were made of chalk blocks bonded with clay (Philp 1981, 41).

The characteristic feature of these walls is that they were built with clay rather than mortar. The use of clay alone has been well established for example in the barracks at South Shields, Wallsend, Housesteads and Poltross Burn. The Myrtle Cottage barracks at Caerleon are unusual in having their masonry laid with 'good quality yellowish mortar' (Fox 1940, 108), as are the Croft barracks in their use of red mortar (Threipland 1967, 42).

Often the opportunity was taken to combine the construction of the lower barrack wall levels with a drainage channel, either for excess water from the street as at Gelligaer and South Shields B3, or additionally to serve as one of the principal drains of the fortress. The water collected in the drain which runs along the length of Prysg Field Barrack 1 at Caerleon was used to flush the adjacent latrine block on its way through the rampart.

Wattle, Daub and Plaster

The walls whose foundations have been described above were nearly always of wattle and daub construction, although boarding has been suggested as a possibility at Mainz (Baatz 1962, 22), for the Agricolan buildings at Ilkley (Hartley 1966, 42), at Martinhoe (Fox and Ravenhill 1966, 18), and on the Lorenzberg 'particularly the interiors' (Ulbert 1965, 30) while Baatz suggests that shingling is a possibility at Hesselbach (1973, 39). Of course it would be possible to add weatherboarding to wattle and daub walls, but a lime wash was often thought a sufficient protection (see below).

Between the main uprights a framework of wattles was constructed to provide the base for the clay daub. In order to secure the framework to the uprights, the common practice was to cut slots in the facing sides of the uprights into which the ends of wattles or staves were pressed.

Wattle-work has been found to follow two basic techniques: vertical and horizontal. In vertical wattling, the space between the wall uprights was joined by three or four horizontal staves fitting into slots in the uprights. The wattles then were threaded between the horizontals and set down into the foundation trench. Brough-on-Humber provides at least one variation for here no signs of wattling were found in the foundation trenches and thus must have started above that level (Wacher 1969, 17); perhaps the method was the same as that used at the Abbey Green barracks in Chester where a sill beam was placed between the post holes to provide a base for the wattling. Clear indications of vertical wattle work have been found at Corbridge, Carlisle and Martinhoe.

Horizontal wattling (*opus craticum*) was more common than vertical. In this form, narrow upright staves intervened between the main uprights and the ends of the wattles were fitted into the slots in the uprights. The main uprights tended to be rather more widely spaced in horizontal than in vertical wattling. Horizontal wattling was clearly the form best suited to walls with a stone sill.

A substantial mass of clay wall survived unburnt at Corbridge and it is clear, as at Pen Llystyn and Valkenburg, that the wall itself was wider than

the foundation trench and that the daub completely covered the uprights and framing (Richmond 1961, 22).

The most considerable remains of wattle and daub walling have been found at Valkenburg and here both types of wattling were found. Glasbergen illustrates socket holes in upright timbers for the wattling frame horizontals, albeit from the *praetorium* (1972, 34, Fig 15). They show little regularity in size or spacing, furthermore some of them have an access channel cut to the edge of the upright showing clearly that the horizontal had been introduced after the construction of the framework. This suggests the possibility that the wattling was prefabricated as hurdles to be sprung into position in the erected framework; but this was not the universal method since at Chesterholm it was found that the wattles wound also round the main uprights.

To prevent erosion by the rain, waterproofing had to be applied to the clay walls and this took the form of a lime wash or plaster which could also be applied to the inside of the walls. One method of applying this plaster was to make use of an additional thin wattle frame. This was held in position by slender stakes which explains the series of small regular postholes sometimes found outside the line of the foundation trench as at Corbridge IB (Gillam 1977, 53). Examination of the plans of the barracks at Slack suggests that these small postholes were the only ones recognised in the excavation of timber Barrack X. A simpler method of application was to provide a key on the clay daub while it was still soft by the use of a trowel. Evidence for such use of a narrow-bladed trowel comes from Barrack A at the Deanery Field Chester and from the Berkeley Street barracks at Gloucester. At Echzell a comb was used.

The New Market Hall barrack at Gloucester provided very clear details of the plasterwork. Sometimes the plaster consisted of little more than a wash, sometimes it consisted of two layers: a foundation layer of coarse plaster 25 mm thick and an upper layer of fine white plaster 20 mm thick (Hassall and Rhodes 1974, 20-21). But the most considerable remains of plasterwork are from Nijmegen (Peters 1965-66; 1969; 1979). This varies in detail in composition, but sufficient has been found in the vicinity of the barracks to justify a general description. First two layers of reddish mortar were laid on the daub foundation. These layers had average thickness of 28 and 45 mm and were both composed mainly of lime, gravel, sand and ceramic material (lumps of pottery and tile). On top of this a grey layer was applied composed of lime and sand with an average thickness of 6 mm. This was followed by a coating of lime mixed with very fine sand. Sometimes this layer was a few mm thick, but sometimes it filled only the pitting in the grey layer. Breaks in the bottom layer of mortar show that it was already dry when the second layer was applied. Peters considers that the walls of the barracks were plastered and whitewashed inside and out (1979, 388).

Two types of plaster were found at Oberstimm. The first was a light lime mortar mixed with gravel and sand and the second was a red plaster, the product of a lime mortar mixed with crushed pieces of tile. Again plaster had usually been applied in three layers (Schönberger 1978, 297). Tafel 6 illustrates very clearly the plasterwork on both sides of an internal partition wall. The findings from Echzell were rather different. On top of the dark clay of the wattle fill came a finer layer of clay plaster containing some straw which formed the base for the top layer of a light, fine plaster without straw (Baatz 1968, 42).

Finds from Echzell and Hesselbach show that the external plastering probably concealed the timberwork of the building (Baatz 1973, 39).

At the base of the wall the plaster often was brought to a finish in a quarter-round moulding on the outside, or a smaller skirting on the inside. The moulding helped to shed the water further away from the vulnerable timbers.

But it should not be thought that plasterwork was universal in the barracks. Frere and St Joseph noted that only the *principia* and *praetorium* at Longthorpe were so provided (1974, 19), while no traces at all were found at Gelligaer (Ward 1903, 29).

A lime wash on top of the plaster must have constituted the finished surface of many barracks. Pits with remains suggesting that they had been used for the preparation of lime wash have been found at Strasbourg and at Butzbach. Indeed a shallow lime preparing pit took up almost the whole interior of Room C in the most southerly officers' quarters in Period 3 at Butzbach (Müller 1962, 17)

Other Methods

The construction of the barracks so far excavated at Colchester is of a very unusual type. The barracks had sill walls consisting mainly of pebbles set in sandy yellow mortar and were constructed by pouring the building materials into upright shuttering (*opus caementicium*). The walls were 0,60 - 0,65 m wide and were intended to stand 0,15 - 0,18 m above ground level. They were finished with a smooth upper surface. The foundations were not offset and they were only 0,05 - 0,08 m deep. No evidence was found for timber frames above the sills walls but rather of sandy-clay walls reminiscent of frameless cob construction or mud bricks (Crummy 1977, 71). Richmond noted walls of clay bricks or blocks on low plinth walls at Castell Collen (Richmond 1961, 24), but the use of such techniques was highly unusual.

The construction of barracks entirely in stone was very rare. This method may have been employed in the Severan barracks at Ilkley and in the Theodosian buildings at Bainbridge where mortar was used in the core of the walls for the first time on the site. It is possible also that the third-century barracks at Bewcastle were constructed entirely of stone, on this occasion bonded only with clay. Nor is it likely that an all-stone construction was characteristic of the late third-century and fourth-century 'chalets' for in Periods 3 and 4 at Housesteads all the walls were clay bonded and finds of numerous nails suggest the presence of timber framing.

Variety

There was often considerable variety in the walls of the same barrack even though all were constructed in the same technique. The clearest distinction is between the external and internal walls, the latter being narrower and of slighter construction. For example the exterior walls at Hesselbach had a width of *c* 0,20 m and the interior walls *c* 0,13 m.

In general, the internal walls were not intended for load bearing, and this may account for the number of examples, Rudchester among them, of internal

stone sill walls which were not bonded with the external walls. The external walls may have been expected to sink and settle after construction, leaving the less pressed internal walls unaffected by the movement.

The foundation trenches for the internal walls at Pen Llystyn and Künzing were found to be not as deep as those for the external walls, while the partition between *papilio* and *arma* at Heidenheim was slighter than the other internal walls.

Internal walls were often built directly on the ground surface, particularly when the principal walls has stone sills. At Colchester the internal partitions consisted of narrow sandy-clay walls *c* 0,24 - 0,40 m wide built on the contemporary ground level without any foundations (Crummy 1977, 71).

At Vindonissa Königsfelden Periods 5 - 7, Maryport and Butzbach it has been found that the internal walls were laid on top of the contemporary floor surface, and at Oberaden it has been suggested that the internal walls were built on top of existing floorboards (Albrecht 1940, 551).

From this it is clear that the internal walls were generally built later than the external, a pattern which has been noted at Chester Abbey Green and Neuss, and may be seen today at Caerleon in the walls of Barrack 1 in the Prysg Field.

Different construction techniques were sometimes used for different parts of the barrack. At Vetera I narrow internal walls were made of tiles laid in a herringbone pattern with gaps for the uprights in contrast to the stone sill exterior walls. The barrack at Carzield had external sandstone sill walls and interior walls constructed on timber sill beams; the Severan barracks at Ilkley had external stone sill walls while a number of internal stakeholes probably denote partitions. Post-trench construction was the general method at Exeter but the partition walls between the *papiliones* and *arma* were built on sill beams at floor level. The same may be said for Nanstallon where at least two partition walls were built with sill beams, while at Ravenglass, sill beams were used for the external walls and post-pits for the uprights of the internal partitions. The barracks at Berkeley Street Gloucester are very unusual in having stone sill construction for the rear and end walls, but post trenches for all the other walls. Hesselbach seems to go against the trend in Period 2 in having small stone sill construction for some of the partition walls in the officers' quarters when post trench was the general technique used in the barracks.

Even more striking is Carrawburgh. The front longitudinal wall of the northerly barrack apparently was of timber while the internal longitudinal wall dividing the *contubernia* had foundations with a width of 1 m made of clay and rough stones. The similar foundations of the rear wall were 0,68 m wide. This suggested to the excavator that the central wall was intended to be higher than the others, possibly in order to accommodate clerestory windows to bring light to the *papiliones* (Breeze 1972, 94). At Ravenglass also there is an emphasis on central longitudinal strength, for here in Phase 2, a barrack was constructed with a double central wall (Building Type F). The excavator's intepretation was that the double wall was necessitated by the unevenness of the ground. Such an interpretation may be of relevance for the construction at Cardean and Birrens. Potter writes that the ground at Birrens is uneven (1979, 31), but in truth it must be said that both sites are quite flat. In general, the central walls of the

barracks are not as strong as the external walls and their line is often interrupted one or more times along their length.

The wall dividing the officers' quarters from the rest of the barrack is often of heavier construction than that of the partition walls between the *contubernia* and may even be constructed in a different technique. Thus at Wallsend, Gelligaer and Rottweil Kastell III this dividing wall uses a stone sill when the other partitions have bases only of timbering.

Sometimes the use of different construction techniques in different parts of a barrack does not follow any plan, but may be the consequence of necessity. Thus in the south-east corner at Bonn, barrack walling was helped to pass over a drain with the help of a sill beam (Wortmann 1968, 327). Often it is difficult to understand the reasons for the use of different techniques. The Goss Street Barrack at Chester employed a mixture of posthole and sill beam construction and the same may be true of the New Market Hall Barrack at Gloucester. It may be imagined that a wooden sill would be a useful alternative when confronted by a stretch of ground which could not be dug because of rock outcrops, alternatively by an area of loose sand in which postholes would tend to collapse or offer little support. When the officers' accommodation of the West Barrack at Martinhoe was extended it seems that sill beams were used in contrast to the post trenches of the rest of the barrack (Fox and Ravenhill 1966a, 19). Certainly the ground was very difficult at Martinhoe, but it may be that sill beam construction was considered to give a better quality of building for the officers. A combination of post trenches and sill beams also was used in the barracks at Corbridge and Pen Llystyn.

Some of the strongest contrasts are between the officers' quarters and the men's quarters in the same barrack. Crummy thought it possible that the men's quarters of the Lion Walk barracks at Colchester were of timber construction, only the centurions' quarters having concrete sill walls (1977, 71). But this may now be considered less likely since it has been seen that the men's quarters of the Gilberd School barracks in Colchester also have the characteristic concrete sill walls (P. Crummy pers comm). It has been seen in Chapter 2 that the centurion's quarters at Grasgasse Regensburg were built on stone sill walls in contrast to the probable timber of the men's quarters (Fischer 1986, 150). Conversely, the centurions' quarters of the Deanery Field barracks Chester had footings bonded entirely of clay while the contemporary footings of the men's quarters had a mortar bedding, which must be considered superior (Droop and Newstead 1931, 12).

Reference has often been made to Oberaden. It is clear that the series of small buildings in the north-west corner were constructed for the officers using post trenches while their men were accommodated either in tents or in very lightly-founded structures. The same situation may obtain in the barracks to the east of Straße II at Dangstetten. Here the remains of the officers' quarters were very clear 'with their relatively deep foundation trenches cut sharply into the gravel' in contrast to the 'often single postholes without connecting post trenches of the men's quarters' (Fingerlin 1970-71, 209). The implication is clear that officers' quarters might well be built before the rest of a barrack and would be considered more important. It is possible that the irregularity of the men's quarters of Building XIV at Longthorpe may be explained if the *contubernia* are considered as a number of small structures added to the pre-existing

centurion's quarters. The unusual veranda construction of the *contubernia* has already been noted.

The apparent absence of centurions' quarters in the barracks at Lauriacum has been discussed in Chapter 2. If the centurions' quarters had been constructed first, they might well have been of a different material to the men's quarters. It need not be thought that buildings of timber construction were necessarily considered inferior to buildings with stone sills. The tribunes' houses at Colchester were of purely timber construction at the same time as the barracks of the legionaries had concrete sill walls. The differences after all would have only long-term consequences.

Examination of the remains of Barrack 1 at the Prysg Field Caerleon reveals something of the same process. It is clear from the pattern of joins in the walls that the centurion's quarters were built first. There is also a substantial difference in the quality of the two parts of the building. The site of the whole barrack slopes gently to the east and considerable efforts were made to ensure that the centurion's walls and floors were level. This was achieved through the use of stone courses which vary in depth along their length and have the appearance of long thin wedges. In contrast, the men's quarters were constructed according to the lie of the land and the external walls consisted of larger stone blocks in fewer and rougher courses.

Centralised Organisation and Supply

Richmond, inspired by Fendoch, proposed the existence of stock-piles of material to be used in standardised fort buildings (1938-39, 151). Such a system has been argued against persuasively by Hanson (1978 and 1982) and Mc Carthy (1986).

The whole of the evidence presented in this study speaks against the detailed uniformity of barrack buildings. They have certain recognisable features but the interpretation here is that they vary very much to meet the needs of the place and moment. A centralised supply of materials for barracks might have been expected to produce buildings more uniform than those which have been revealed.

On the other hand it remains possible that stockpiles existed for the major timbers such as the gate and tower uprights. This is illustrated by the conservation of the upright timbers of the *porta praetoria* at Longthorpe. On the demolition of the first fort, the uprights were sawn off at ground level and the remainder no doubt earmarked for future use (Frere and St Joseph 1974, 13).

Appointments

Roofing

Many different materials were used for roofing. Tiles were by far the most common after the first century at which time they were not much used in auxiliary forts (although they are found in the legionary fortresses at this period); nor were they confined to larger barracks or to those with stone sills. For example they are associated with wholly timber barracks at

Nijmegen and Öhringen. When tiles were not used, advantage was taken of local materials. Slates were used at Princess Street Chester, Brough-on-Noe, Caernarvon and Rückingen; stone roofing slabs were used at Princess Street Chester again and at Carrawburgh. Simple thatch or shingling were also very often employed, in particular in the early timber barracks. Their use has been suggested at Dangstetten, Pen Llystyn and Niederbieber. Rush thatching has been identified at Bearsden, thatch at Butzbach and shingling at Martinhoe. More unusual is the idea, again from Martinhoe, that the garrison used its tents as leather roofs in the manner proposed by Richmond for Masada (Fox and Ravenhill 1966, 19), but the very exposed and windy position of the fortlet overlooking the Bristol Channel makes such a suggestion improbable.

A clear distinction between the centurions' and men's quarters was found at Inchtuthil. The centurions had roofs with tiles but those of their men had a less permanent material (Pitts and St Joseph 1985, 151).

It is very likely that most of the barracks has simple pitched roofs. This is illustrated at Fendoch by occurrence of runnels formed by the dripping of rainwater along both sides of the barracks. It is possible that detached officers' quarters imply a different roof line (Jarrett 1976, 34) and it has been shown in Chapter 3 that internal proportions of certain barracks may imply the same.

As was seen in Chapters 2 and 3, there is a substantial minority of barracks which are built with a party rear wall. Most of these are found in the continental legionary fortresses, but they also occur in auxiliary forts. This conformation renders the access of light to the *papiliones* very difficult without the construction of some kind of clerestory and it is thus that most of the reconstructions are drawn.

Figure 123 reproduces the dimensions most typically found in one of the pairs of barracks of this kind, that is a width of *c* 11 m for the officers' quarters and *c* eight metres for the men's quarters. If the height of the veranda is taken to to be three metres and the slope of the roof to be 22,50°, assuming that the pair of barracks is to be covered by one pitched roof, the height of that roof will be *c* 7,50 m. If a clerestory is added it will be *c* 8,50 m. If the clerestory is to light the *papilio*, the height of the *papilio* will be some seven metres, a room considerably higher than it is broad or deep; one furthermore which would loose all heat up into the roof. The same results follow if the roof line is imagined to begin at the edge of the men's quarters, the veranda being a lean-to addition. The respective heights will be only *c* 1,30 m less.

If a ceiling is imagined, the clerestory becomes pointless except to lighten a second-floor room. Such a second floor has been suggested for the stone barracks in the south-west corner of the fortress at Nijmegen (Bogaers and Haalebos 1983), but on the basis of the known numbers of men per century, there would seem no need to imagine second-storey rooms. These would tend to obviate the need for *arma* whose presence is a very persistent feature of the barracks throughout the period under study. Such a construction is possible, but if it is to be imagined for all barracks of this conformation it seems very strange to build such a complicated building of timber at Ellingen when there was plenty of room to build two single auxiliary barracks.

It seems more probable that admission of daylight to the *papiliones* was not considered very important. There is no shortage in the finds of lamps from the barracks. Twin ridges would be the most likely form of roof construction. Rainwater falling between the two ridges could be drained with the use of timber guttering as was normal practice in the broad-span post war timber glass house structures of horticulturalists. Georgian housing too bears witness to the effectiveness of multiple small pitched roofs. It may be added that the party walls and the external walls of the excavated double barracks are no larger or more deeply founded than other barrack walls. Some difference might be expected in order to cope with a more elaborate and heavier superstructure.

Rain falling from the roofs formed shallow and slightly irregular troughs and where the ground drained quickly, as did the gravel subsoil at Fendoch, no attempt was made to prevent the troughs. But roof guttering must on occasion have been provided and part of a timber gutter was found in the area of the centurions' houses at Oberaden (Kühlborn 1982, 511). Sometimes drainage ditches were dug similar to the one to the rear of the New Market Hall barracks Gloucester, about 1,20 m wide at the top, some 0,50 m deep and of a shallow U-shape in section. More often eavesdrip guttering was provided. In timber barracks this was often fashioned out of a half log or tree-trunk and is marked by a shallow, regular, U-shaped depression in the ground. In many barracks with stone sills a more sophisticated provision was made. At Housesteads, the veranda of the Hadrianic barracks was bounded by a gutter cut from stone blocks, while at Carrawburgh along the front of the veranda of the barrack to the south of the *via sagularis* ran an eavesdrip 0,15 m wide formed of dressed stones one course deep and resting on flags. The barracks at Carnuntum also were provided with drains along the side of the verandas.

Veranda

The most usual upright supports for the veranda roof were wooden posts established in postholes in the normal way as, for example, at Gelligaer. Also common were stone bases into which sockets had been cut for the uprights. Examples have been found at Neuss, Vindonissa (North-East Corner and Breite), Lauriacum, Vindobona and Carnuntum. When the barracks had stone sill walls the veranda posts themselves also could be given small similar foundations as at the Deanery Field Chester and stone foundations were also found at Housesteads. A sill wall running the length of the veranda for the support of the uprights was suggested for The Croft barracks at Caerleon while at Degerfeld such a sill wall ran round the three sides of the *Kleinkastell* buildings.

The use of stone for the full length of the uprights is only rarely attested but their remains in the form of stone drums are still to be seen on the site of the barracks at Chesters. Square stone bases were found at Lauriacum and it was the opinion of the excavator that they would have been completed in stone rather than timber (von Groller 1908, 92). Stone pillar bases for the veranda also have been found at Housesteads (Wilkes 1960, 64). A recent reconstruction has suggested that stone columns took the place of wooden posts at Crook Street Chester (Strickland and Davey 1978, rear cover).

The proportions of the veranda and *contubernia* discussed in the previous chapters suggest that the veranda may sometimes have been a lean-to structure and sometimes integral with the whole construction.

The most common veranda surface, apart from simple earth (especially in the early auxiliary forts), was of cobbles as at Crook Street and Goss Street Chester (Phase 1), Housesteads and Carrawburgh. Gravel was found at Berkeley Street Gloucester and at Poltross Burn (if indeed there was a veranda) where it was combined with a series of flag steps to cope with the steep slope. Stone flags were found at Prysg Field Caerleon, Slack and suggested for Goss Street Chester (Phase 2). No veranda posts were found at the Prysg Field thus it may be that the stone flags were laid before the establishment of any posts. There is evidence for timber flooring at Vindonissa Königsfelden and Heidenheim and duckboards have been suggested for The Croft barracks at Caerleon.

Flooring

The flooring of the *contubernia* took a great variety of forms. The simplest surface was pounded earth as at Slack which had the advantage of warmth over some of the more elaborate finishes, but generally the earth was given some reinforcement. At Balmuildy masonry chippings were added and at Dover, chalk was pounded in. Clay was the surface most commonly used and the examples are too numerous to cite here. The depth of the clay could often be quite considerable, but the 0,65 m at South Shields was exceptionally thick and stems from a desire to level a floor which was uneven. Clay was also often combined with other materials such as gravel (New Market Hall Gloucester and Ardoch), light cobbling or broken tile. But clay was not always present and light cobbling and gravel alone were combined at Old Kilpatrick while Cadder had floors of cobbles only and Fendoch and Drobeta floors of gravel only. Pure sand floors were found at the Deanery Field Chester and others of rammed brick fragments at Caerleon.

Stone paving slabs were also often used. They were of sandstone at Birrens and must have been none too warm in the Scottish winters. Stone paving has also been found at Randylands, High House, Poltross Burn and Ebchester. Tufa blocks were laid in the barracks at Niederbieber while tile flooring was found on the Odeon site at Chester. Warmer would have been timber flooring which has been interpreted at the Northgate Brewery and Abbey Green barracks Chester, Oberaden, Strasbourg St Étienne, Vindonissa Köngisfelden-Breite, Carnuntum, Fendoch, Ravenglass, Hayton, Arentsburg, Dormagen and Butzbach. The floor at Ravenglass (Phase 2) was composed of 0,10 m planks resting on thin joists which in turn rested on a gravel surface (Potter 1979, 31). It is likely that timber floors were more common than many excavations have revealed. Light cobbling or gravel would form a good foundation for timber joists.

Concrete floors were also common, often combined with crushed tile to form *opus signinum*. Details of such a floor emerged very clearly at Corbridge. The floor was 0,15 m thick and was composed of a single layer of small cobbles over which mortar had been poured and then coated with a thin top layer of pounded tile (Richmond and Gillam 1953, 208). These floors were usually brought up in a curve at the edges to form a skirting. Such floors were smooth, waterproof and easy to clean while the pounded tile meant that the surface was not quite as cold as paving stones or simple concrete. Such floors have been found at Deanery Field and Odeon Chester, Prysg Field

Caerleon, Vindonissa Königsfelden-Breite and Breite, Carnuntum and possibly at Gelligaer.

More sophisticated and laid in a similar fashion were tessellated floors composed of small tesserae of tile. They occurred not infrequently in the Prysg Field barracks Caerleon and at Vindonissa. Such a floor probably was provided for the highly decorated room now interpeted as a *triclinium* in the officers' quarters at Echzell (see below). At Königsfelden Vindonissa a fine example of a tiled floor was found in a centurion's quarters. Small tiles with a length of 0,10 m were laid in a herring-bone pattern and their joints filled with mortar (Tomasević 1962, 40). A Medusa mosaic floor of the first half of the third century has been found in a centurion's quarters at Bonn (Gechter 1986, 155); mosaic floors have been found in barracks in Breite Vindonissa (Fellmann 1952-53, 21) and frequent pieces of mosaic glass at least in the barracks at Burladingen (Bersu 1917, 118), but such flooring is highly unusual.

Floors varied much within individual barracks and no type was tied to any form of building construction. In general *opus signinum* floors are more often found in officers' quarters and legionary barracks. It possible that similar distinctions were made at Rocester. Here the men's rooms appear to have had clay floors, while those in the officers' quarters had gravel, possibly as a bedding for timber floors (Rocester 1985-86). But such a clear differentiation is not often to be noted between the two parts of a barrack.

Doors

The position of the doors in the barracks has often been difficult to determine. The doors to the *arma* and *papilio* most commonly were placed in line on one or other side of the *contubernium*. Presumably it was easier to build the door surround in conjunction with the partition walls rather than in the middle of the walls. This position also made the best use of the space available. The position of these doors does not show any clear pattern vis-à-vis the officers' quarters. Thus the doors to the *arma* and *papiliones* at Valkenburg Castellum 1 are always on the left side of the *contubernium* irrespective of the position of the officers' quarters. But the left hand side is by no means a rule. Often the doors were not positioned so regularly. At Brough-on-Humber they were placed diagonally, furthermore here there was also a lateral door allowing communication between the two *contubernia*. At Ladenburg recent excavations have shown that in two *contubernia* the doors from *arma* to *papilio* were positioned next to the partition wall between the two *contubernia* and not in the same relative position in each *contubernium* (C. S. Sommer pers comm). It is understood that often there was a door at the end of the veranda into the officers' quarters and occasionally one has been found in the gable end as at Nanstallon. Doors in such positions at The Lunt were equipped with small porches.

The presence of doors is sometimes indicated by stone threshold blocks and examples come from Carnuntum, Birrens, Slack and Zwentendorf. They suggest a width of a little over one metre for the doors although there is a probable example of 0,90 m from Vindonissa and this same width is suggested by timber thresholds from Carnuntum and Valkenburg. On the other hand doors without such thresholds might be rather narrower as were those at Ladenburg with widths of *c* 0,75 m.

Pivots rather than hinges seem to have been the usual method for hanging the doors. Sockets and socket stones for the pivots have been found at Deanery Field Chester, New Market Hall Gloucester, Carnuntum, Zwentendorf, Sewingshields, Housesteads Milecastle and Poltross Burn.

A door lock found in the likely vicinity of barracks at Arnsburg makes it probable that the doors were lockable (Kofler 1902, 10)

Doors may not have been the only means of securing the *contubernia*. In front of the entrances to rooms 3 and 4 of Block A of the Deanery Field barracks in Chester there was a row of narrow, roughly dressed blocks of sandstone leaving a space or channel of *c* 75 mm before the threshold. The purpose of these cavities is uncertain but it possible that they were designed to hold some portable shuttering only infrequently employed (Newstead 1928, 5). This implies that the *papiliones* had doors in the normal fashion, but that the *arma* usually may have been left open. Richmond went further in his report on the excavations at Fendoch in suggesting that the *arma* were open-fronted (1938-39, 136). This would increase the amount of the light in the *papiliones* and reflect more accurately the use of the terms by Hyginus.

Windows

The finds of window glass deriving from barracks show that they also had windows, doubtless to both back and front where possible. Window glass is known from Chester (Odeon), Caerleon Prysg Field, Mainz, Carnuntum, Ravenglass, Slack, Gelligaer, Valkenburg, Alteburg, Dormagen, Butzbach, Arnsburg, Heddernheim, Öhringen, Burladingen, Poltross Burn and High House. Thus it is to be found in barracks of wholly timber construction as well as in those with stone sills; in fortresses, forts and fortlets.

The use of window glass was not universal. Miller considered that the window glass found at Balmuildy probably derived only from the *praetorium* and *balneum* (1922, 95), while the total absence of glass at Lauriacum, Bearsden and Pen Llystyn was remarked upon by their excavators. The use of shutters must have been common and is suggested for Bearsden (Breeze 1984, 38-39). The occasional use of window irons such as that found at Lauriacum is also to be expected.

The height of the windows cannot be known, but recent evidence suggests that they may have been high up in the walls rather than low. Plaster remains from Echzell recently have been studied at the Saalburgmuseum and this shows the emplacement of a window in very much the same position as in the reconstructed barracks there, that is with their bottom edge some two metres from ground level (D. Baatz pers comm).

Amenities

Hearths

The remains of hearths often are found in the *contubernia* and it is probable that they were a standard feature in most barracks although the evidence of their presence does not always survive. Heating was their primary purpose, but cooking was also probably an important subsidiary role (see below).

The classic position for the hearth or fireplace, whether legionary or auxiliary, is in the *papilio* built up against the middle of the partition wall between *papilio* and *arma*. This is reasonable since the hearth would often then have been under the highest point of the roof and well positioned either for a chimney or for some smoke outlet in the roof if no ceiling were present. But hearths have been found in almost every position conceivable in the *contubernia*, in the middle of *papilio* and *arma* and in the corners.

Hearths are also found in the officers' quarters. Often they are situated in one of the small rooms at the very end of the barrack; these rooms thus may be interpreted as kitchens. They also are to be found heating one or more of the living rooms.

Since there is no hard and fast rule for the position of the hearths in the *contubernia*, it is not surprising that they are often found in different positions in different periods in the same barrack. Thus in Period 1 at Hesselbach the hearths were placed against the front wall of the (undivided) *contubernia* and in Period 2 against the left partition wall between the *contubernia*. At Degerfeld almost all the hearths moved from the *papilio* to *arma* in Phase 1a. This is not to say that hearths were not often rebuilt in the same place; many show evidence for successive rebuildings; that in the most northerly room in the north barrack at Degerfeld was rebuilt seven times (Jorns and Meier-Arendt 1967, 23). Hearths often take different positions in different *contubernia* of the same barrack.

A particularly fine series of fireplaces was excavated by Professor Newstead in the Deanery Field barracks Chester during the 1920s. These may be taken to be representative of the most sophisticated constructions. Although generally U-shaped in plan they varied considerably in form and construction surely reflecting work by the *contubernium* group. The most elaborate was found in *papilio* 3A in Block B. This hearth was set on a bed of clay which was hollowed out in the centre to form a cavity which in turn was filled with broken tiles set in mortar. Over this was placed a layer of thick tiles, some of which had become cracked and pulverised by the action of the fire. Behind the tiles was a backing of clay extending towards the face of the wall. To the front was a series of seven roughly dressed stones placed on edge and bedded in mortar to form a semi-circular kerb which projected 0,10 m above the floor of the hearth. On both sides were large blocks of sandstone set in mortar and projecting above the floor line of the hearth. These large blocks were probably to prevent logs from toppling onto the floor (Newstead 1928, 8-9). The overall width of the fireplace was 1,20 m and the kerb projected 0,90 m from the line of the wall.

A feature of some of the most sophisticated fireplaces is that they were built into the thickness of the masonry wall behind them. The crescent-shaped intrusion clearly implies the presence of some kind of flue or chimney. Although this construction is not found in the Deanery Field hearths at Chester, examples have been found at Vindonissa Breite and North-East Corner, Housesteads and Slack. When the walls were of half-timbering this practice was much less common. The fireplaces were still built against the wall but usually a thick layer of tile, stone or clay intervened as at Niederbieber and Heidenheim. Nevertheless Hesselbach Period 2/2a Building 4 provides examples of a series of fireplaces intruding into half-timber walls (Baatz 1973, 38 Abb 19). The barrack/stable in

Fläche C Period 2 at Dormagen had one such fireplace. The hearth consisted of a concrete floor plate with sides 0,46 m long. Broken pieces of tile and stone set on edge marked the sides giving the hearth a diameter of 0,30 m. The chimney walls up to 0,45 m thick were still preserved to a height of 0,25 m. The chimney was made of roofing tiles arranged with their narrow edges to the outside and rested on a foundation of broken tile and cobbles set in clay (Müller 1979, 28). At Oberstimm in Phase 1a a hearth with a chimney was built into the middle of an external half-timbered wall in Building C, but this was not a conventional barrack (Schönberger 1978, 68). Baatz (1973, 41 Abb 22) and Cichy (1971, 28) provide realistic reconstructions of fireplaces of this kind.

By no means were all hearths so sophisticated. In particular it is highly unlikely that those whose base consisted of a number of tiles or stones arranged in the form of a small square in the middle of the *papiliones* or *arma* had any kind of superstructure. Very clear examples come from Dormagen. Their smoke must simply have escaped through a hole in the roof.

There is a substantial minority of barracks where no trace of a hearth has been found. Richmond suggested that the timber flooring at Fendoch may have prevented their use, but this suggestion would not find favour with Baatz or Cichy. At Dover, the presence of hearths in some barracks but merely of residual traces in others has led to the suggestion that braziers may have been used as alternative source of heating and cheer (Philp 1981, 39). Indeed the use of braziers has been suggested for Caerleon, Vindonissa, Lauriacum, Carnuntum and Fendoch. The almost total absence of hearths in the barracks at Caerleon is very striking. It is possible that some of the rectangular bases of tiles or stones in the middle of the *papiliones* and *arma* served as stands for braziers rather than as hearths themselves. The presence of braziers implies also that the primary purpose of the hearths was for heating rather than cooking. Nevertheless, no actual remains of braziers have been found.

The most sophisticated heating provision so far found in the *contubernia* comes from Oberstimm Building 6 Period 2. In each *arma* of this barrack was a pit up to 2,70 m long and between 0,35 and 0,48 m wide. Some of these had pear-shaped ends. The sides were straight on three sides but the north side sloped. The bottom was relatively level and the pits had a grey-white, ashy filling. Certainly these pits had contained a fire at one time. Schönberger suggests that a dome may have surmounted the rounded part of the pit containing the fire while the smoke escaped at the other end. He interprets the pits as small examples of canalised heating which would have been more effective than hearths (1978, 112). This forms a great contrast to the simple provision found in one of the rooms at Bearsden. Here the bottom of an amphora had been used for the base of a small hearth (Breeze 1984, 39).

It should perhaps be added here that hypocausts are virtually unknown in the barracks of the first two centuries. A famous exception is that found in the quarters of the *primus pilus* at Inchtuthil, especially unusual in a timber building. A further example occurs in the quarters of one of the centurions of the first cohort at Caerleon, this time in a building with a stone sill. Small versions of this kind of heating system are to be seen in the areas mainly of the centurions' quarters at Lauriacum and Carnuntum, but they are to be dated to the end of the third century and later.

Latrines and Washing Facilities

Officers' quarters often had their own small latrines which were usually placed in one of the small rooms at the end of the quarters in order to have access to fortress or fort drains running past the ends of the barracks. When the centurions' quarters at Abbey Green Chester were rebuilt on stone sills *c* AD 100, the most westerly of those known was supplied with a lead-lined latrine which emptied directly into the main drain running along the north side of the barracks (Mc Peake, Bulmer and Rutter 1980, 19). At Vindonissa, the small Room 3 at the north end of the centurion's quarters of the barrack immediately to the east of the north gate, in Period 4 had a sloping floor and a tiled drain or gutter which led out to the large drain running along the north side of the barracks. The excavator said that this certainly served the purpose of a latrine (Simonett 1938, 89). Similarly, the north-east corner of the north room of the centurion's quarters of the barrack immediately to the west of the north gate, in its stone period, had a tiled floor which seemed to slope to the east towards the drain running along the front of the barrack. Simonett interpreted this as a latrine and commented that such arrangements were often noted at Vindonissa (Simonett 1941, 173). From Neuss also it was reported that in the smaller rooms of the centurions' quarters several examples had been found of a tiled floor sloping steeply in the direction of small drain which led into an external main drain (Koenen 1904, 141). Again a latrine emplacement is the obvious interpretation. The frequent occurrence of latrines in the centurions' quarters at Bonn also has been noted (Gechter 1986, 155).

These latrines were often associated with washing facilities which were contrived to provide some flushing action. Fragmentary drains were discovered in the end rooms of the Prysg Field barracks at Caerleon suggesting ablution rooms and the finds included a small stone basin or trough with a hole for drainage from one of the end rooms of the centurion's quarters of Barrack 9. It was associated with the usual shallow stone-built drain sunk in the floor (Nash-Williams 1932, 139). Drains out of the north side of the centurions' quarters in the Deanery Field Chester again suggest a wash room (Droop and Newstead 1931, 15). Such arrangements were not restricted to the legionary fortresses.

The centurion of Barrack XIV at Housesteads was very well provided for in the Hadrianic period. His latrine was a three-sided structure of stone blocks. Its outlet led through the end wall to connect with the main drain of the fort. Another drain, constructed of stone also flowed into the main drain. Its purpose may have been both to carry away waste from washing and cooking, also to disperse heavy rainfall. On this occasion there was no flushing connection (Wilkes 1961, 280-81).

Auxiliary forts were often not provided with such elaborate drainage systems as these and recourse had to be made to cesspits. Barrack I at Hod Hill was equipped with a closet which had a cesspit to the south of the barrack. A similar arrangement existed in Barrack II. The cesspit was placed at the mouth of the entrance to the officers' quarters and was solidly covered. It measured 0,75 × 1,25 m and was served by a slightly sloping box drain leading from the closet emplacement. The closet was marked by a circular pit of 0,60 × 0,55 m out of which the shoot led and into which led a drain from a wash-place to the north thus ensuring some flushing (Richmond 1968, 81). Similar emplacements have been found at Valkenburg Castellum 1.

A small cesspit was located in the north-east corner of Barrack IV at Nanstallon. During Period 1 the pit lay partly under the wall-line but in the main just outside the eastern end wall of the officers' quarters. In Period 2 the officers' quarters were extended and the pit was incorporated in the building. An arrangement similar to that described for Hod Hill may be imagined. A timber-lined cess-pit was found the the north-west corner of Flavian Strageath Building II and a similar timber-lined cess pit recently has been excavated just beyond the end of the officers' quarters at Rocester (Rocester 1985-86, 2).

Even when a central drainage system was established in an auxiliary fort, when the subsoil was suitable, use could still be made of soakaway cesspits. Thus a latrine seepage pit is suggested in the officers' quarters of Barrack 2 at Künzing (Schönberger 1975, 28).

Different to the private emplacements described above is cesspit P1 which appears to have been dug as a latrine during the early stone phase (*c* 120-160) of the centurion's quarters of the Northgate Brewery barrack at Chester. This trench was 4,5 m long and 0,50 m wide. It was placed in the middle of the centurion's quarters and survived through the main stone phase to the beginning of the third century. The size of the trench is surprising and demonstrates the large number of people having business in the centurion's quarters, at least during the day. Rooms 3 and 4 with mortar floors were separated from the latrine and its odours by a transverse corridor which perhaps formed the main entrance. It would seem that Rooms 3 and 4 constituted the living quarters and many of the other rooms offices (Ward and Strickland 1978, 22).

But there is no question that this latrine had to serve the whole of the century because another considerable cesspit, P47, was also in existence at the same time. This pit was situated at the extreme north end of the barrack veranda, next to the centurion's quarters. Post sockets were found at the corners of the pit, also numerous nails, thus it seems that the posts round the pit formed the framework of a shed which would have blocked the end of the veranda. If the pit were boarded over, the gulley at its south end may have been provided to enable containers of cess to be emptied into it (Ward and Strickland 1978, 22). The placing of latrines in the verandas at Chester seems to have been common practice because timber-lined latrine pits were constructed and used in the ends of the two verandas examined in the second-century Princess Street barracks (Strickland 1982, 9).

At Waddon Hill, a latrine trench was located in the western end of the veranda of barrack Building IV. The trench was *c* 6,0 m in length, enough space for nine or ten men. Webster suggests that it met the needs of barrack Buildings IV and V (1979, 54).

Again it is possible that latrines were located in the verandas at Degerfeld. The walls flanking the entry to the courtyard of the *Kleinkastell* in Phase 1 seem to form small alcoves with the front walls of the barracks. The colour of the drainage trenches connected with the alcoves is green and suggested the possibility of latrines to the excavators (Jorns and Meier-Arendt 1967, 24).

A similar arrangement was found at The Lunt. Two possible latrine pits were found in Barrack 5. One measuring 4,55 × 0,9 m was more elongated than the others and was situated at the officers' end of the veranda or

corridor in a position which suggests its use both by the officers and men. The second pit underlay the apparent threshold to the officers' quarters. Both pits probably were timber-lined, capped with timber and held buckets. The absence of running water often must have made tub closets a necessity.

Distinctive latrine arrangements were found in Barrack 4 at The Lunt . Pit 43 measured 1,5 × 0,6 × 0,9 m deep and was carefully lined with clay. Its ends were deliberately tapered and the excavator considered this to indicate that it was designed to accommodate two circular tubs or buckets. Adjacent, in the next room was another pit which measured 1,05 × 1,2 × 0,9 m deep. Again it was lined with clay and could have contained water. The juxtaposition of these pits suggests that this corner of the barrack was used for latrine and ablution purposes. Interesting is the fact that both of these pits were located in the officers' quarters. The capacity would seem to be over-generous for the needs of the officers and staff and they also may have been used by the men of the barrack.

Elsewhere latrines were placed well away from the officers' quarters. A latrine pit took up about one quarter of the area of the last *contubernium* of the more northerly barrack at Exeter Goldsmith Street. Fairly square in outline, it is difficult to know how many men this served, but it is possible that this last *contubernium* was put aside as a latrine for the whole century. Similar comments may be made concerning a drain containing excrement found leading from the men's quarters of the first cohort at Vindobona (Harl 1986, 323). Gechter has excavated two small latrines in the barracks of the auxiliary unit at Neuss and considers that he has the postholes of two back to back latrine seats, but it is impossible to say how many men they served (1983-84, 119).

Some latrines served only a single *contubernium*. In the *arma* of the barrack south of the *via sagularis* at Carrawburgh, a pit with a tongue-like projection had been dug into the floor. This may have been a latrine pit and if so the gully is reminiscent of the gully to P47 at Chester. The pit presumably had been covered by wooden boards and Breeze considers that the pit could only have been constructed and used when the garrison was below full strength (1972, 92).

The timber boarding and clay lining of some of these pits would mean that the liquids could not readily soak away and in any event the solids would pile up; thus some allowance must have been made for emptying them from time to time and bucket emplacements have been interpreted at The Lunt. This must have been a lowly and undesirable job and not a full-time occupation which probably explains the very few references to it. But the duty roster of *Legio III Cyrenaica* for the first ten days of one October AD 90/96 has a record that M. Longinus was clearing out the latrines (Fink 1971, 110-11, Papyrus No 9, 32g) and it is possible that 2f of the same document records that C. Domitius Celer had a similar task (Davies 1974, facing 304, Fig B).

But latrines did not always involve solids. Preserved in the north-east corner of *contubernium* 8 at Goss Street Chester was the top half of an amphora latrine. The amphora had been filled with fist-size cobbles. Its use must have been confined to the men of the *contubernium*. The same may be said of the latrine in *contubernium* 2 of Barrack V at Myrtle Cottage Orchard Caerleon. Here a small recess 0,37 m wide and 0,45 m high was built into the south wall of the *papilio* at ground level. This latrine had an external outlet onto the veranda paving and was fronted inside by a

single upright slab. This feature was not built until the third century. Simplest of all, the eavesdrip channel of the east wall of Barrack 2 at Brough-on-Humber seems to have been used a the latrine of the whole block during Period IIB (Wacher 1969, 19).

The discovery of so many latrines in the barracks is surprising considering the elaborate, separate latrine blocks at, for example, Caerleon and Housesteads, while the location of an amphora latrine in the *via sagularis* of the north *praetentura* at Strageath would seem a better place than the *contubernia* for such purposes.

The examples of washing facilities cited above have been associated with latrines but this was not always so. A possible bath was found in Room 6 of the centurion's quarters of Barrack VI Myrtle Cottage Caerleon and is dated to the early second century. The bath took the form of a rectangular cement basin measuring 1,60 × 1,22 m sunk into the middle of the floor and edged by a quarter round moulding (Fox 1940, 111). In a centurion's quarters at Neuss the remains of a made-up floor with a thick, trough-shaped basin were thought to be reminiscent of a bathroom (Koenen 1904, 141). The remains of a large cold bath and of a second basin also have been found in the centurion's quarters of barracks in the north-west corner of the fortress at Bonn. They were connected by a tiled drain to the main collecting sewer of the *via sagularis* (Gechter 1977-78; 1979, 74). Again the probable remains of a bath with its concrete surface marked out in squares was found in the centurion's quarters of the stone southern barrack at Königsfelden Vindonissa (Wiedemer 1961-62, 34). Another building at Breite *valetudinarium* Vindonissa with a lead-lined bath was possibly the centurion's quarters of a barrack (Simonett 1934, 82).

If officers often were favoured with latrine and washing facilities, so they were with supplies of water. At Waddon Hill, two square water tanks were located in the middle of the officers' quarters while none was found in the rest of the barracks. Two tanks near the rampart were probably for the needs of horses. It is notable that, even on such a difficult site where centralised supply and collection would have been easier, special provision was still made for the officers. The Lunt also was situated on a plateau and here again the main provision was for the officers. Water tanks have been found in the centurions' quarters of the first three barracks. On the other hand Barrack 5 has a large water tank in its third *contubernium* presumably for the use of the whole century.

Occasionally, more localised arrangements can be seen. In the *arma* of one of the *contubernia* of Myrtle Cottage Barrack V at Caerleon was found a heavy olla half sunk into the floor which could have provided a drinking supply (Fox 1940, 116). Two pits were found in the veranda of Barrrack 10 at Fendoch in front of *contubernia* 5 and 9 which could have had the purpose of holding amphorae for the water supply of the *contubernia*. A similar pit was found in front of Barrack 8 (Richmond 1938-39, 136). Again, in Period III at Dover a large globular amphora was located in the ground in front of Barrack B25 in a similar position to those at Fendoch, again possibly for the storage of water for the mess-unit (Philp 1981, 55). Inside the building in the eastern half of Housesteads Milecastle were found four flagstones set on edge so as to form an enclosure about 0,3 m square and 0,2 m deep. A fifth flag formed the bottom. It was thought by the excavators that this may have been used to support an amphora of the tall cylindrical type with a supply of fresh water (Hunter-Blair 1934, 114).

On many sites wells were sunk, often in the vicinity of the barracks, to meet the water requirements. Examples may be quoted from Carnuntum, Elginhaugh, Welzheim (Ostkastell), Burladingen and Kunzing. No less than forty wells up to nine metres deep have been identified at Oberaden. These also tend to concentrate round the officers' quarters, but they are also found occasionally at the end of the tent rows (Kühlborn 1982, 509).

Storage Pits and Rubbish Pits

Storage pits have been found in all parts of the barracks including the veranda (Künzing Barrack 1). The more elaborate examples, some of which merit the title of cellar, are most often found in the officers' quarters, but this is by no means the rule. But the officers' quarters do have a relatively greater provision of storage facilities and this was noted at Aalen and Haselburg.

The most carefully constructed examples had a lining of clay or timber and these are found from the earliest period at Haltern and Rödgen; at Mainz and Vindonissa an idea was borrowed from well construction when a barrel was used as a pit lining while there is an example of a tile-lined pit at Lauriacum whose purpose is unclear.

Perhaps the most impressive cellar to be found is one of two in the officers' barrack at Hofheim (Erdlager); it measured 11,5 × 3,0 m. It was provided with steps, was lined with timber and must have had a timber cover. Inside were found at least five amphorae (Ritterling 1913, 67). The cellar (Nr 784) excavated in the northerly building at Welzheim (Ostkastell) was timber-lined and measured 3,0 × 4,0 m with an earth ramp on the south side for access (Planck 1983, 12). Similarly Pit 158 in the officers' quarters of the western barrack at Moos-Burgstall measured 2,60 × 1,35 × 1,00 m deep and had a ramp entrance from the north. Remains of amphorae were found in the southern part of the pit. It probably had been timber-lined (Schönberger 1982, 199).

Koenen found a series of deep pits in the barracks of the auxiliary unit at Neuss. The pits measured 1,77 × 0,88 m and seem to have had two levels. The upper level had a post socket situated in the middle which Koenen considered to indicate an apparatus for emptying the pit. It is more likely that such an apparatus was for handling amphorae rather than the horses' dung proposed by Koenen (1904, 142).

The pit for use in the officers in Barrack I at Hod Hill was constructed neatly to take up the full width of the end of the main passage of the quarters. It measured 1,60 × 1,60 m and would have had a stout covering. Pit 6 at Bar Hill measured 4,27 × 1,83 × 2,13 m and lay within the end *contubernium* of Barrack V. It had a cover of sandstone slabs and may also have been timber-lined. This pit could have functioned as a water tank or storage bin and 'it is difficult to imagine that the end *contubernium* was in use when the pit was open' (Robertson, Scott and Keppie 1975, 22).

Such pits were often filled with rubbish on the evacuation of the fort but there were other pits whose primary purpose was the reception of rubbish. Some rubbish pits may have been emptied on a regular basis and it possible to imagine that they held a basket or bucket for ease of operation. Examples of such pits may be the 'Wolfsgruben' from Carnuntum. These take the form of pairs of circular pits with diameters of *c* 1,30 m and depths of

c 1,40 m. Their regular form and flat bottoms suggest that they held flat-bottomed containers of some kind, perhaps buckets or baskets (von Groller 1903, Sp 56, Textfig 25).

Similar containers would have been appropriate for the quite small pits often placed along the line of the veranda in front of the *contubernia* such as those noted on the air photographs of Brandon Camp (St Joseph 1979, 53). The same may be said for the pits at Cadder found at both ends of the barracks where they abutted the streets. Since their fill came from a late date in the occupation of the fort it is possible that they were emptied regularly until that time. Something of the same process has been revealed in the excavations at Princess Street Chester. Here the soldiers were making use of the unbuilt area to the east of the barracks for rubbish disposal. A large number of small pits was found which were filled with rubbish and sealed with sand immediately after use (Strickland 1982, 11). The contents of bones and *lorica* fittings are such that might have come from single *contubernia* and might have been regularly cleared from pits or containers near the *contubernia* if the open area had not been available for disposal.

Although the position of some of the rubbish pits may conform to a pattern, the distribution of most of them is haphazard throughout fortress and fort. No less than 125 have been found at The Lunt and a good number of them are in and about the barracks.

Rebuilding

It should not be forgotten that the barracks were in need of constant maintenance and repair. A particular problem seems to have been posed by pits and latrines. At one point during the second half of the second century, the north end of the Northgate Brewery barrack at Chester was in danger of collapsing into the latrine situated in the veranda (Ward and Strickland 1978, 23-24). Similarly a cess pit under the north-east corner of Barrack IV at Nanstallon caused a collapse (Fox and Ravenhill 1972, 81). The corners of barracks always were vulnerable to poorly driven vehicles and the south-west corner of Building XIX at Caerhun had to be supported by two buttresses.

Furnishings

Furniture

Little is known of the furnishing of the *contubernia*. It might be considered that the most obvious arrangement would be to have four sets of double bunk beds in the *papilio*. In his excavations at Heidenheim, Cichy found numbers of small post-holes in the *papiliones*. He interpreted these as the remains left by bunks set against the rear and side walls and of small tables in front of the hearths (1971, 27-28; 1972). He may be correct in this but it is striking that very few traces of any such arrangement survive elsewhere.

There is evidence for a wooden structure of some kind in the *papilio* of the *contubernium* nearest to the centurion's quarters of Block B in the Deanery Field Chester which was interpreted as 'some long oblong structure such as a couch or seat raised above the sand floor' (Droop and Newstead 1931, 10).

In the more northerly barrack in Phase 2 at Ravenglass in the *arma* were found stakeholes which were interpreted either as the supports for beds or benches against the wall (which arrangement would make entry from the veranda difficult), or perhaps as screens (Potter 1979, 31). From Pen LLystyn comes occasional evidence for furniture. When present this was almost always in the *papilio* and placed either against its front or rear wall; the excavator interpreted the remains probably as cupboards and benches rather than bunks (Hogg 1968, 128).

In the absence of other evidence it must be assumed that the more common practice was for the men to sleep on palliasses which could be tidied away during the day if necessary; that is in spite of the difficulties in stepping over recumbent bodies in the middle of the night. It is possible that other materials were brought into the *papilio* for warmth for in Period 3 at Butzbach the whole of one floor seems to have been covered with matting or a similar material (Müller 1962, 16), while at High House Turf-Wall Milecastle, in the pits of the west side, bracken and heather appears to have been mixed with floor sweepings from the barrack (Simpson, Richmond and St Joseph 1935, 227).

Wall Painting

Finds of painted wall plaster deriving from barracks are quite common in the legionary fortresses although rather less so in the auxiliary forts. Furthermore, within the barracks the centurions' and officers' quarters were often more richly provided for than the men's quarters.

Peters' conclusion with regard to Nijmegen is that although it is possible that some of the most elborate wall paintings in the fortress came from the barracks, it is more probable that the centurions' quarters had simple panel decorations while the men's quarters had white walls with red socles (1979, 379). More elaborate wall painting is found in centurions' quarters elsewhere. Those of Barrack A at Deanery Field Chester had schemes with floral decoration for, on the first rendering, were found representations of possibly a pansy with another flower with red petals and green and brown leaves allied to a design of concentric circles struck with a compass, the inner yellow and the outer purple-brown. A broad black border showed pale parallel *striae* resembling the structure in the leaf of an iris. The second rendering had a thick ground cover of Pompeian red with a white stripe. Its overall design was not clear, but possibly it depicted a large, red-petalled flower on a black stem (Newstead and Droop 1936, 38-39). Wall plaster coloured more simply dark red was found in the men's quarters at the Deanery Field (Newstead 1924, 63).

Figural representations dating to *c* AD 260 have been found in centurions' quarters at Aquincum (Szirmae 1986, 427) while painted wall plaster of quality again was noted particularly in the centurions' quarters at Crook Street Chester (McPeake 1977, 12), at the north-west corner at Bonn (Gechter 1979, 74), at Vindonissa Königsfelden (Wiedemer 1962, 28) and in the North-East Corner (Simonett 1938, 90-91). The centurions' quarters of the end barrack at Caerleon Prysg Field dating to the second half of the second century included a room with plaster painted in polychrome geometric patterns (Wilson 1971, 246), but stray occurrences of painted wall plaster from the Prysg Field barracks in general gave evidence that some of the *contubernia* at least had been plastered and painted (Nash-Williams 1931, 137). In the third century the *contubernia* of Myrtle Cottage Caerleon

Barrack V were plastered internally with smooth white plaster decorated in patterns with red paint (Fox 1940, 116).

The above examples are of buildings with stone sills, but painted plaster with panel designs dating to the first century also were found in the timber New Market Hall barracks at Gloucester although it is not certain from which part of the barrack the painting came (Hassall and Rhodes 1974, 20-21). Painted plaster was also found in barracks possibly occupied by auxiliaries at Vindonissa (Hispanische Kohorte) (Fels 1909, 37). Further finds of painted plaster possibly deriving from barracks have been made at Low Petergate York, St Étienne Stasbourg and Judenplatz Vindobona.

Painted wall plaster is found much less frequently in auxiliary forts. Best known is the painting from Echzell. This find came in the fill of a cellar in the officers' quarters of the barrack next to the north gate in the right *retentura* (Baatz 1968). The painting dates to the late Hadrianic period or to the first half of the reign of Antoninus Pius and derives from two rooms which were treated very differently. Wall A in Raum I is the best preserved. Three picture fields are represented in an architectural framework. The side scenes depict Theseus and the Minotaur and Daedalus and Icarus, the central scene Fortuna and Hercules. Possibly there was a dark blue ceiling. Further work on the plaster remains have revealed wreaths of flowers and of black and white grapes and have led to the re-interpretation of the room as the *triclinium* of the quarters rather than as a bedroom. It also has become clear that the ceiling of the room was domed or barrel-vaulted in some way to correspond with the higher position on the wall of the depiction of Fortuna and Hercules (Baatz pers comm). The standard of the painting was not great art but good workmanship and clearly is highly unlikely to have been carried out by the residents.

Also very remarkable is the depiction of the Head of Dionysus from one of the *praetentura* barracks at Hofheim (Steinkastell) Period II (Nuber 1983). In this instance the plaster was found in the *contubernium* next to the officers' quarters.

Painting in geometrical patterns or stripes of dark to red-brown were found in the barracks at Butzbach Period 3. At Oberstimm, 38 fragments of painted wall plaster were found in the men's quarters of Building 6. Two groups could be established according to the decoration: one with simple lines on a red ground and another with lines and tendrils on a white ground (Schönberger 1982, 293-98).

In all these instances the painting was applied *al secco* on top of a fine lime wash. The simpler painted decoration could have been carried out by the garrison, but the more sophisticated work found at Chester, Aquincum, Echzell and Hofheim is most likely to have been carried out by visiting specialist craftsmen.

Barrack Activities

Cooking and Eating

The presence of so many substantial hearths in the *contubernia* raises the question of whether they were used for cooking. To feed eight men would require a series of vessels of considerable size necessarily of iron or some other metal, similar to the vessel imagined by Baatz for Hesselbach (1973,

41 Abb 22). Finds of such vessels and the means of their support over the hearths are almost unknown. At Carnuntum an iron rod with iron chain rings possibly for suspending a kettle was found associated with a hearth in the corner of a room in a building in the left *praetentura*, but unfortunately this was not a barrack (von Groller 1924, Sp 52). On the other hand Ritterling found numerous roasting spits at Hofheim (Erdlager). Some were square or rectangular in cross-section and varied in length from 200 to 340 mm. Clearly they were designed to fit into a grid similar to the one whose side section was found. This was 277 mm long and had eight holes for the reception of the spits. This would meet nicely the needs of a *contubernium*. Also found were spits round in cross-setion with handles formed into a figure of eight. These were from 240 to 420 mm long and could well have been used at a hearth fire (Ritterling 1913, 189).

Certainly it seems that each *contubernium* had its own crockery and mess utensils. A *mortarium* waster from the Neronian fortress of Usk had a graffito scratched on the rim showing that it was the 'mixing bowl for the *contubernium* of Messor', and fragments of two *terra sigillata* dishes found at Valkenburg and Utrecht bore graffiti referring to a *contubernium* (Johnson 1983, 202).

By way of contrast the baking presumably predominantly of bread seems to have been organised on the basis of the *centuria* or *turma*. This is suggested by the find of a centurial bread stamp from Mainz (von Petrikovits 1975, 97) and by the distribution of ovens suitable for bread-baking built into the rear of the ramparts. Ovens were situated opposite the barracks of each cohort at Inchtuthil where it was found generally that there was one oven for each century (Pitts and St Joseph 1985, 200). A similar arrangement is known at Chester and Caerleon. The same allocation of one oven per century is found at Fendoch (Richmond 1938-39, 138). Other examples of ovens located in the rear of the rampart come from Birrens, Pen Llystyn, Rocester, and the Saalburg but it is not known how they relate to the *centuriae* and *turmae*. At the Saalburg at least fifty ovens had been cut into the rampart of the second century fort. Such ovens often had associated timber structures, possibly no more than lean-to sheds or windbreaks.

The provision of one oven to a group of men more numerous than the *contubernium* group can be seen at the milecastles of Housesteads, Poltross Burn and High House and at the *Kleinkastell* of Haselburg. In these examples a single oven set in the back of the rampart met the baking requirements of the small garrisons which often numbered considerably less than a century. The arrangement at Martinhoe seems to have been different for here were found as many as eight ovens in the area of the *intervallum* although they are unlikely all to have been in contemporary use.

Finds of millstones are common on military sites and the stones are generally of two different sizes. The larger are from mills which would have required some four men or animal power to operate them, while the smaller stones come from individual hand-mills. Examples of the larger millstones bearing the inscriptions of individual centuries are known from the fortress of Mainz and from the forts of Greatchesters, Wiesbaden and Straubing. The forts of Newstead and the Saalburg have yielded both large and small millstones and one of the small stones from the Saalburg bore the inscription of 'Con Brittonis', which confirms that they may be regarded as the normal equipment of the *contubernium*.

It would seem most probable that the grain for the centurial bread was ground in the centurial mills such as those possibly located in the *fabriculae* of the barracks at Valkenburg Castellum 1. Traces of possible millhouses have also been found at the base of the northern rampart of the Antonine fort at Chesterholm.

Yet the *contubernia* also had hand-mills. It must be considered possible that these stones were used not necessarily for the milling of bread wheat but rather of oats and the whole range of pulses which could be made into porridge or potage or even biscuits like oat-cakes prepared over the fire or brazier. Yet this does not really accord with the evidence from cellar 784 found in a building probably a barrack at Welzheim (Ostkastell). The cellar contained predominantly grains of spelt wheat with an admixture of oats, barley and rye (Körber-Grohne, Kokabi, Piening and Planck 1983, 47-49).

Thus it remains possible that the issue of the grain ration was, in the first instance, to each man in accordance with Herodian's description of Caracalla in camp: 'He would grind enough corn for himself with his own hands and make a barley cake which, after baking on charcoal, he would eat' (IV vii 5). But the issue of at least the major proportion of the grain on a centurial basis for milling and baking seems more likely. This would be in agreement with evidence for the allocation of other supplies to specific centuries. Thus at Nanstallon, part of the handle of an amphora found in a barrack was incised with the graffito: '14: Century of A...' (Wright 1968, 213 No 69). The amphora may have contained wine, oil or fish sauce for the century. The involvement of the century as a unit in its own may also be seen in the *patera* handle from Saham Toney in Norfolk which carries the inscription: 'the century of Primus' (Hassall and Tomlin 1978, 480 No 61).

Yet at Stockstadt was there is an example of a general purpose, large-scale bakehouse and kitchen which could have catered for much more than just one century. The building consisted of four rooms (three stone-built) and had two ovens, two grinding mills and a well. It could well have met the entire needs of a reduced garrison. It is possible that bread supply at Vindonissa from *c* AD 75 to 150 was centralised in a building to the west of the south gate of the fortress (Moosbrugger-Leu 1959-60) and at Hofheim (Erdlager) in Building T next to a grain store (Ritterling 1913, 64). Schönberger has interpreted a building in the right *retentura* in Period 1b at Oberstimm as a chamber for smoking meat and one capable of meeting the needs of more than just the garrison of Oberstimm (Schönberger 1978, 42). At Hod Hill a cook-house measuring some 11,50 × 4,25 m was positioned against the back of the southern rampart to the west of the south gate; clearly this was to feed more than just the men of one century. Similar lean-to structures have been found at Lease Rigg, Slack and Rückingen while at Old Burrow the 4,65 sq m of the oven would have been sufficient to bake or roast for the whole garrison (Fox and Ravenhill 1966, 11-13). Positioning was different at Rötelsee where a large hearth was found at the rear of the central *Kleinkastell* court, but it too provided for the whole garrison. Of course the numbers involved in the two fortlets would be quite small.

It is not appropriate here to analyse the nature of the Roman military diet, but the bone reports make it clear that it included meat from cattle, pig, sheep and domestic fowl. The supply of such can be seen as organised provisioning best suited to localised centurial cooking. Something of the same may be seen at Hayton. Here the even proportions of species whose bones were found in different areas suggested that a set ration of each animal's meat was given to groups of men while the distribution of the

bones implied that butchering and eating was confined to the north-east corner of the fort (Johnson 1978, 103).

Also present in the diet were animals not the product of husbandry but of the chase such as deer, wild boar, beaver, hare, wood pigeon, game birds and fish. Perhaps oysters and mussels also may be included in this group. The smaller creatures would seem most likely to have been the result of activities of members of the *contubernia* in off-duty hours or of purchases in the *vici*; the *contubernium* hearth is the most probable place for their cooking. Again the *contubernium* would seem the likely setting for the consumption of the wood strawberries, raspberries and other wild plants the evidence for which survived in cellar 784 at Welzheim. On the other hand there must have been occasions when the larger game animals such as deer were roasted whole, probably in the intervallum area. Something of a party atmosphere can be imagined on the evening when Silvano Gaius Tetius Veturius Micianus, prefect of the Sebosian cavalry regiment roasted 'the wild boar of remarkable fineness which many of his predecessors had been unable to bag' (RIB 1041).

The few bones recovered from three *contubernia* of the Goss Street Barrack Chester gives a slightly different picture. Here were found no bones of game animals, but only of ox, sheep, pig and horse. The emphasis on heads, shoulder, rump, rib and shin suggested that these were bones suitable for boiling in broth or soup (Richmond and Webster 1951, 37-38). If this were true, the *contubernium* surely would have been the place of cooking, the joints having been obtained from the cook house or from the *vicus*.

Thus the evidence would suggest that much cooking took place outside the barracks based on the *centuria* or *turma* but that much subsidiary activity took place in the *contubernium*. Soldiers must have collected their official rations from the cook-houses and have taken it back to their barracks. No doubt practice varied very much in detail from time to time and from place to place and perhaps from season to season. This is illustrated by the fact that analysis of sewage from the latrine at Bearsden suggests that the diet there was mainly vegetarian (Breeze 1982, 346).

The soldiers made use of both native and imported pottery. The analysis of graffiti at Haltern makes it certain that all ranks used vessels of *terra sigillata* although they are most frequent in the tribunes' houses and the officers' quarters (Galsterer 1983, 19). A valuable table service was found in the area occupied by barracks in the right *latus praetorii* at Valkenburg Castellum 1 (Lith 1978-79, 9). Nor were the soldiers strangers to glass. 329 fragments can be ascribed to identifiable vessel-forms at Valkenburg, largely of the pre-Flavian period. Although there are too few pieces of the various vessel forms to enable a hypothetical distribution to be made, it is clear that both the officers' quarters and the *contubernia* had coloured glass plates and drinking vessels. The officers' quarters of Castellum 1 Barrack 6 yielded fine vessels: the two examples of 'marmorierte Rippenschalen' from the fort with emerald green bases and a fragment of a drinking vessel of Isings Type 12 again of emerald green (Lith 1978-9, 22). In Barrack I at Nanstallon were found pieces of glass beakers in the *contubernia* and fragments of a glass bowl in the officers' quarters (Fox and Ravenhill 1972, 80-81). Glassware has been noted also at Vindonissa, Castledykes, Housesteads and Buciumi.

Further Activities in the *Contubernia*

A wide variety of semi-official duties must have taken place in the *contubernia* and the first of these was the cleaning, repair and even manufacture of equipment.

A vital part of such work involved metal-working. In the *arma* of *contubernium* 5 in Block B of the Deanery Field barracks Chester were found three small crucibles, fragments of others, a clay nozzle with five fine piercings, pieces of vitreous slag bearing traces of bronze, waste bronze in the form of nodules and clippings and a large quantity of burnt clay. The room clearly was used as a bronze workshop some time before the end of the first century. Further finds of waste bronze and slag came from the *papilio*; from the *papilio* of *contubernium* 2 came 130 gms of waste bronze and a thick-walled crucible (Newstead 1928, 11). At Nanstallon, metal-working, including the working of precious metals, had taken place in the hearth of the end *contubernium* of Barrack IV, for an inscribed weight and cylindrical make-weight were found (Fox and Ravenhill 1972, 83). Evidence for extensive iron working came from the general areas of Barracks R2, R3 and R6 at Pen Llystyn, additionally in P2 fragments of iron and a little iron slag were found (Hogg 1968, 138). A small pit, a large depression and a spread of slag suggested smithing activity in Barrack 9 in Phase 4 at Ravenglass (Potter 1979, 44).

In one half of the officers' quarters of the double barrack at Carzield was found a furnace suitable for the working of metals and nearby a broken spear and a broken bronze statuette which would have been suitable scrap material. No other metal-working remains were found in the rest of the barrack. On the other hand furnaces for metal-working were present in the end *contubernium* of Building XVII of Antonine II Strageath. It is possible that these dispositions have significance for the location of the *custodes armorum*, but it has been seen that metal-working was often too widespread just to have been the work of one man per barrack.

Running repairs to leatherwork must have been a task for all, but there may have been specialists in the barracks for the leaden sheath of a shoemaker's last was found in the *papilio* of *contubernium* 1 Block B at the Deanery Field Chester and a shoemaker's anvil was found in a pit on the site of barracks at Hunter Street (Newstead 1926, 76).

The men of the barrack must have taken their turn in the cleaning rota. Such a duty seems to have been carried out at least in the officers' quarters in Building 4 of Valkenburg Castellum 1, for the majority of the finds there came from the vicinity of the walls. This may well have been indicative of regular if inefficient sweeping (Glasbergen and Groenmann-van Waateringe 1974, 28). The duty roster of *Legio III Cyrenaica* gives a day's duty for one of the 31 men of a century as 'sweeper in barracks' (Fink 1971, 110, 29b) while C. Aemelius Valens had to work on the uniform of Helius on the second and third days (Fink 1971, 108, 3c and 3d) and on the ninth day P. Clodius Secundus had to clean Helius' boots (Fink 1971, 108, 6m). No doubt Helius was the centurion.

Reading and writing also took place in the barracks. A bronze inkwell found in Room 3 of Building XIV at Longthorpe and a number of *terra sigillata* inkwells from the area of the barracks in the *latus praetorii dextra* at Valkenburg Castellum 1 gives evidence for the use of ink.

There is little doubt that games of chance were more popular pastimes. Gaming counters and evidence for board games come from almost every military site, but the most spectacular discovery of this kind comes from Ravenglass. Here a bag of 126 gaming counters was found on the burnt floorboards of Barrack 4 and must represent one or more sets owned by an individual or a *contubernium* group. The counters seem to have been used in two ways, first in the game of *ludus latrunculorum* using the face of the counters, and secondly in gambling, employing numbers and letters scratched on the underside of 84 of the counters (Potter 1979, 75-87).

Religious sentiment sometimes found expression in the surroundings of the *contubernia*. A marble tablet was found in one of the *contubernia* of Barrack A Deanery Field Chester. The inscription, in good rustic capitals of the second century reads: 'To the genius of the standard-bearers of the Twentieth Legion *Valeria Victrix* presented to his colleagues by T. Flavius Valerianus'. A small altar without inscription also was found (Newstead 1928, 15-16). In Phase III of Barrack B24 at Dover, an altar base was positioned in Room 2 with a miniature votive altar above. Other votive objects were found nearby including a mother goddess figurine. During this Phase, a major alteration took place enlarging the southern end of this barrack and Philp suggests that the conversion of the two end rooms may have made possible the creation of a *sacellum* for the worship of the Mother Goddess (1981, 147). Dedications to the 'genius of the century' have been found in the vicinity of the barracks at Vindobona and the Saalburg.

Conclusion

It remains difficult to get to the truth of barrack life. Clearly there were considerable contrasts in the provision made for the officers and the men both in fortresses and forts. Less pronounced is the discrepancy between legionary and auxiliary barracks (that is putting to one side the peristyle houses of the legionary first cohorts). Certainly the centurions and decurions of the auxiliary barracks often had amenities lacking in the *contubernia* of the legionary barracks. The *triclinium* at Echzell and some of the finds of glassware in auxiliary barracks are the most striking examples of this and exhibit a considerable exercise of taste. Nor should it be thought that buildings constructed entirely of timber necessarily were inferior to those constructed on stone sills. The tribunes' houses at Colchester were built entirely of timberwork while the barracks had an apparently more sophisticated method of construction. The find of part of a very fine, profiled, door-surround bearing a centurial inscription from the area of the officers' quarters at Oberaden shows how high a standard some of the timber buildings may have reached. And yet the amount of rubbish often found in barracks and the inevitably fairly cramped conditions suggest that life there was sometimes rather squalid. At least it is possible to accept Robertson's succinct appraisal of the life of the soldiers at Castledykes: 'The garrison ate meat from oxen and pigs, used glass bottles and lived in timber and clay barracks' (1964, 264).

Chapter 8

Conclusions

Introduction

This study shows that the characteristic elements of the imperial barrack are present and recognisable from the Augustan/Tiberian period, ie centurion's/officers' quarters and men's quarters with a division of the men's quarters into a number of *contubernia*. These elements take different forms throughout the periods and provinces under study but fundamental barrack composition remains unchanged in any significant way until the later third century.

The range of types and sizes is very similar in every period, although the Flavian may be described as the period of clearest barrack definition, while the Augustan/Tiberian and Claudian/Neronian have generally smaller barracks than the later periods. The forms and sizes of the barracks and of their different elements cannot usually be taken to be diagnostic in any simple way in terms of period, province, garrison type, or of their occupation by infantry or cavalry. Some provincial and legionary distinctions are to be noted, but the general conclusion is that the barracks present a consistently varied picture both of types and dimensions throughout the periods and in all the provinces under study.

Such conclusions have been reached through the detailed comparison of the dimensions of the barracks and their elements, and by the establishment of a number of different typologies. The most important of these latter defines 'building types' to cover barracks, stables and store buildings from fortresses, forts and fortlets. These types define different forms of centurions'/officers' quarters and men's quarters. The barracks have been further analysed according to the presence and absence of verandas, the configuration of the rear walls of the barracks, the number of *contubernia*, also the occasional presence of 'special' *contubernia* next to the centurions'/officers' quarters or at the ends of the barracks (or both).

Characteristic proportions in the barracks have also been recognised: the proportion of the overall length taken by the centurion's/officers' quarters, the respective proportions of the depth of the *contubernium* taken by the *papilio* and *arma*, also the respective proportions of the overall width of the barrack taken by *papilio*, *arma* and veranda (or veranda space). Such clear linear relationships within the barrack, in contrast to the much more confused comparable area relationships and the great range of sizes of all the elements of the barracks, suggest that the barracks were laid out to fill a given space according to proportions which could be measured on the ground, rather than according to theoretical area conceptions.

Results

Fortresses

The cohort barracks in the fortresses are almost universally of Building Type A from the Claudian/Neronian period onwards, the Augustan/Tiberian

period admitting slightly greater variety. The most striking exception to this rule is provided by the Type X barracks at Bonn and Vetera II where the two internal, double barracks of the cohort blocks have a single centurion's quarters at both ends of the double barracks.

Most centurions' quarters are built integrally with the men' quarters, but there is a minority of examples where they are divided by an alley or passage some 1,50 m wide. This feature is particularly to be associated with *Britannia* and with barracks built by *Legio XX Valeria Victrix*.

Evidence from Regensburg supports von Petrikovits' suggestion (1975; 67, 134-5) that the barracks at Lauriacum may never have had centurions' quarters, the centurions living outside the fortress with their families since Severus' grant of AD 197. Whatever the truth of this, it is clear that centurions' and men's quarters could be built separately and at different times.

The cohort barracks are built with separate rear walls as well as with party rear walls (ie double barracks). A particular variation of this is found at Neuss where the centurions' quarters of many of the barracks have separate rear walls while their men's quarters have party rear walls.

The cohort barracks are found almost universally to have been provided with verandas.

The overall size of the cohort barracks varies considerably from fortress to fortress and often within the same fortress, especially where the fortress outline is irregular as at Vindonissa and Carnuntum where the barracks seem to lengthen to take up the space available. The widths of the barracks also often show considerable variation. In spite of such differences, the internal proportions of the barracks are often very consistent. The proportion of the overall length taken by the centurion's quarters usually approximates to 33 % of the whole, however there is a number of early fotresses in *Britannia* where the comparable figure is *c* 25 %: Inchtuthil, Colchester, Wroxeter (?), ie in the proportions of 3 : 1 rather than 2 : 1. Again a connection with *Legio XX Valeria Victrix* is apparent.

The *contubernium* numbers of the cohort barracks vary considerably. No total is characteristic of any legion, period or province; on the other hand the totals from the same fortress tend to be the same, at least where the overall shape of the fortress is rectangular. This is because the total relates to the length of the men's quarters (often of the same length in the same fortress), the spacing of the partition walls between the *contubernia* again tending to be similar in the same fortress. On the other hand there is no standard dimension for the *contubernium* spacing; this varies considerably from fortress to fortress.

The special first and last *contubernia* have a wide range of 'types' and form no recognisable distribution patterns. It has not been possible fully to elucidate their purpose. The areas of the individual standard *contubernia* vary considerably, both within the same fortress and from fortress to fortress as do the total living areas of the individual barracks. There is no standard *contubernium* size.

The internal proportions of the *contubernia* of the cohort barracks are very consistent with the *papilio* usually taking *c* 60 % of the *contubernium*

depth; similarly the width percentages of the barracks are consistent, the *papilio/arma*/veranda proportions being *c* 50/30/20 %.

The general impression given by the cohort barracks is that, whatever their size, they always maintain a balance between all their different elements. In spite of this, the centurions' quarters reveal a slightly greater consistency in size than do the barracks overall. Thus at Exeter a typical size of centurion's quarters is maintained at the expense of the men's quarters.

The cohort blocks themselves usually approximate very closely to a square - those at Bonn being particularly uniform. Although the widths of the barracks within the cohorts vary considerably from fortress to fortress and within each fortress, it is striking that the widths of the streets between the barracks vary hardly at all and approximate to units of Roman feet. This fact and the tendency of the barracks to vary in length suggest that the fortress with its streets was first set out on the ground and then the barracks built to fill the spaces available.

In the light of new evidence it was found that a slight amendment should be made to von Petrikovits' two schemes for the layout of the cohorts in the fortress (1975, 108). Those now proposed are Type A with the barracks contained in more than three *scamna*, and Type B with the barracks only in *scamna* 1, 3 and 5.

New evidence from Nijmegen suggests the presence there of a first cohort of double strength in a manner analagous to Inchtuthil. Timber Flavian double barracks clearly underly the later Flavian single-cell rooms of the first cohort. A similar situation may be envisaged at Caerleon. The possible presence of a double strength first cohort at a later date in other fortresses is rejected. The evidence from Nijmegen suggests that the initial reform took place under Vespasian but was reversed by Domitian, thus supporting a Domitianic date for Hyginus.

The variations in the sizes of barracks and cohort-blocks reveal no patterns and are not held to be significant in indicating a plan of seniority in the fortresses.

It is clear that the presence of non-cohort barracks in the fortress is more prevalent than has hitherto been understood. The similarity of many of the barracks to those from auxiliary forts suggests that they may often have held auxiliaries, even if whole auxiliary units were not always present. Neuss is exceptional in probably accommodating an entire unit.

Comparison of the Augustan/Tiberian barracks with later legionary and auxiliary examples suggests that Rödgen was garrisoned by some one thousand auxiliaries; the barracks from the other Augustan/Tiberian sites are more convincingly to be interpreted as legionary.

Forts

The range of the building types of the barracks in the auxiliary forts is much greater than in the legionary fortresses, and greater variety also occurs within individual forts. By far the most important are Types A and B which occur in very similar numbers. Their incidence is similar in all

periods and provinces although Type B features particularly in *Britannia* in the Antonine period, indeed particularly on the Antonine Wall.

The auxiliary barracks are less complex architecturally than the legionary barracks. Thus there are very few examples where the officers' quarters are divided from the men's quarters (but again these few may be associated with *Legio XX Valeria Victrix* in *Britannia*), or of barracks with a rear party wall, or of special first and last *contubernia*. Furthermore the *contubernia* may lack subdivision into *papilio* and *arma*, while the veranda and porticus are far less frequently to be found, even in Type A barracks.

The overall size of the auxiliary barracks is usually less than that of the cohort barracks, but there is a considerable overlap in the middle of the range, demarcation being most marked in the Flavian period. The sizes of the barracks vary considerably within individual forts, from fort to fort and from province to province, both in length and width. It should be noted that *Britannia* is remarkable for some small barracks in the Claudian/Neronian period and the two Germanies for relatively large barracks.

Differences in barrack widths produce considerable variations in the areas of the officers' and men's quarters, but within the individual barracks the different elements generally balance. The officers' quarters of the barracks on Hadrian's Wall consititute an unusual and interesting group in that they are all of very similar size; this is not true of the men's quarters.

Again it is possible to discern recurring proportions in the composition of the barracks, although these do not emerge so sharply as in the cohort barracks. The officers' quarters most often take *c* 25 % of the overall length of the barrack. The concentration on 33 % is much less marked.

The *contubernium* totals also achieve no clear uniformity and vary from 6 to 13. Admittedly totals from the same fort tend to be similar in barracks of the same length, but this is not universally true and considerable variations are found in forts which have barracks of different lengths. As in the cohort barracks the *contubernium* totals are found to relate to the lengths of the men's quarters and although their spacing is similar in the same fort, there is no standard between different forts in any period or province. The different sizes of the *contubernia* ensure that the total living areas of the barracks bear no close relation to the numbers of *contubernia*. Possibly surprising is the similarity between the areas of the individual *contubernia* and the total living areas of the men's quarters in both legionary and auxiliary barracks. This said, there is almost always considerable variation in the sizes of the *contubernia* and of the total living areas of the barracks in every fort.

The proportions of the *contubernia* show an important change. Although the 60/40 % division of the cohort barracks continues, and although there is often considerable variation in each fort, the clearest concentration is now at 50/50 %. The association of this figure with Type B barracks (which hardly ever have a porticus) has implications for the roof-line of the building: a pitched roof centring over the middle line of the building being most likely. The relatively large *arma* would have to compensate for the lost space of a veranda. These proportions are particularly to be associated with the Type B barracks of Antonine *Britannia*.

The overall width proportions of the barracks also reveal differences to the cohort barracks, the *arma* taking a greater proportion at the expense of *papilio* and veranda. Occasional examples with a very broad veranda space imply different roof constructions for the officers' and men's quarters, indeed again the absence of a porticus.

Barracks from the same fort are usually of similar size, but there is a small minority of forts where the barracks divide into two groups, each of a different length. The reasons for this are unclear, but clearly the discrepancy may be afforded when barracks are aligned differently in the *praetentura* and *retentura*, for example at Haltonchesters.

By far the majority of the barracks are arranged *per scamna* both in the *praetentura* and *retentura*. The apogee of this layout is reached in the Flavian period. The total number of barracks in a fort is usually even. This implies an overall system of pairing of barracks even if the number in one quarter of the fort is an odd number (most often three). It is confirmed that the forts planned without a *retentura* are confined almost entirely to the Claudian/Neronian period.

The length of the *per scamna* barracks in general relates closely to the width of the fort although there are exceptions. Usually the barracks take up to the full the space available. On the other hand there is no consistency in the distances between the barracks, in this respect quite different to the regularity of the fortress streets. This variability on occasion gives the impression that not all available space in the fort is being made use of.

It has not been possible to discern any general scheme of seniority in the arrangement and disposition of the barracks as postulated by Baatz (1973, 54-8).

Fortlets

The fortlet barracks have two building types exclusively their own. The Type X barracks form three sides of a open courtyard; to date they are restricted to *Germania Inferior* and *Germania Superior*. Type W barracks are found in some of the milecastles of Hadrian's Wall. These may best be described as single *contubernium* barracks.

The remaining barracks again show considerable variety and they are nearly always rather smaller than their auxiliary counterparts. This small size is sometimes to be explained by the fact that the barrack pairs constitute the two halves of a divided centurial barrack in the manner outlined by Breeze (1974c; 1977c). Thus regarded these barracks are comparable with many of those in the auxiliary forts.

The officers' quarters of these consolidated fortlet barracks correspond in the main with the smaller examples from the auxiliary forts. The same may be said for the men's quarters. The proportions of the overall lengths taken by the officers' quarters ranging from 18 - 25 % are also similar to those in the forts.

When considered as single centurial barracks, the Type X barracks may also be seen to correspond to normal barrack proportions and dimensions.

The small size of many of the fortlet barracks means that their *contubernia* are also considerably smaller than those of most auxiliary barracks. In fact they are often too small to have accommodated their theoretical full eight man complement. There is evidence for the presence of special *contubernia* at Barburgh Mill and Nersingen.

The officers' quarters are usually positioned next to the single gate of the fortlet, or next to the more important gate of two. But the evidence does not suggest that either one side or the other is to be regarded as the senior.

The areas of the barracks show close correspondence with the areas of their fortlets, demonstrating a more economical use of space than in the auxiliary forts.

Horses and Stables

Plentiful refences in classical texts reveal that horsemanship was an integral part of life in the Celtic and Roman worlds. In the light of this, the highest standards of care and management should be expected for the horses (including both cavalry mounts and baggage animals) of the Roman Army. In spite of this no consistent pattern for the care of the Roman Army horse emerges.

Reasonable standards of care and accessibility would suggest that stables should be provided in the forts, especially for the *ala* mounts. Sometimes it is possible for certain buildings to be so interpreted, but equally there are forts whose garrison would require the presence of mounts but whose interior is entirely occupied by barracks and other buildings clearly not to be identified as stables, or by stables not sufficient to meet the needs of the garrison, for example at Strageath. The use of fort annexes for the corralling of horses or for the location of stables must be considered a possibility.

No building in the fortresses has been convincingly identified as a stable. The interpretation of the fortress *tabernae* as stables is rejected.

Nineteenth century treatises on horsemanship reveal considerable agreement with regard to the care of horses and for the space required by each horse in the stable. They also emphasise the need for harness to be stored separately from the horses. The point they make most emphatically is that the stable should be well drained. Although this leads them to propose the use of tiled floors with drains, they also state that clay floors could be quite satisfactory if provided with sufficient bedding and if regularly mucked out. Various advice is given with regard to the advantages of different kinds of bedding and the advisability of storing fodder or accommodating grooms in the loft space. Such observations make it clear that a stable could leave very varied evidence in the archaeological record.

Such considerations may help to explain the lack of pattern in the provision of stables in the forts. Where there is good evidence to support the interpretation of a stable (such as the presence of a drain containing horses' teeth), these buildings are of a wide variety of building types. Examples comprise both long, open buildings and others divided into a number of small compartments. In spite of this, when the space available for the horses and the theoretical requirements of the garrison are

analysed closely, it has been possible to make a estimate of the probable provision of space per horse. There is considerable coincidence round the averange figure of 1,16 × 2,66 m.

Examination of the faunal evidence also reveals a very complicated pattern. It is clear that a wide variety of recognisable horse types were present in the forts: small low-bred ponies of *c* 11 hands, probably transport animals, pure-blooded Arabs, large cold-blooded working horses, and high-bred, spirited descendants of the Celtic pony, the improved Gallic breeds of 13 to 14 hands. It is the latter which was probably the typical Roman cavalry mount and could have been accommodated in the space determined above. The very variety again suggests a close and sophisticated acquaintance with the qualities of different breeds of horse. A simple general mélange of breeds is not suggested by the faunal evidence or by the ancient sources.

Many questions remain, such as whether special provision was made for the storage of harness, which would need to be hung up to dry. There is no consistent evidence that the barracks possibly associated with stables had either larger *contubernia* or proportionately larger *arma* to accommodate harness. The degree to which grooms were present to care for the horses is also unknown.

Thus the picture to emerge is a very complicated and rather unsatisfactory one, especially in comparison with that of the barracks which, even if they vary considerably in detail, at least have features consistent enough to make them readily recognisable as barracks. One explanation for this confused picture may lie in the continuation of different (often Celtic) ethnic practices with regard to the horses in the auxiliary regiments. This could affect both stabling and breeds. For example the Moorish regiments (as illustrated on Trajan's Column) continued to use their low-bred, ill-looking horses at least until the third century; they also continued to ride with a small stick to guide the horse rather than with bridle and bit. A further consideration must be that, as implied by Hadrian at Lambaesis, expectations for a crack *ala* regiment were different to those for a more mundane *cohors quingenaria equitata* (CIL VIII 18042 Aa = ILS 2487).

Garrisons

Much of the purpose of the above has been to find a key to the vexed question of garrisons through the recognition of identifiable differences between barracks occupied by legionaries and auxiliaries, infantry and cavalry, or even by the different auxiliary units. The reader will have realised by now that such simple distinctions do not emerge from this study. It may be useful here to relate those features of the barracks which may be suggested to be indicative but in fact do not prove so to be.

Size and sophistication are the clearest distinguishing feature of the cohort barracks, but of the barracks with the best claim to have been occupied by legionaries in the auxiliary forts many are relatively small. They do not have consistently large officers' or men's quarters, they do not necessarily have large *contubernia* or a large total of them. Their length proportions and width proportions are more typical of the auxiliary forts than the fortresses as are the spacings of the *contubernium* walls. Nor are these barracks more sophisticated in their architectural details. In short they are typical for auxiliary fort barracks. Sheer size probably remains the best indicator of the presence of legionaries.

With regard to the possible distinctions between infantry and cavalry barracks in the auxiliary forts, the building types of the barracks are not found to be significant, although there may be a slight trend for probable cavalry barracks to favour Type B. Building Type I is clearly very well suited to the accommodation of two *turmae*, but Heidenheim gives the only satisfactory demonstration of this. It is true that where rear party wall construction is found, it is favoured disproportionately by *alae*, as are the few special first *contubernia*.

Neither the lengths of the barracks, nor their total areas, nor those of their officers' and men's quarters are found to be generally significant although several of the largest officers' quarters are from probable *ala* barracks, nearly all of them large examples from the Flavian period. The sizes of the individual *contubernia* and of the living space available to each man (either calculated on the basis of the single *contubernium* or when calculated over the whole barrack) are not indicative although probable cavalry provision is among the more generous examples. *Contubernium* totals are also found not to be significant.

When the proportions of the barracks are considered, in the Flavian period the probable cavalry barracks do show a preference for length proportions of *c* 33 % and infantry for *c* 25 %, but such a distinction is not clear in other periods. The proportions of the *contubernia* are not significant (thus proportionately large *arma* do not necessarily favour cavalry), neither are the overall width proportions of the barrack.

In summary it may be said that some of the largest auxiliary barracks are probable *ala* barracks, but some probable *ala* barracks are of average auxiliary size. No clear distinctions can be drawn between the barracks of the other units, part-mounted or otherwise.

The presence of barracks of different lengths in the same fort is not found to indicate the presence of different kinds of troops in the manner postulated by Breeze and Dobson for Hadrian's Wall (1969 and 1974); neither do the numbers of barracks and stables often correspond to their theoretical totals. In this connection it is possible that the two halves of the Type F barracks, for example at Birrens, are in fact single *turma* barracks, and such a consideration should be borne in mind for other small barracks (ie Flavian Crawford). Furthermore a number of the very smallest barracks should probably be seen as 'half barracks' divided by fort streets (Rough Castle, Crawford Phases 2 and 3). Occasional barracks, different in nature to their counterparts in the same fort, may have housed administrative or specialist troops (Cardean, Strageath, Corbridge, Valkenburg, Künzing).

The different layouts of the forts do not favour particular kinds of garrison. There is no evidence that *ala* forts have wider streets to accommodate the horses as may have been expected, on the other hand it is possible that wider gates may indicate the presence of cavalry.

Thus it has not been possible to make any clear progress in determining the disputed numbers in the auxiliary units. The infantry accommodation in the probable *cohors quingenaria equitata* barracks is not obviously reduced in size to be appropriate for small centuries of 60 men. On the other hand Heidenheim with its 12 *contubernia* (10 standard + 2 special) does suggest *turma* strength of 40 for the *ala milliaria* (5 × 8 men + 1 special *contubernium* for each *turma*), but Heidenheim is the only site with details

of barracks for this kind of unit. The evidence does not yet provide solutions to the questions of the strength of the centuries of the *cohors milliaria peditata* or of the number and strength of the *turmae* of the *cohors milliaria equitata*.

No further progress has been made in the identification of 'type-sites' for the different auxiliary units following the lines set out by Richmond (1955). A small number of forts may come into this category: Beckfoot, Gelligaer, Pen Llystyn (x2) (*cohors quingenaria peditata*), Fendoch (*cohors milliaria peditata*), Caerhun, Künzing (*cohors quingenaria equitata*), Chesters, (*ala quingenaria*), but the great disparity in the evidence presented tends to call into question the concept of the type-site. The Roman Army seems to have been responding to too complex a series of circumstances and to have been too flexible for simply-recognisable types often to have existed.

Still the need is for the total excavation of forts and their annexes if it is to be possible to recognise the features possibly indicative of different types of unit. Until then it will be necessary to take every possible factor into consideration.

Construction and Amenity

It has been possible to recognise the use of various units of Roman feet in the layout of the barracks - but there are many more examples where such units are not recognisable. It is suggested that although barracks may have been conceived in terms of Roman feet, their actual planning took the form rather of making use of the space available once the defences and roads had been laid out. They were set out in simple proportions which could have been achieved through the pacing of centurions.

Certainly, at least in *Britannia*, it was the legionaries who constructed the fort defences and principal fort buildings until the second half of the second century. Although they may also have sometimes have constructed the barracks as well, it would seem probable that the auxiliaries often built their own barracks and the contrast in the standards and practices of construction would tend to confirm this.

The great range of sizes and types is sufficient to make any kind of organised central supply of standard timbers for anything other than large gate posts extremely unlikely.

The earliest legionary barracks were wholly timber frame buildings, but by the Claudian/Neronian period stone sill wall construction began in the provinces outside *Britannia*. In *Britannia* it was only the Trajanic/Hadrianic period which saw the wholesale adoption of the stone-sill method. By way of contrast, auxiliary barracks only began to be built on stone sills in any number in the Trajanic/Hadrianic period and this method never eclipsed entirely the various timber methods. *Britannia* was responsible for much of the stone-sill construction in the Trajanic/Hadrianic period, while in the other provinces it was a feature of the Antonine if not the Severan period. It is notable that in *Germania Inferior*, *Germania Superior* and *Raetia* barracks continued to be built of timber even when fort defences were reconstructed in stone. Stone-sill construction in the fortlets also began in the Trajanic/Hadrianic period and then was consistently the most important method. Hardly any barracks are thought to have been constructed entirely of stone.

These differences illustrate the distinction between the legionary and auxiliary barracks, although it should be noted that timber buildings were not necessarily inferior to those with stone sills. The provision for the officers in the auxiliary barracks in terms of amenities (hearths, latrines, washing and storage facilities) and appointments (paved flooring and wall plaster) was higher than that in the legionary *contubernia*. The provision in the legionary centurions' quarters was the most elaborate of all, nevertheless the wall-painting found in officers' quarters at Echzell is as yet unmatched by anything in the fortress barracks. Finds of glass and pottery suggest a division between officers and men in both fortress and fort.

In addition to their military duties the activities of the men in fortresses, forts and fortlets must have been very similar: taking their turn in the milling of flour and the baking of bread, cooking in the cook-house or preparing smaller meals on the *contubernium* hearth, cleaning and repairing equipment, sweeping the barracks and passing the time with writing or games of chance. But it must be said that the barracks provide less insight into the lives of the soldiers than might have been hoped; the *contubernia* often seem surprisingly empty. The need is still for excavation.

CONTENTS

VOLUME II

Location Maps 1 - 6

1	*Britannia*	257
2	The Antonine Wall	258
3	Hadrian's Wall	258
4	Rhine and Upper Danube	259
5	Lower Danube	260
6	Italy and North Africa	261

List of Sites included in Tables 262

Figures A - E

A	Building Types	267
B	Rear Wall Configuration Types	271
C	First *Contubernium* Types	272
D	End *Contubernium* Types	273
E	Fort Layout Types	274
F	Barrack Group Configuration Types	275

Figures 1 - 123

Chapter 1 The Evidence

1	Building Types: All Buildings (Total Sample)	276
1.1	Building Types: Barracks (Amended Sample)	277
1.2	Building Types: Barracks - Augustan/Tiberian	277
1.3	Building Types: Barracks - Claudian/Neronian	277
1.4	Building Types: Barracks - Flavian	278
1.5	Building Types: Barracks - Trajanic/Hadrianic	279
1.6	Building Types: Barracks - Antonine	279
1.7	Building Types: Barracks - Severan	280
1.8	Building Types: Barracks - Third Century	280
2	Overall Dimensions	281
2.1	Overall Dimensions - Augustan/Tiberian	283
2.2	Overall Dimensions - Claudian/Neronian	284
2.3	Overall Dimensions - Flavian	285
2.4	Overall Dimensions - Trajanic/Hadrianic	286
2.5	Overall Dimensions - Antonine	287
2.6	Overall Dimensions - Severan	288
2.7	Overall Dimensions - Third Century	289
3	Barrack Proportions	290
4	Barracks and Ancillary Buildings: Areas	291
4.1	Areas - Augustan/Tiberian	292
4.2	Areas - Claudian/Neronian	292
4.3	Areas - Flavian	293

4.4	Areas - Trajanic/Hadrianic	294
4.5	Areas - Antonine	295
4.6	Areas - Severan	296
4.7	Areas - Third Century	296
5	Officers' Quarters: Areas	297
5.1	Officers' Quarters: Areas - Augustan/Tiberian	298
5.2	Officers' Quarters: Areas - Claudian/Neronian	298
5.3	Officers' Quarters: Areas - Flavian	299
5.4	Officers' Quarters: Areas - Trajanic/Hadrianic	300
5.5	Officers' Quarters: Areas - Antonine	301
5.6	Officers' Quarters: Areas - Severan	302
5.7	Officers' Quarters: Areas - Third Century	302
6	Men's Quarters: Areas	303
6.1	Men's Quarters: Areas - Augustan/Tiberian	304
6.2	Men's Quarters: Areas - Claudian/Neronian	304
6.3	Men's Quarters: Areas - Flavian	305
6.4	Men's Quarters: Areas - Trajanic/Hadrianic	306
6.5	Men's Quarters: Areas - Antonine	307
6.6	Men's Quarters: Areas - Severan	308
6.7	Men's Quarters: Areas - Third Century	308
7	Length Proportions: Officers' and Men's Quarters	309
7.1	Length Proportions - Augustan/Tiberian	310
7.2	Length Proportions - Claudian/Neronian	310
7.3	Length Proportions - Flavian	311
7.4	Length Proportions - Trajanic/Hadrianic	312
7.5	Length Proportions - Antonine	313
7.6	Length Proportions - Severan	314
7.7	Length Proportions - Third Century	314
8	Area Proportions: Officers' and Men's Quarters	315
8.1	Area Proportions - Augustan/Tiberian	316
8.2	Area Proportions - Claudian/Neronian	316
8.3	Area Proportions - Flavian	317
8.4	Area Proportions - Trajanic/Hadrianic	318
8.5	Area Proportions - Antonine	319
8.6	Area Proportions - Severan	320
8.7	Area Proportions - Third Century	320
9	*Contubernium* Totals	321
9.1	*Contubernium* Totals - Augustan/Tiberian	322
9.2	*Contubernium* Totals - Claudian/Neronian	322
9.3	*Contubernium* Totals - Flavian	323
9.4	*Contubernium* Totals - Trajanic/Hadrianic	324
9.5	*Contubernium* Totals - Antonine	325
9.6	*Contubernium* Totals - Severan	325
9.7	*Contubernium* Totals - Third Century	325
10	*Contubernium* Areas	326
10.1	*Contubernium* Areas - Augustan/Tiberian	327
10.2	*Contubernium* Areas - Claudian/Neronian	327
10.3	*Contubernium* Areas - Flavian	328
10.4	*Contubernium* Areas - Trajanic/Hadrianic	329
10.5	*Contubernium* Areas - Antonine	330
10.6	*Contubernium* Areas - Severan	331
10.7	*Contubernium* Areas - Third Century	331
11	Total Living Space (Men's Quarters)	332
11.1	Total Living Space - Augustan/Tiberian	333
11.2	Total Living Space - Claudian/Neronian	333
11.3	Total Living Space - Flavian	334
11.4	Total Living Space - Trajanic/Hadrianic	335

11.5 Total Living Space - Antonine 336
11.6 Total Living Space - Severan 337
11.7 Total Living Space - Third Century 337
12 *Contubernium* Proportions: *Papilio/Arma* 338
12.1 *Contubernium* Proportions - Augustan/Tiberian 339
12.2 *Contubernium* Proportions - Claudian/Neronian 339
12.3 *Contubernium* Proportions - Flavian 340
12.4 *Contubernium* Proportions - Trajanic/Hadrianic 341
12.5 *Contubernium* Proportions - Antonine 342
12.6 *Contubernium* Proportions - Severan 343
12.7 *Contubernium* Proportions - Third Century 343

Chapter 2 Legionary Barracks

13 Men's Quarters and Verandas: Comparative Widths 344
14 Rear Wall Construction 345
15 Construction Methods 346
16 Barrack Lengths 347
17 Barracks and Fortresses: Comparative Lengths 348
18 Centurions' Quarters: Integral and Non-integral 349
19 Centurions' Quarters: Dimensions 350
20 Men's Quarters: Dimensions 351
21 Centurions' Quarters and Barracks: Comparative Lengths 352
22 Centurions' and Men's Quarters: Comparative Lengths 353
23 Centurions' and Men's Quarters: Comparative Areas 354
24 Special First *Contubernia*: Types 355
25 Special End *Contubernia*: Types 355
26 Special First and Standard *Contubernia*: Comparative Areas 356
27 Special End and Standard *Contubernia*: Comparative Areas 357
28 *Contubernium* Totals and Barrack Lengths 358
29 *Contubernium* Totals and Men's Quarters' Lengths 359
30 *Contubernium* Spacing 360
31 *Contubernium* Living Space (Timber/Stone) 361
32 *Contubernium* Living Space per man 362
33 *Papilio/Arma*: Comparative Areas 363
34 *Papilio/Arma*/Veranda: Comparative Proportions 364
35 *Papilio/Arma*/Veranda: Comparative Proportions (periods) 365
36 Cohort-Blocks: Barrack Pairing 366
37 Cohort-Blocks: Dimensions 367
38 Cohort-Blocks: Proportions 368
39 Cohort-Blocks and Fortresses: Comparative Areas 369
40 Cohort-Blocks and Fortresses: Comparative Lengths 370
41 Cohort-Blocks and Fortresses: Comparative Widths 371
42 Cohort-Blocks and Barracks: Comparative Widths 372
43 Cohort-Blocks and Streets: Comparative Widths 373

Chapter 3 Auxiliary Barracks

44 Building Types: Barracks 374
45 Barrack Porticus: Presence and Absence 375
46 Barrack Porticus (Building Type A) 375
47 Men's Quarters and Veranda Space (Type A): Comparative Widths 376
48 Building Type A: Comparative Rooflines 377
49 Rear Wall Construction 378
50 Construction Methods 379

51	Barrack Lengths	380
52	Officers' Quarters: Integral and Non-integral	381
53	Officers' Quarters: Dimensions	382
54	Officers' Quarters: Areas according to different Building Types	383
55	Men's Quarters: Dimensions	384
56	Men's Quarters: Areas according to different Building Types	385
57	Officers' and Men's Quarters: Comparative Lengths	386
58	Officers' and Men's Quarters: Comparative Areas	387
59	Special First *Contubernia*: Types	388
60	Special First and Standard *Contubernia*: Comparative Areas	389
61	Special End *Contubernia*: Types	390
62	Special End and Standard *Contubernia*: Comparative Areas	391
63	*Contubernium* Totals and Barrack Lengths	392
64	*Contubernium* Totals and Men's Quarters' Lengths	393
65	*Contubernium* Breadths and Men's Quarters' Lengths: Comparison	394
66	*Contubernium* Spacing	395
67	*Contubernium* Living Space (Timber/Stone)	396
68	*Papilio/Arma*: Comparative Areas	397
69	*Papilio/Arma*: Comparative Proportions (Building Types A and B)	398
70	*Papilio/Arma*/Veranda: Comparative Proportions	399
71	*Contubernium*/Veranda: Proportions of Building Width	400
72	Barracks and Forts: Comparative Areas	401
73	Barracks (*per strigas*) and Forts: Comparative Lengths	402
74	Barrack (*per scamna*) Lengths and Fort Widths: Comparison	403
75	Fort Layout Types	404
76	Barrack Orientation	405
77	Barrack-Group Configurations	406
78	Three-Barrack Groups: Dimensions	407
79	Three-Barrack Groups: Areas	408
80	Barrack Pairs: Dimensions	409
81	Barrack Pairs: Areas	410
82	Barrack Pair Width / Distances between Quarters: Comparison	411

Chapter 4 Fortlets

83	Men's Quarters and Veranda Space: Comparative Widths	412
84	Barrack Lengths	413
85	Projected Centurial Barracks: Dimensions	414
86	Officers' Quarters: Dimensions	415
87	Men's Quarters: Dimensions	415
88	*Contubernium* Totals and Men's Quarters Lengths	416
89	*Contubernium* Spacing	417
90	*Papilio/Arma*: Comparative Areas	418
91	*Papilio/Arma*/Veranda: Comparative Proportions	419
92	Barracks and Fortlets: Comparative Areas	420
93	Barracks and Fortlets: Comparative Lengths	421
94	Building Pairs: Dimensions	422
95	Widths of Building Pairs / Distances between Quarters: Comparison	423

Chapter 5 Stables, Stores and Horses

96	Building Types	424
97	Construction Methods	425
98	Stables: Dimensions	426

99 Stables: Areas 427
100 Stables: Dimensions of Internal Divisions 428

Chapter 6 Garrisons

101 Attested Garrisons: Barrack Lengths 429
102 Attested Garrisons: *Contubernium* Totals 430
103 Legionary Barracks: Living Space per Man 431
104 Attested Garrisons: Living Space per Man 432
105 Attested Garrisons: Barrack Building Types 433
106 Attested Garrisons: Fort Layout Types 434
107 Attested Garrisons: *Contubernium* Living Space 435
108 Attested Garrisons: *Contubernium* Proportions 436
109 Attested Garrisons: Areas of Officers' Quarters 437
110 Attested Garrisons: Areas of Men's Quarters 438
111 Attested Garrisons: Total Living Space per Barrack 439
112 Attested Garrisons: Barrack Length Proportions 440
113 *Viae Sagulares*: Widths 441
114 *Intervallum* Space: Widths 441
115 *Viae Praetoriae*: Widths 442
116 *Viae Principales*: Widths 442
117 *Viae Decumanae*: Widths 443
118 *Portae Praetoriae*: Widths 443
119 *Portae Principales*: Widths 444
120 *Portae Decumanae*: Widths 444

Chapter 7 Construction and Amenity

121 *Contubernium* Width into Centurion's Quarters Length (Fortresses) 445
122 *Contubernium* Width into Officers' Quarters Length (Forts) 446
123 Roof Elevations 447

Plans 1 - 25

1 Neuss - *Novaesium* 449
2 Dormagen 451
3 Krefeld-Gellep Period II 453
4 Krefeld-Gellep Period III 454
5 Krefeld-Gellep Period IV Phases a and b 455
6 Fendoch 456
7 Strageath Flavian 457
8 Strageath Antonine I 458
9 Strageath Antonine II 459
10 Elginhaugh 460
11 Caerhun 461
12 Echzell 462
13 Drobeta 463
14 Bearsden 464
15 Birrens 465
16 Hod Hill 466
17 Dover *Classis Britannica* Fort II 467
18 Valkenburg Castellum 1 468
19 Hofheim Steinkastell I 469
20 Rottweil Kastell III 470

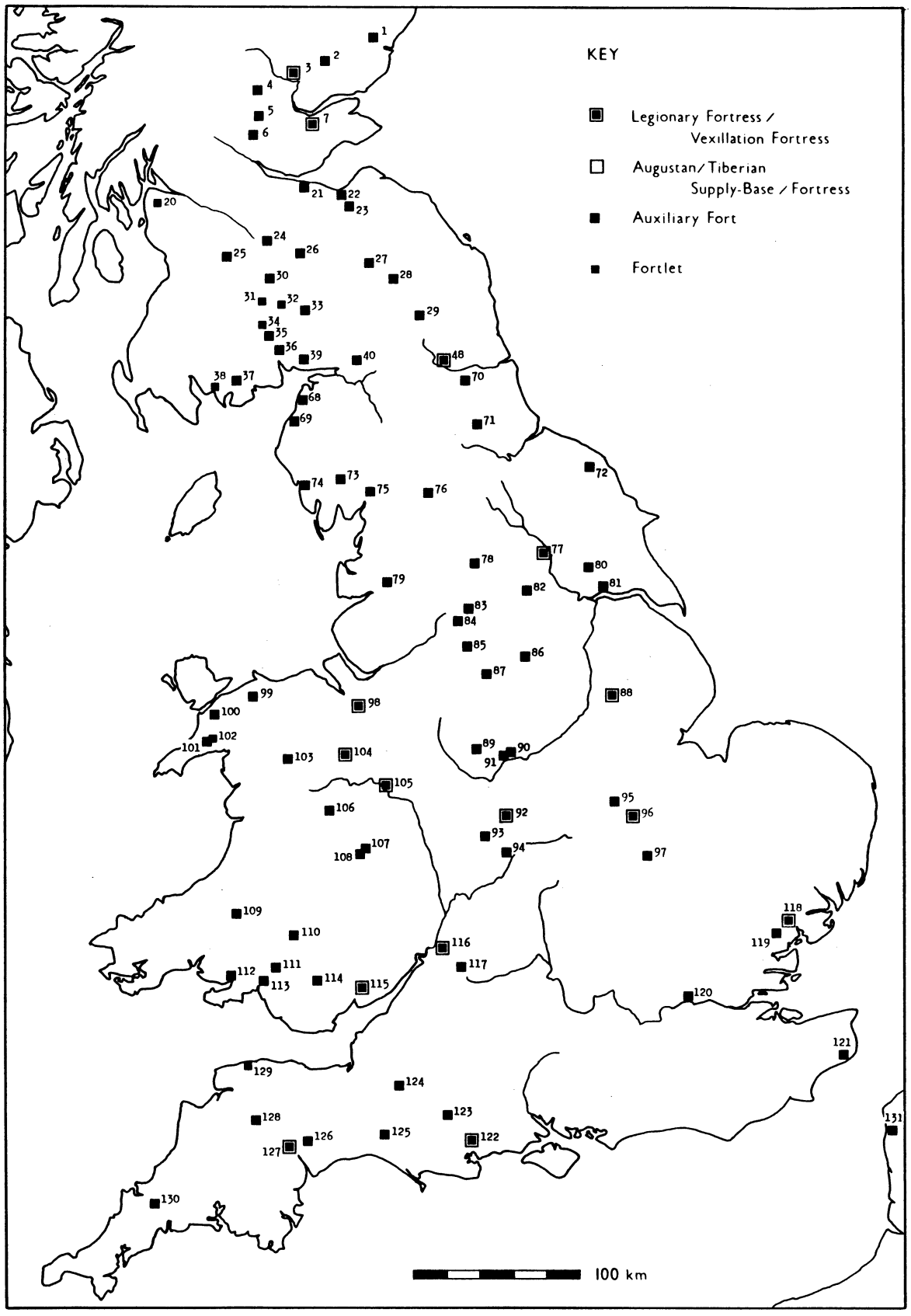
21 Oberstimm 471
22 Slăveni 472
23 Gelligaer II 473
24 Künzing 474
25 Chesters 475

Tables A - G

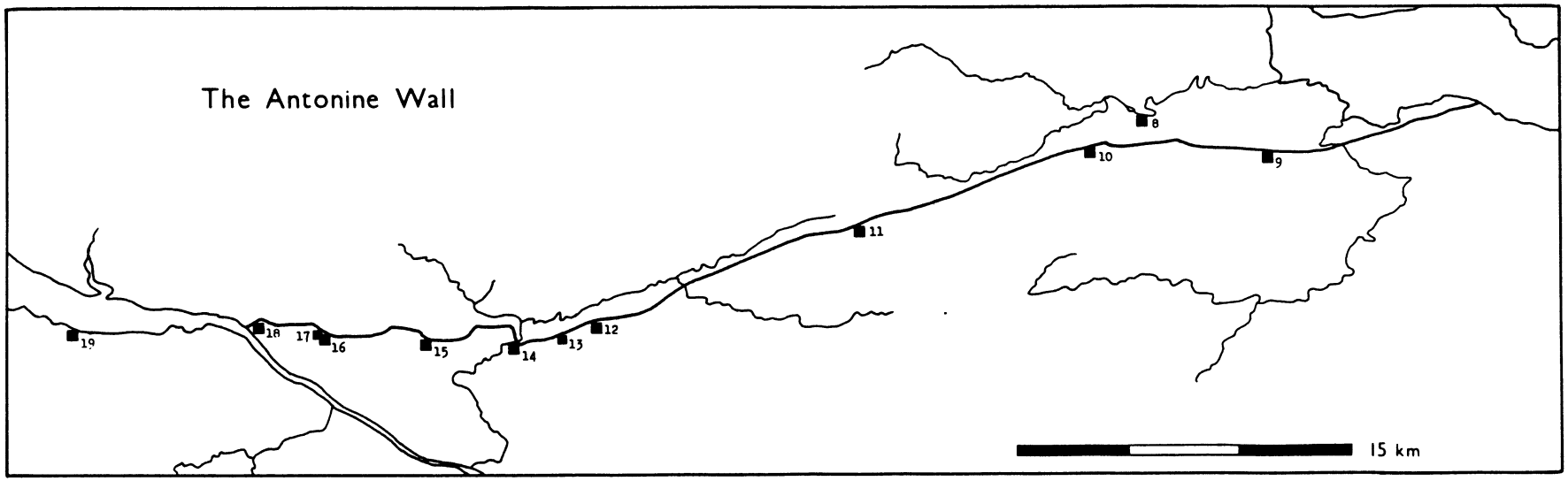
A Barracks and Stables 476
B Qualities of the good horse 477
C Distinctions between different breeds of horse 478
D Characteristics of different barbarian cavalry traditions 480
E Stables without internal subdivisions: internal widths 481
F Theoretical space allowance per horse 482
G Building Inscriptions - *Britannia* 484

Bibliography 485

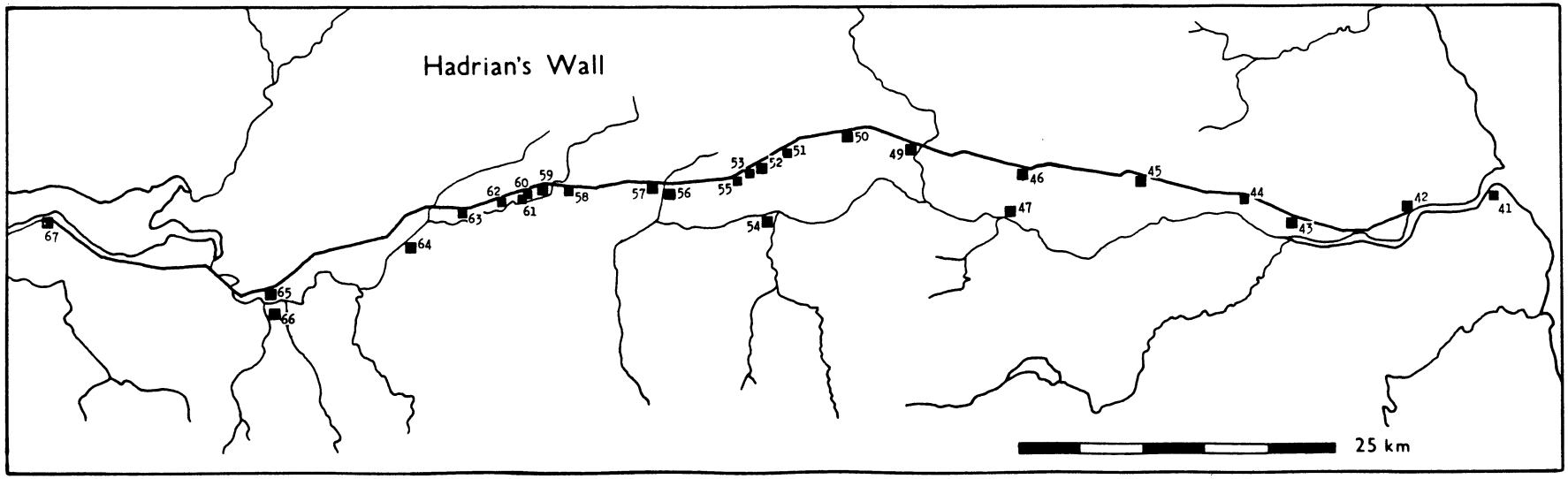
Ancient Authors 485
Modern Literature 489



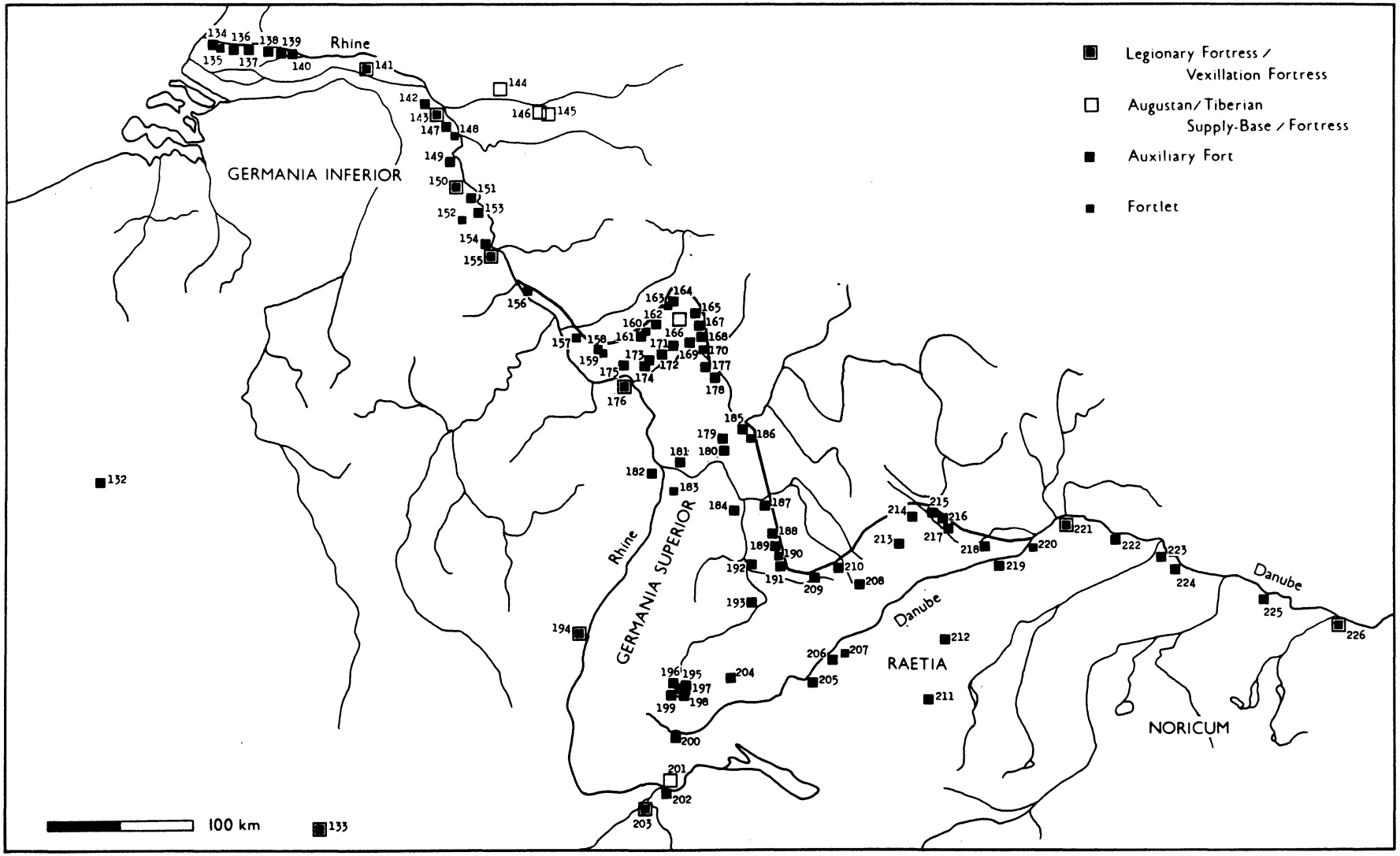
Location Map 1 *Britannia*



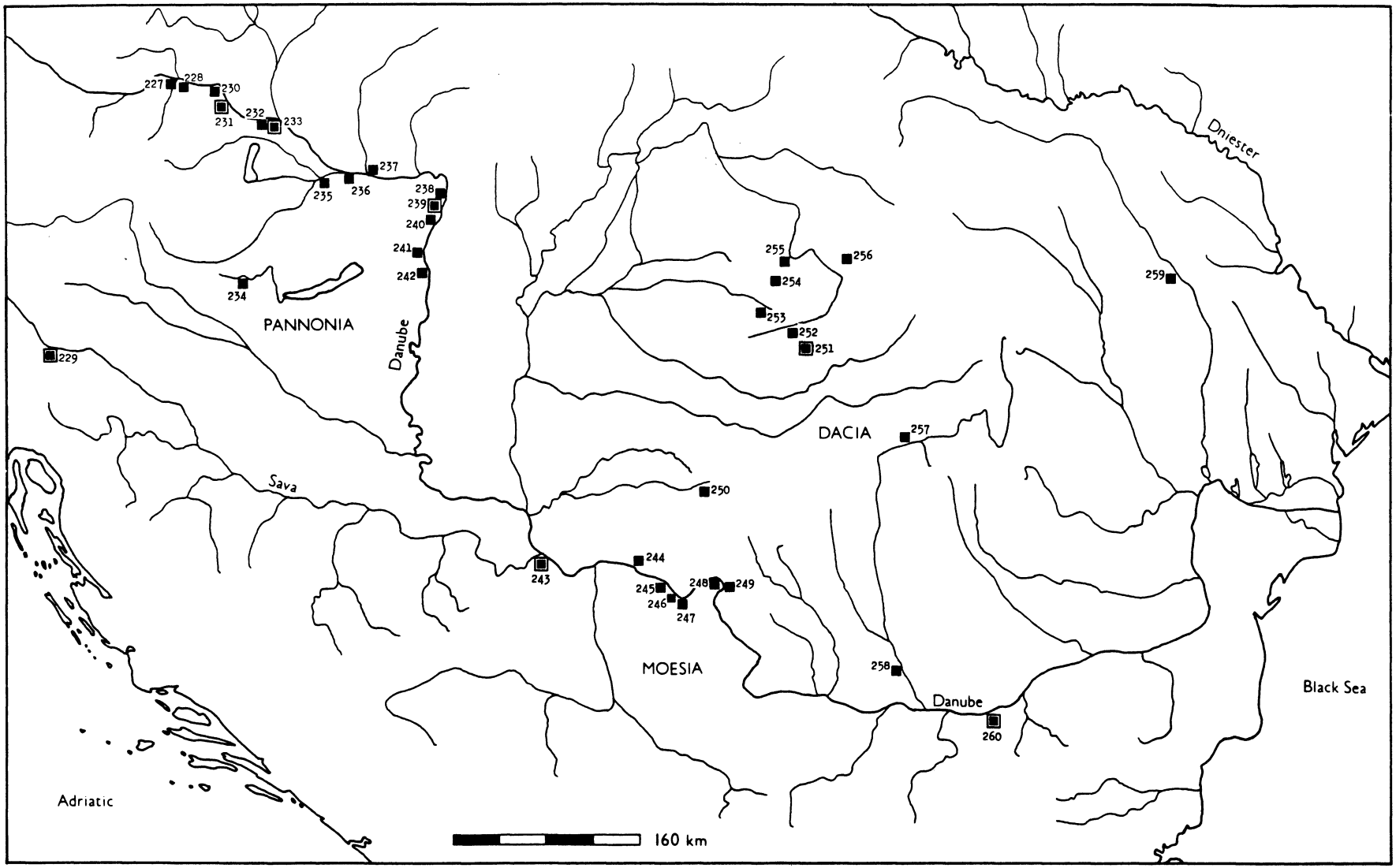
Location Map 2 The Antonine Wall



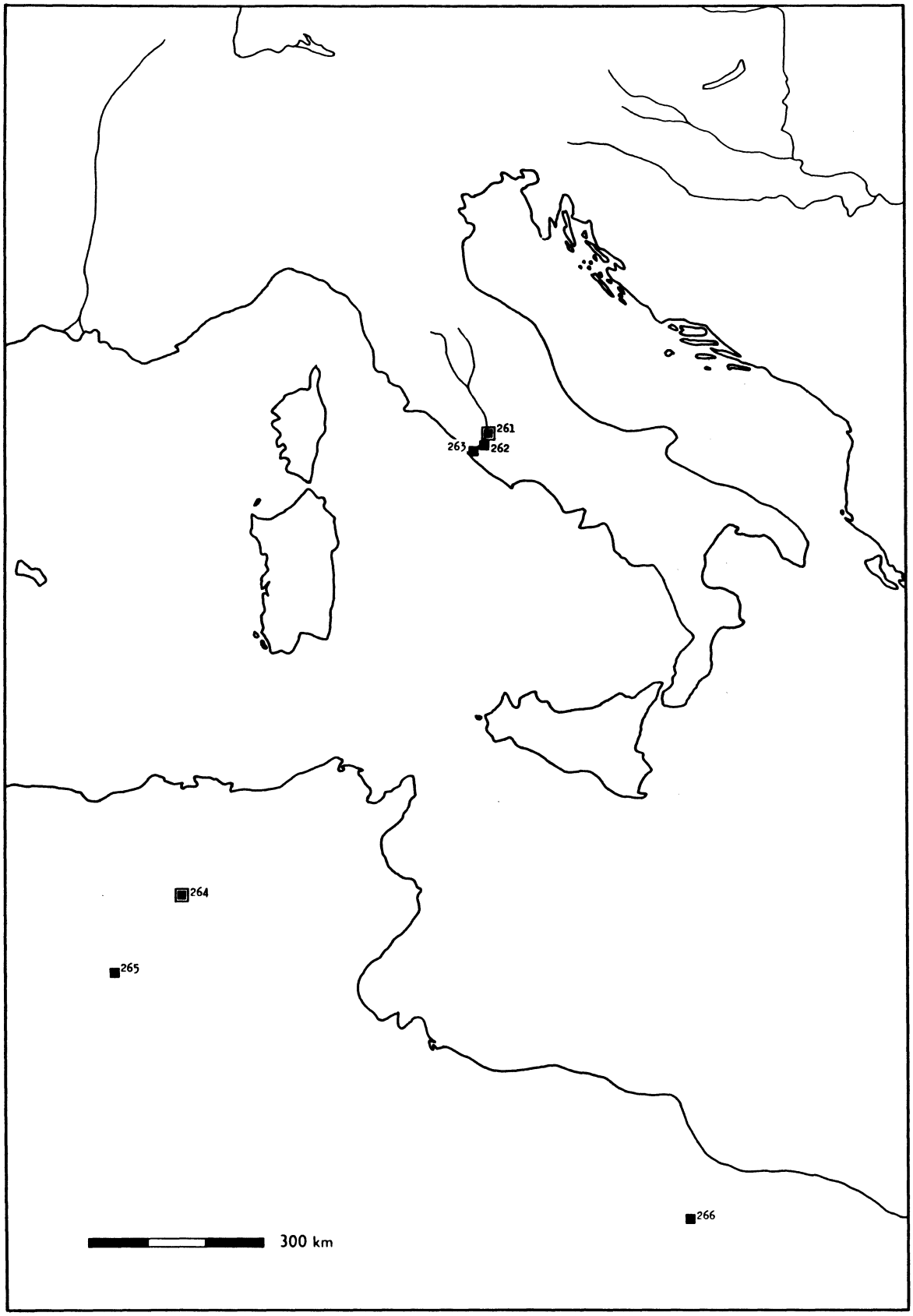
Location Map 3 Hadrian's Wall



Location Map 4 Rhine and Upper Danube



Location Map 5 Lower Danube



Location Map 6 Italy and North Africa

LIST OF SITES

1 Stracathro
2 Cardean
3 Inchtuthil
4 Fendoch
5 Strageath
6 Ardoch *Alauna*
7 Carpow
8 Camelon
9 Mumrills
10 Rough Castle
11 Bar Hill
12 Cadder
13 Wilderness Plantation
14 Balmuildy
15 Bearsden
16 Duntocher
17 Duntocher
18 Old Kilpatrick
19 Old Bishopton
20 Outerwards
21 Cramond
22 Inveresk
23 Elginhaugh
24 Castledykes
25 Loudoun Hill
26 Lyne
27 Newstead *Trimontium*
28 Cappuck
29 High Rochester
30 Crawford
31 Durisdeer
32 Tassiesholm (Milton)
33 Raeburnfoot
34 Barburgh Mill
35 Dalswinton
36 Carzield
37 Glenlochar
38 Gatehouse of Fleet
39 Birrens *Blatobulgium*
40 Bewcastle *Fanum Cocidii* ?
41 South Shields *Arbeia*
42 Wallsend *Segedunum*
43 Benwell *Condercum*
44 Chapel House (Milecastle 9)
45 Rudchester *Vindovala*
46 Haltonchesters *Onnum*
47 Corbridge *Corstopitum*
48 Red House
49 Chesters *Cilurnum*
50 Carrawburgh *Brocolitia*
51 Sewingshields (Milecastle 35)
52 Housesteads *Vercovicium*
53 Housesteads Milecastle (Milecastle 37)

54 Chesterholm *Vindolanda*
55 Castle Nick (Milecastle 39)
56 Haltwhistle Burn
57 Great Chesters *Aesica*
58 Poltross Burn (Milecastle 48)
59 Birdoswald *Banna* ?
60 High House (Milecastle 50)
61 High House (Turf Wall Milecastle)
62 Bankshead (Milecastle 52)
63 Randylands (Milecastle 54)
64 Old Church
65 Stanwix *Uxellodunum* ?
66 Carlisle *Luguvalium*
67 Bowness *Maia*
68 Beckfoot *Bibra*
69 Maryport *Alauna*
70 Ebchester *Vindomora*
71 Binchester *Vinovia*
72 Lease Rigg
73 Ambleside
74 Ravenglass *Glannoventa*
75 Watercrook
76 Brough-by-Bainbridge *Virosidum* ?
77 York *Eburacum*
78 Ilkley *Olicana* ?
79 Ribchester *Bremetennacum*
80 Hayton
81 Brough-on-Humber *Petuaria*
82 Castleford *Lagentium*
83 Slack *Camulodunum* ?
84 Castleshaw
85 Melandra Castle *Ardotalia* ?
86 Templebrough
87 Brough-on-Noe *Navio*
88 Lincoln *Lindum*
89 Rocester
90 Littlechester *Derventio*
91 Derby
92 Mancetter *Manduessedum*
93 Metchley
94 The Lunt
95 Great Casterton
96 Longthorpe
97 Godmanchester
98 Chester *Deva*
99 Caerhun *Canovium*
100 Caernarvon *Segontium*
101 Pen Llystyn
102 Pen Llystyn fortlet
103 Llanfor
104 Rhyn Park
105 Wroxeter *Viroconium*
106 Forden Gaer *Lavobrinta* ?
107 Buckton
108 Brandon Camp
109 Dolaucothi (Pumpsaint) *Luentinum*
110 Y Gaer *Cicutio* ?

111 Coelbren
112 Loughor *Leucarum*
113 Neath *Nidum*
114 Gelligaer II
115 Caerleon *Isca*
116 Gloucester *Glevum*
117 Cirencester *Corinium Dubonnorum*
118 Colchester *Camulodunum*
119 Stanway
120 London (Cripplegate)
121 Dover
122 Lake Farm
123 Hod Hill *Dunium* ?
124 South Cadbury
125 Waddon Hill
126 Hembury
127 Exeter *Isca Dumnoniorum*
128 Bury Barton
129 Martinhoe
130 Nanstallon
131 Boulogne
132 Arlaines
133 Mirebeau
134 Valkenburg
135 Valkenburg (Boven)
136 Arentsburg
137 Alphen *Albaniana*
138 Zwammerdam *Nigrum Pullum*
139 Utrecht *Traiectum*
140 Vechten *Fectio*
141 Nijmegen *Noviomagus*
142 Altkalkar *Burginatium*
143 Xanten *Vetera I*
144 Haltern
145 Oberaden
146 Beckinghausen
147 Moers-Asberg *Asciburgium*
148 Werthausen
149 Krefeld-Gellep *Gelduba*
150 Neuss *Novaesium*
151 Dormagen *Durnomagus*
152 Heidenburg
153 Alteburg
154 Bonn (Boeselagerhof)
155 Bonn *Bonna*
156 Niederbieber
157 Holzhausen
158 Kemel (Ältere Schanze)
159 Kemel (Jüngere Schanze)
160 Saalburg (Kleinkastell)
161 Saalburg
162 Kapersburg
163 Degerfeld
164 Butzbach
165 Echzell
166 Rödgen
167 Florstadt-Oberflorstadt

168 Altenstadt
169 Nidderau-Heldenbergen
170 Neuwirtshaus
171 Okarben
172 Heddernheim
173 Hofheim (Erdlager)
174 Hofheim (Steinkastell)
175 Wiesbaden *Aquae Mattiacorum*
176 Mainz *Moguntiacum*
177 Seligenstadt
178 Stockstadt
179 Würzberg
180 Hesselbach
181 Ladenburg *Lopodunum*
182 Rheingönheim
183 Wagbachkastell
184 Heilbronn-Böckingen
185 Miltenberg
186 Haselburg
187 Öhringen (Burgkastell)
188 Mainhardt
189 Murrhardt
190 Rötelsee
191 Welzheim (Ostkastell)
192 Stuttgart-Canstatt
193 Köngen
194 Strasbourg *Argentorate*
195 Rottweil Kastell I *Arae Flaviae*
196 Rottweil Kastell II *Arae Flaviae*
197 Rottweil Kastell III *Arae Flaviae*
198 Rottweil Kastell IV *Arae Flaviae*
199 Rottweil Kastell V *Arae Flaviae*
200 Hüfingen *Brigobanna*
201 Dangstetten
202 Zurzach
203 Windisch *Vindonissa*
204 Burladingen
205 Rißtissen
206 Unterkirchberg *Phaeniana*
207 Nersingen
208 Heidenheim *Aquileia*
209 Unterböbingen
210 Aalen
211 Lorenzberg
212 Friedberg
213 Munningen
214 Gnotzheim
215 Theilenhofen (Neues Lager)
216 Weißenburg (Breitung)
217 Ellingen
218 Pfünz
219 Oberstimm
220 Weinberg
221 Regensburg *Castra Regina*
222 Straubing (Kastell IV) *Serviodurum*
223 Moos-Burgstall
224 Künzing *Castra Quintana*

225 Schlögen *Iaviacum* ?
226 Enns-Lorch *Lauriacum*
227 Traismauer *Augustiana*
228 Zwentendorf *Asturis* ? *Piro Torto* ? *Cannabiaca* ?
229 Ljubljana *Emona*
230 Zeiselmauer *Cannabiaca* ? *Asturis* ?
231 Wien *Vindobona*
232 Petronell
233 *Carnuntum*
234 Zalalövő *Sala*
235 *Arrabona*
236 Ács-Vaspuszta *Ad Statuas*
237 Iža-Léanyvár *Celamantia*
238 Budapest *Aquincum* (auxiliary fort)
239 Budapest *Aquincum*
240 Albertfalva
241 Adony *Vetus Salina*
242 Dunaújvaros *Intercisa*
243 Beograd *Singidunum*
244 Pojejena
245 Čezava *Novae*
246 Boljetin
247 Veliki Gradac *Taliatae*
248 Tekija *Transdierna*
249 *Drobeta*
250 Jupa *Tibiscum*
251 Turda *Potaissa*
252 Gilău
253 Bologa *Resculum* ?
254 Buciumi
255 Moigrad *Porolissum*
256 Căşeiu *Samum* ?
257 Feldioara
258 Slăveni
259 Voineşti
260 *Novae*
261 *Albano*
262 Rome
263 *Ostia*
264 *Lambaesis*
265 *Gemellae*
266 Bu Ngem

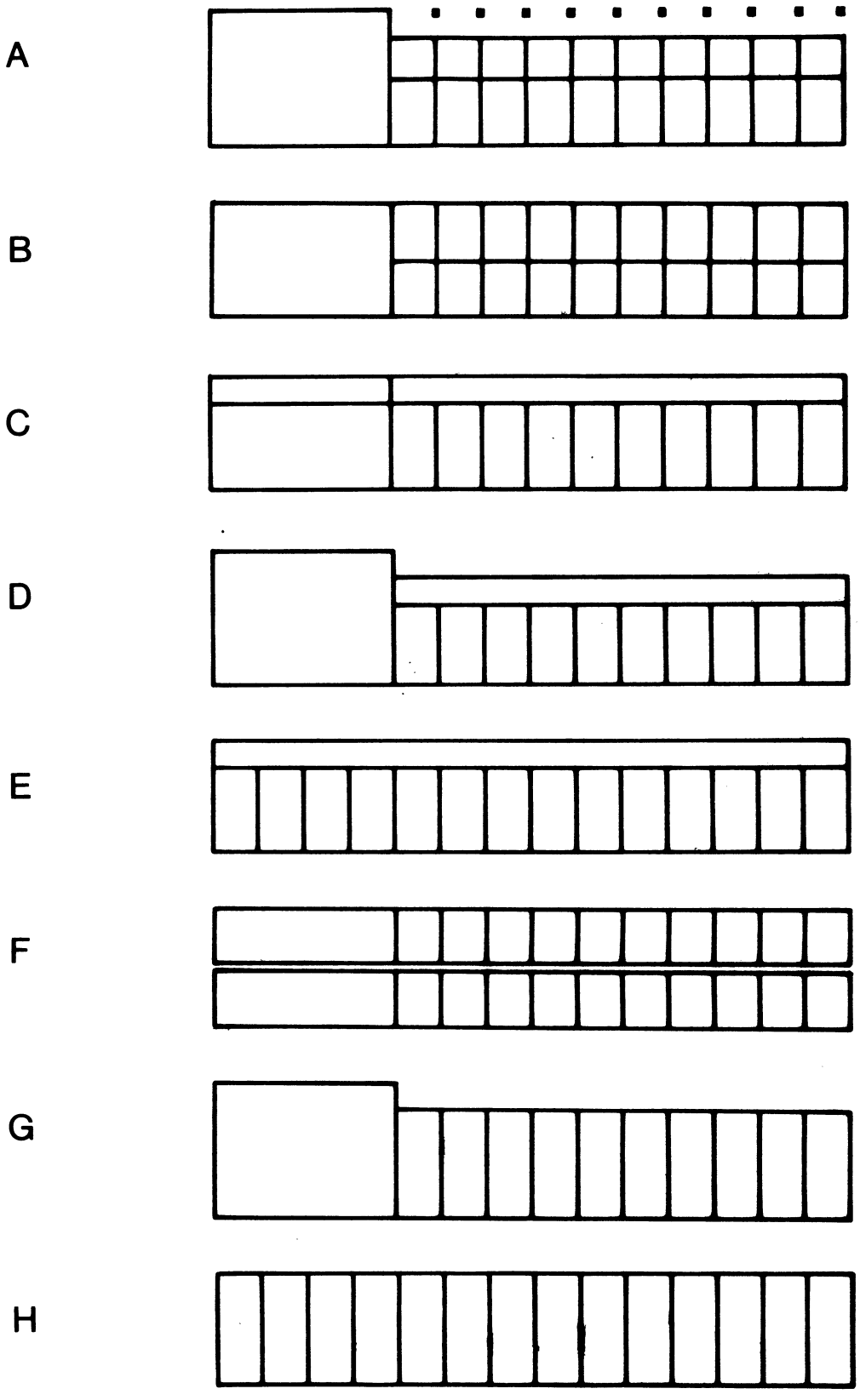
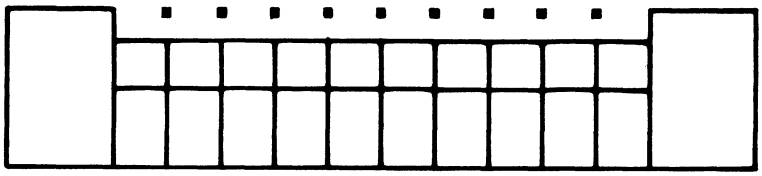
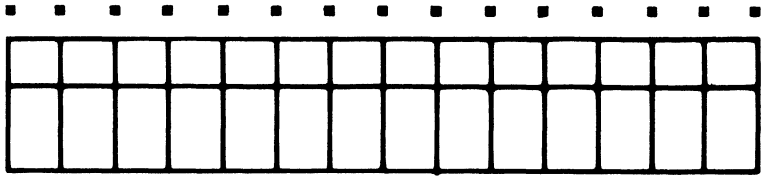


Fig A Building Types

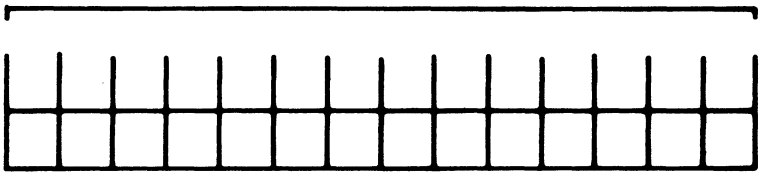
I



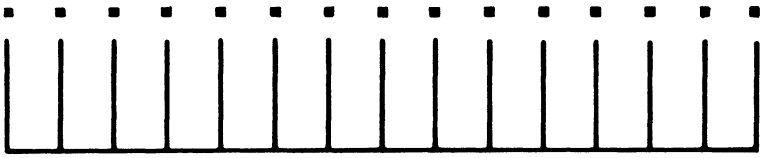
J



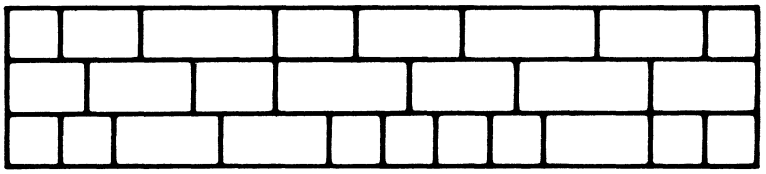
K



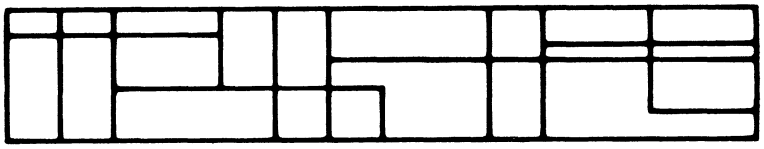
L



M



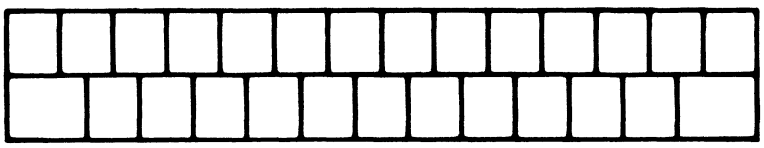
N



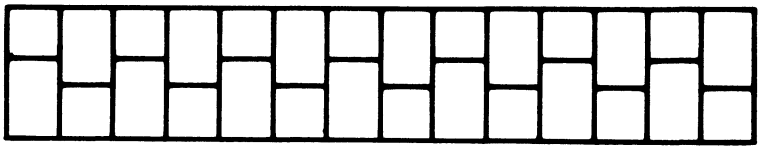
O



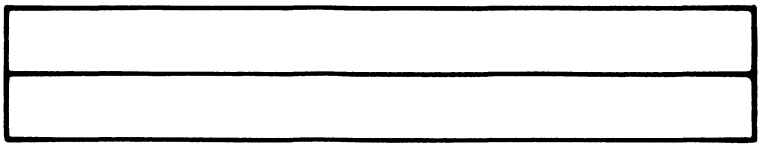
P



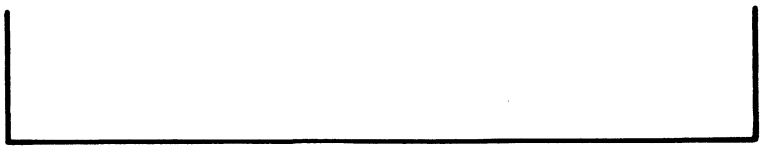
Q



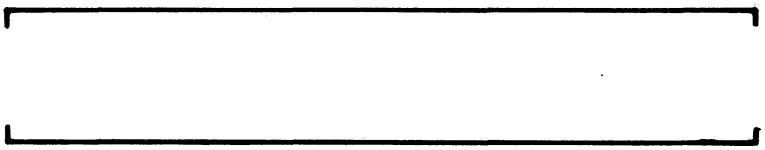
R



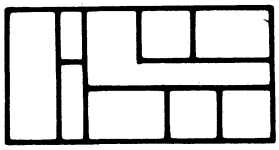
S



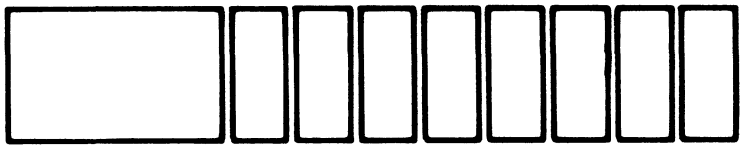
T



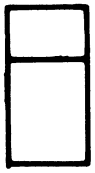
U



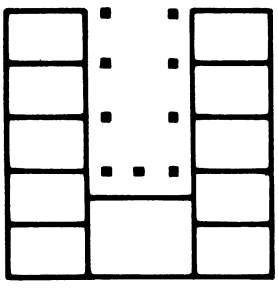
V



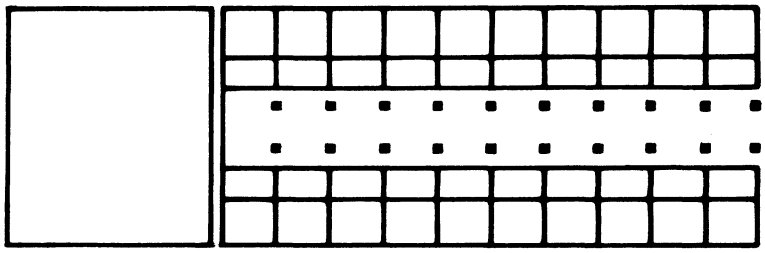
W



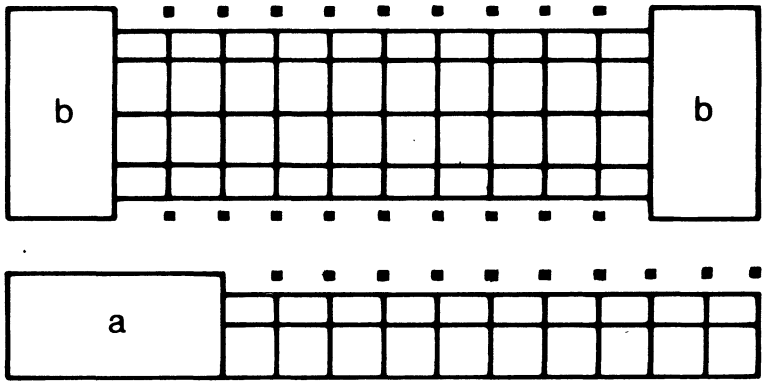
X



Y



Z



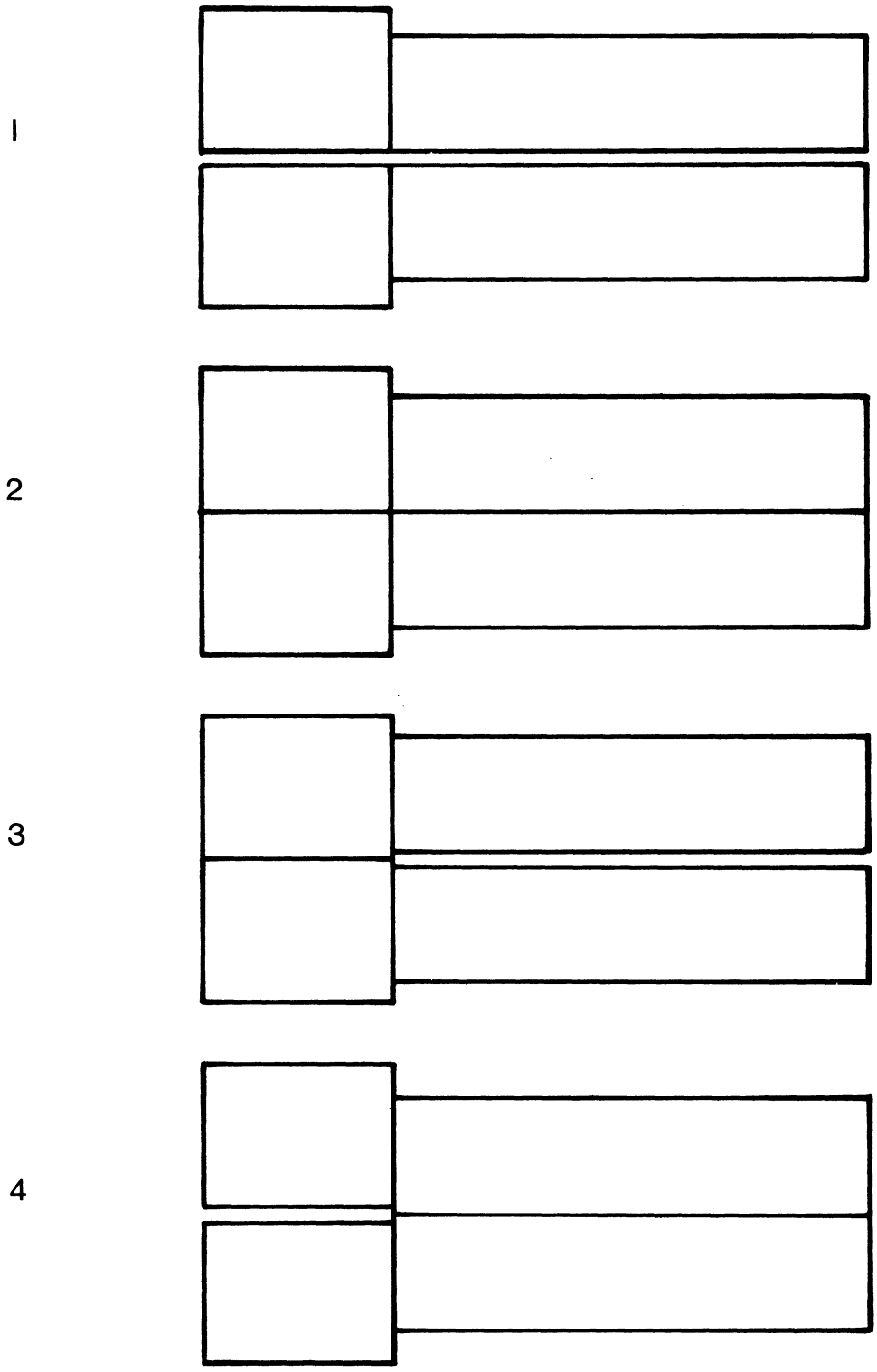


Fig B Rear Wall Configuration Types

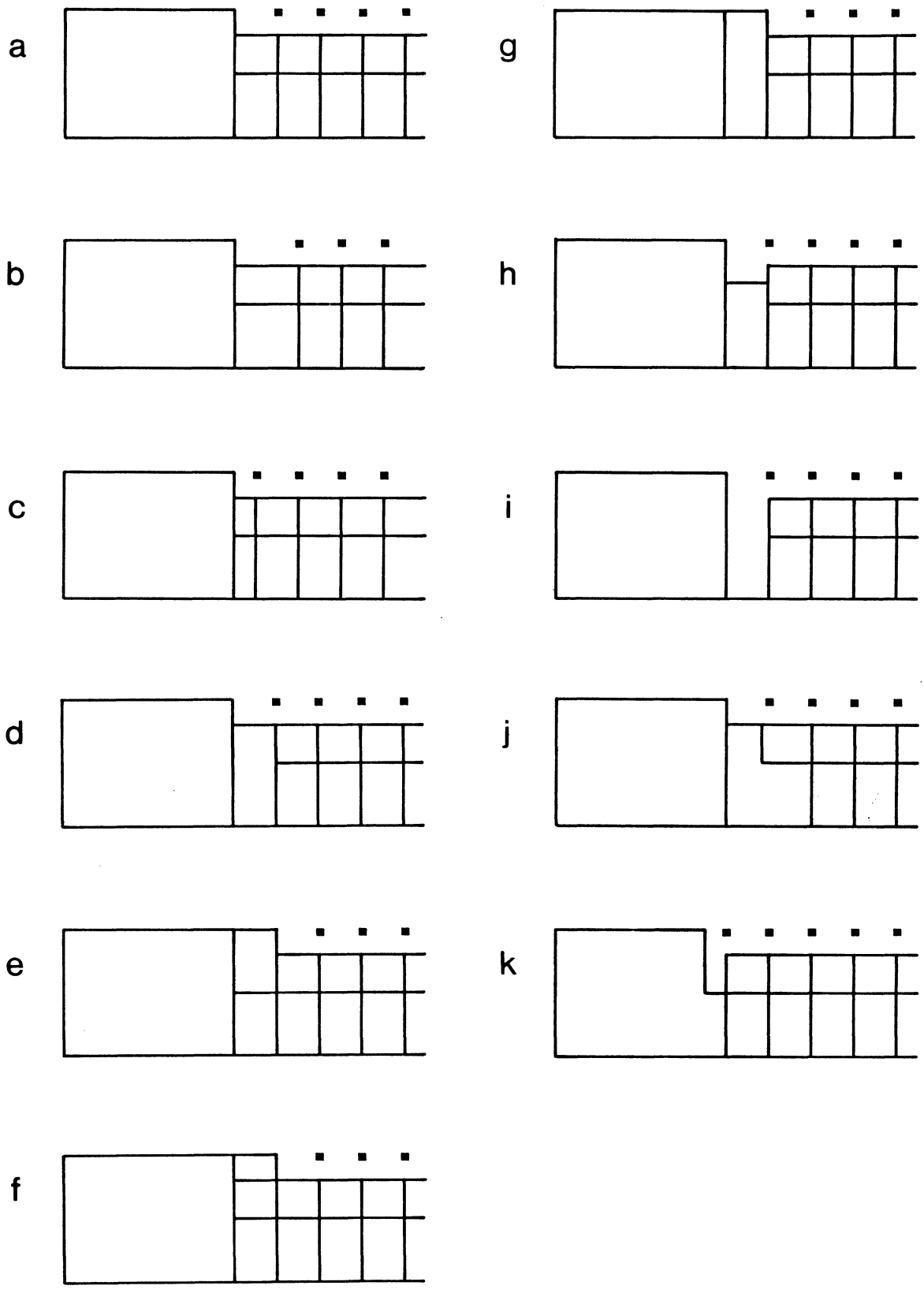


Fig C First *Contubernium* Types

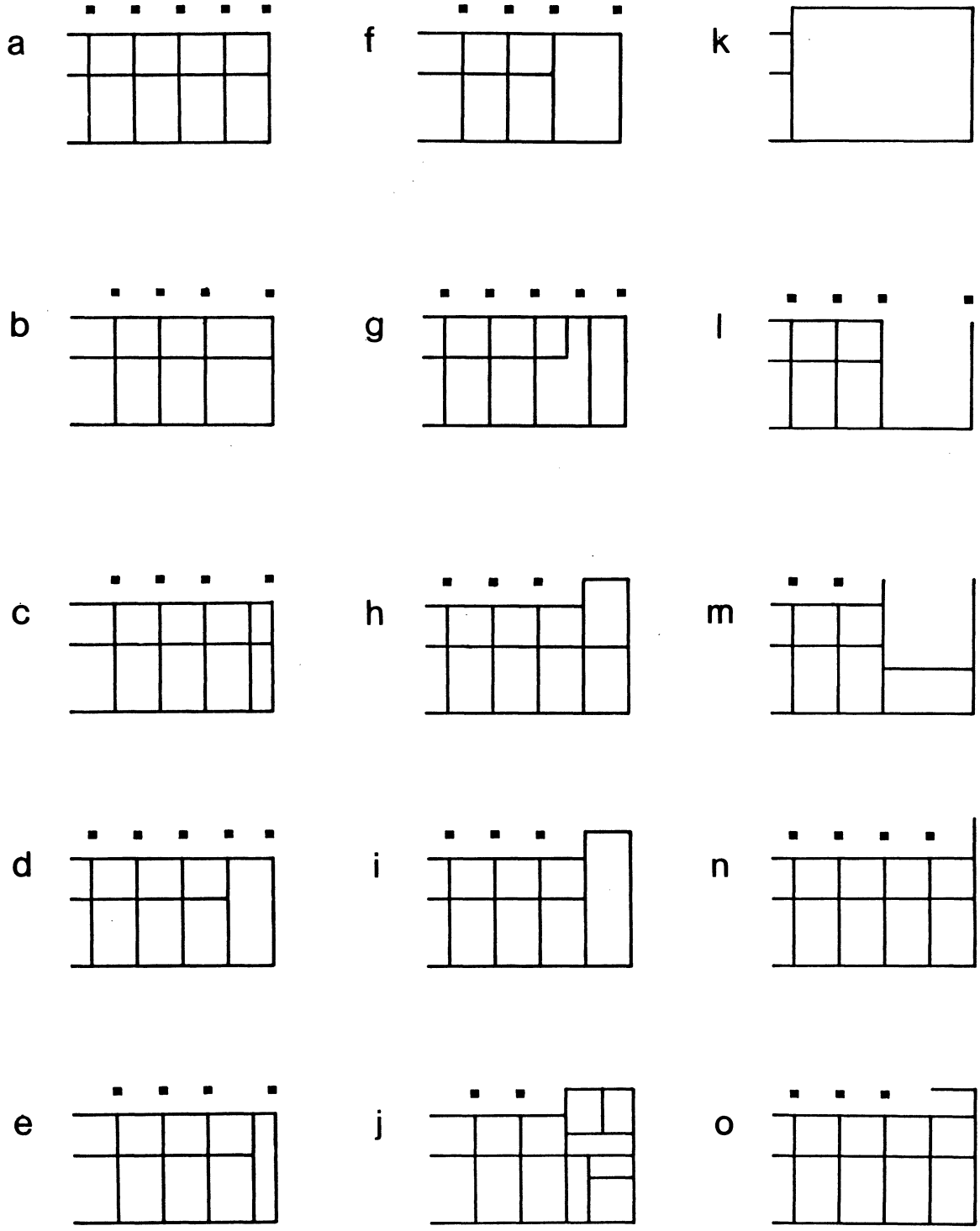


Fig D End *Contubernium* Types

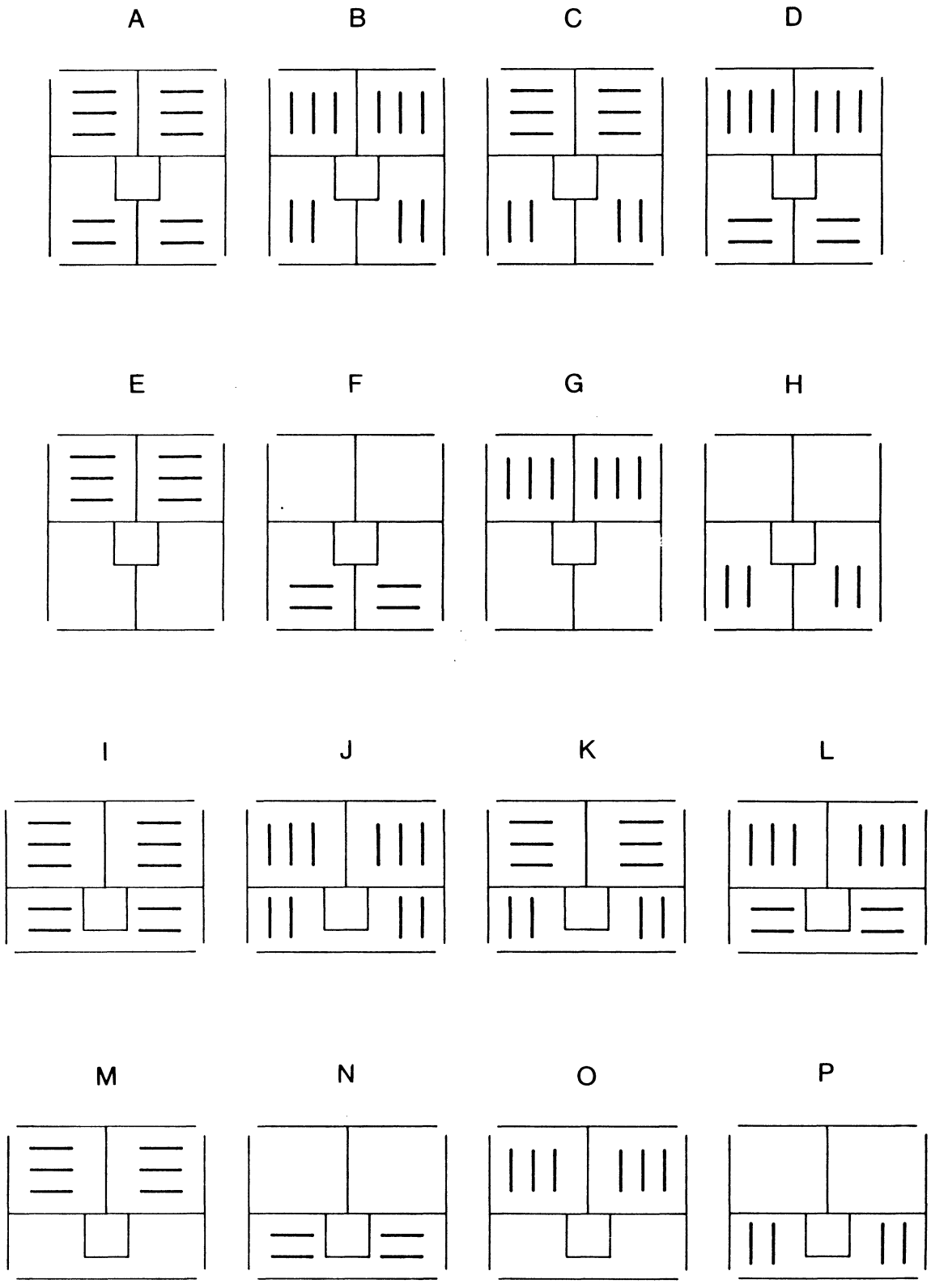


Fig E Fort Layout Types

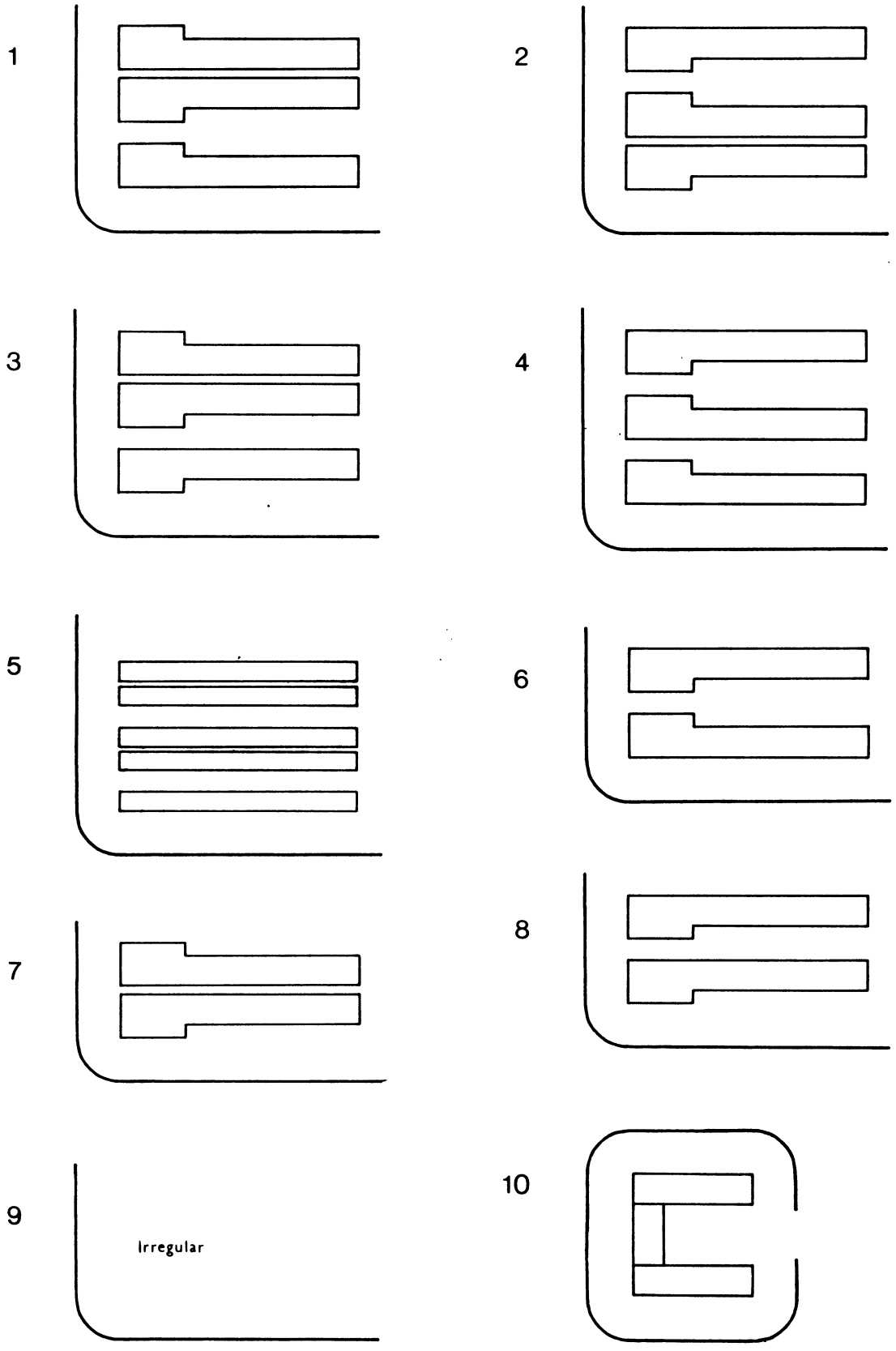


Fig F Barrack Group Configuration Types

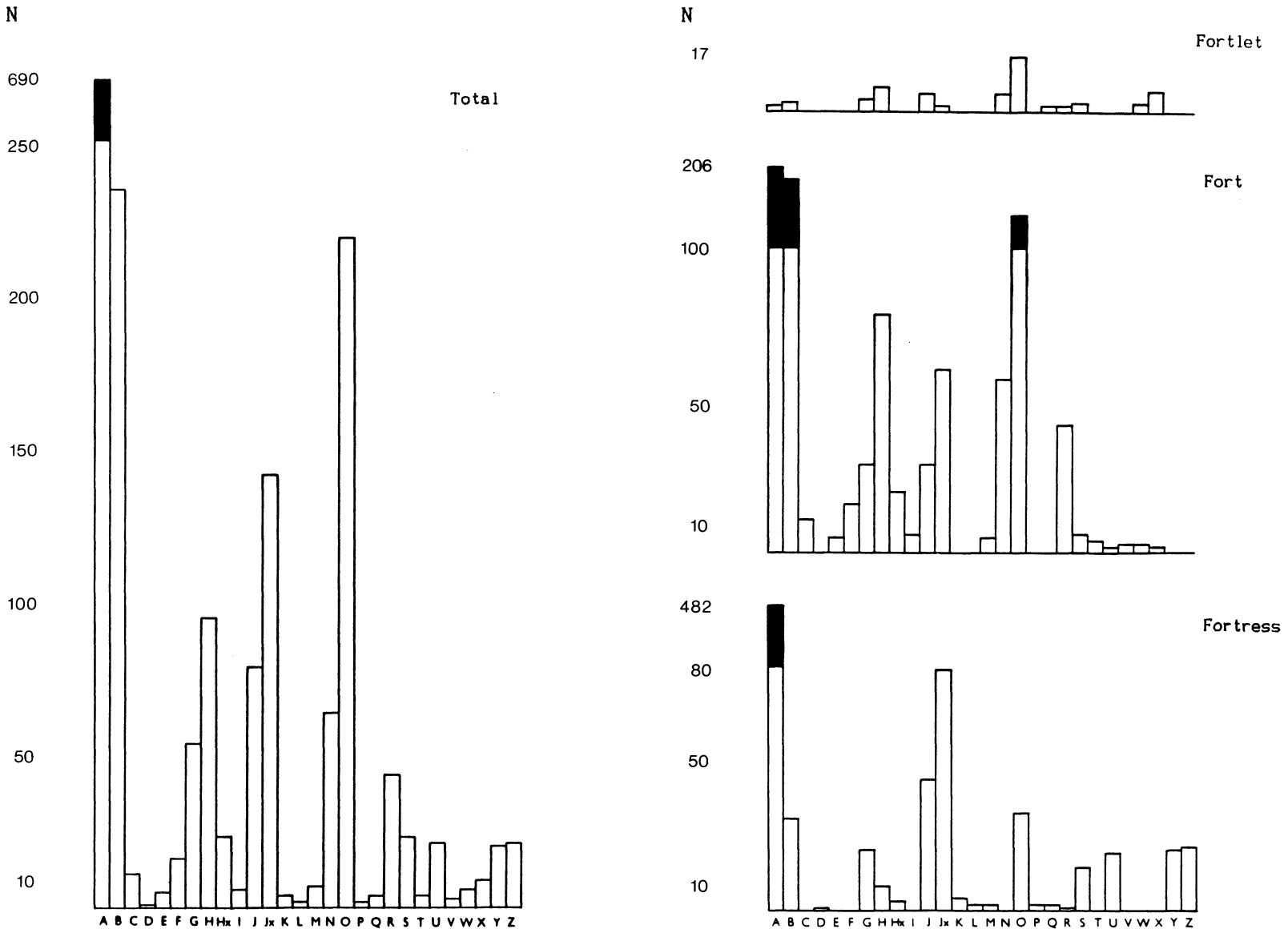


Fig 1 Building Types: All Buildings (Total Sample)

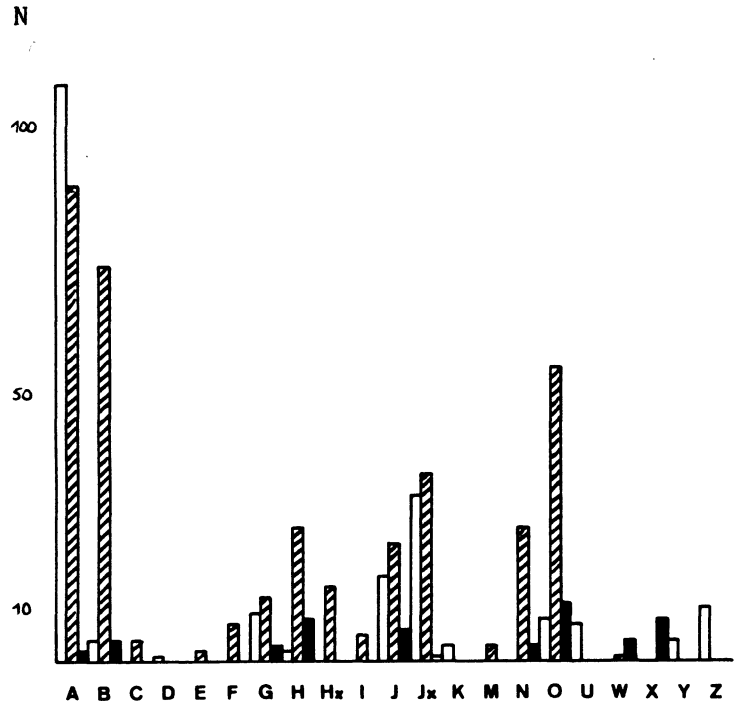


Fig 1.1 Building Types: Barracks (Amended Sample)

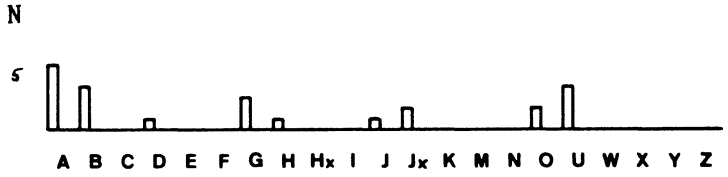


Fig 1.2 Building Types: Barracks - Augustan/Tiberian

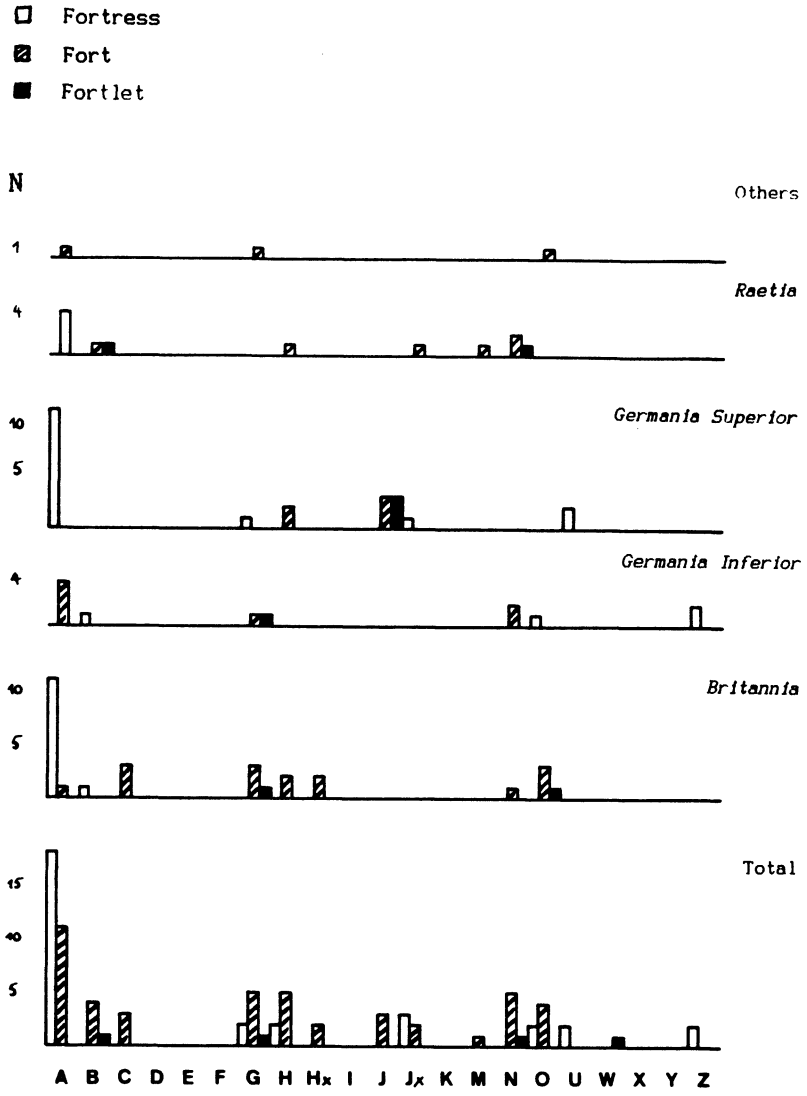


Fig 1.3 Building Types: Barracks - Claudian/Neronian

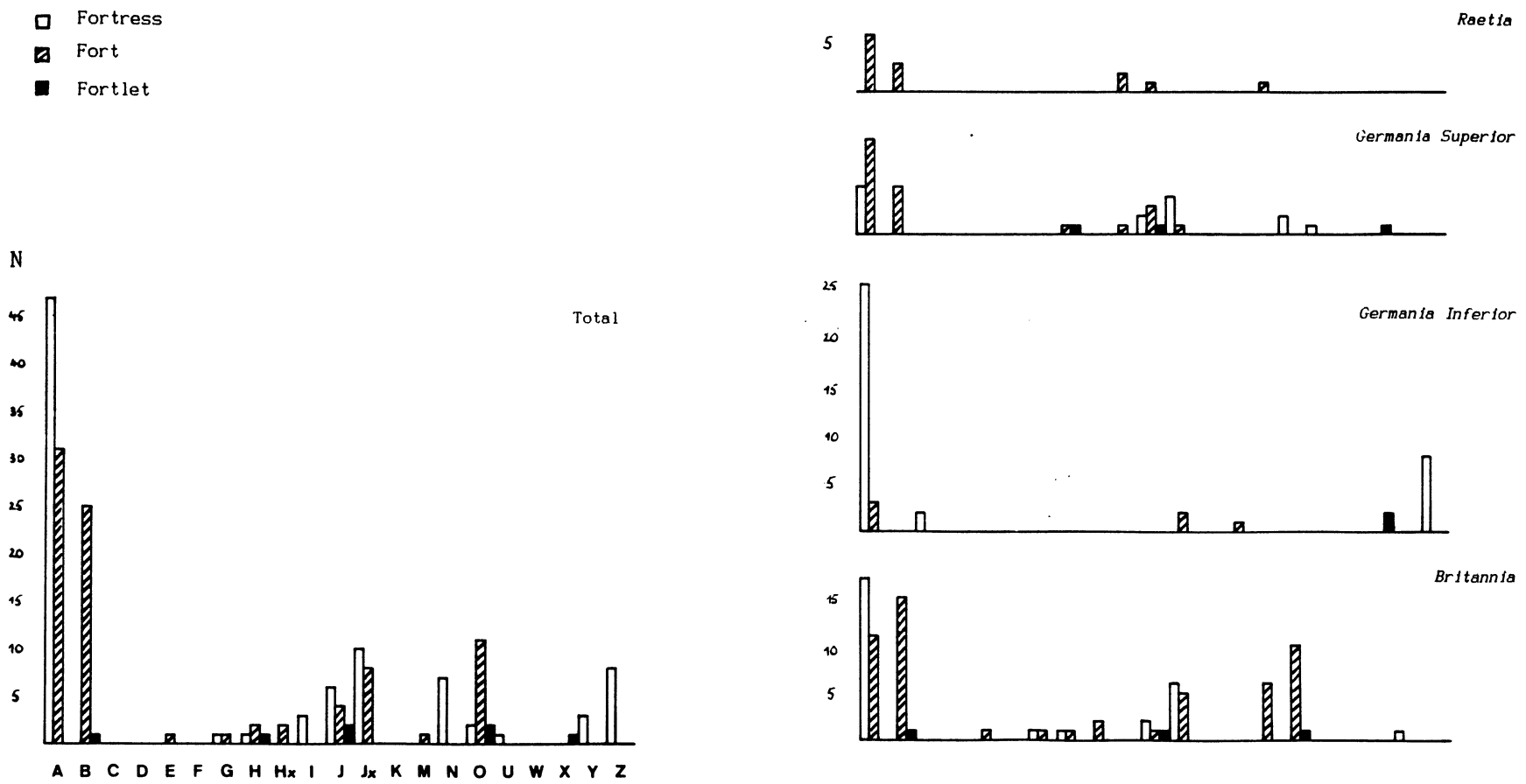


Fig 1.4 Building Types: Barracks - Flavian

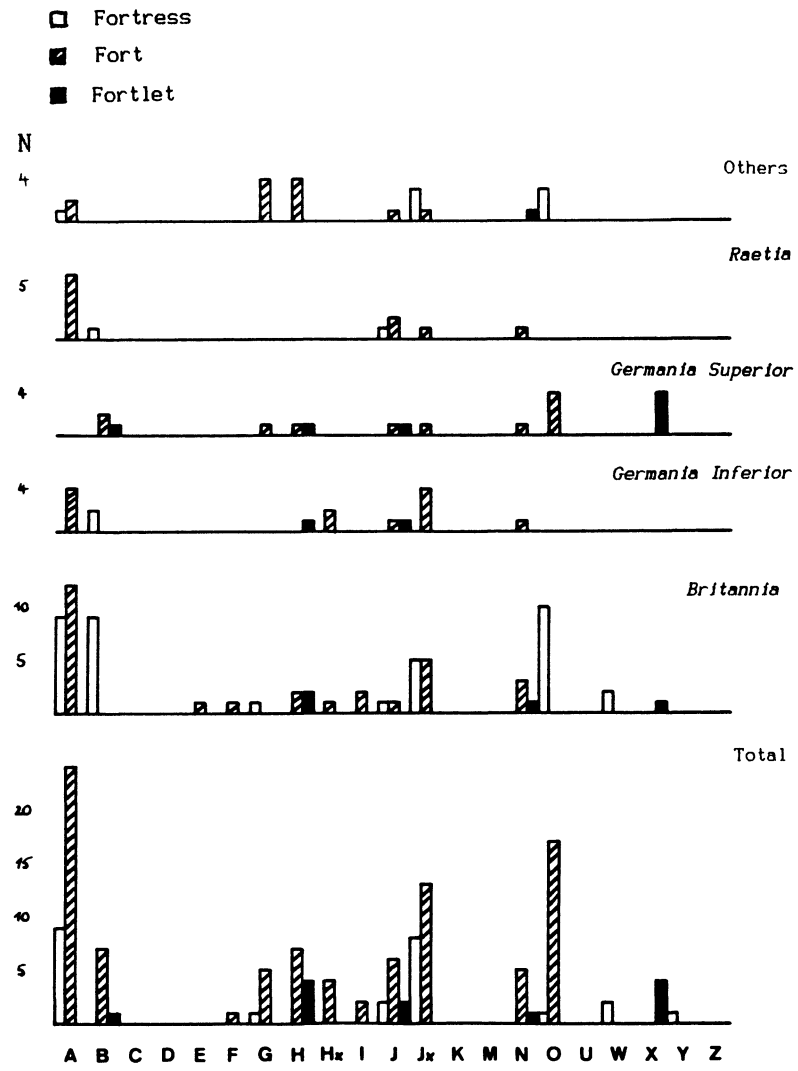


Fig 1.5 Building Types: Barracks - Trajanic/Hadrianic

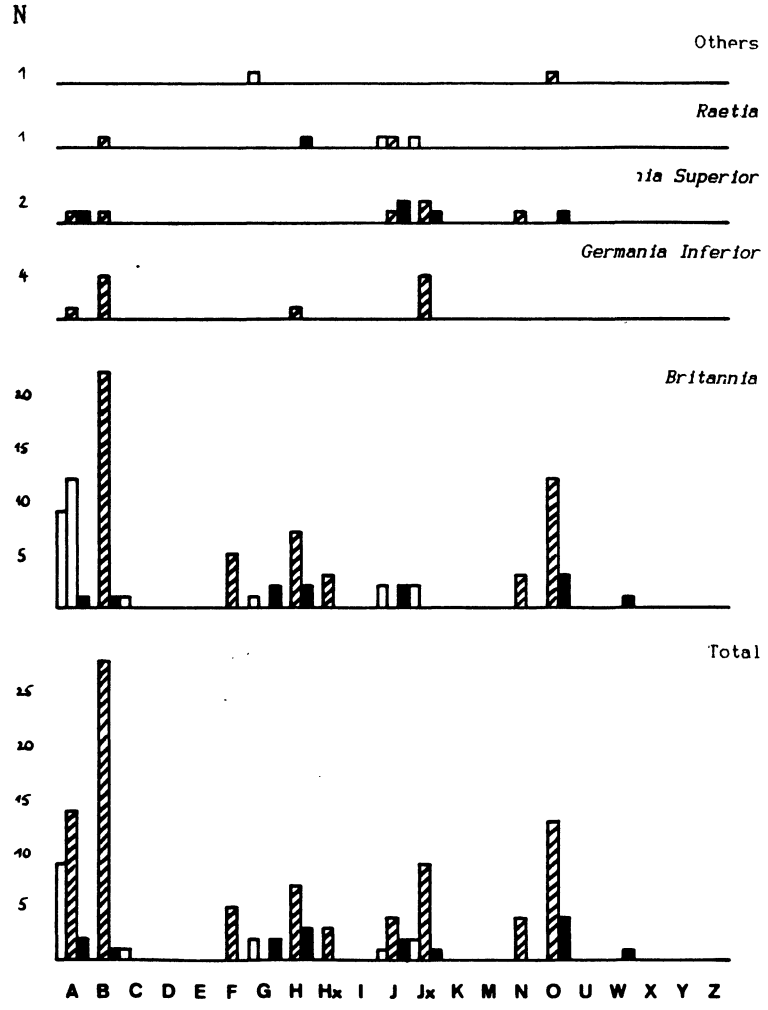


Fig 1.6 Building Types: Barracks - Antonine

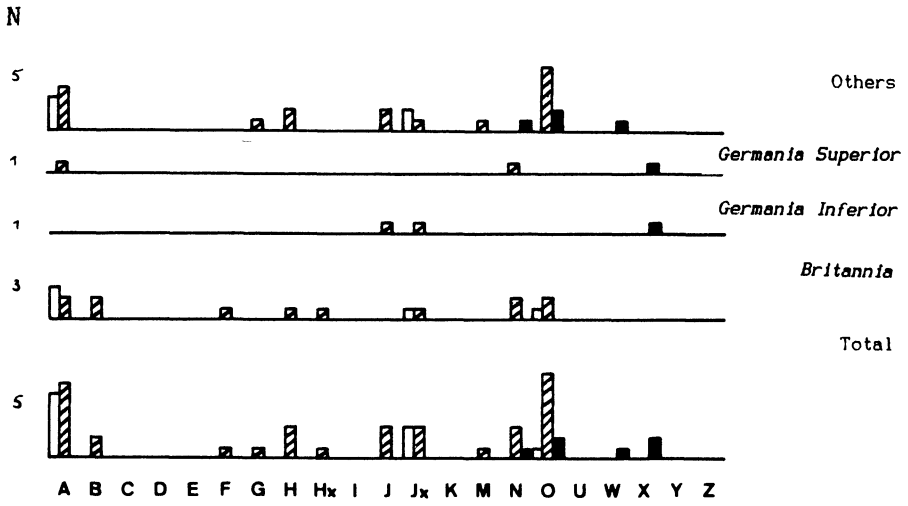


Fig 1.7 Building Types: Barracks - Severan



Fig 1.8 Building Types: Barracks - Third Century

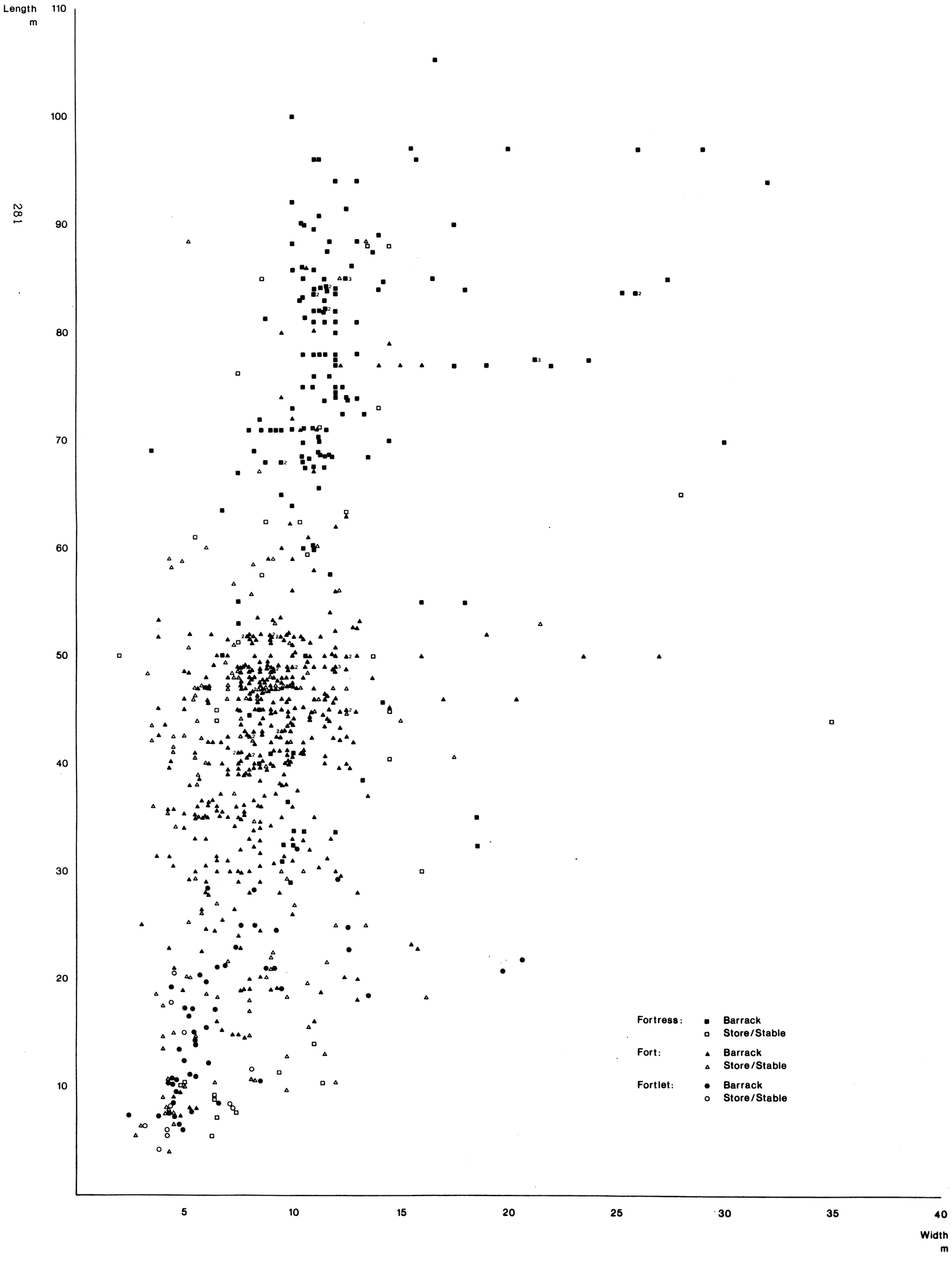


Fig 2 Overall Dimensions

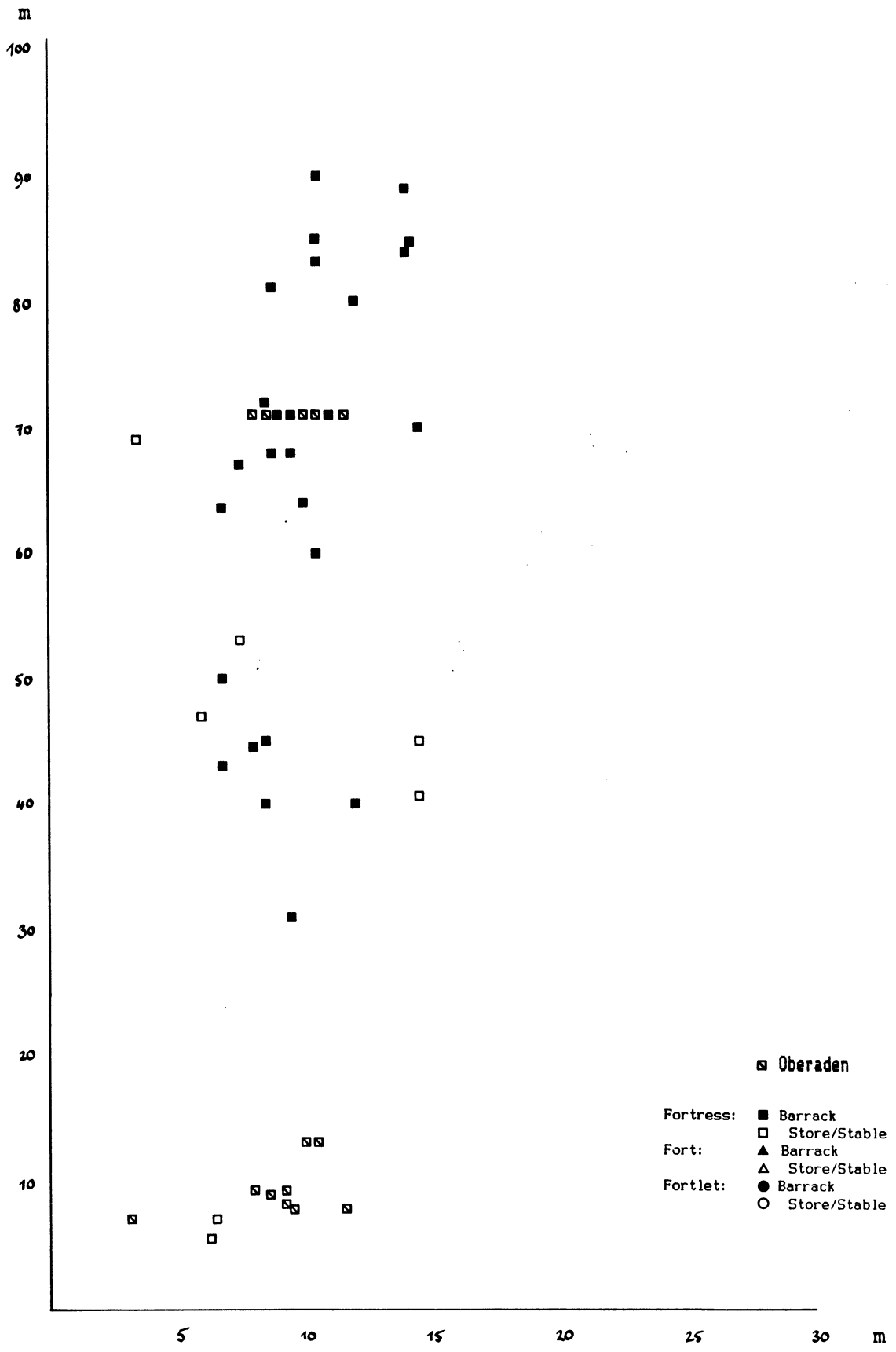


Fig 2.1 Overall Dimensions - Augustan/Tiberian

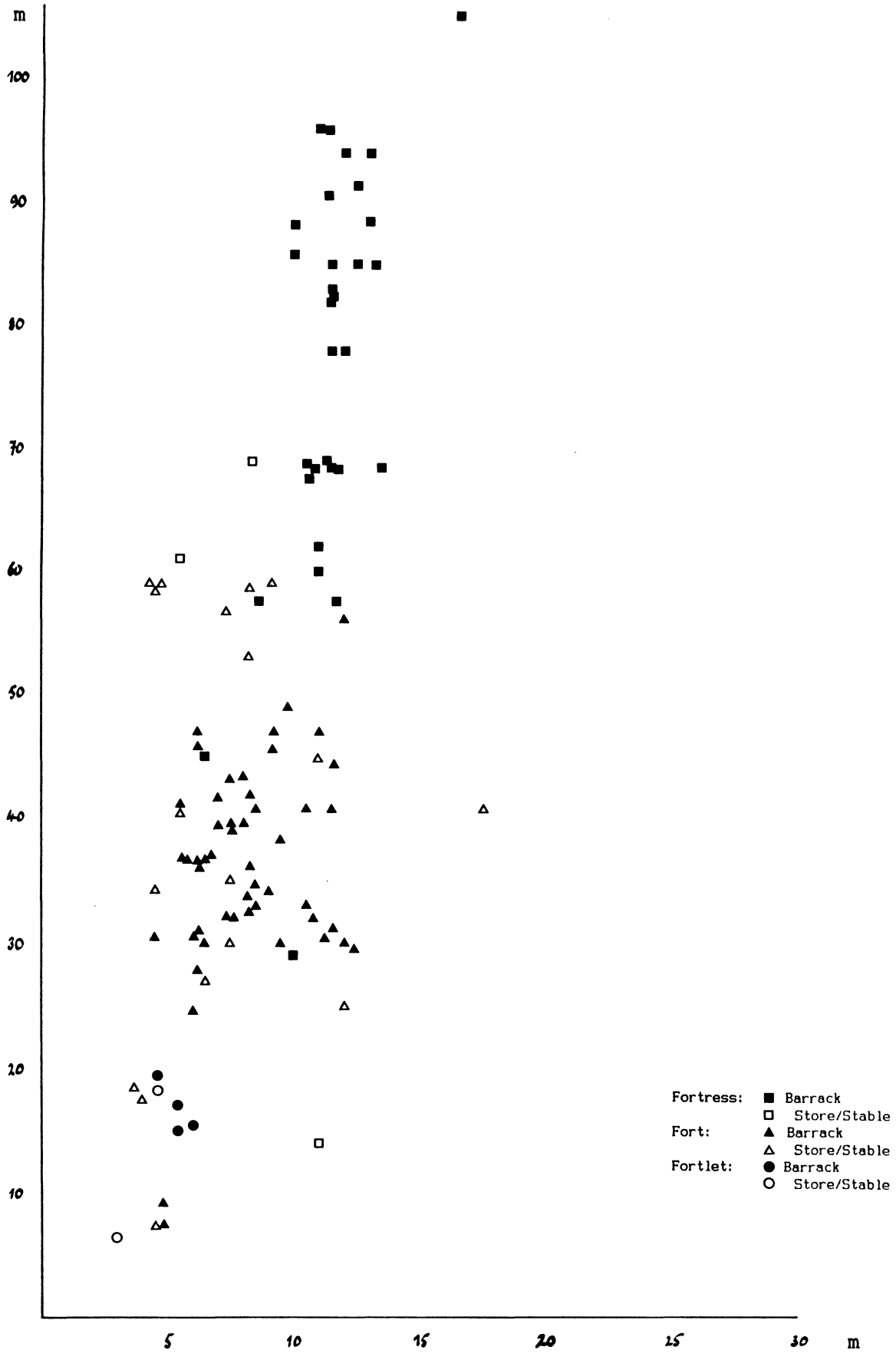


Fig 2.2 Overall Dimensions - Claudian/Neronian

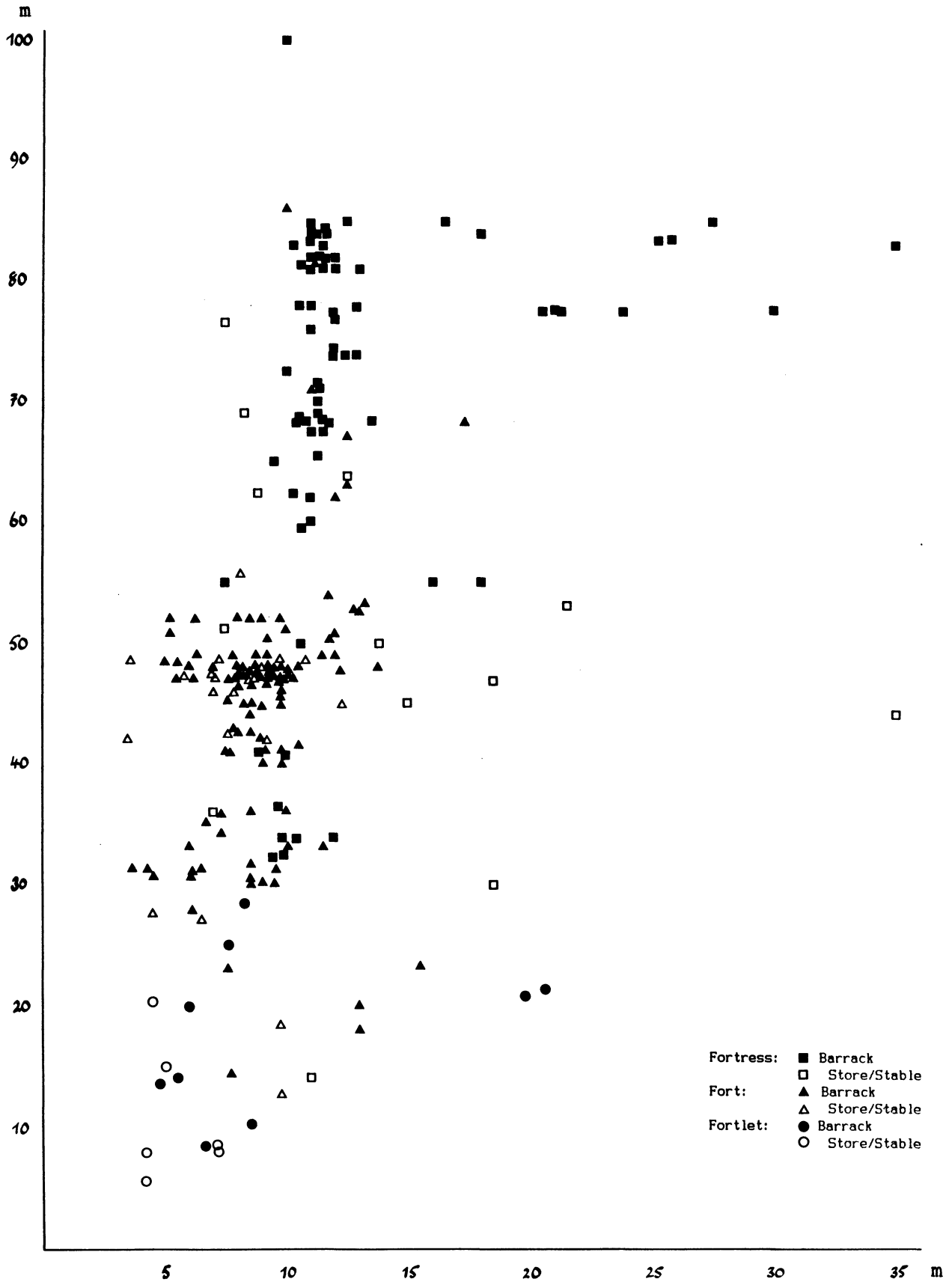


Fig 2.3 Overall Dimensions - Flavian

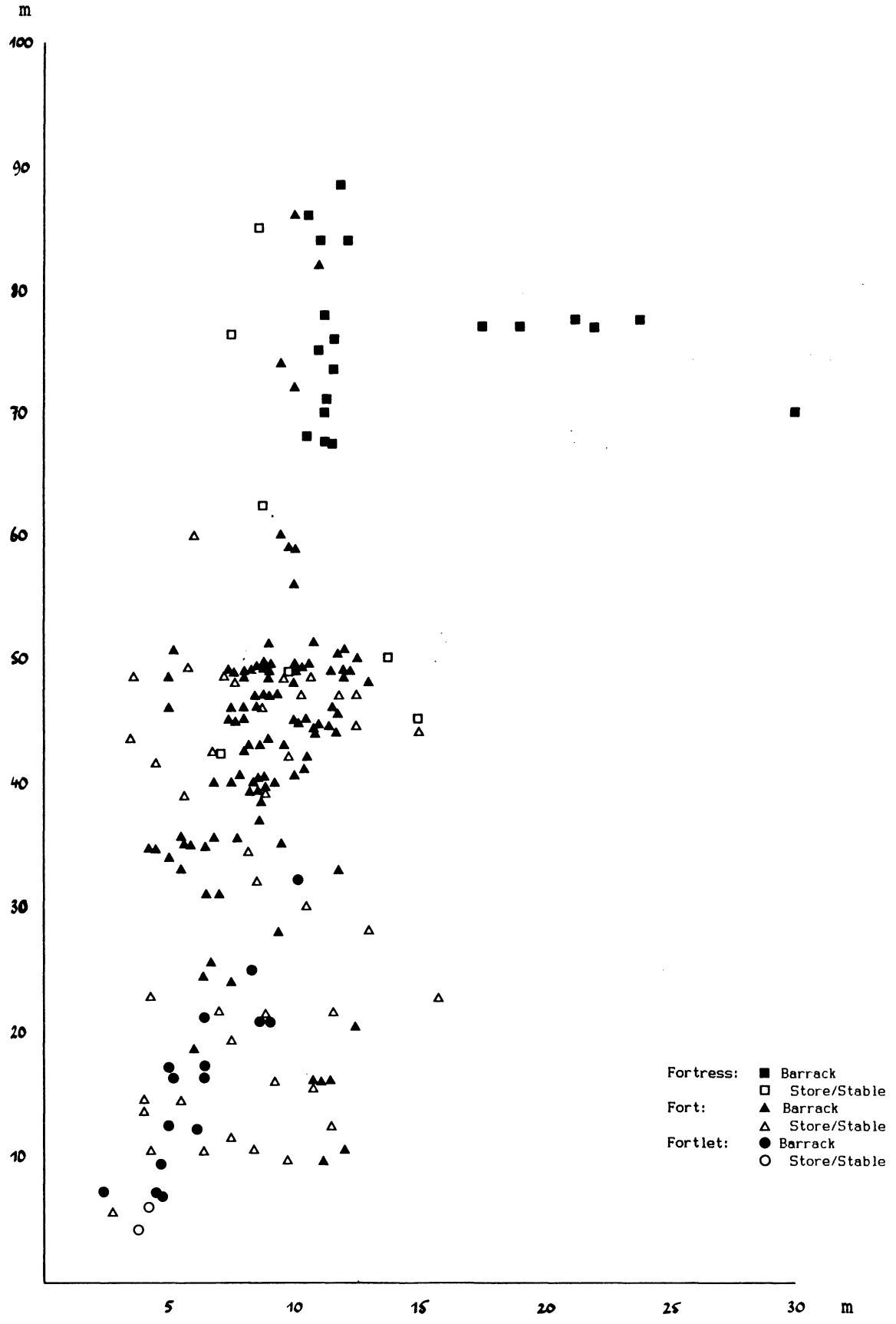


Fig 2.4 Overall Dimensions - Trajanic/Hadrianic

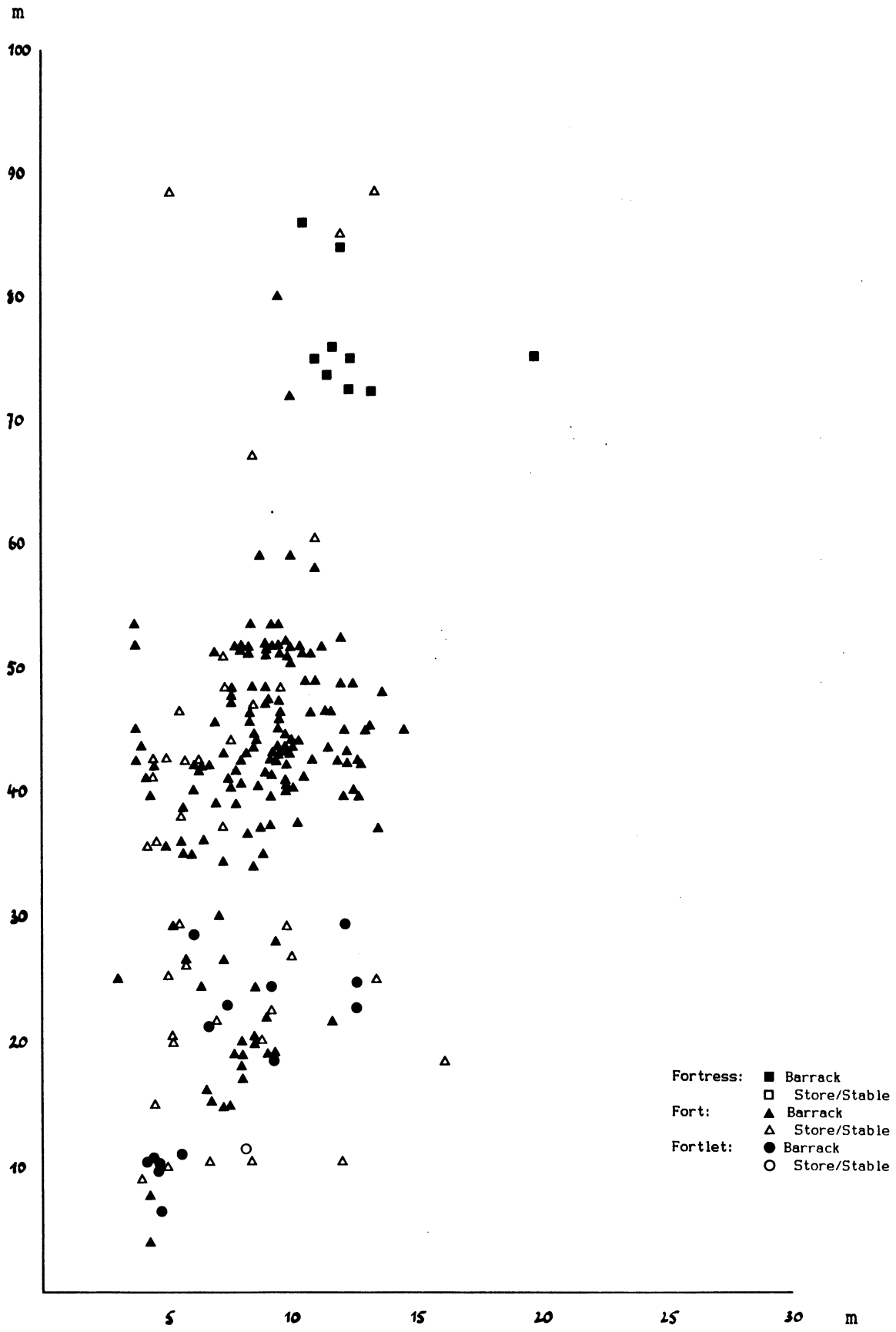


Fig 2.5 Overall Dimensions - Antonine

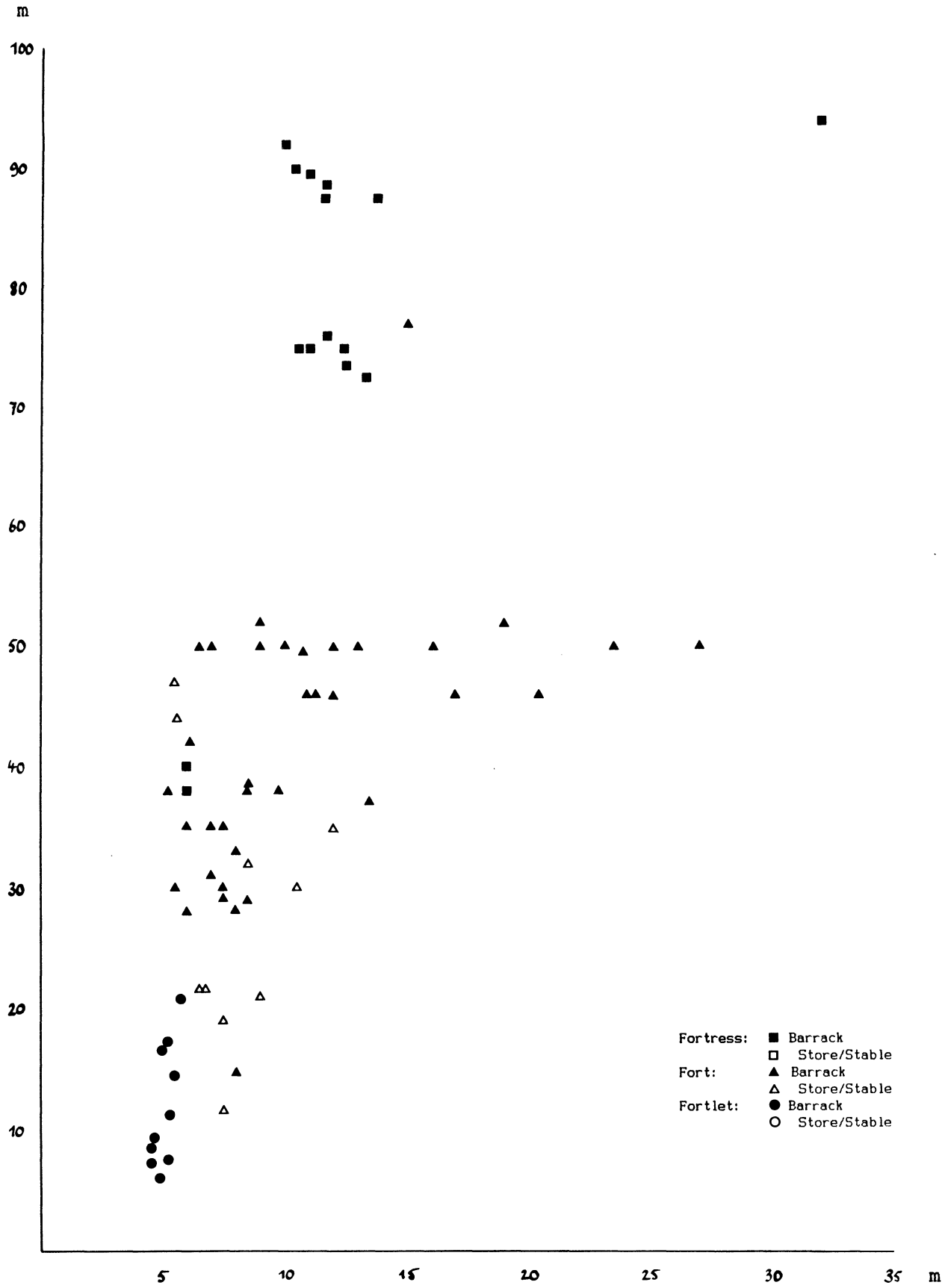


Fig 2.6 Overall Dimensions - Severan

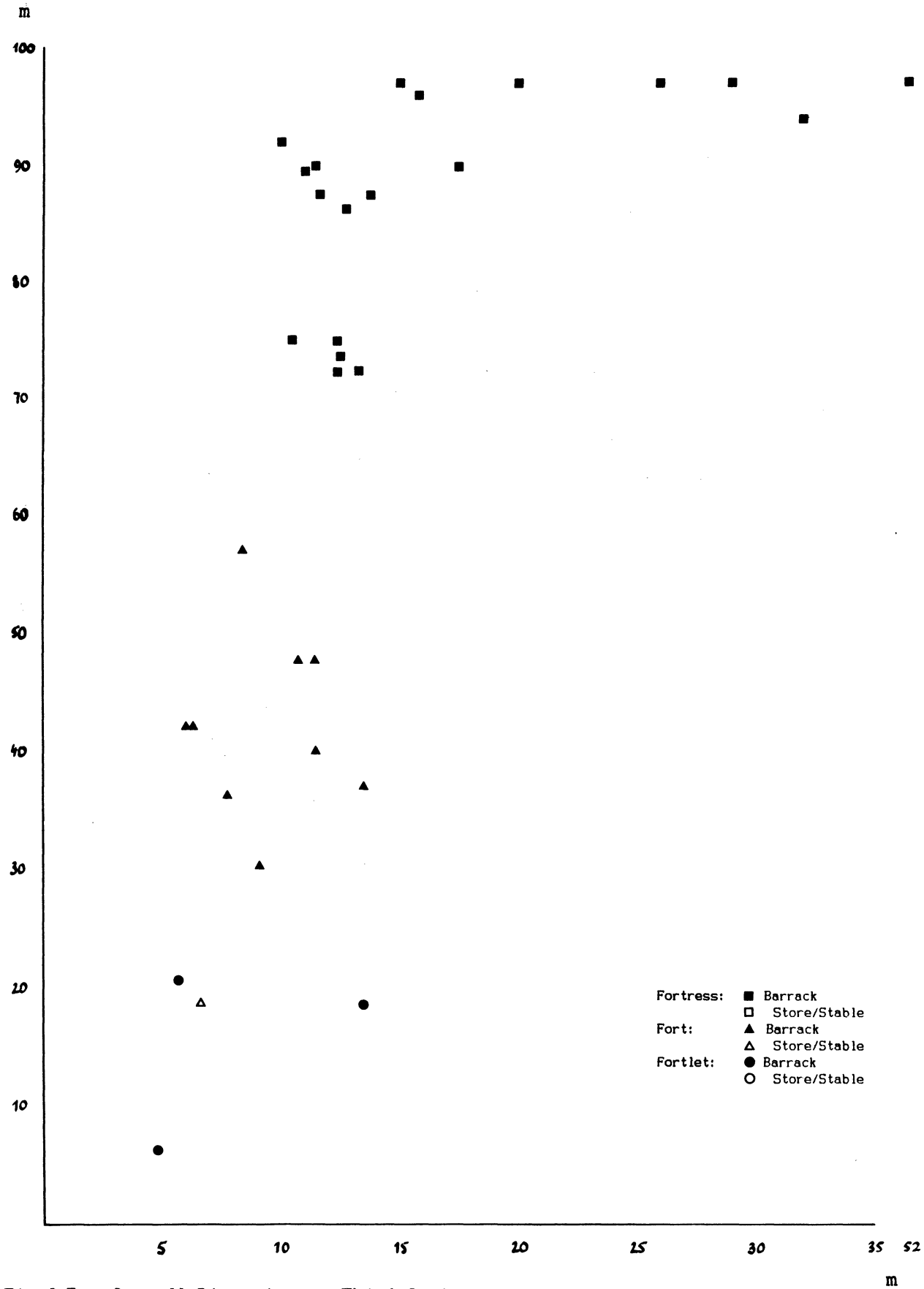


Fig 2.7 Overall Dimensions - Third Century

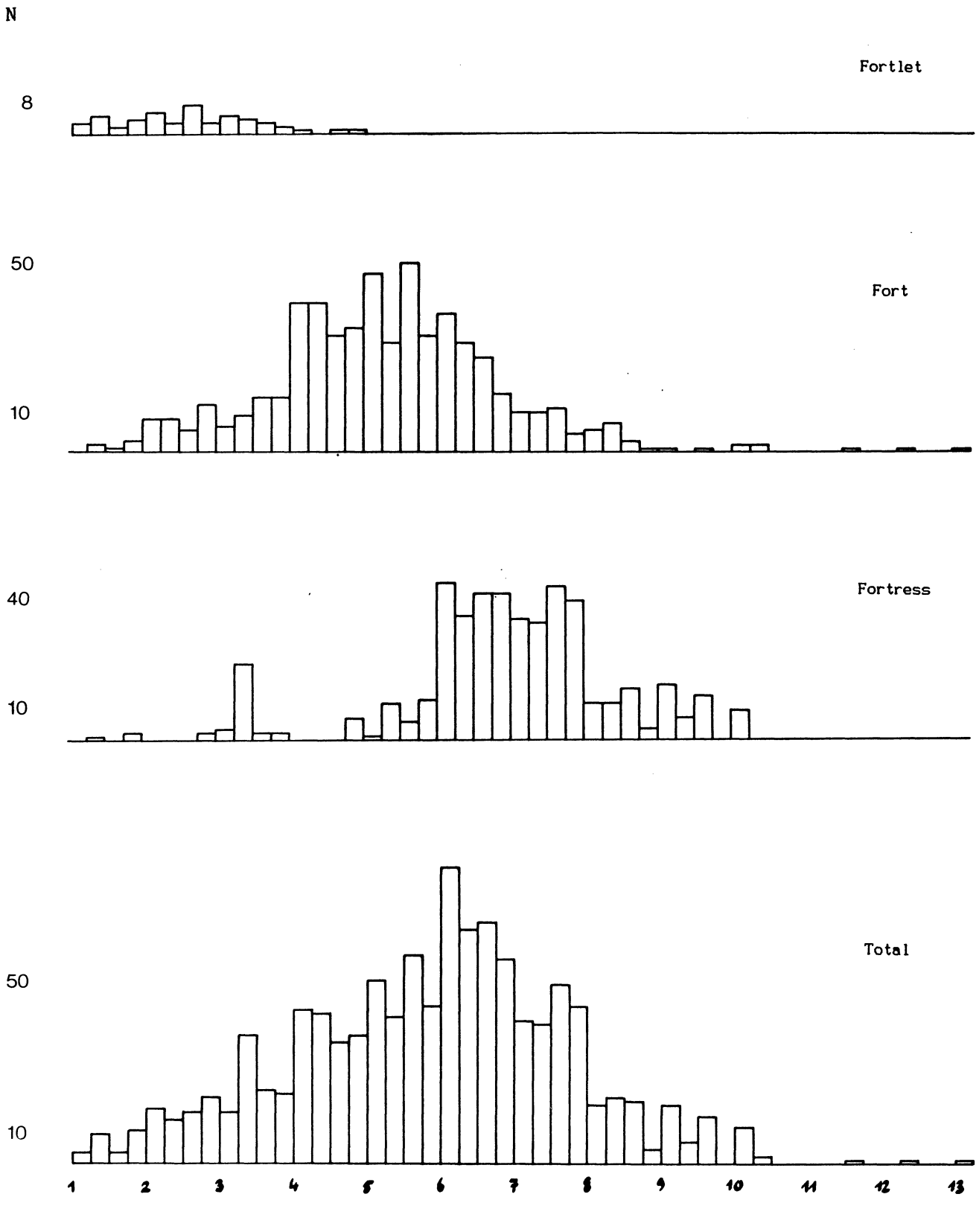


Fig 3 Barrack Proportions

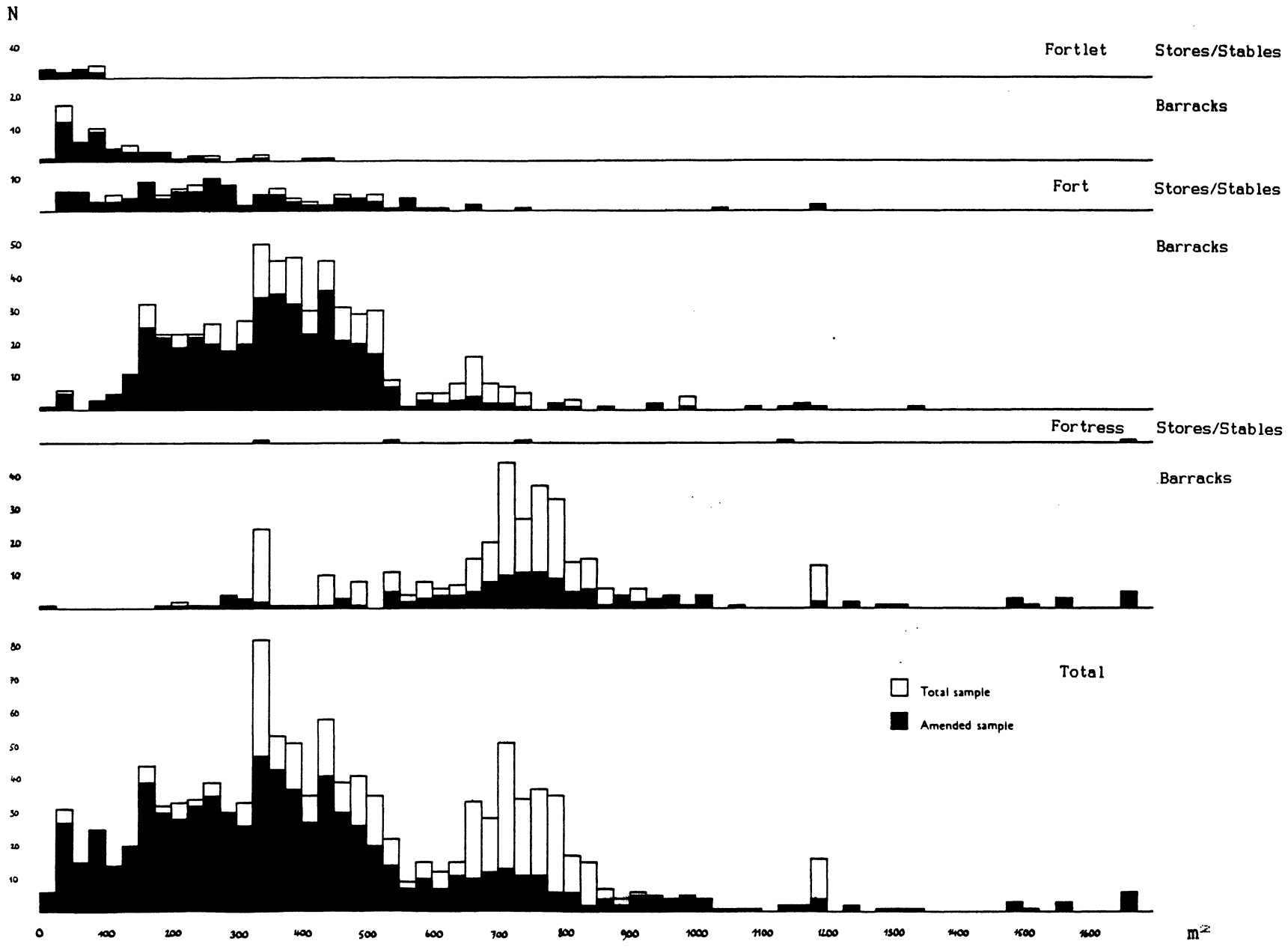


Fig 4 Barracks and Ancillary Buildings: Areas

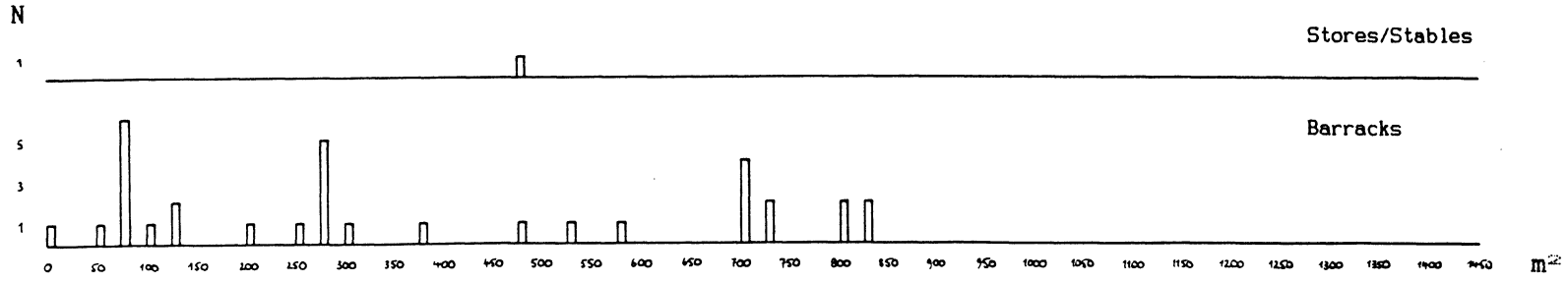


Fig 4.1 Areas - Augustan/Tiberian

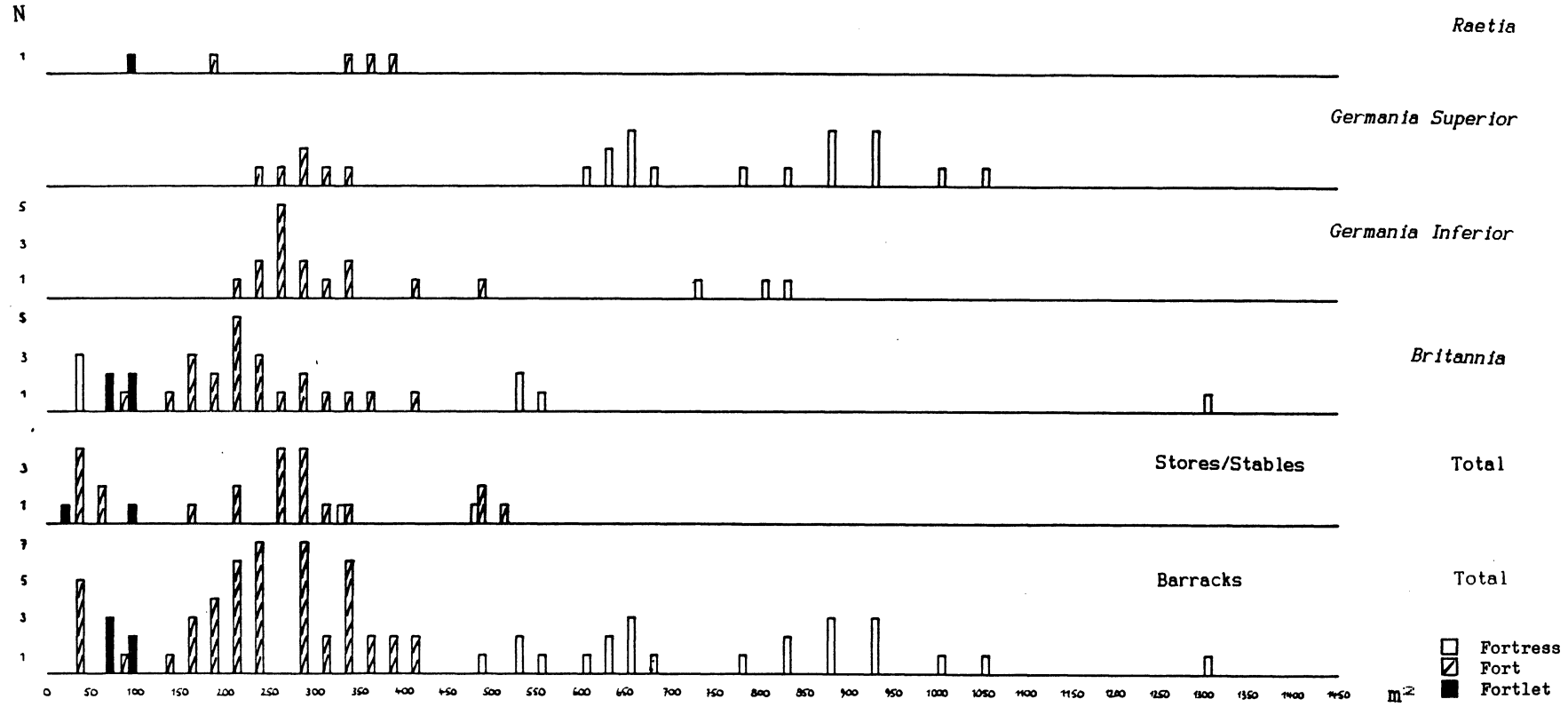


Fig 4.2 Areas - Claudian/Neronian

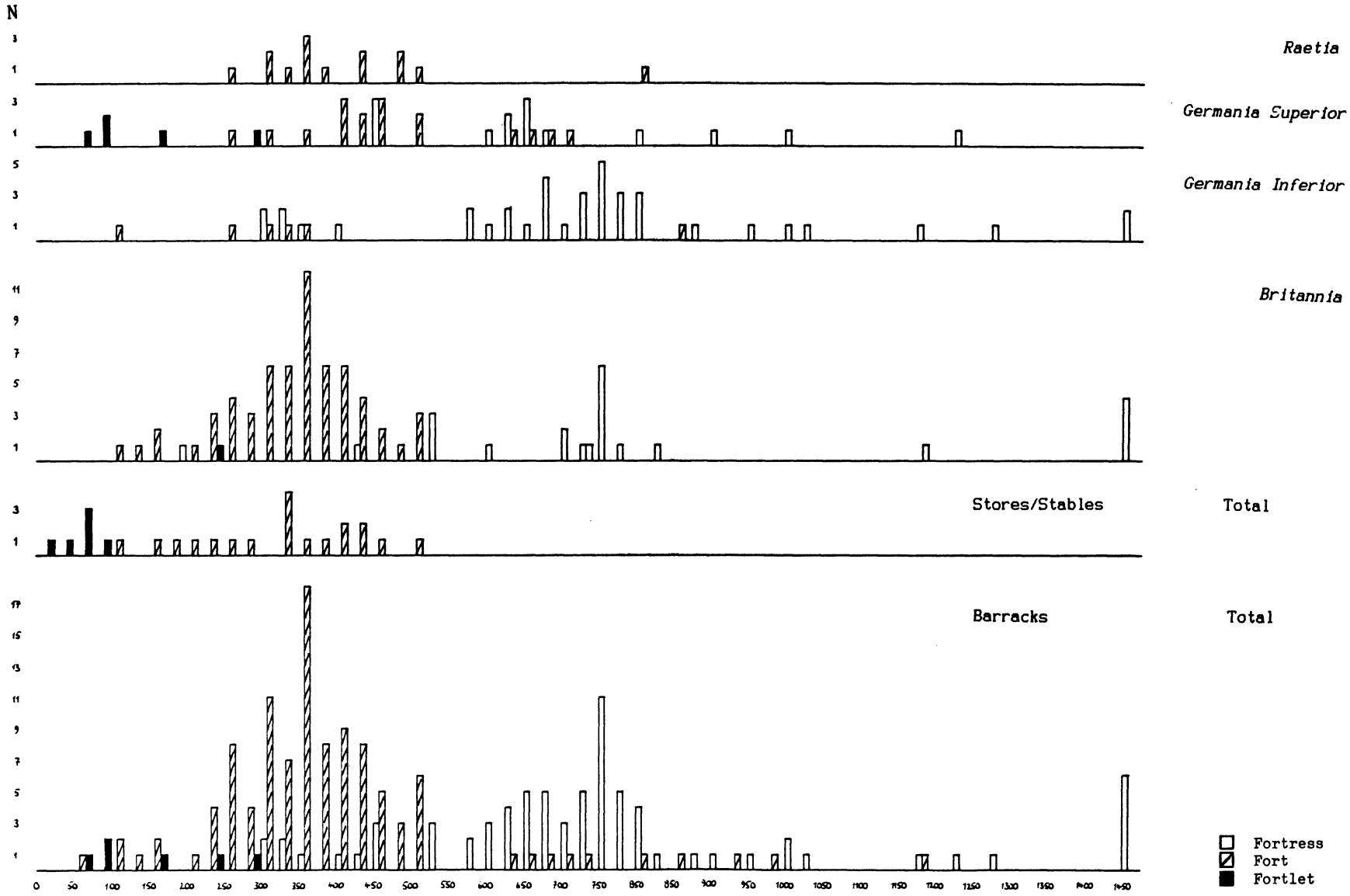


Fig 4.3 Areas - Flavian

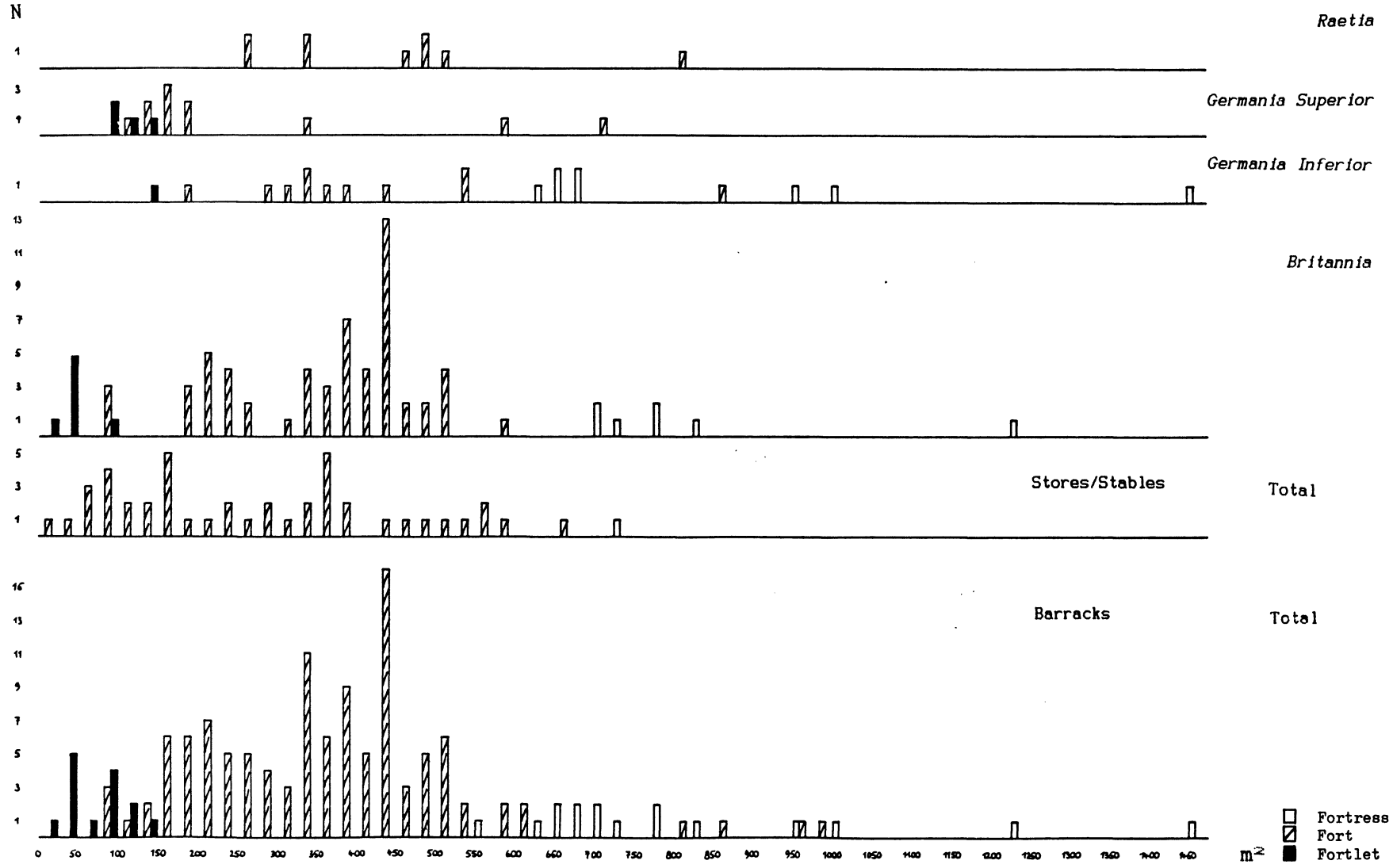


Fig 4.4 Areas - Trajanic/Hadrianic

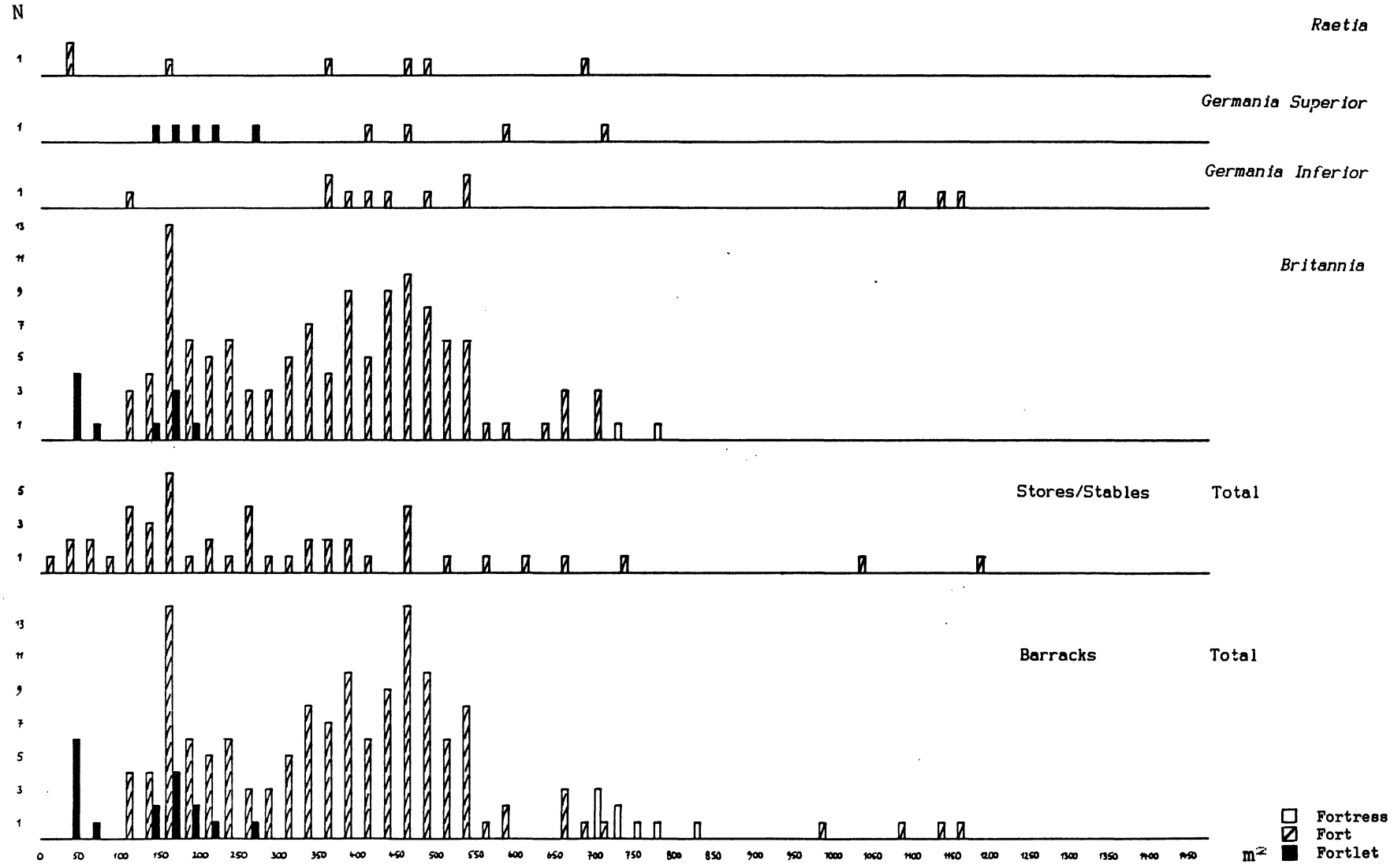


Fig 4.5 Areas - Antonine

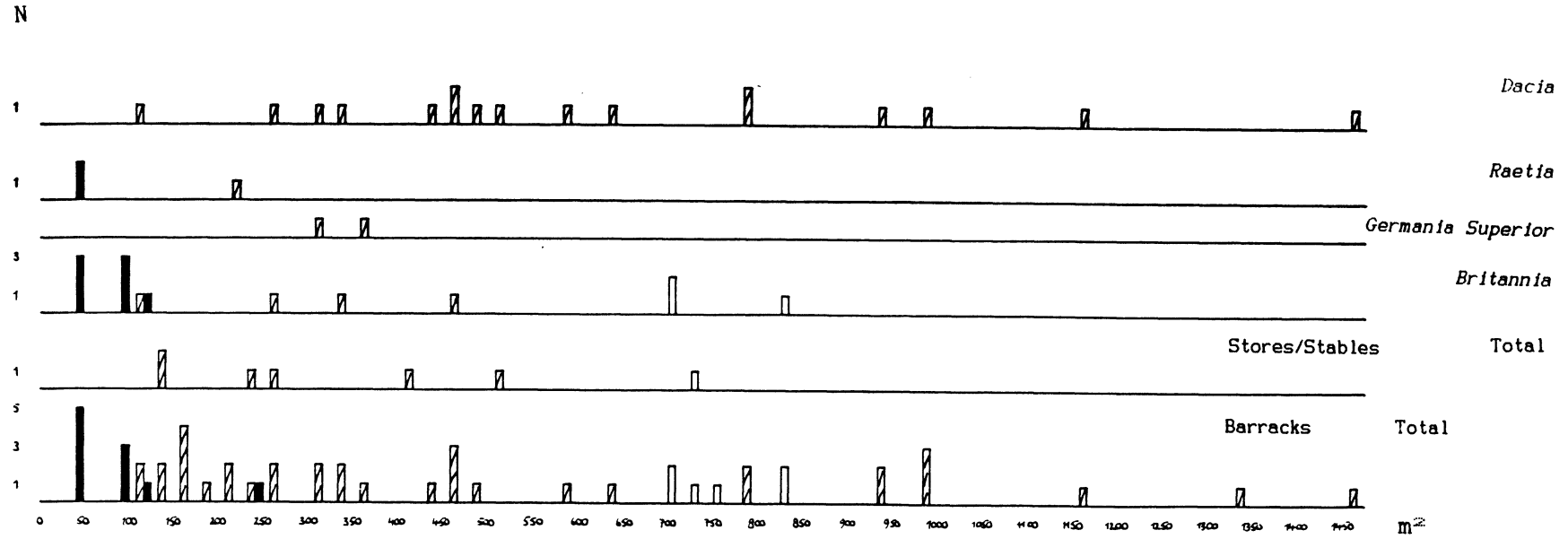


Fig 4.6 Areas - Severan

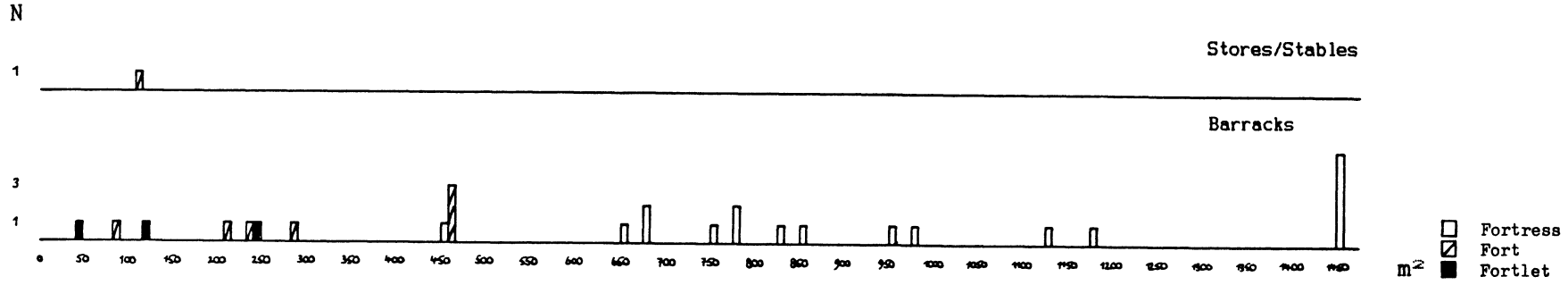


Fig 4.7 Areas - Third Century

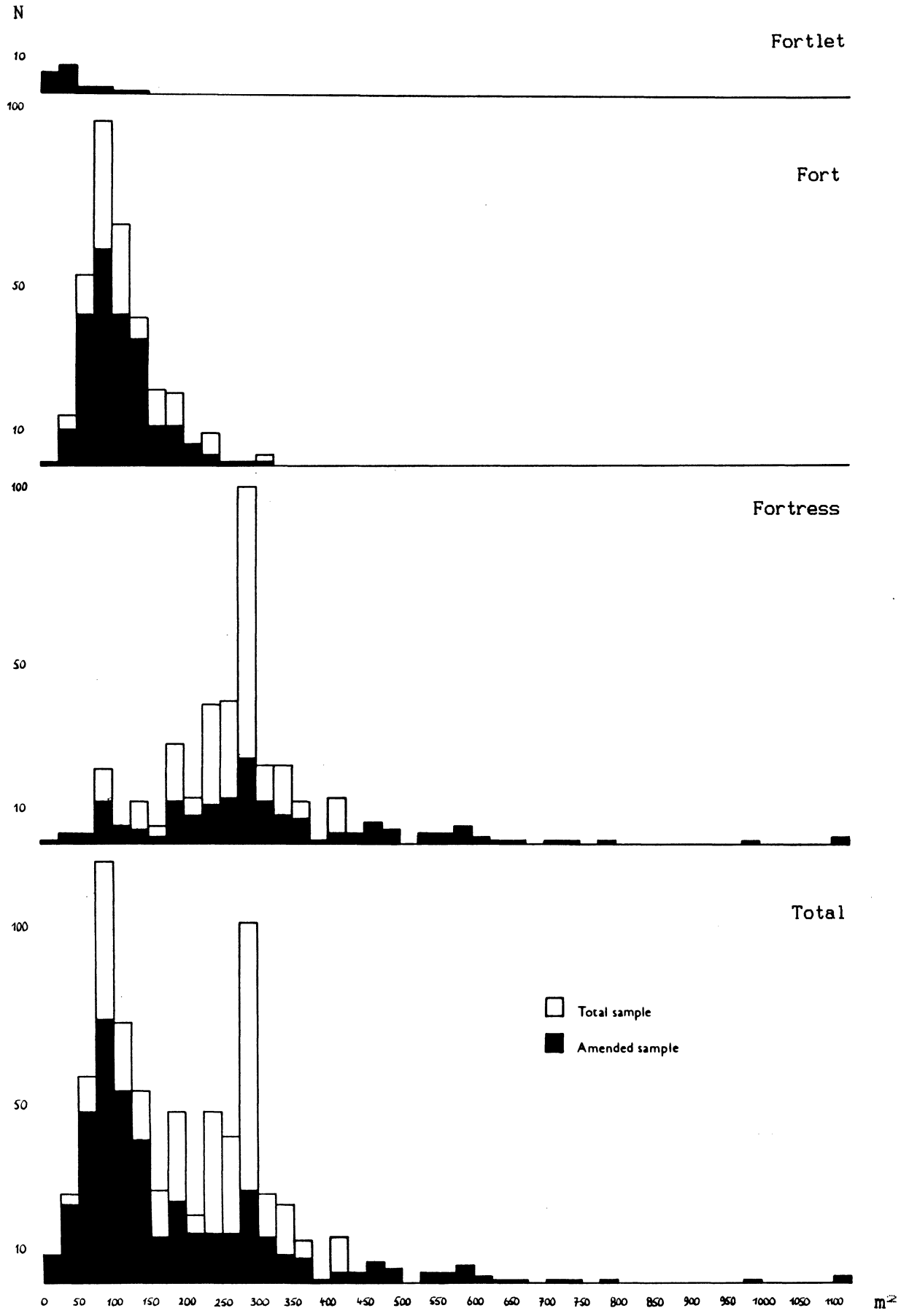


Fig 5 Officers' Quarters: Areas

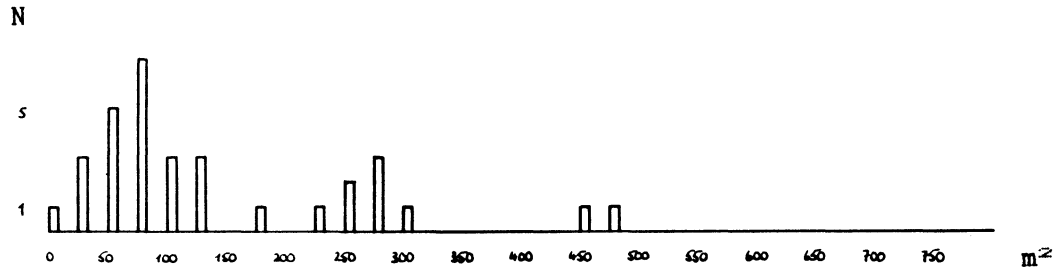


Fig 5.1 Officers' Quarters: Areas - Augustan/Tiberian

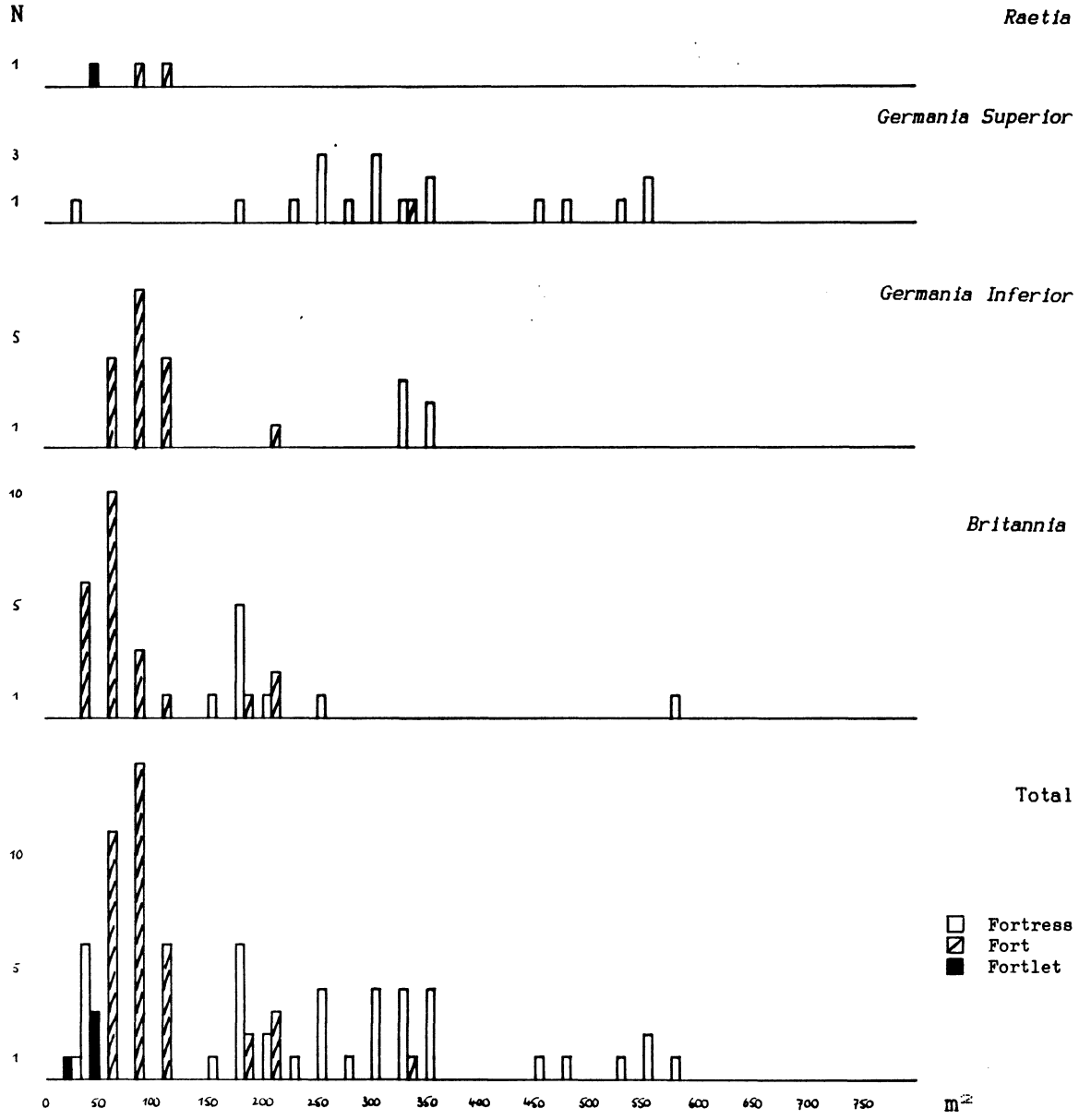


Fig 5.2 Officers' Quarters: Areas - Claudian/Neronian

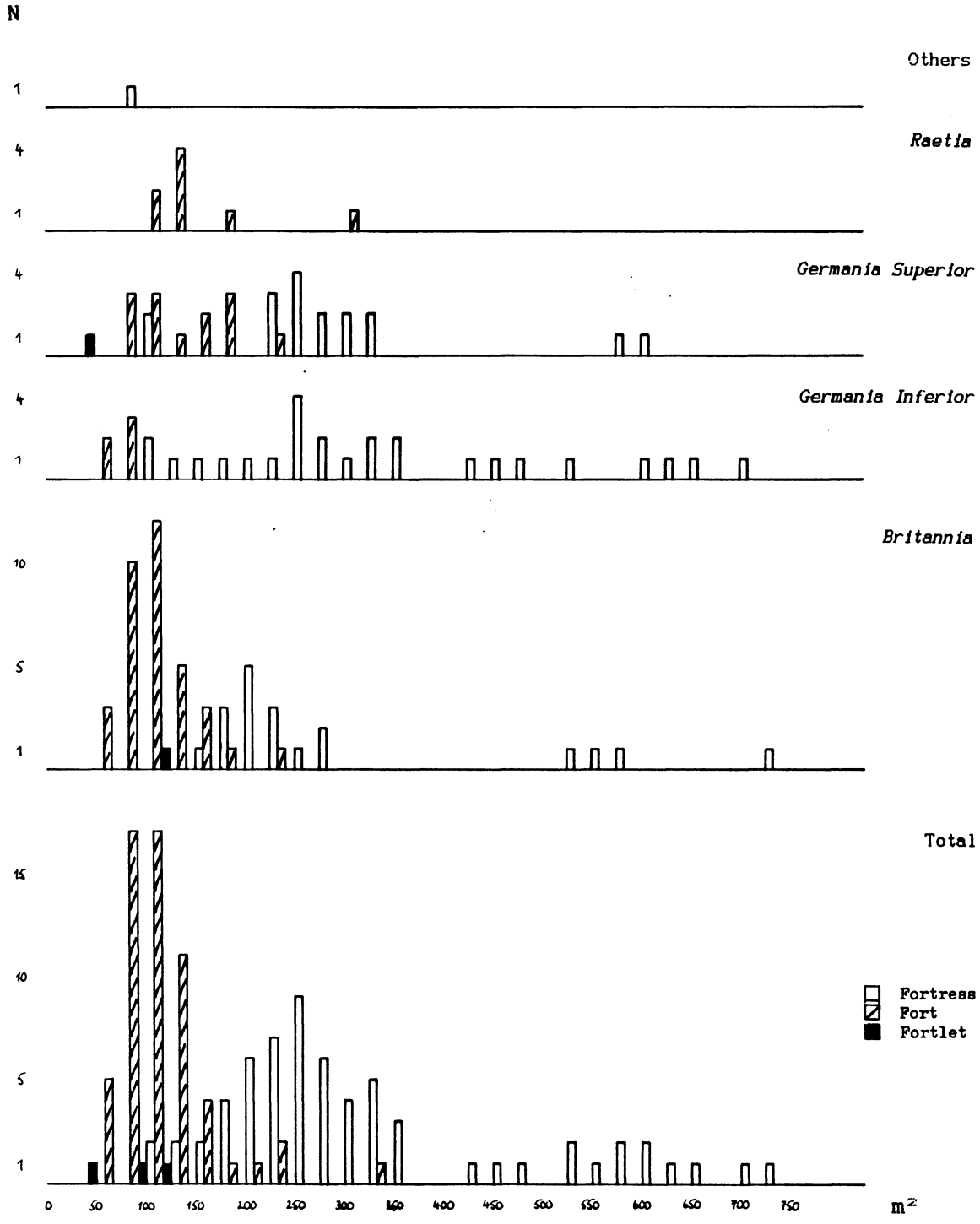


Fig 5.3 Officers' Quarters: Areas - Flavian

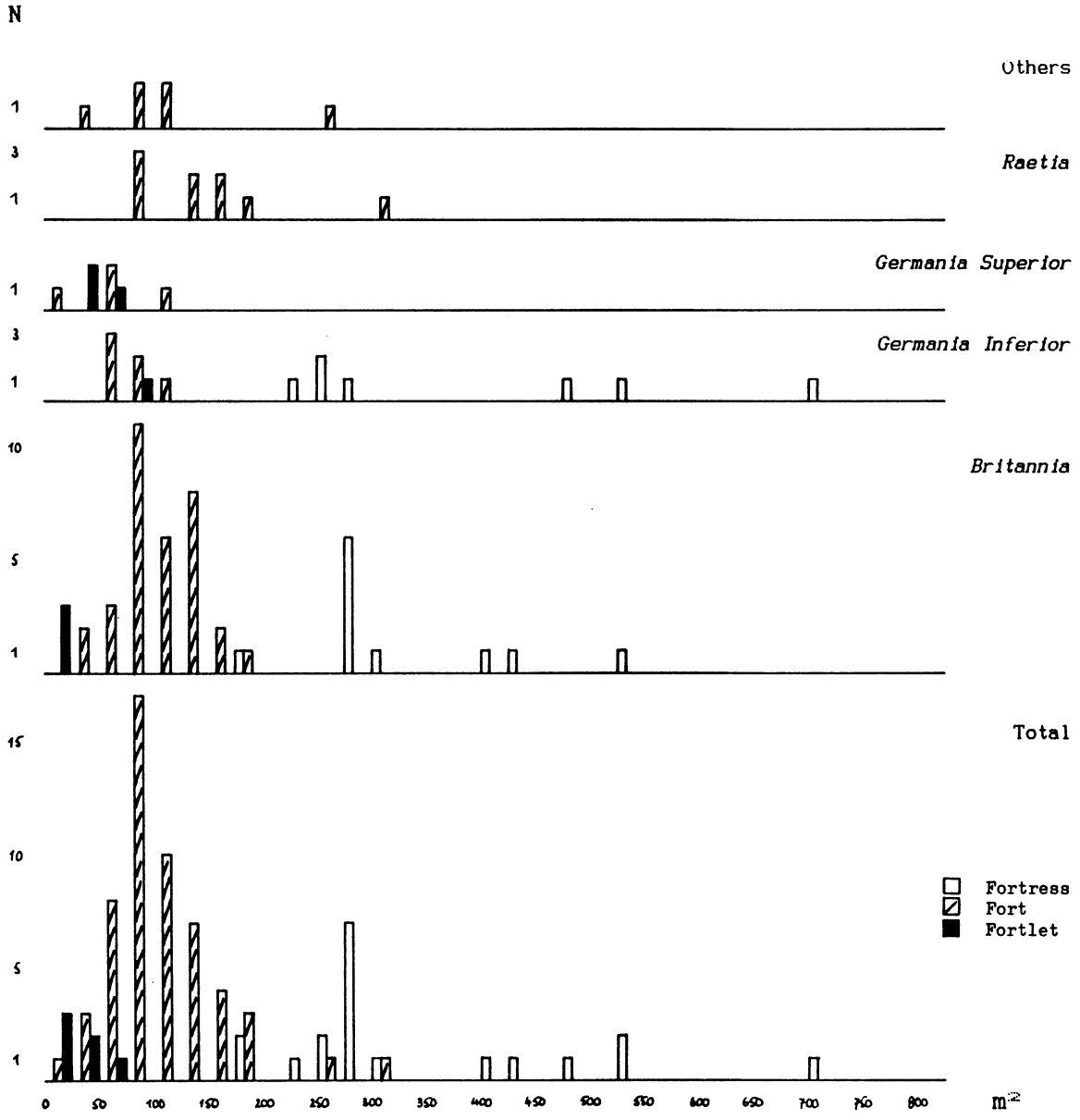


Fig 5.4 Officers' Quarters: Areas - Trajanic/Hadrianic

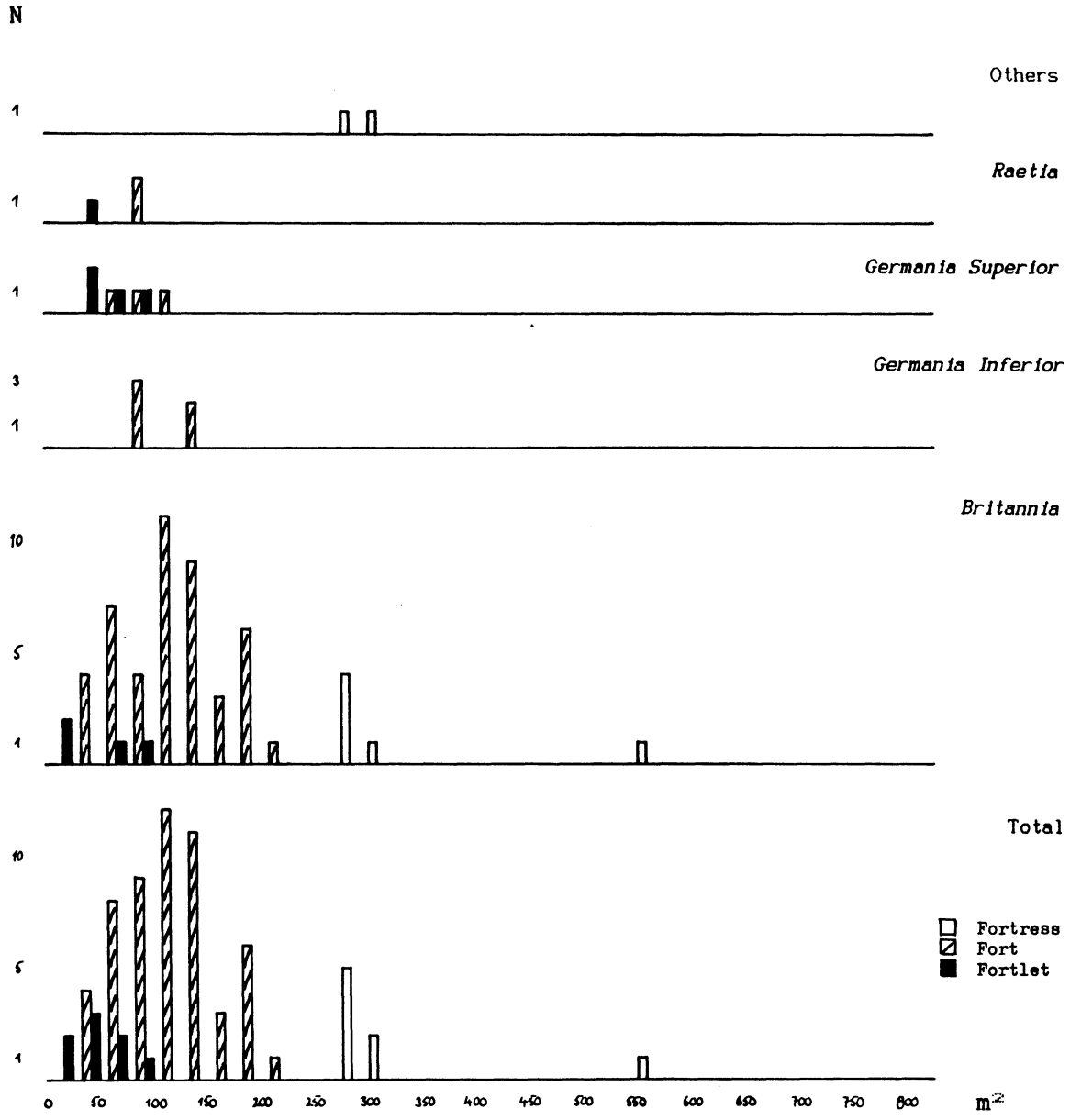


Fig 5.5 Officers' Quarters: Areas - Antonine

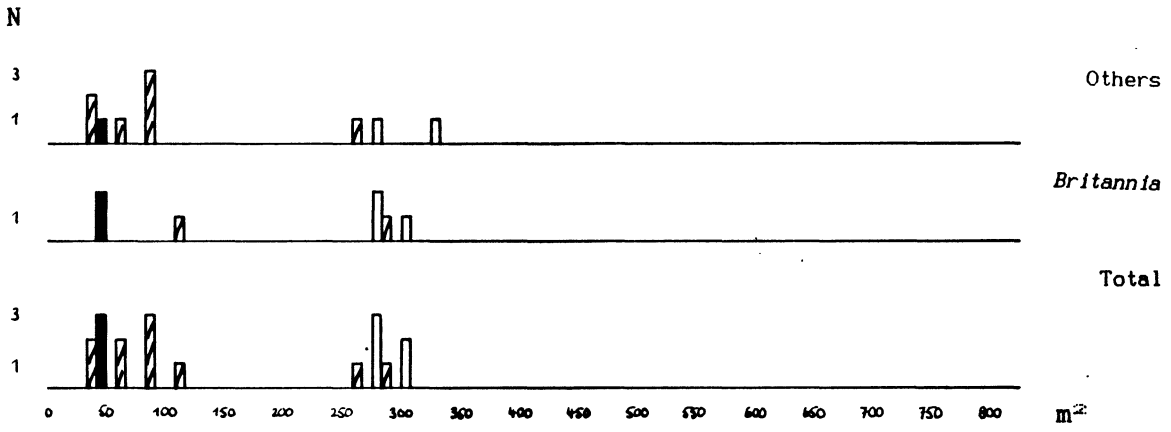


Fig 5.6 Officers' Quarters: Areas - Severan

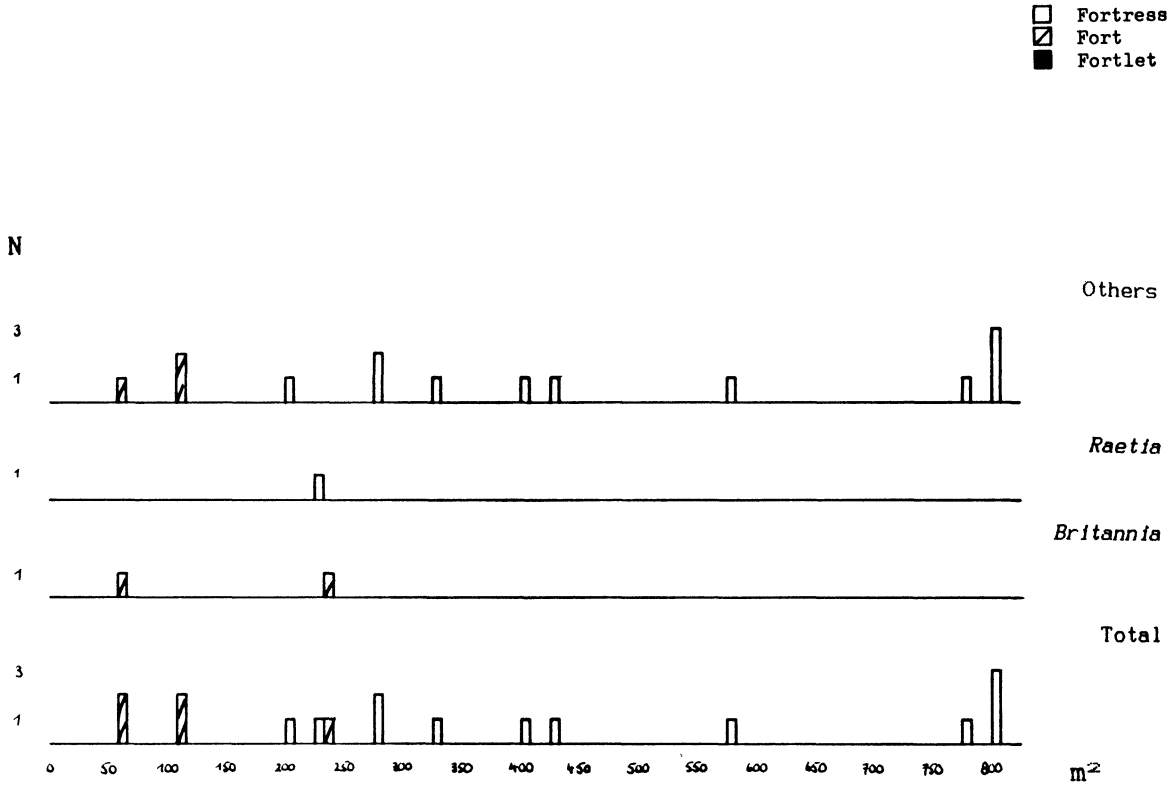


Fig 5.7 Officers' Quarters: Areas - Third Century

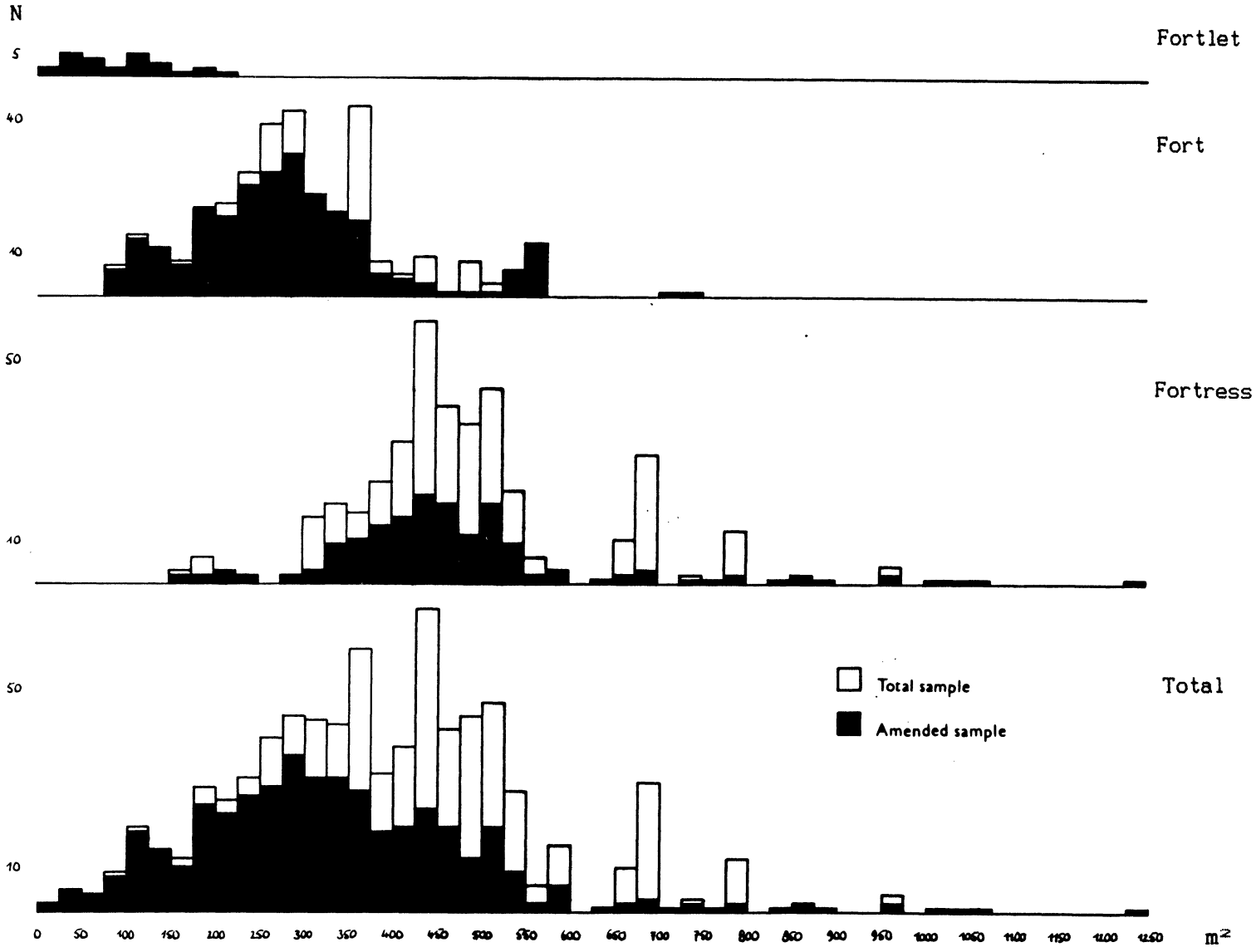


Fig 6 Men's Quarters: Areas

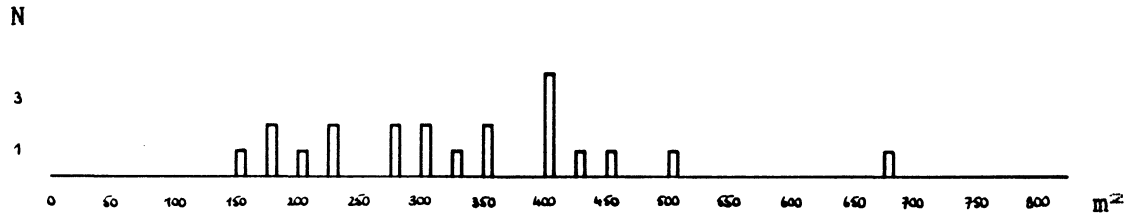


Fig 6.1 Men's Quarters: Areas - Augustan/Tiberian

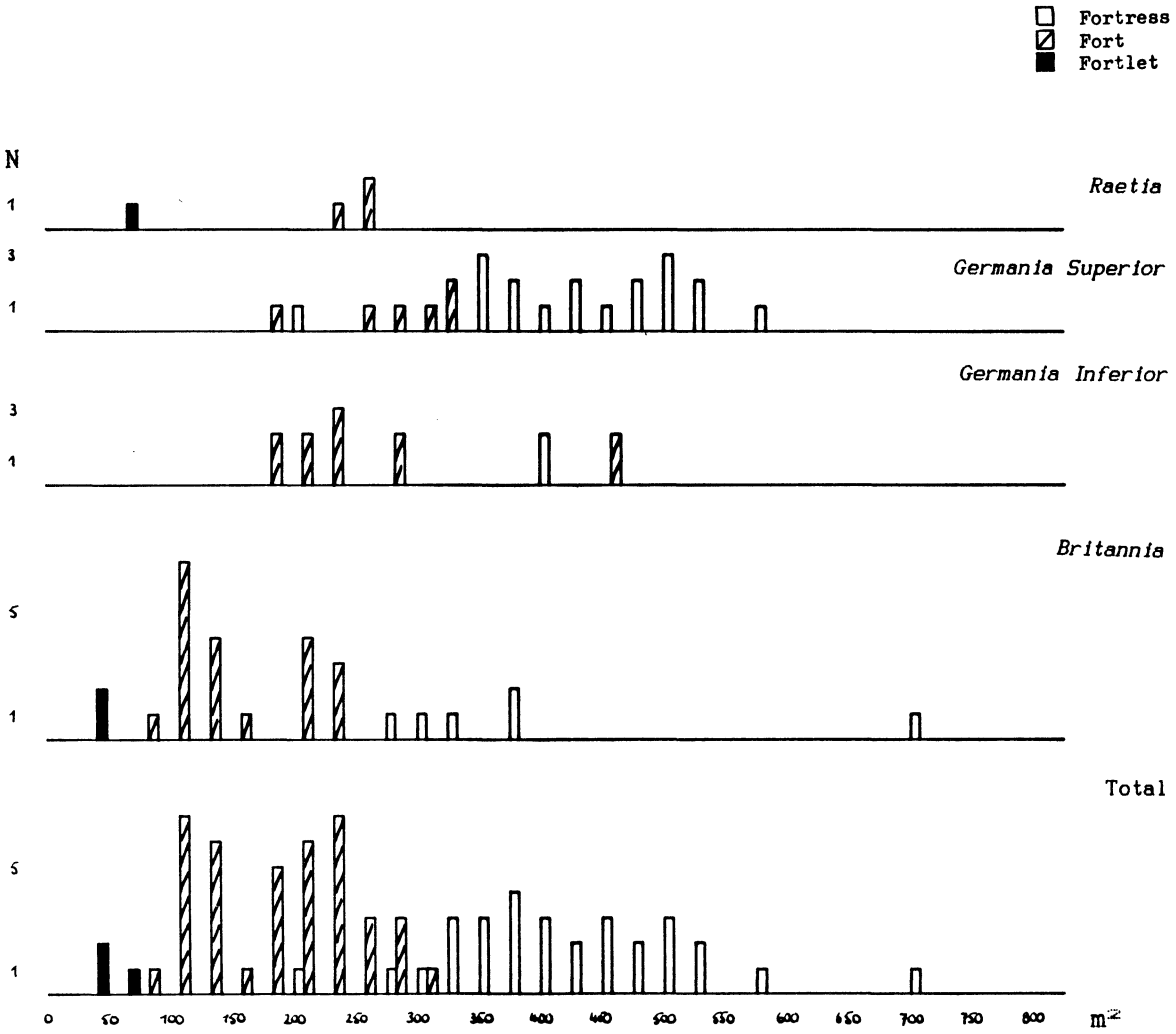


Fig 6.2 Men's Quarters: Areas - Claudian/Neronian

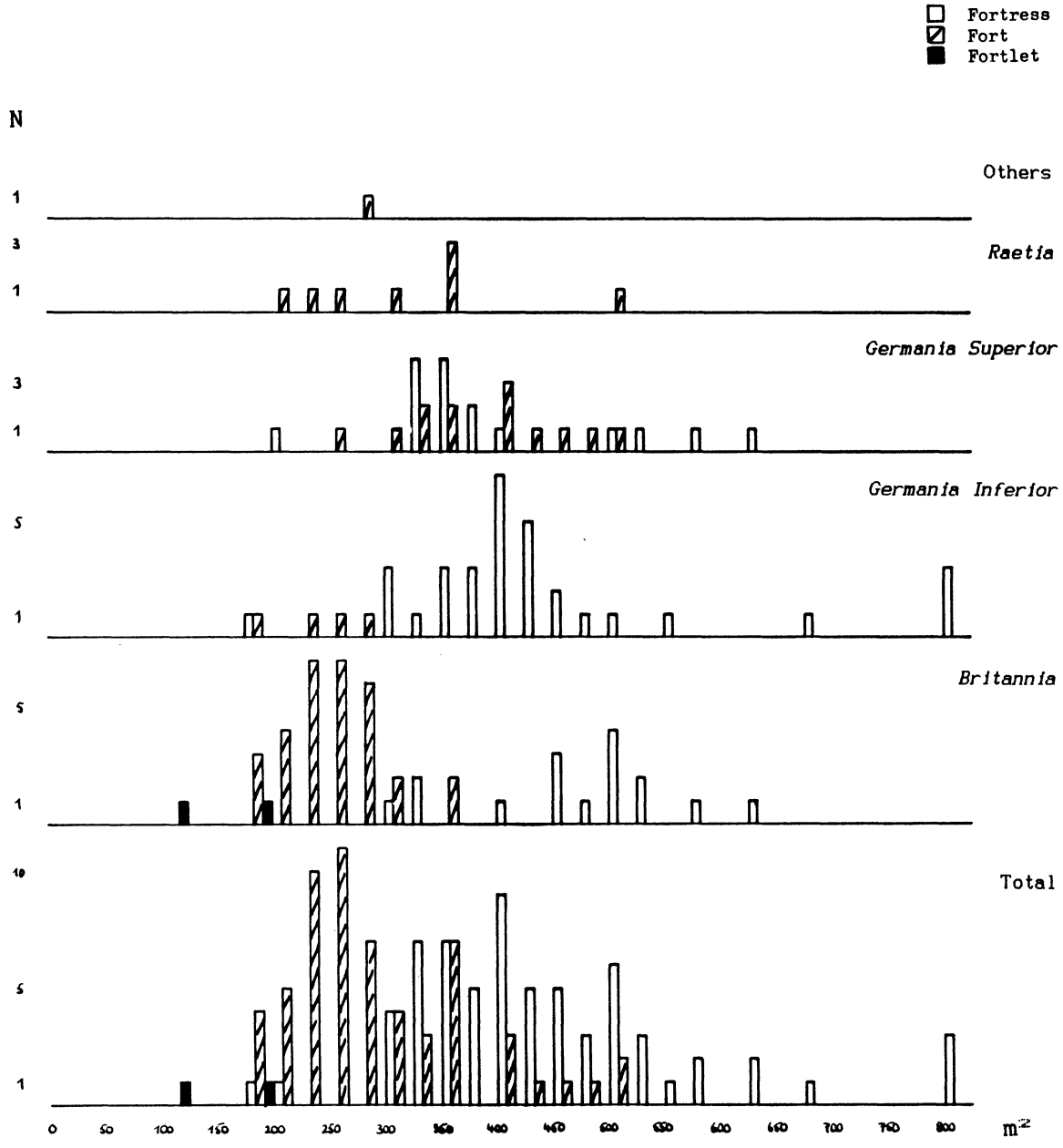


Fig 6.3 Men's Quarters: Areas - Flavian

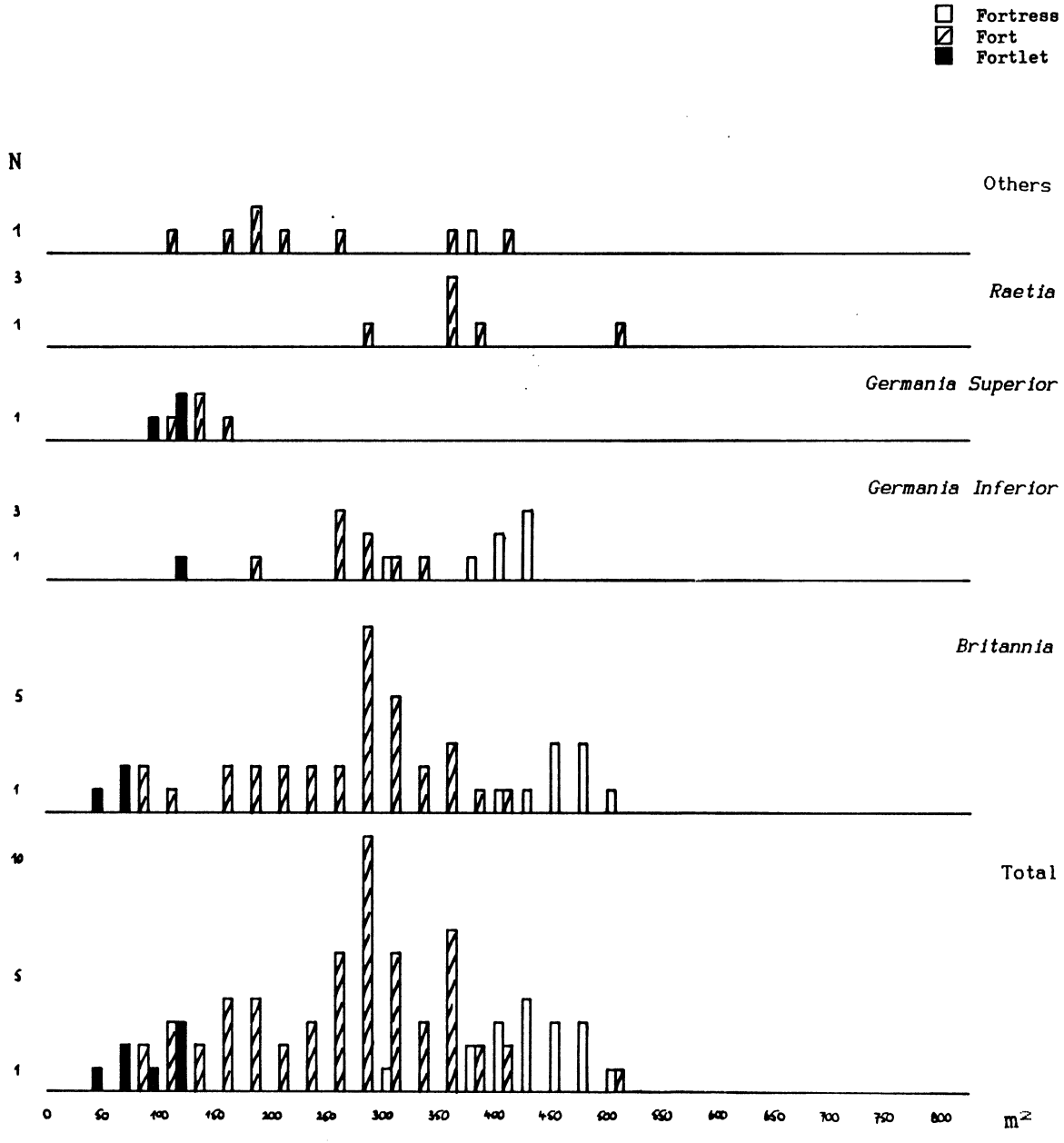


Fig 6.4 Men's Quarters: Areas - Trajanic/Hadrianic

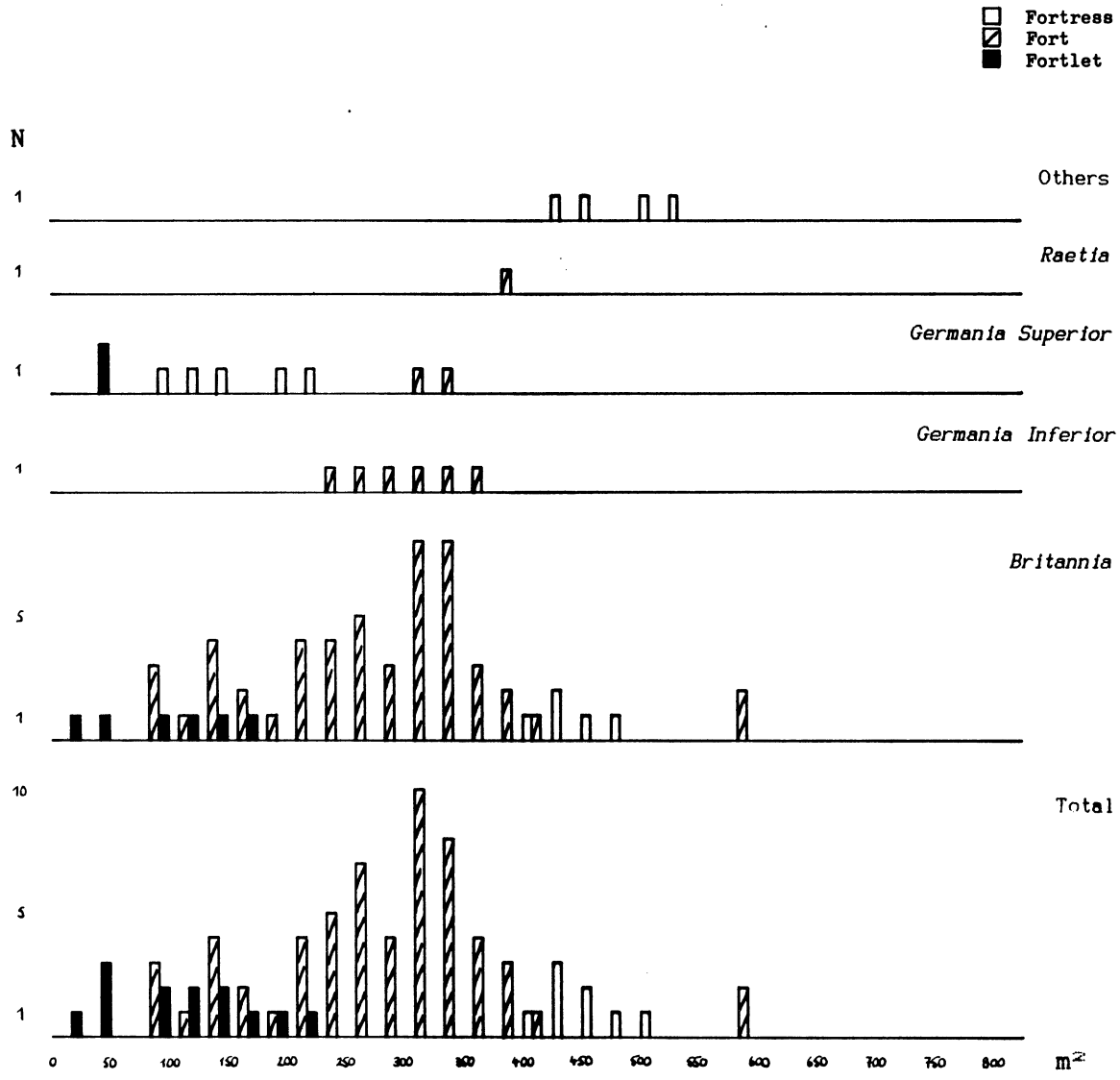


Fig 6.5 Men's Quarters: Areas - Antonine

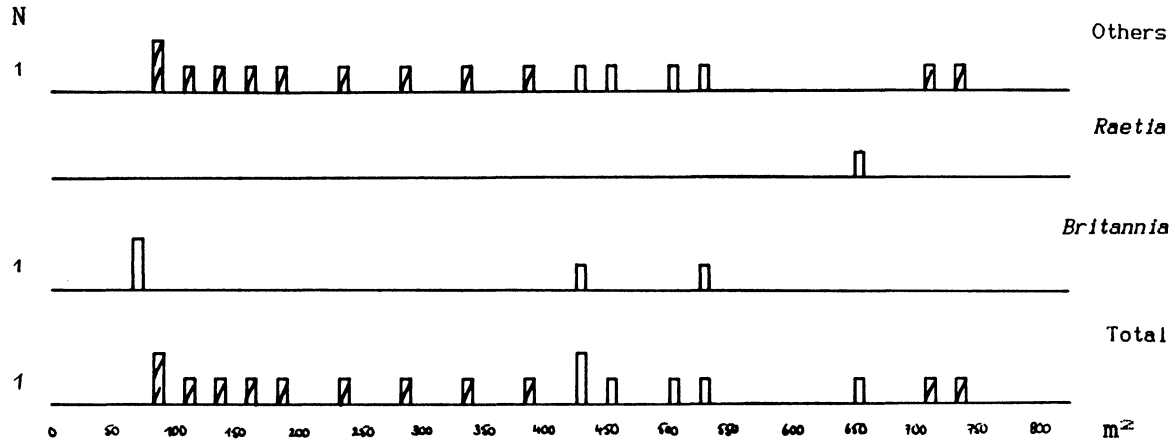


Fig 6.6 Men's Quarters: Areas - Severan

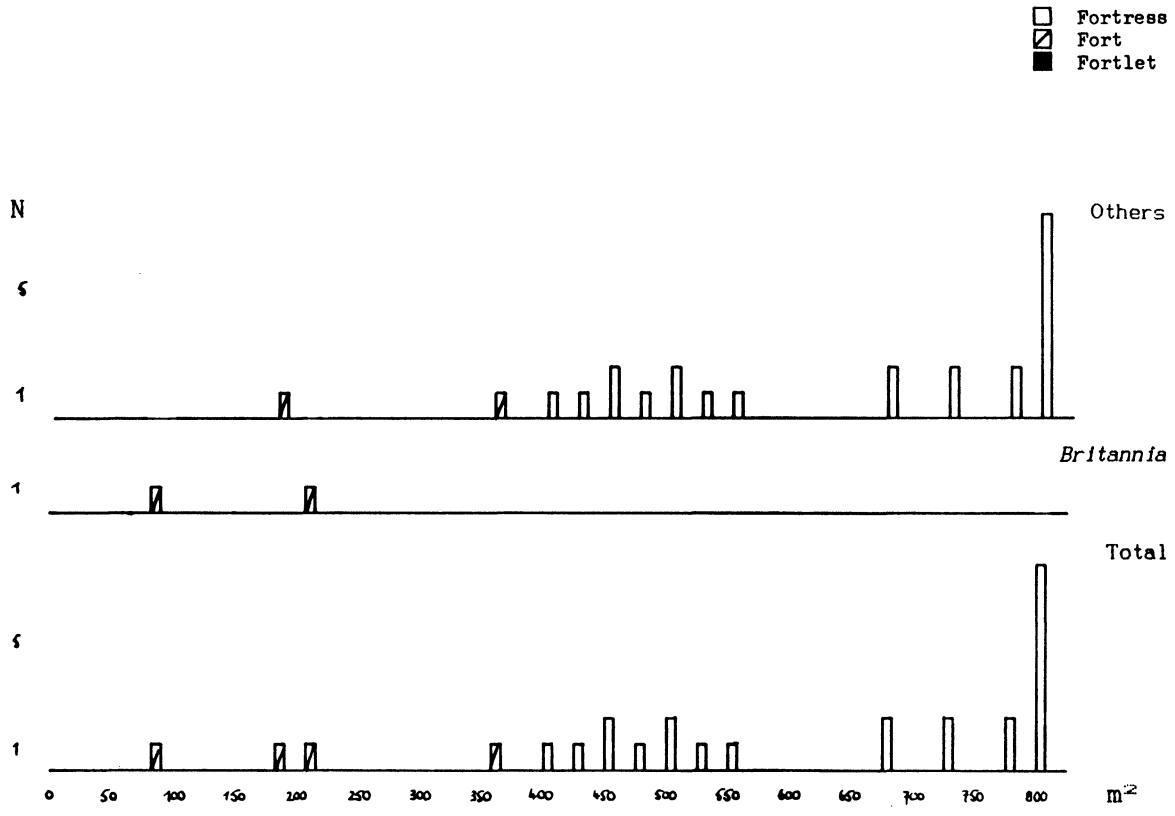


Fig 6.7 Men's Quarters: Areas - Third Century

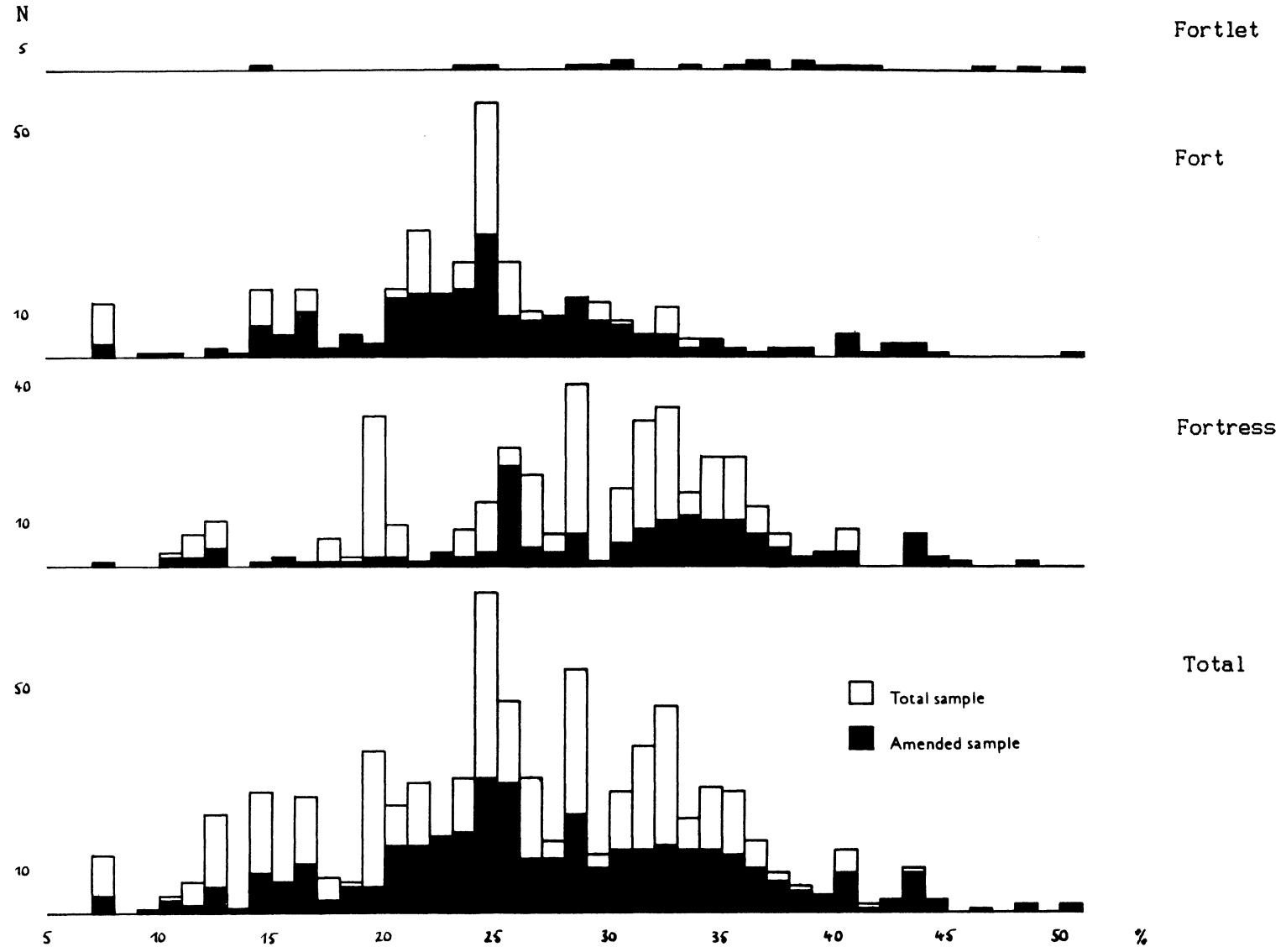


Fig 7 Length Proportions: Officers' and Men's Quarters

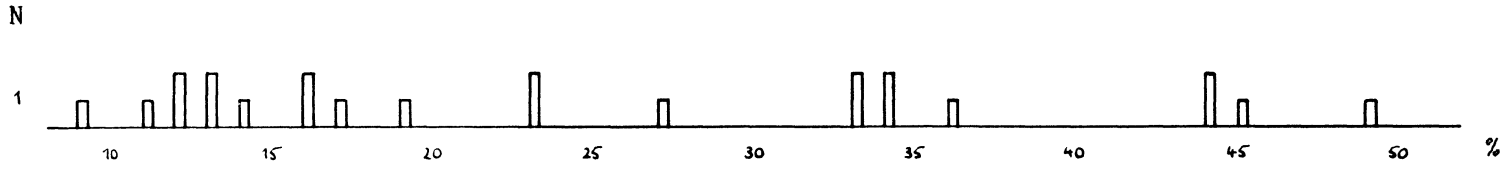


Fig 7.1 Length Proportions - Augustan/Tiberian

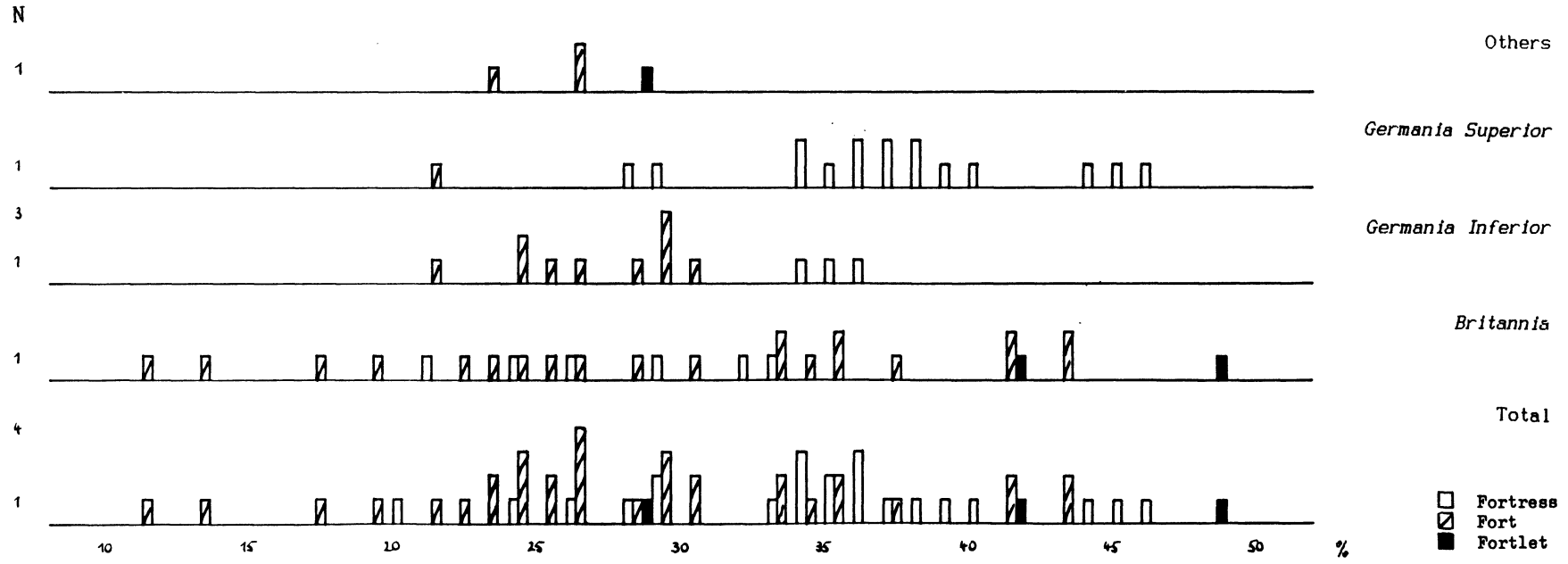


Fig 7.2 Length Proportions - Claudian/Neronian

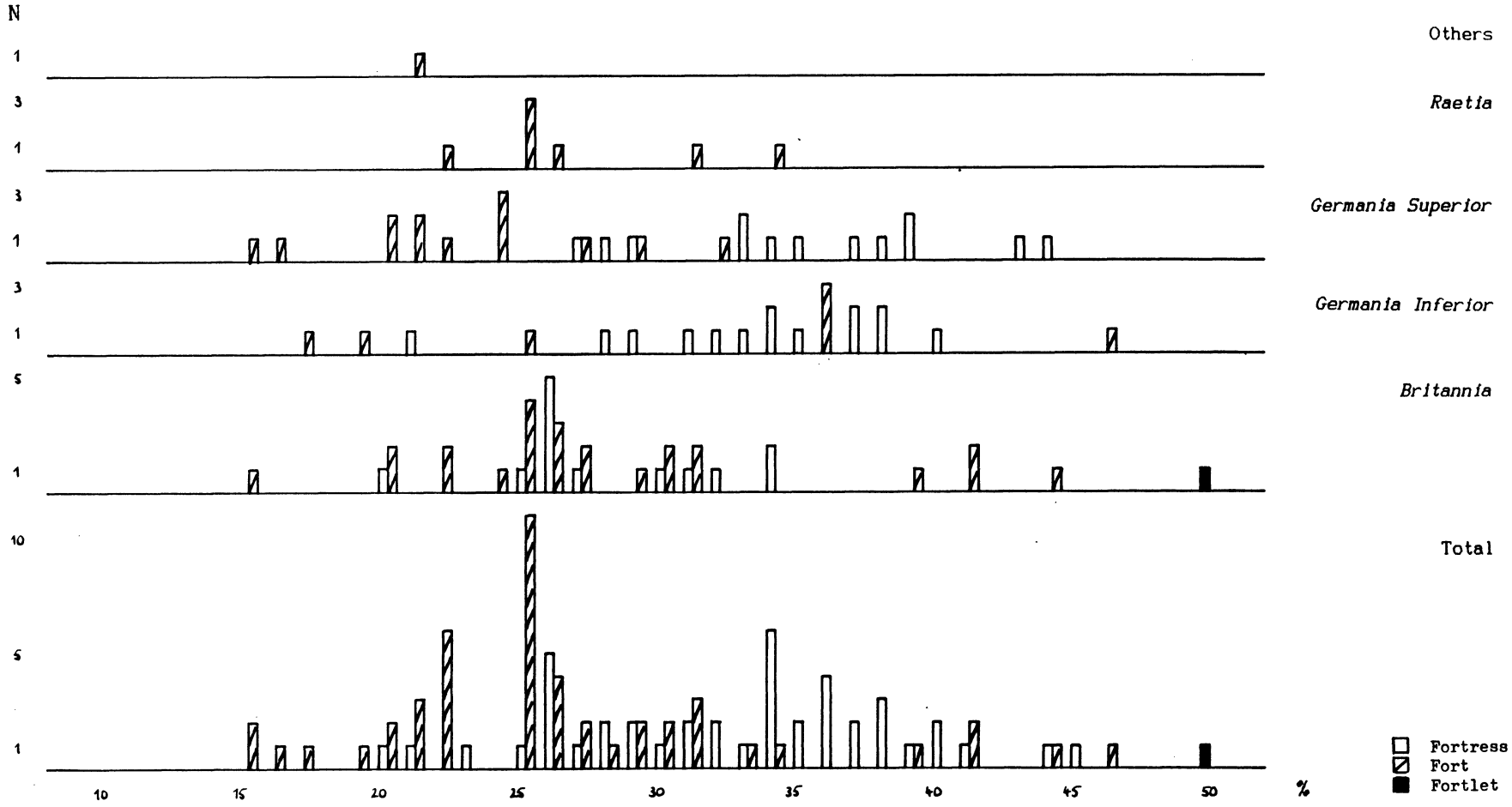


Fig 7.3 Length Proportions - Flavian

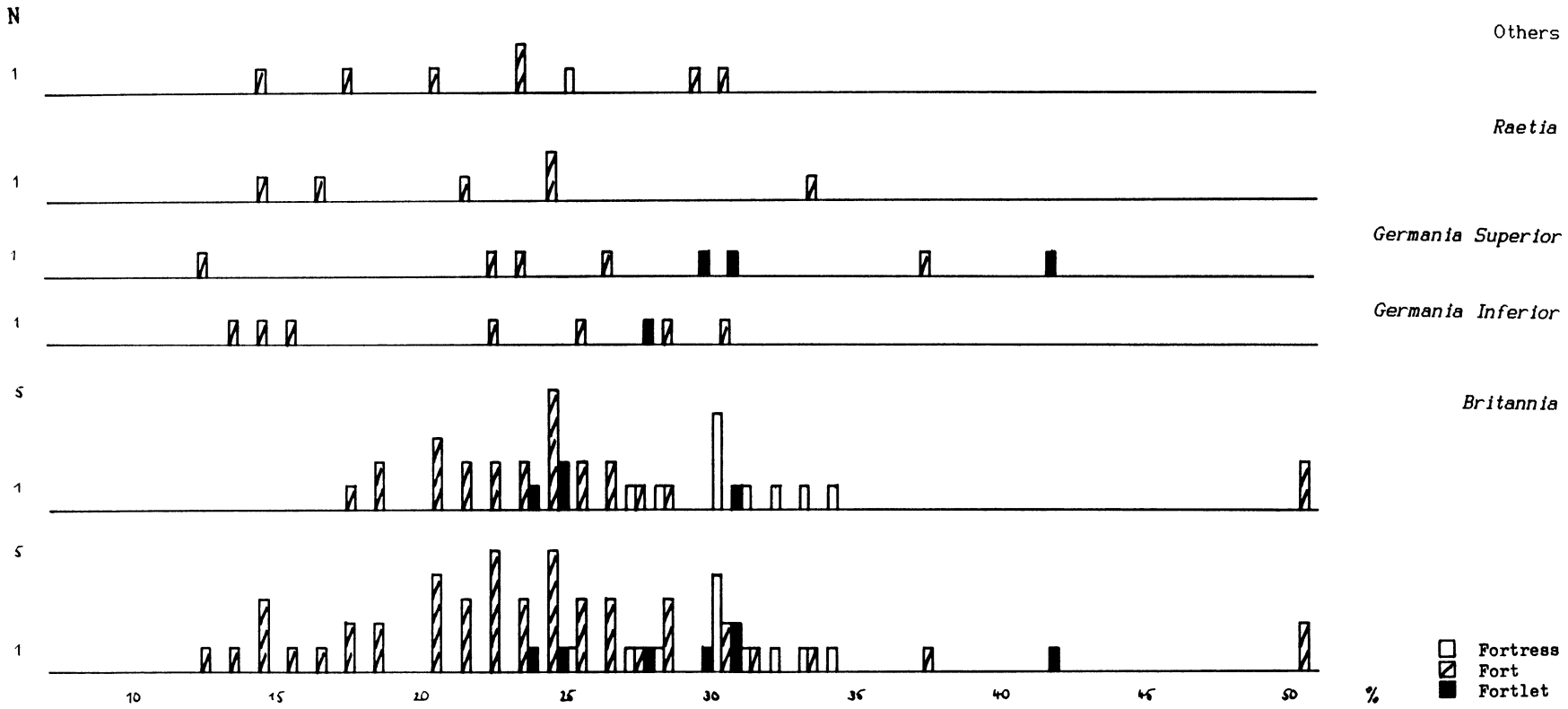


Fig 7.4 Length Proportions - Trajanic/Hadrianic

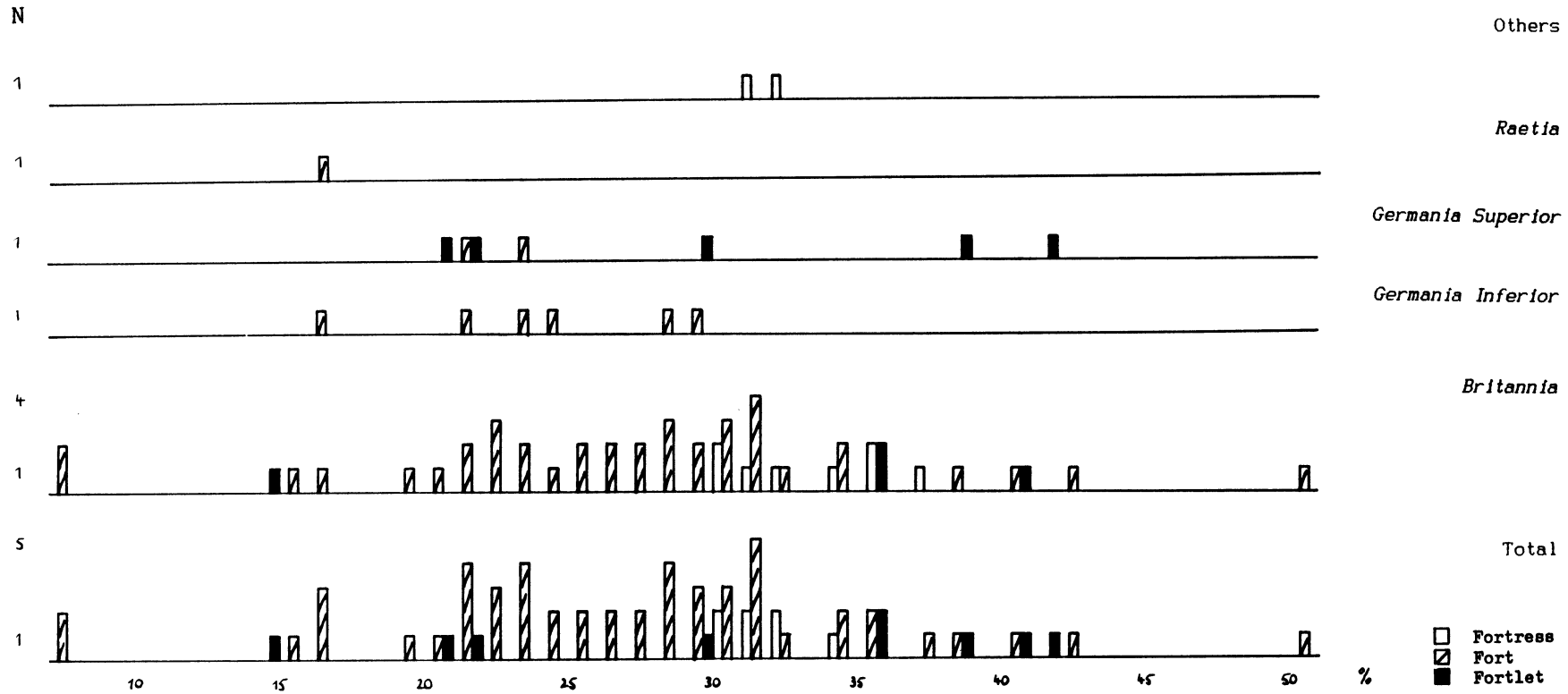


Fig 7.5 Length Proportions - Antonine

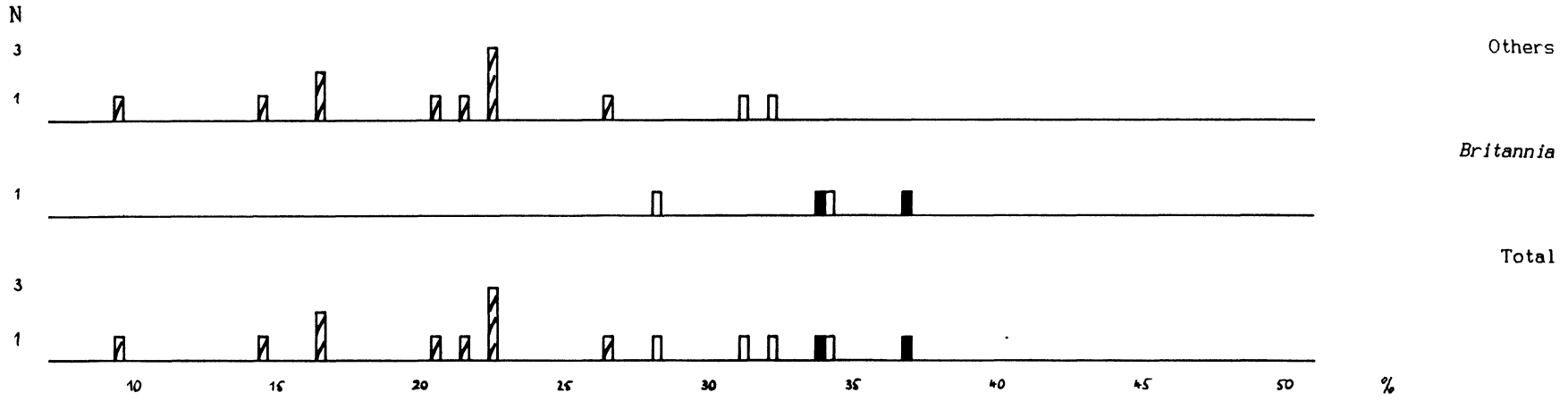


Fig 7.6 Length Proportions - Severan

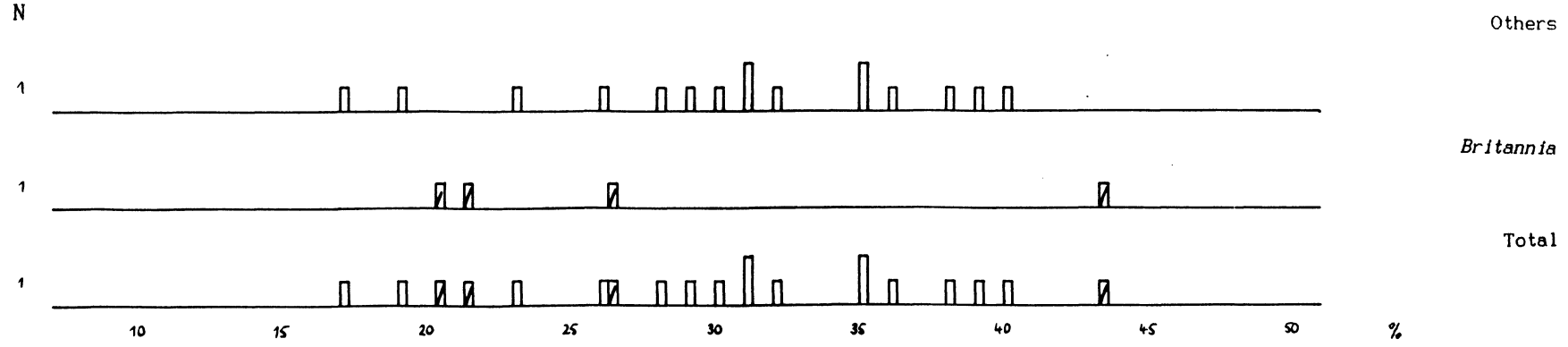


Fig 7.7 Length Proportions - Third Century

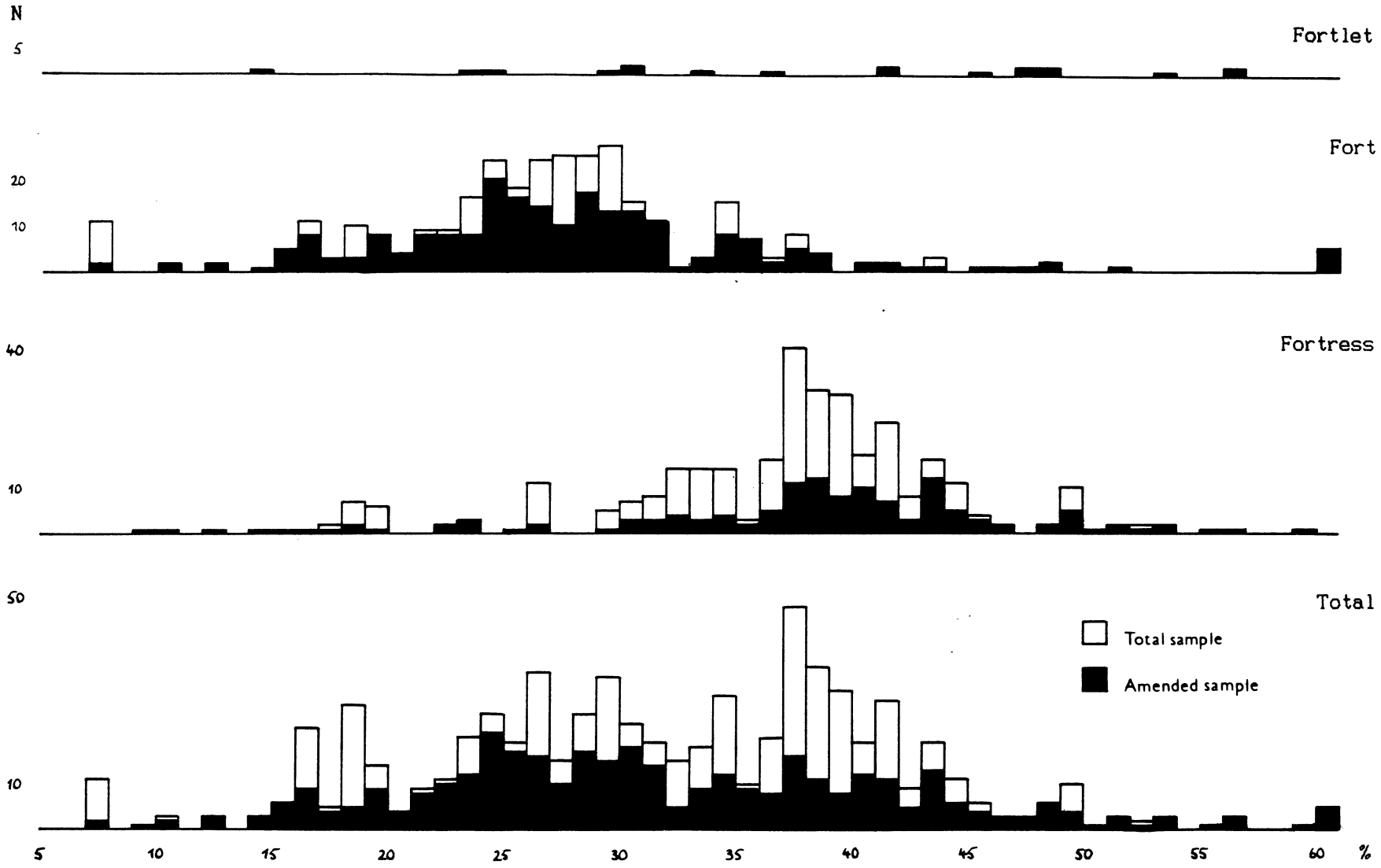


Fig 8 Area Proportions: Officers' and Men's Quarters

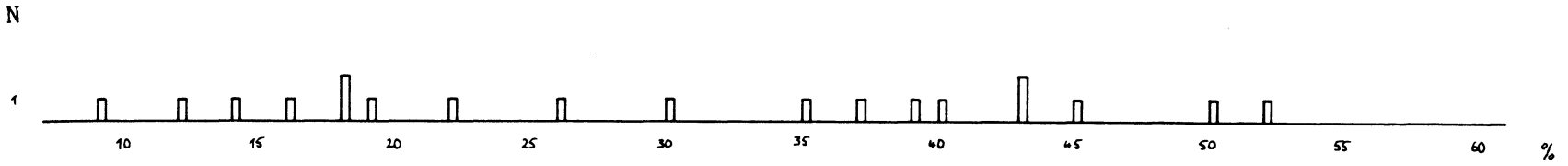


Fig 8.1 Area Proportions - Augustan/Tiberian

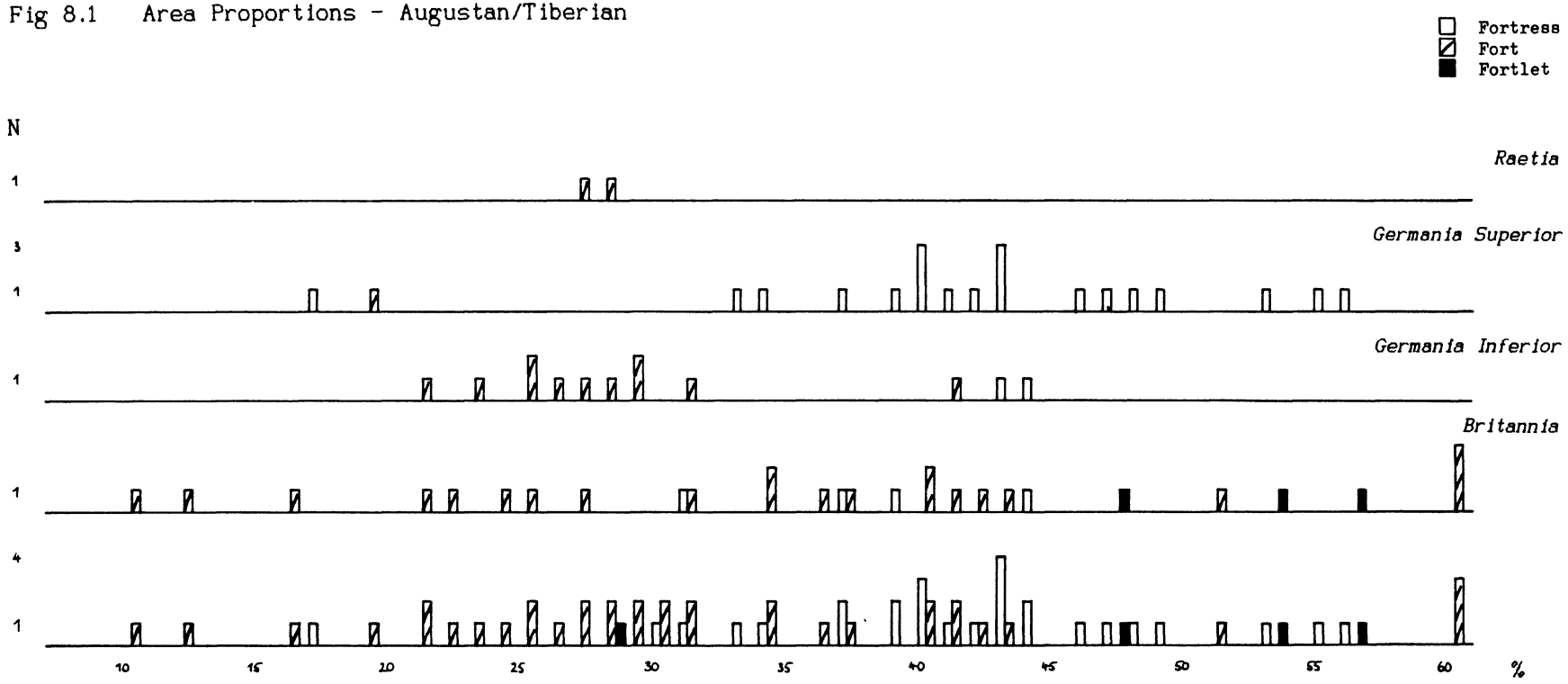


Fig 8.2 Area Proportions - Claudian/Neronian

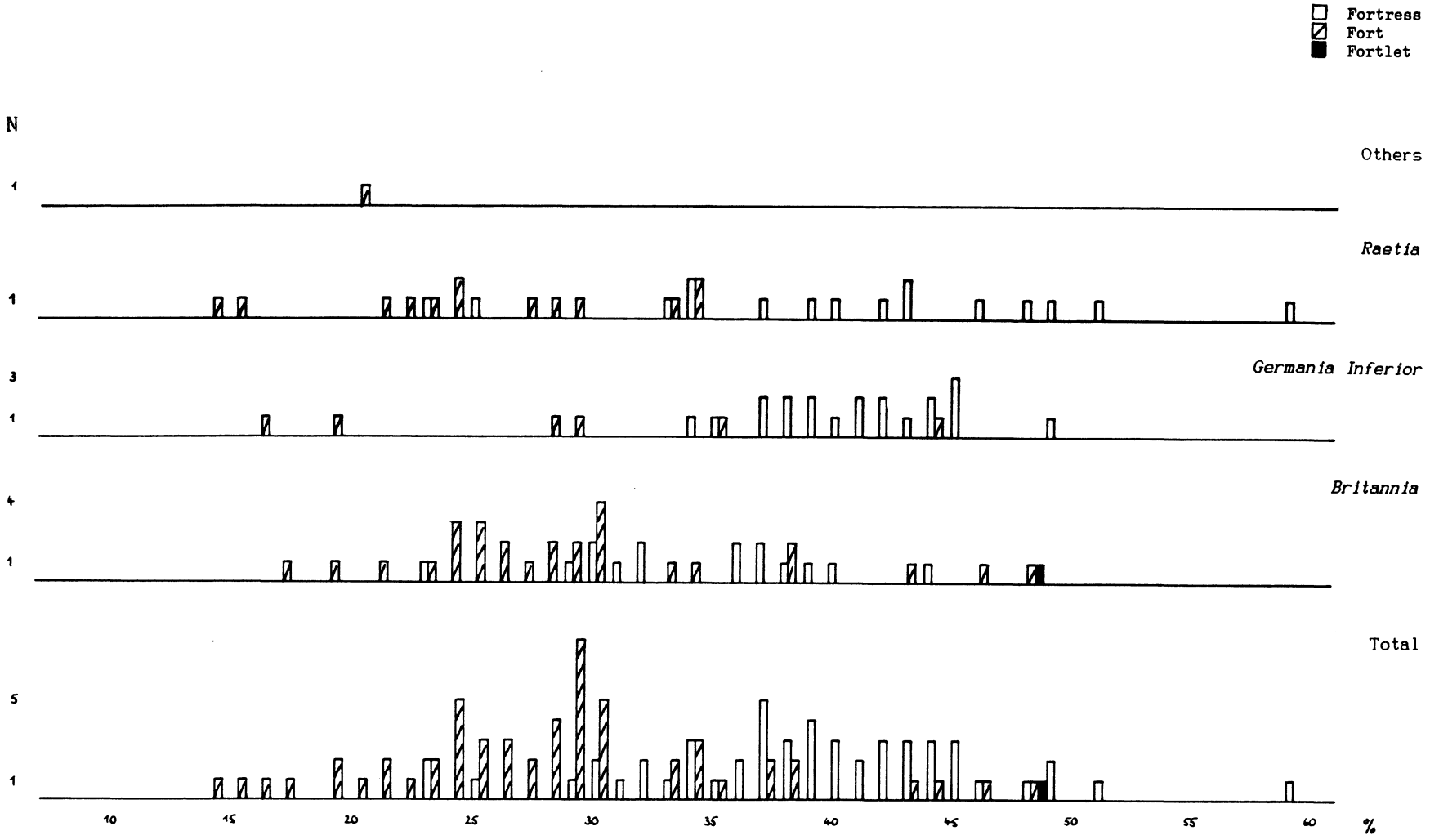


Fig 8.3 Area Proportions - Flavian

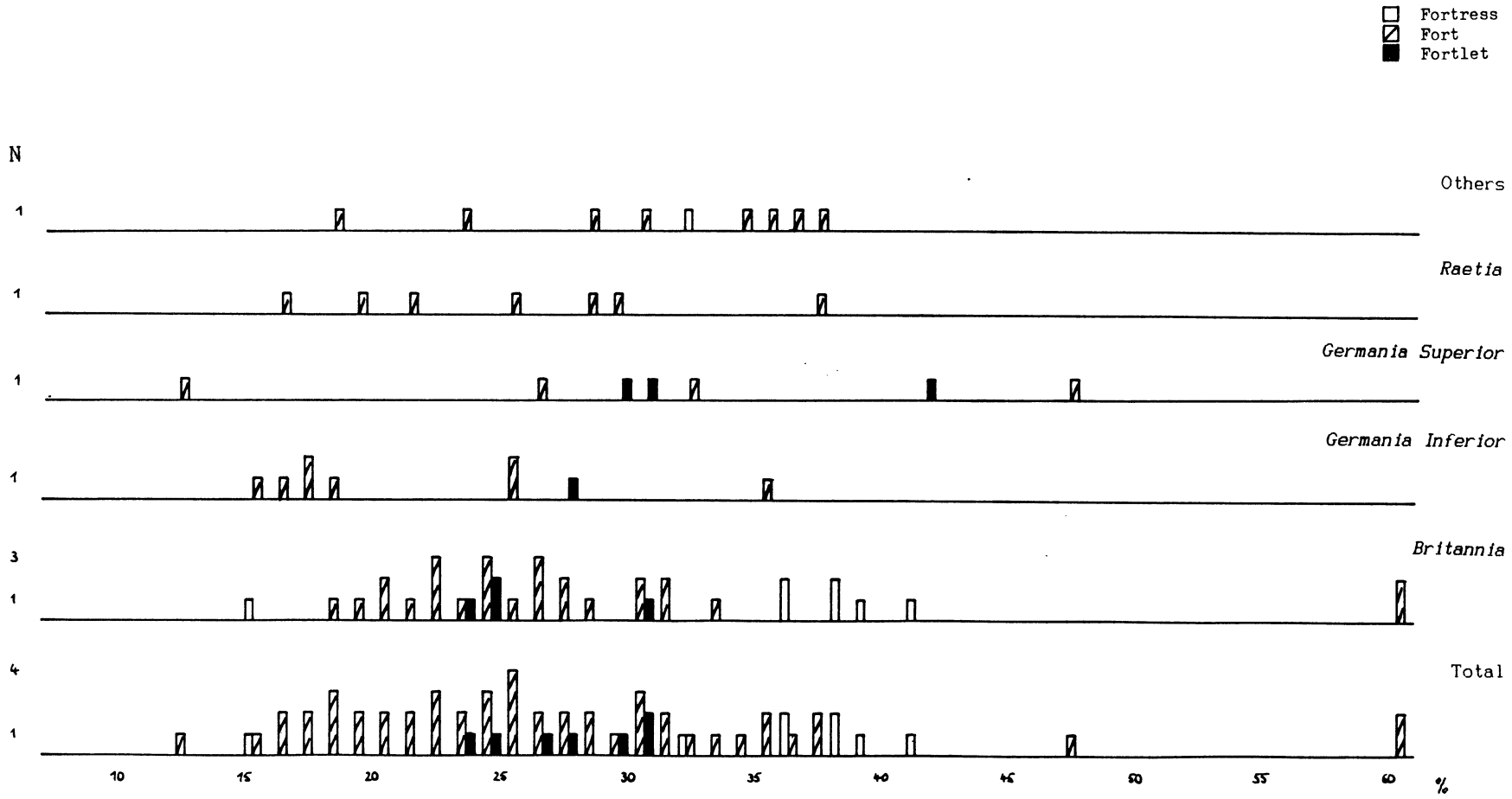


Fig 8.4 Area Proportions - Trajanic/Hadrianic

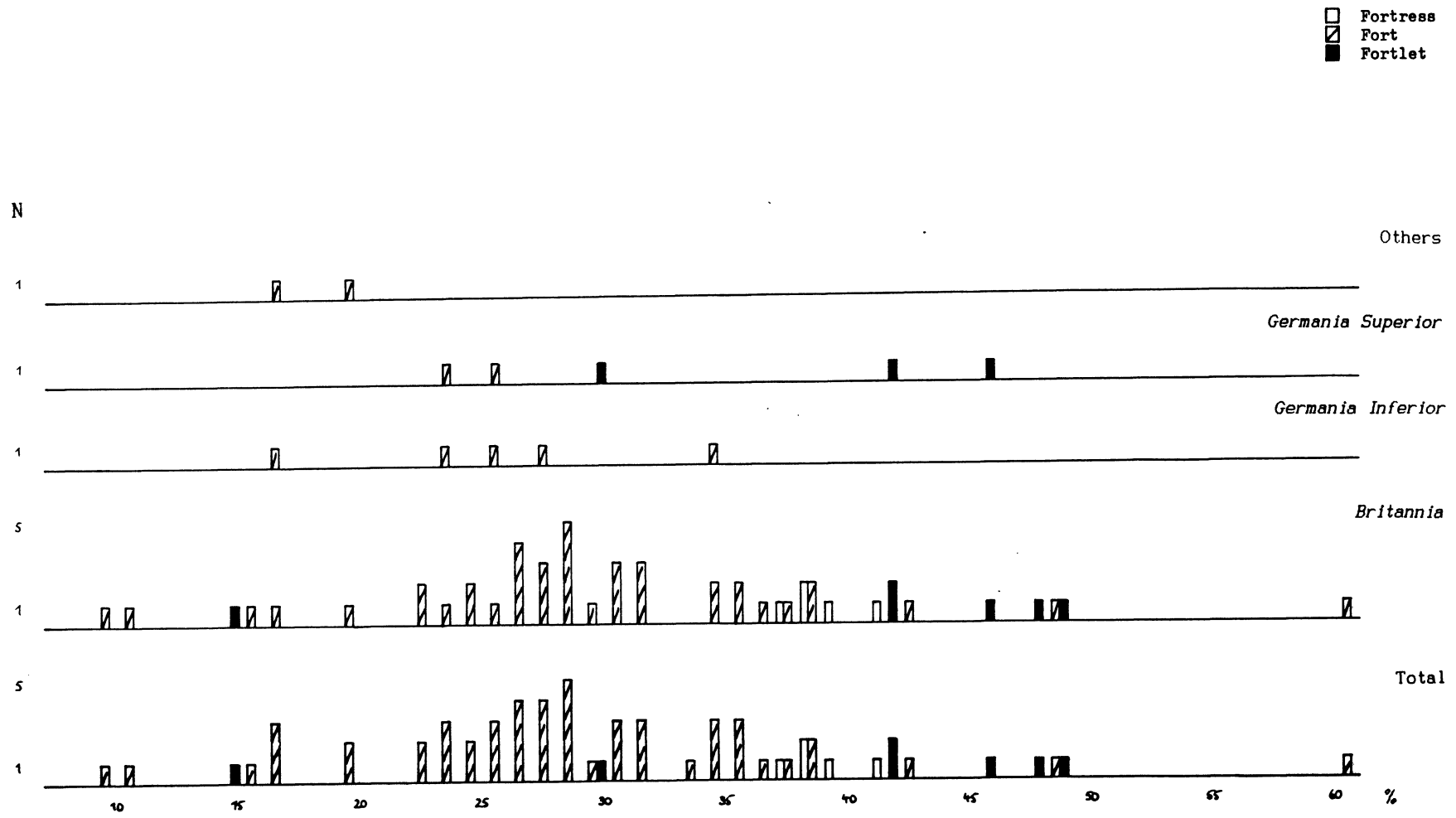


Fig 8.5 Area Proportions - Antonine

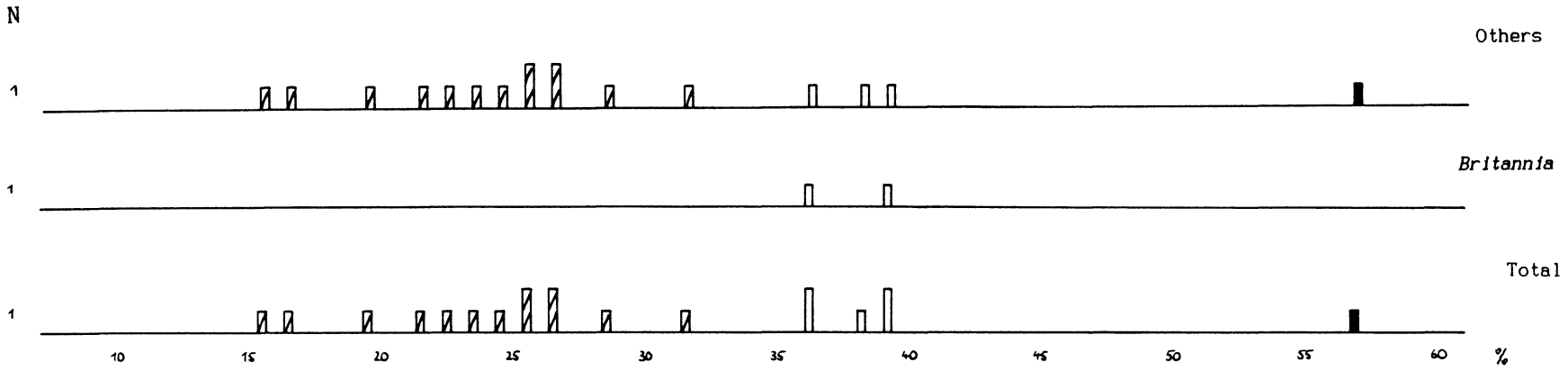
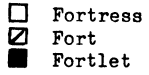


Fig 8.6 Area Proportions - Severan



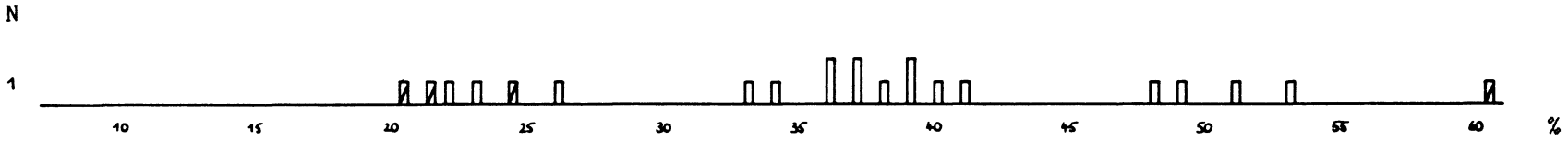


Fig 8.7 Area Proportions - Third Century

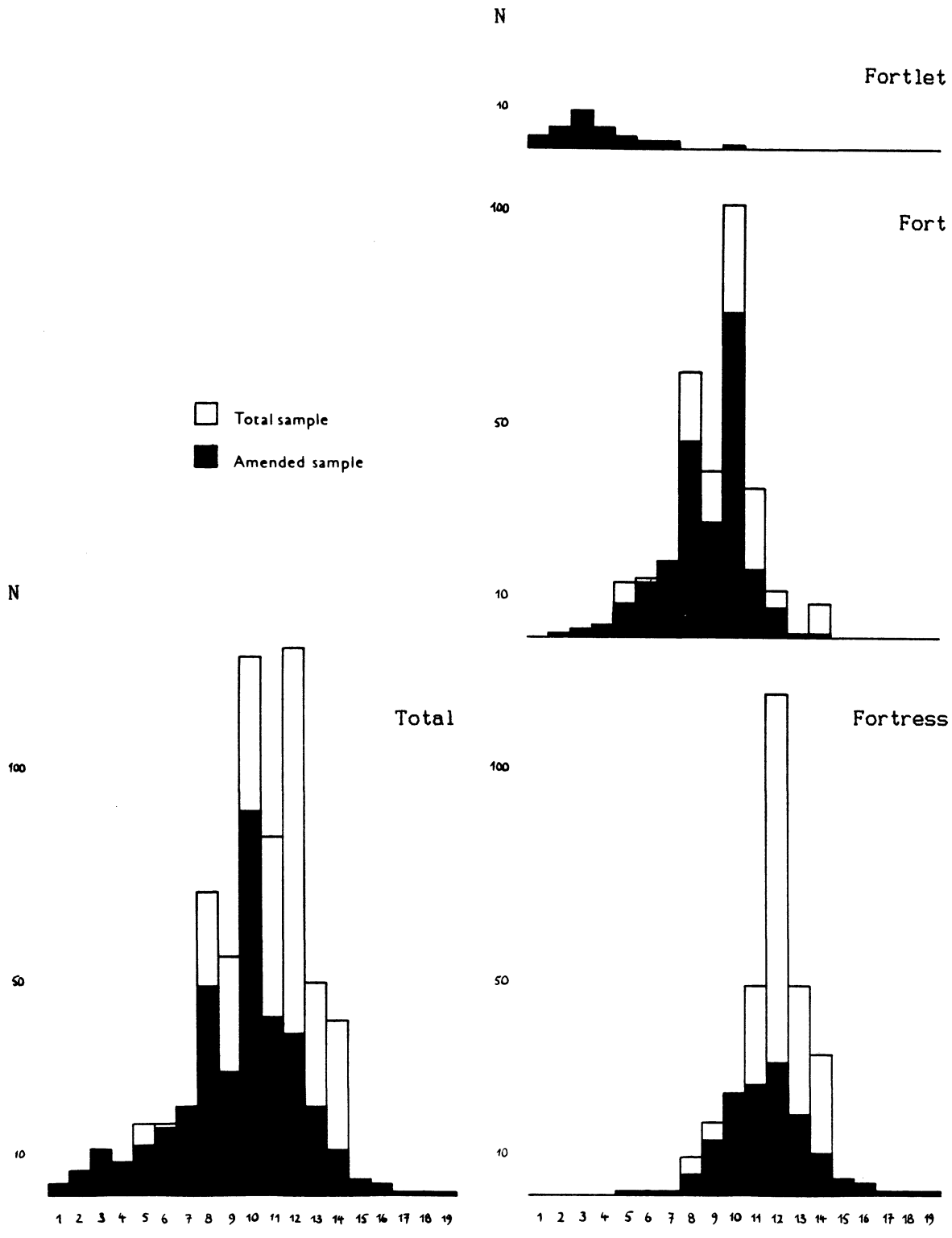


Fig 9 *Contubernium* Totals

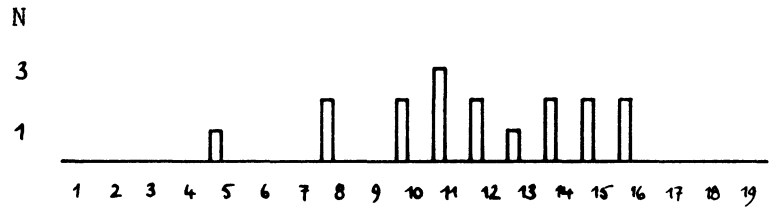


Fig 9.1 *Contubernium* Totals - Augustan/Tiberian

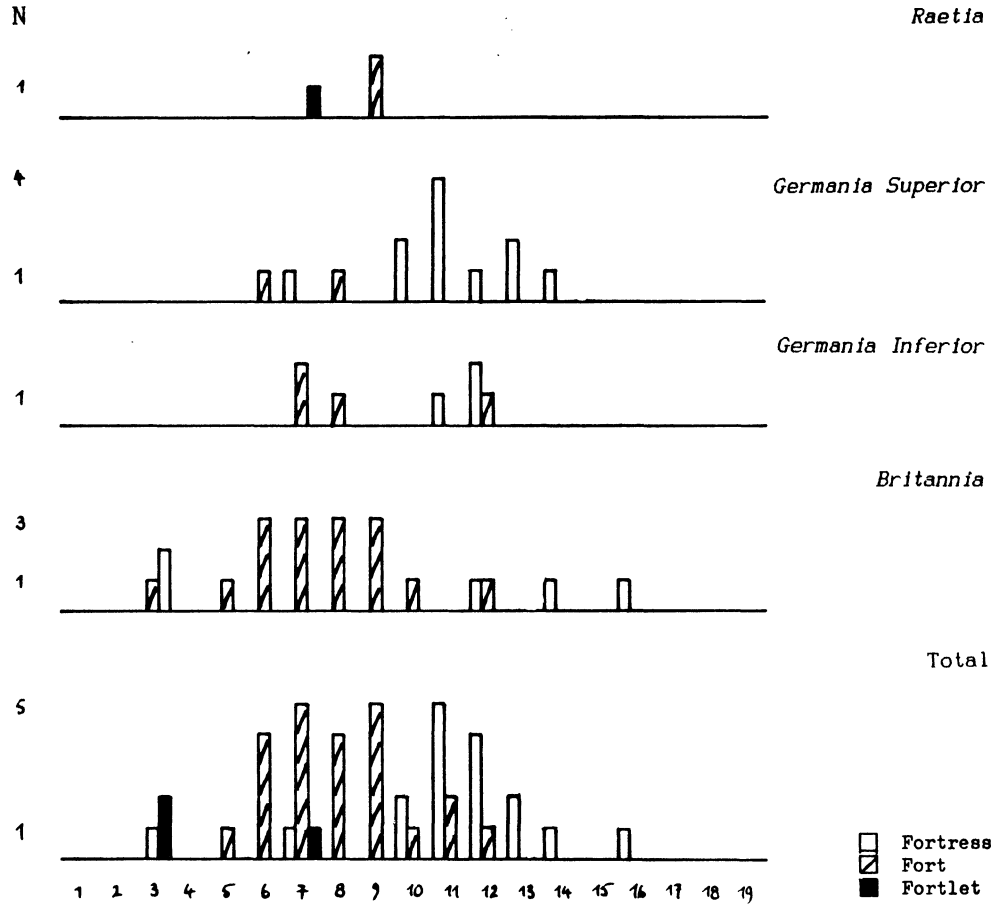


Fig 9.2 *Contubernium* Totals - Claudian/Neronian

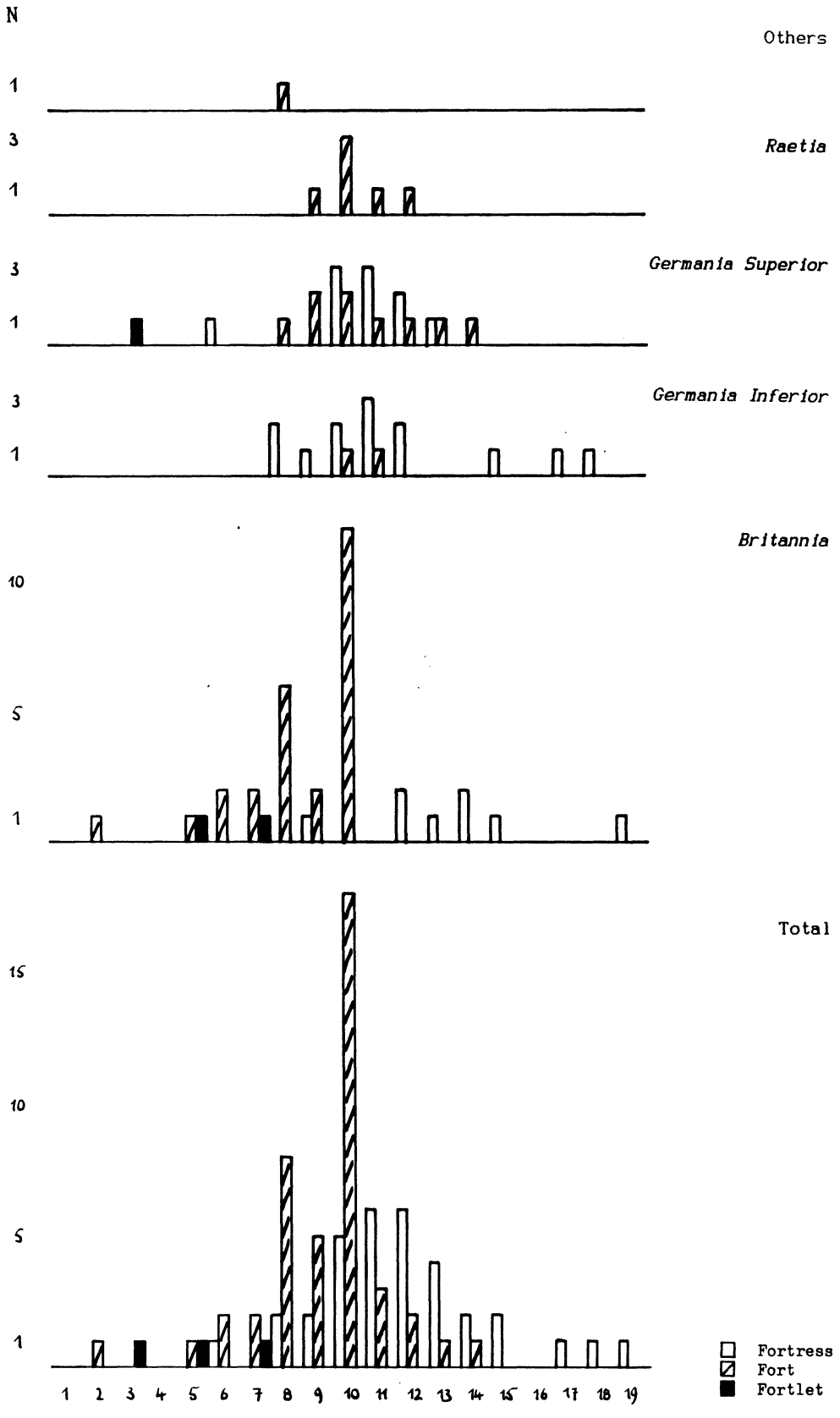


Fig 9.3 *Contubernium* Totals - Flavian

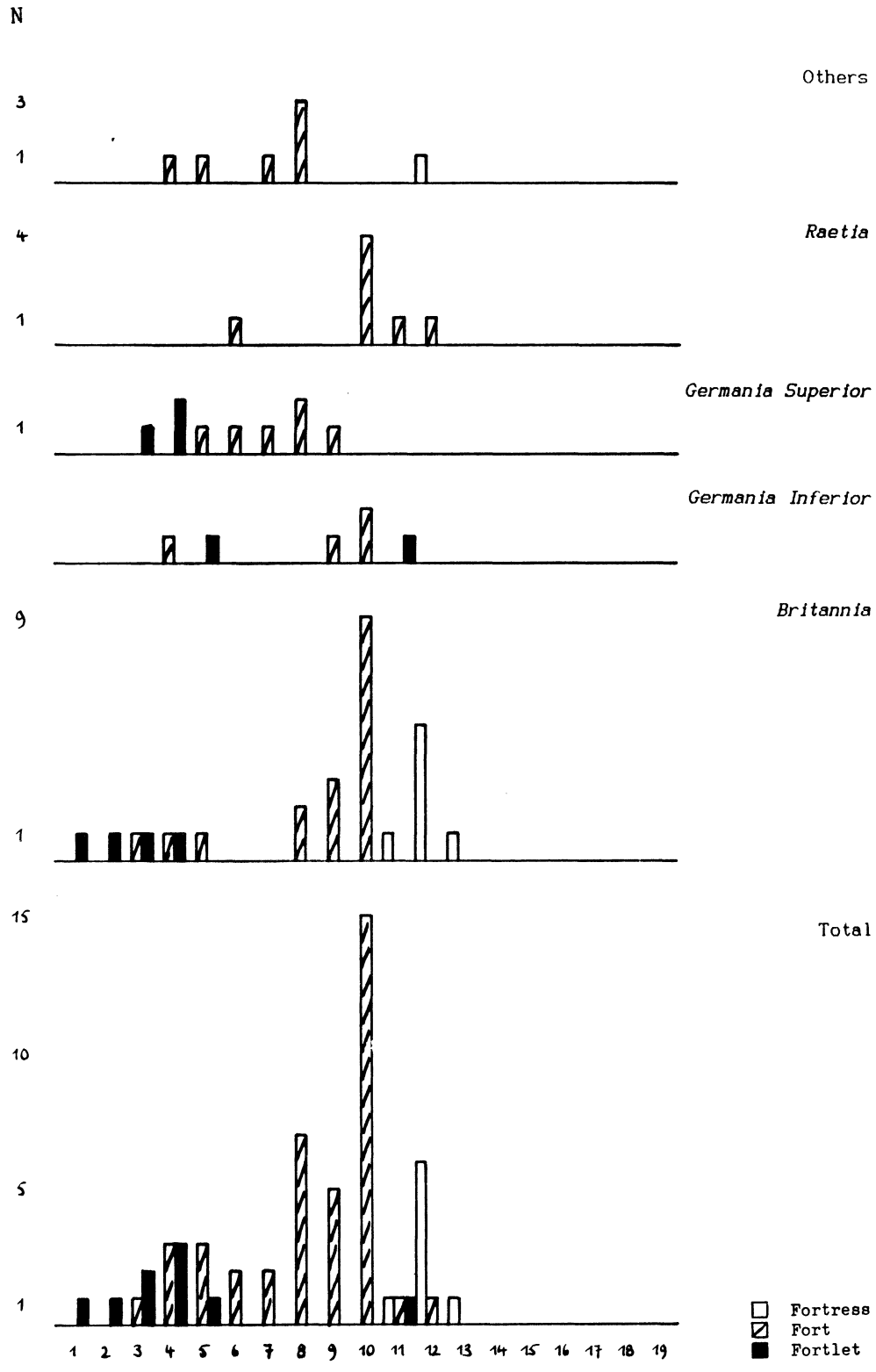


Fig 9.4 *Contubernium* Totals - Trajanic/Hadrianic

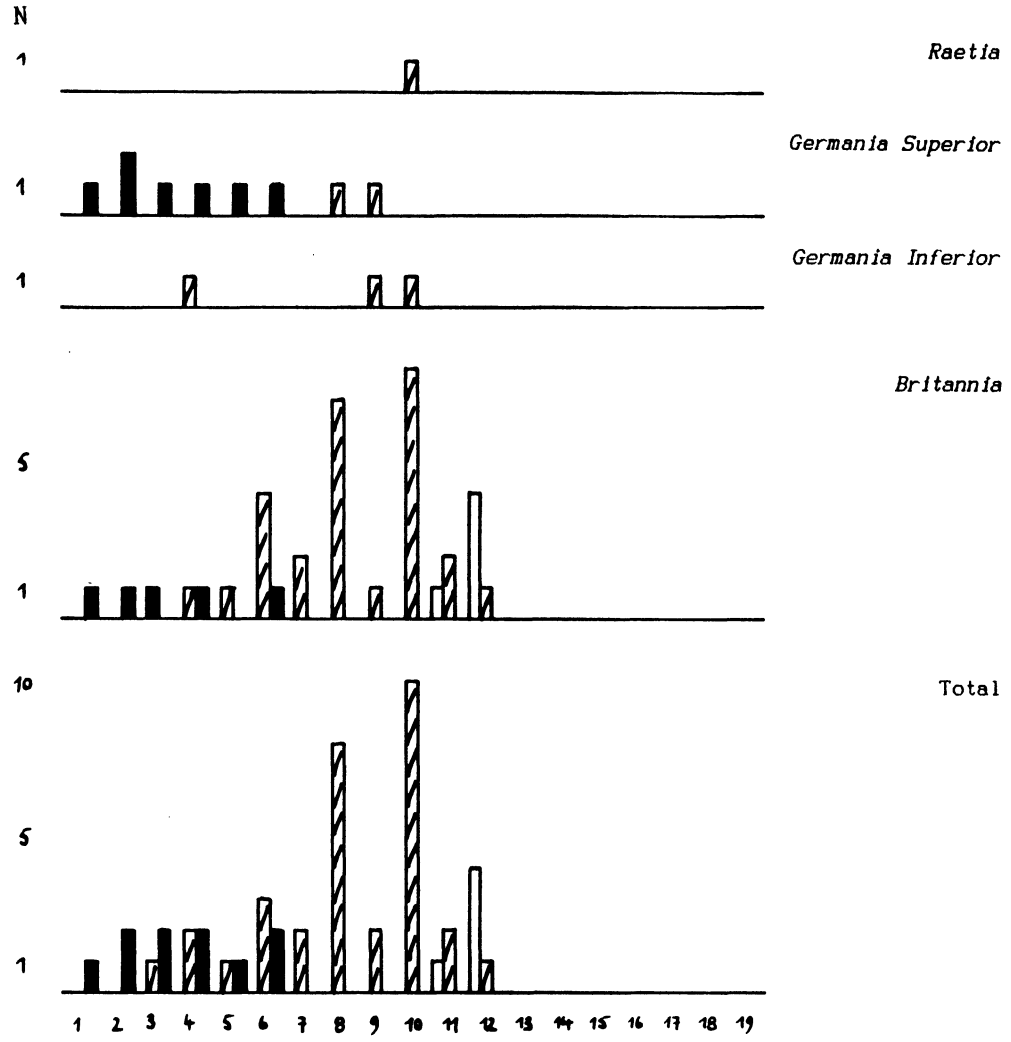


Fig 9.5 *Contubernium* Totals - Antonine

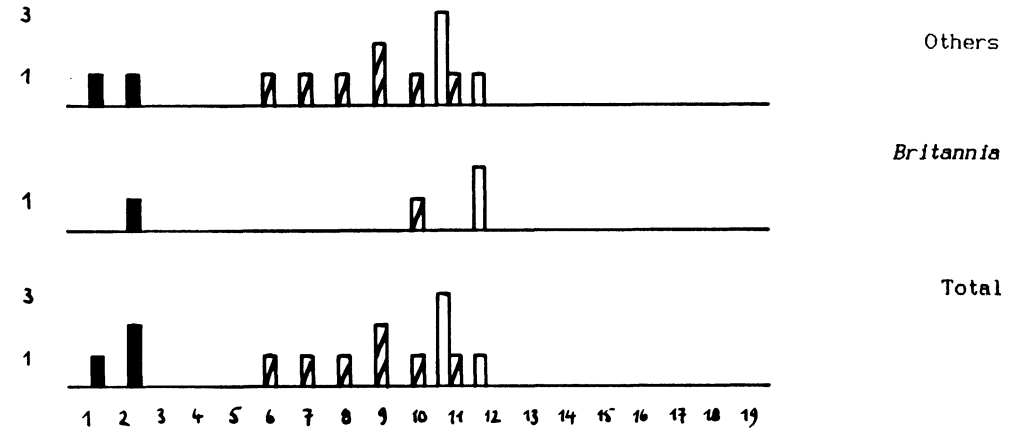


Fig 9.6 *Contubernium* Totals - Severan

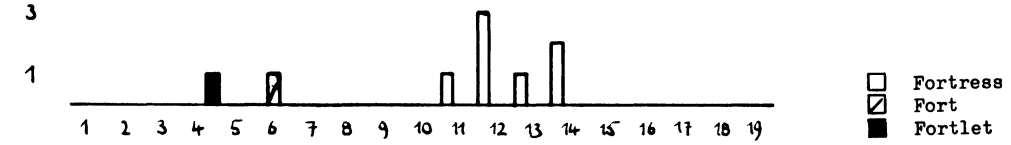


Fig 9.7 *Contubernium* Totals - Third Century

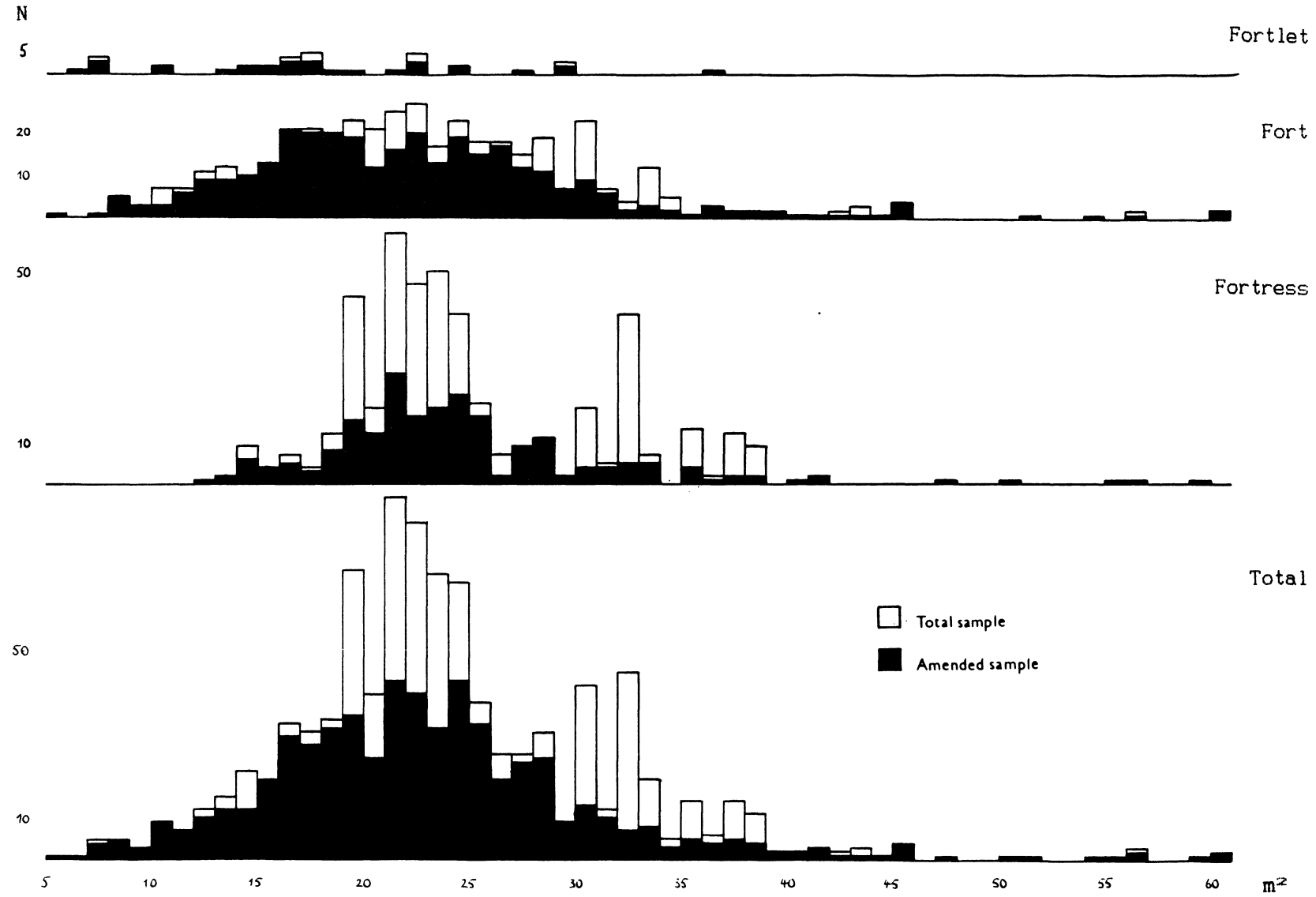


Fig 10 *Contubernium* Areas

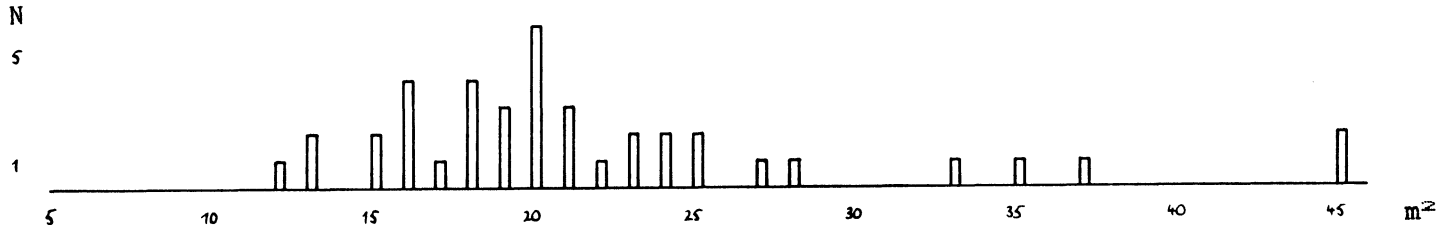


Fig 10.1 *Contubernium* Areas - Augustan/Tiberian

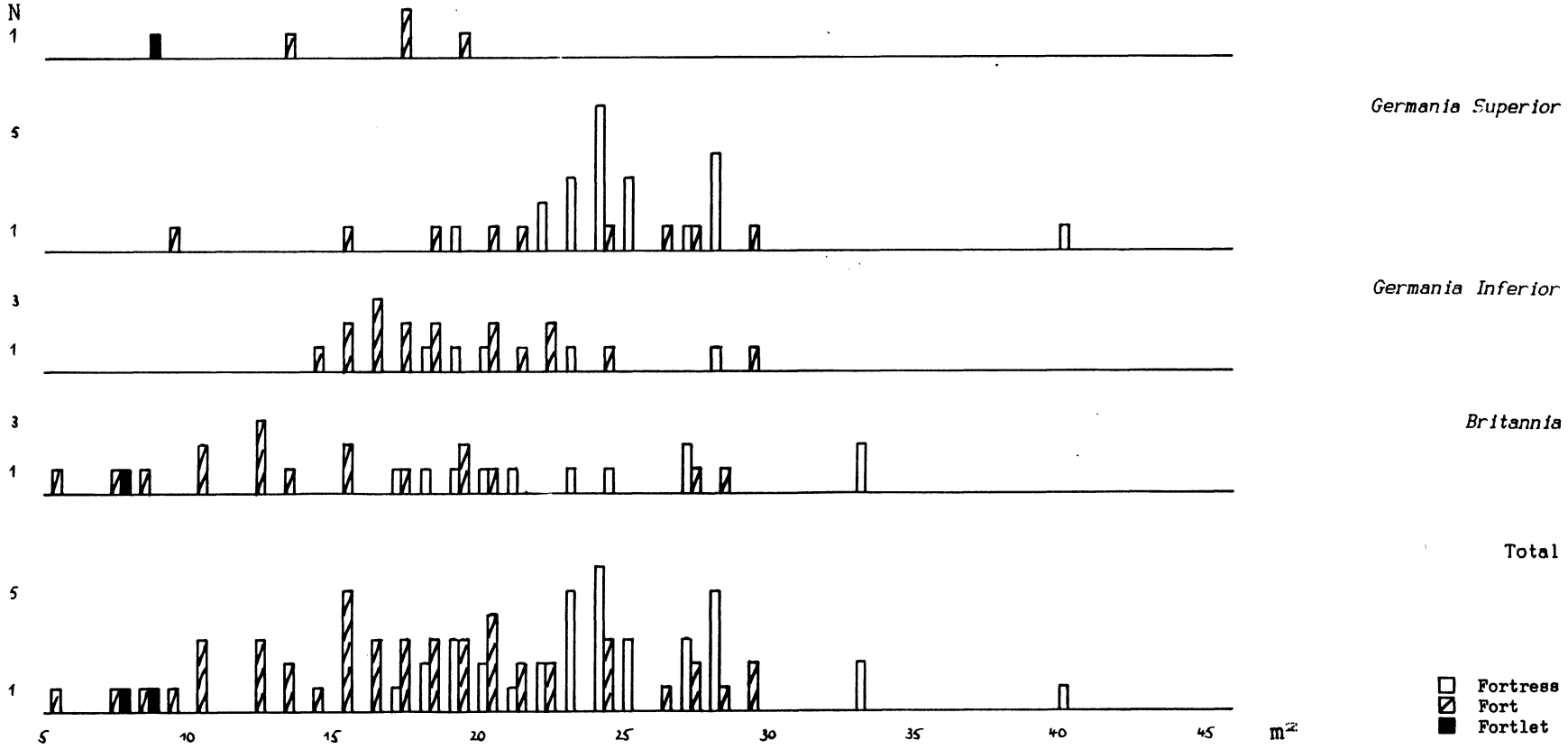


Fig 10.2 *Contubernium* Areas - Claudian/Neronian

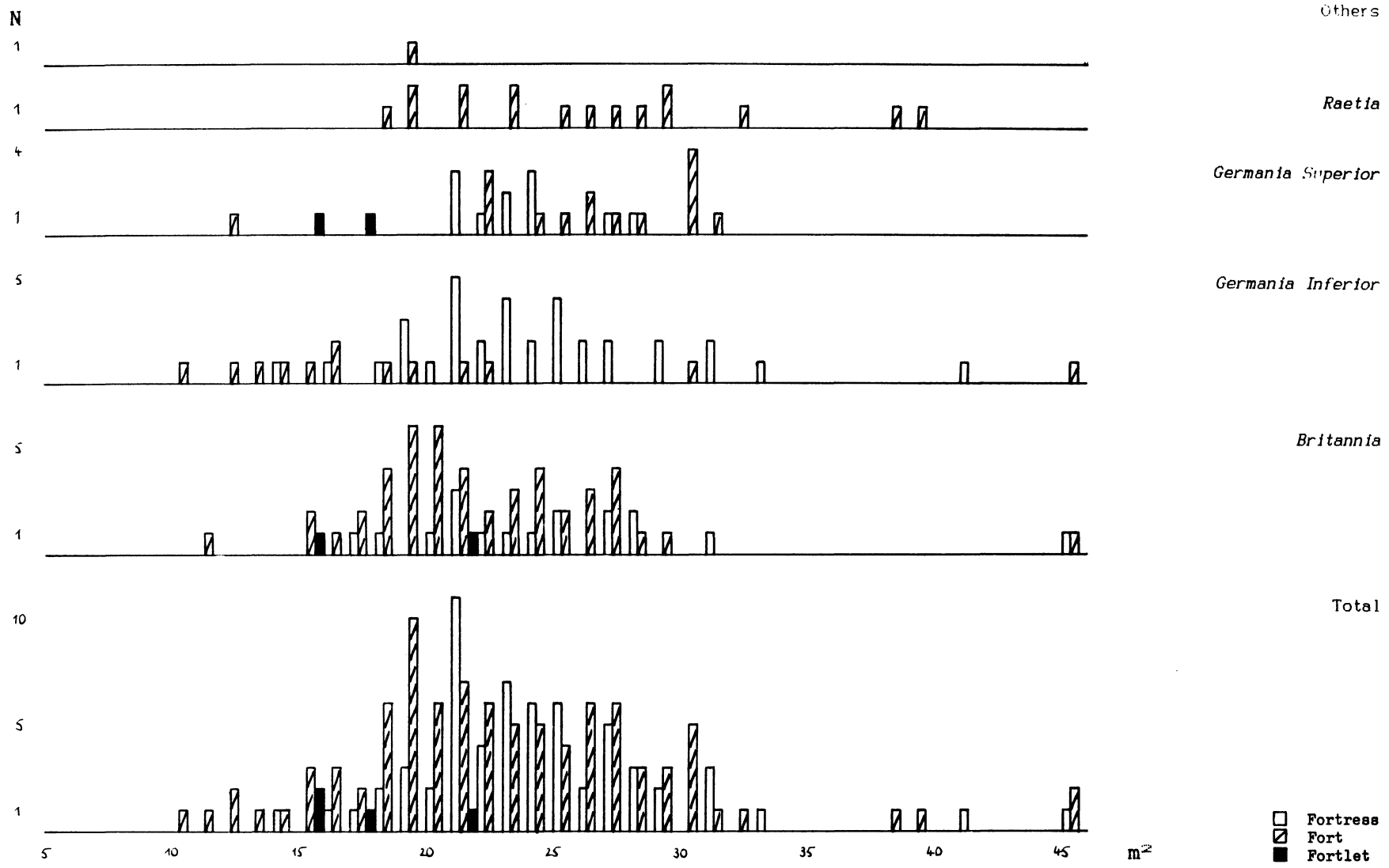


Fig 10.3 *Contubernium* Areas - Flavian

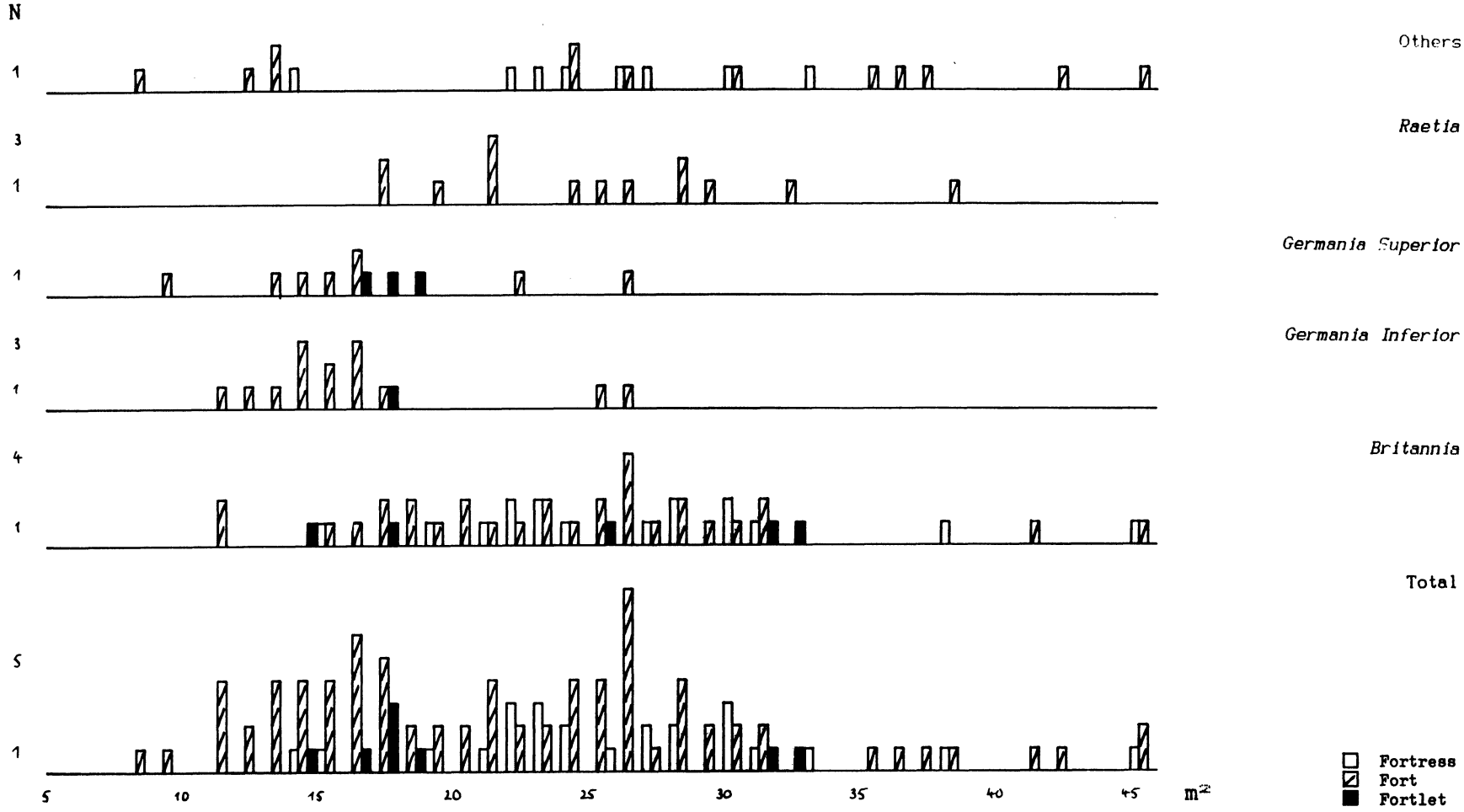


Fig 10.4 *Contubernium* Areas - Trajanic/Hadrianic

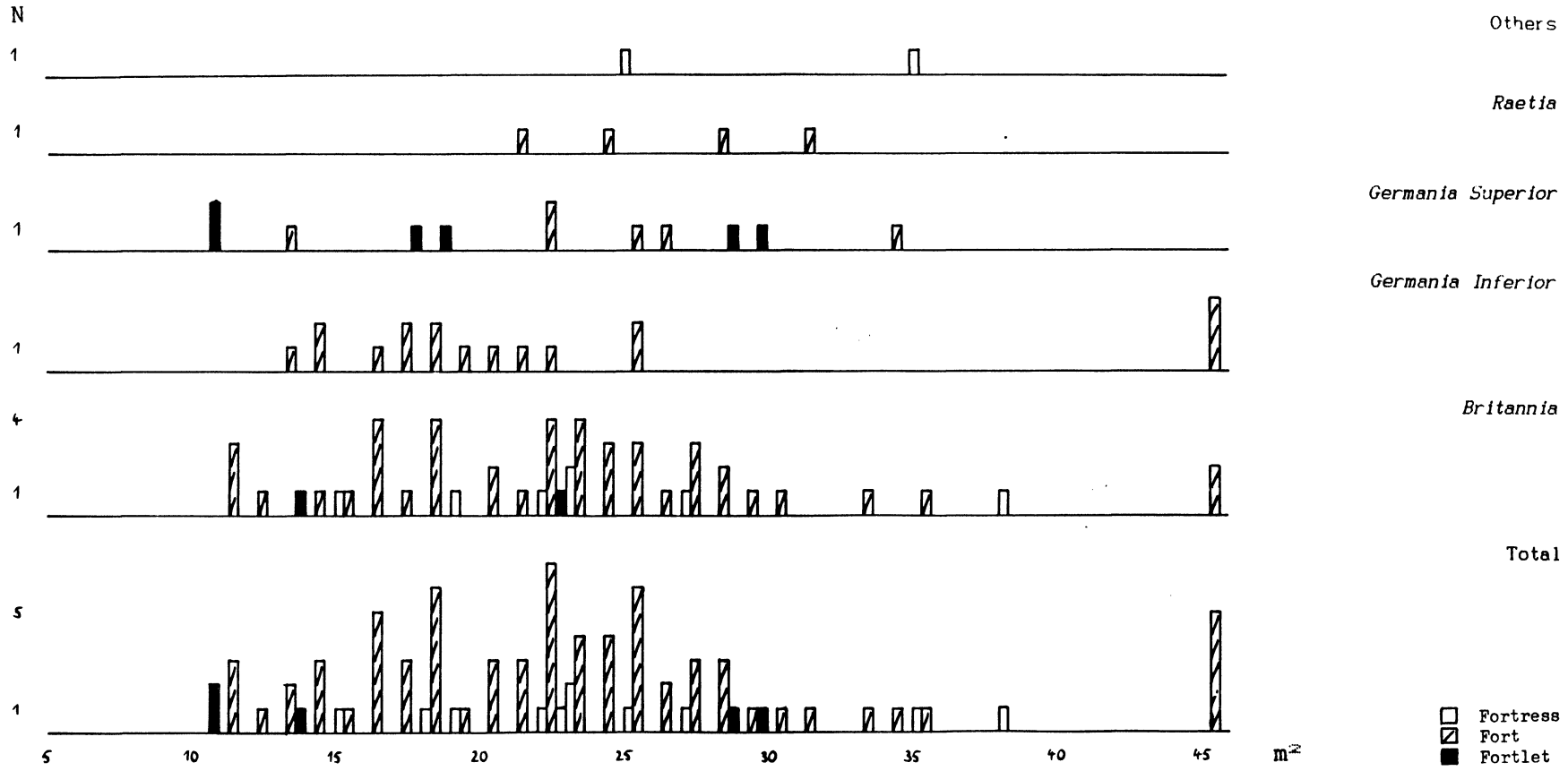


Fig 10.5 *Contubernium* Areas - Antonine

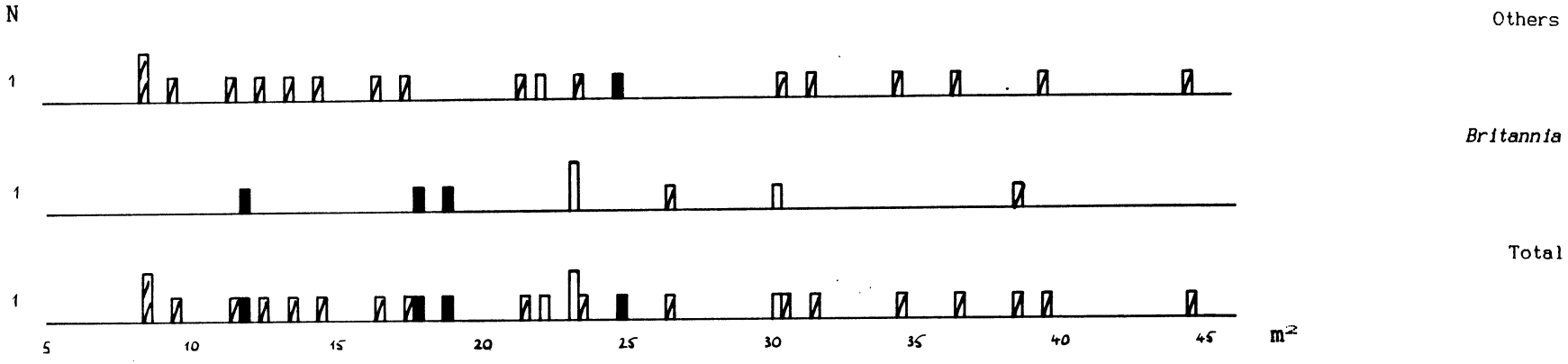


Fig 10.6 *Contubernium* Areas - Severan

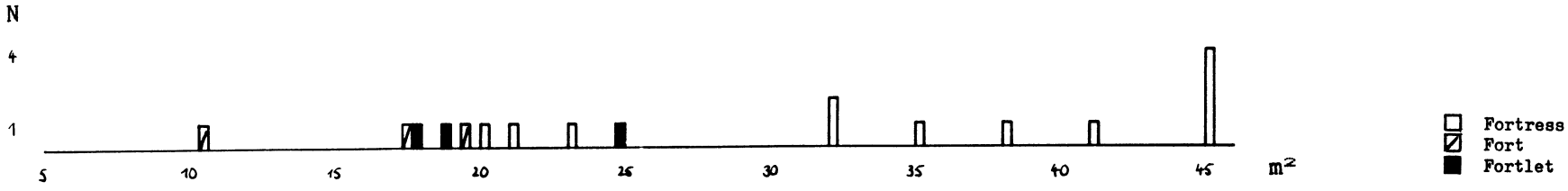


Fig 10.7 *Contubernium* Areas - Third Century

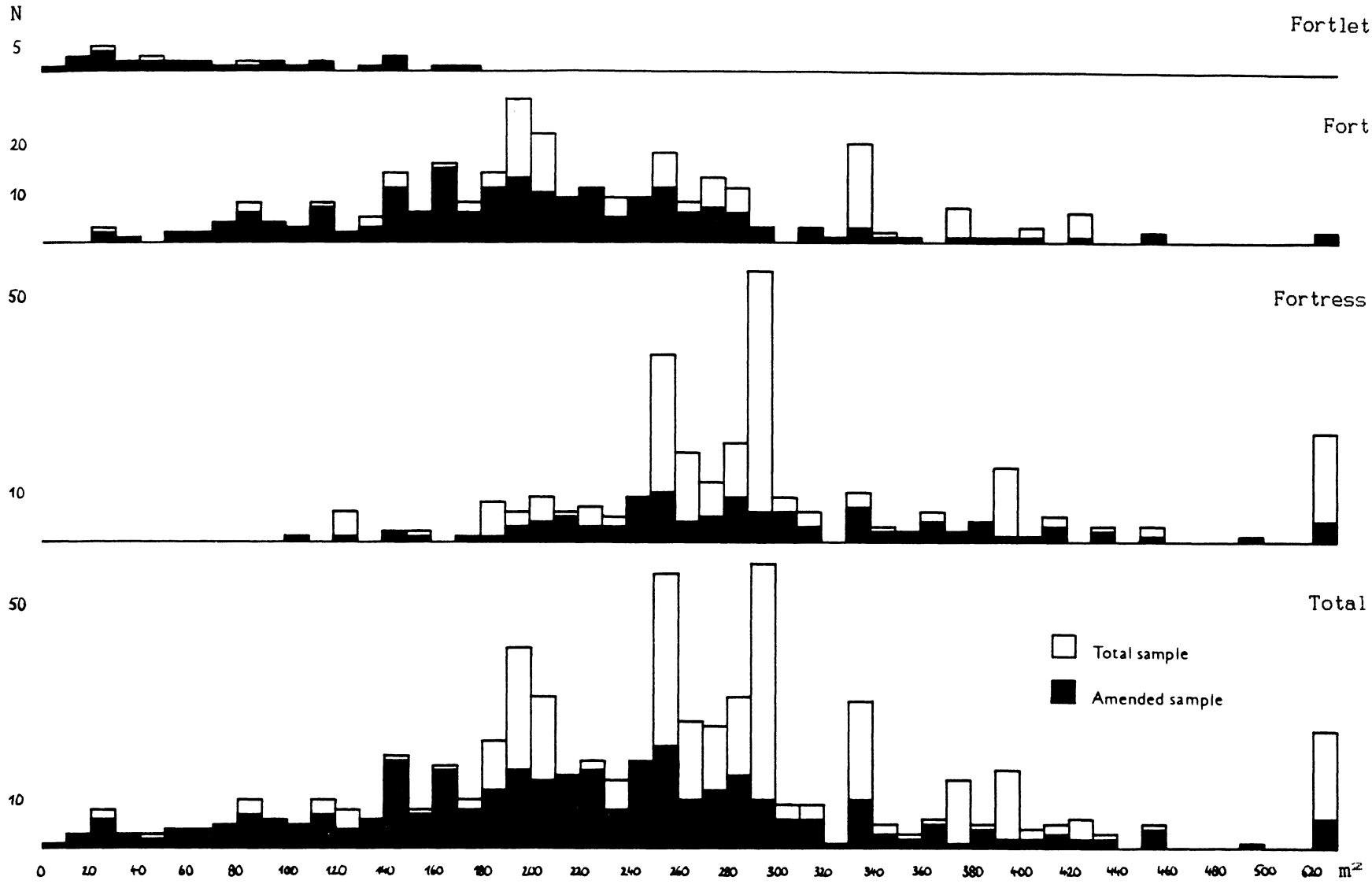


Fig 11 Total Living Space (Men's Quarters)

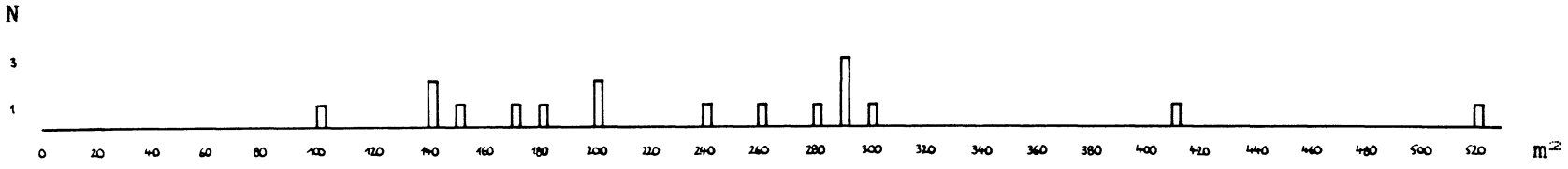


Fig 11.1 Total Living Space - Augustan/Tiberian

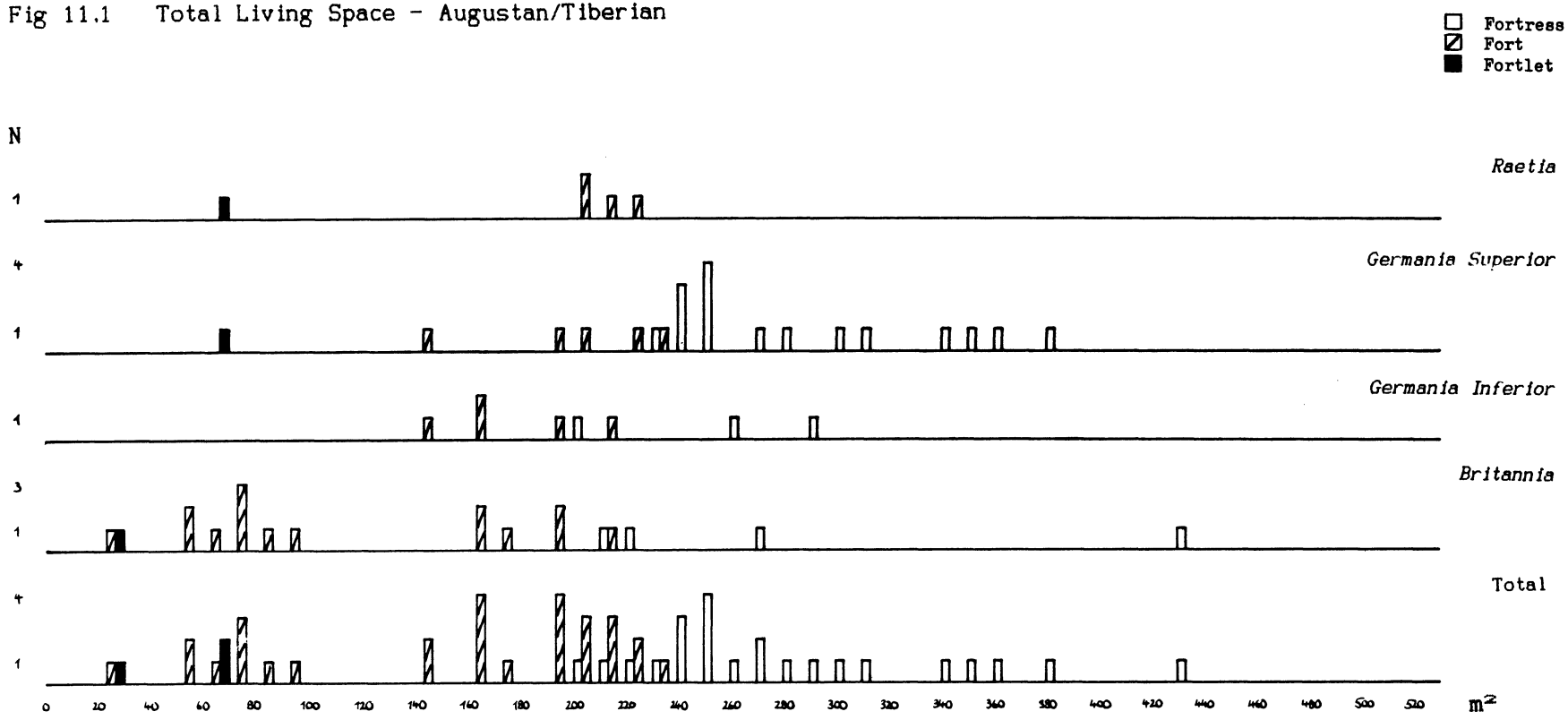


Fig 11.2 Total Living Space - Claudian/Neronian

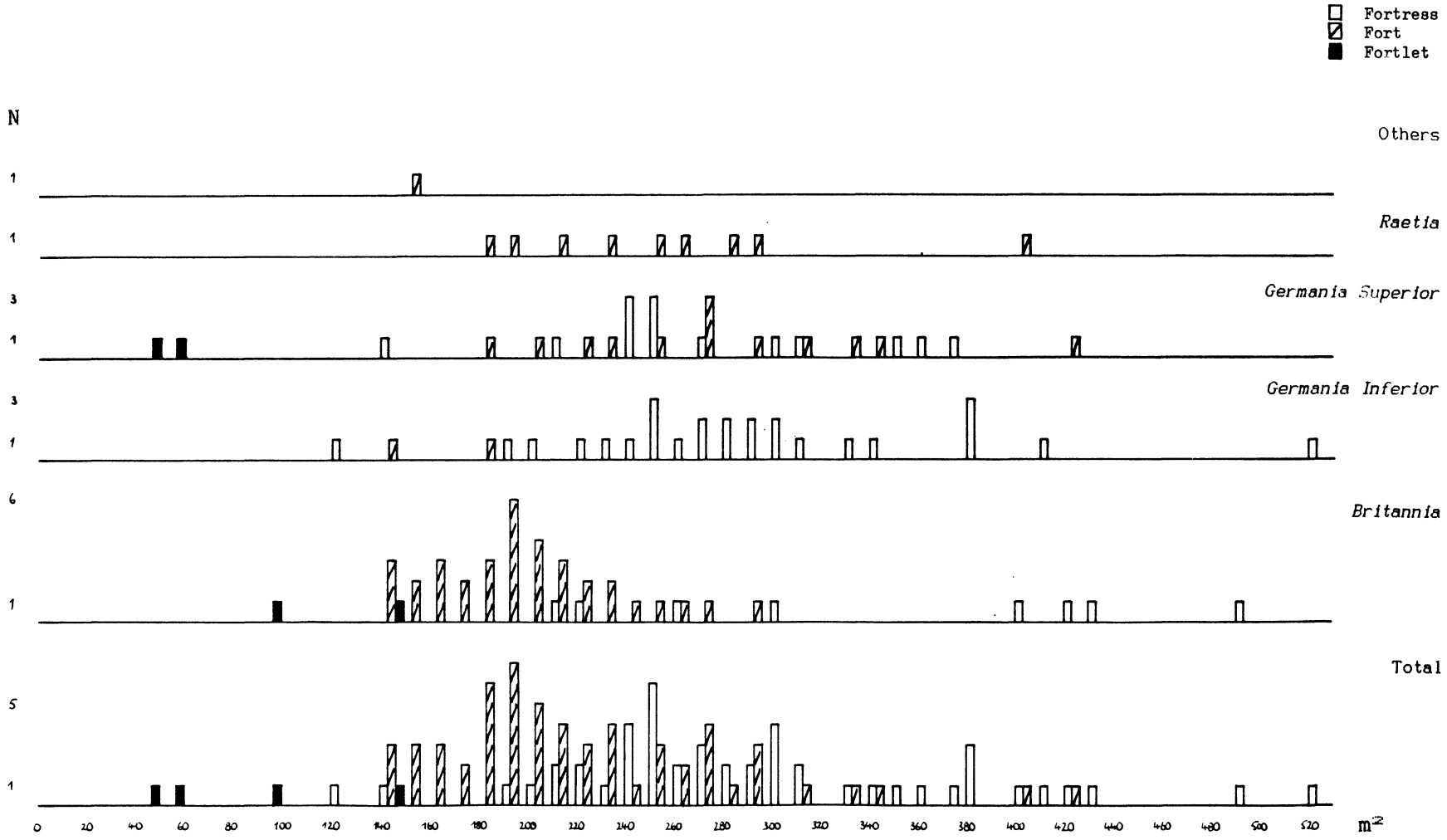


Fig 11.3 Total Living Space - Flavian

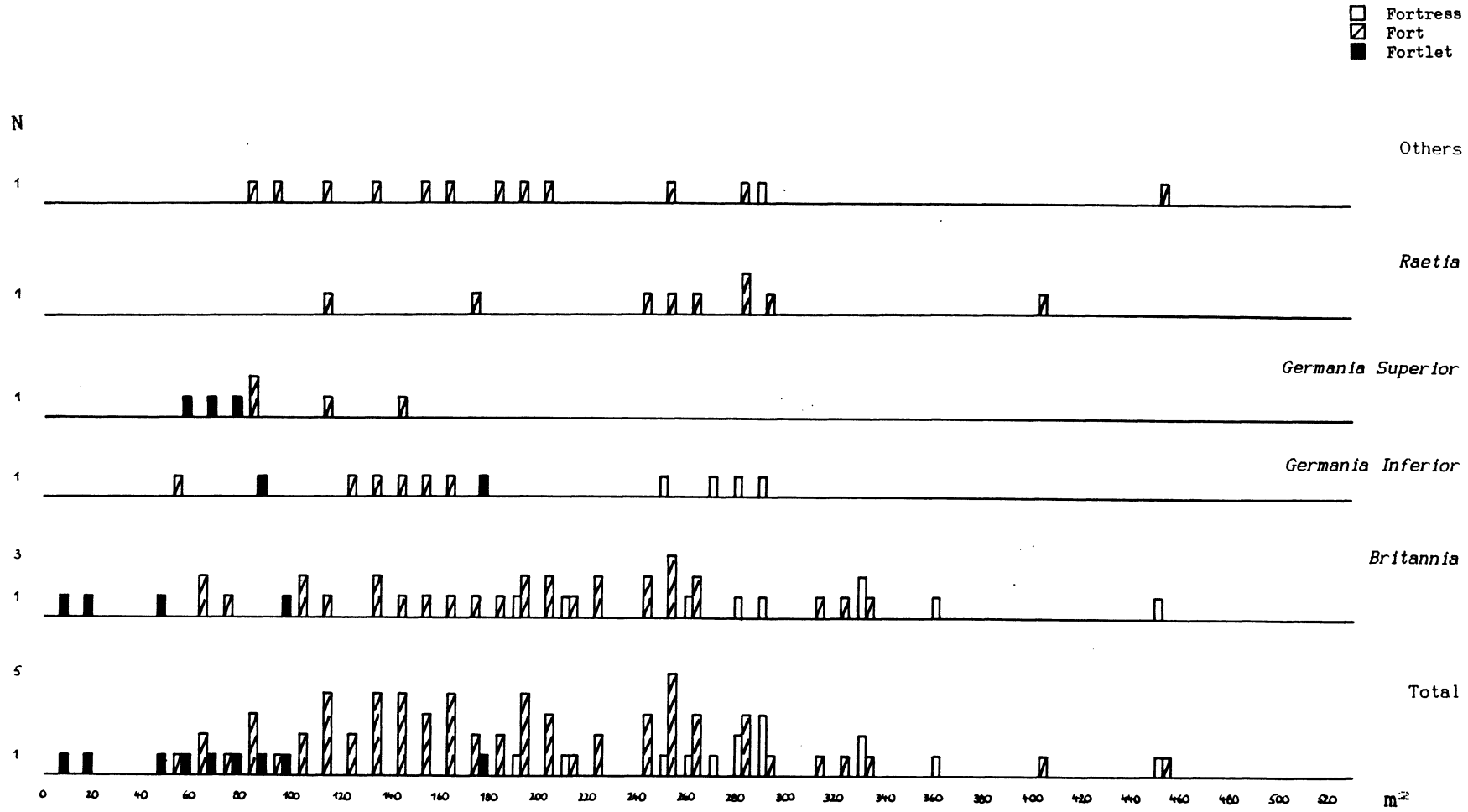


Fig 11.4 Total Living Space - Trajanic/Hadrianic

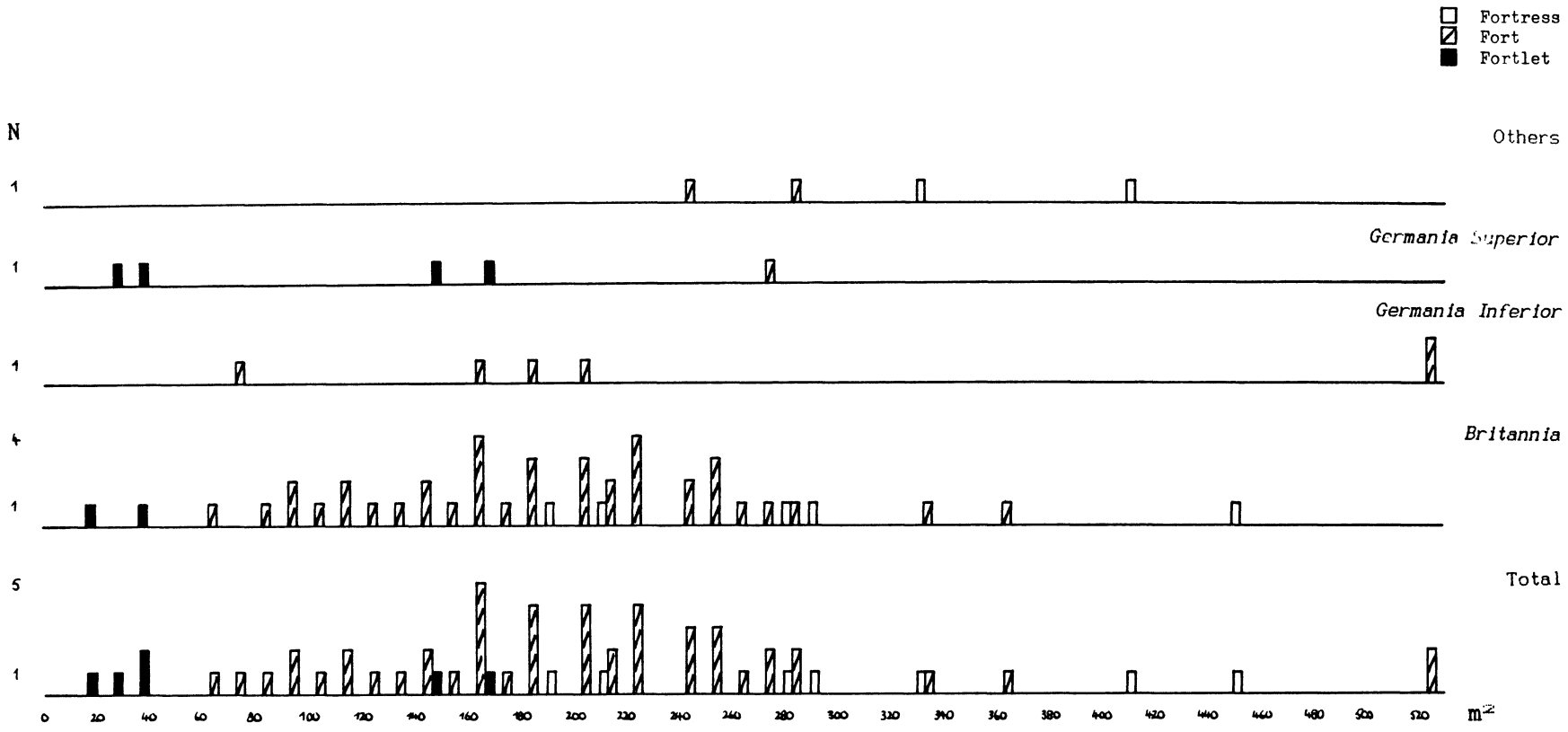


Fig 11.5 Total Living Space - Antonine

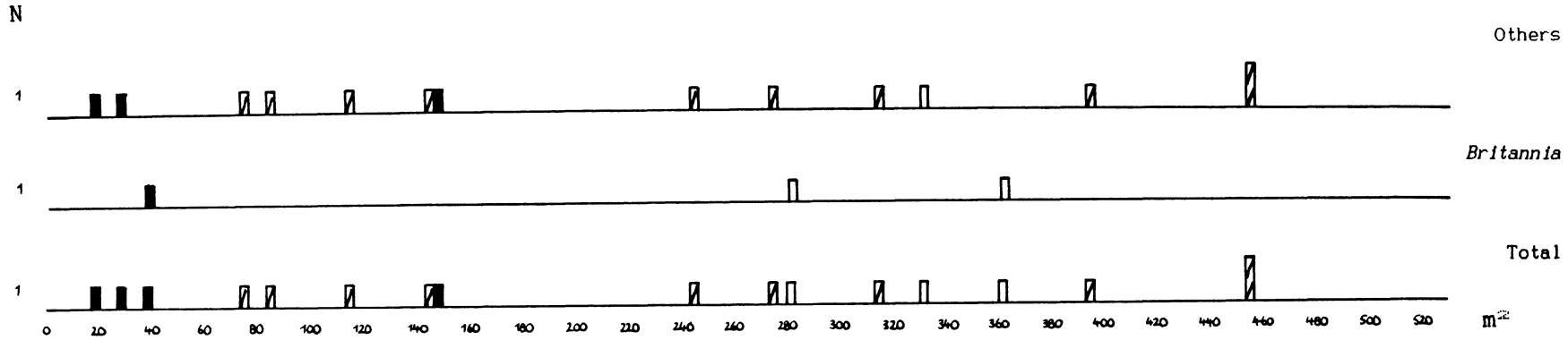


Fig 11.6 Total Living Space - Severan

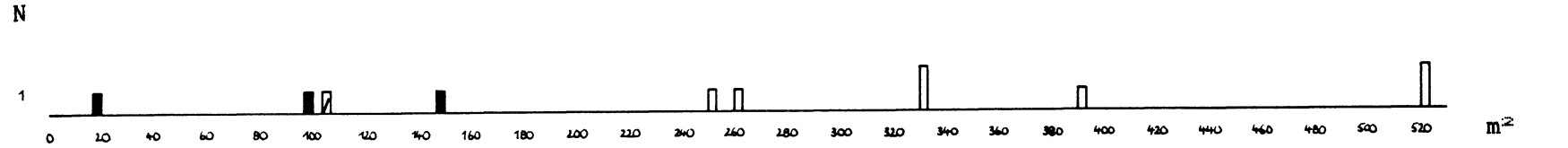


Fig 11.7 Total Living Space - Third Century

Fortress
Fort
Fortlet

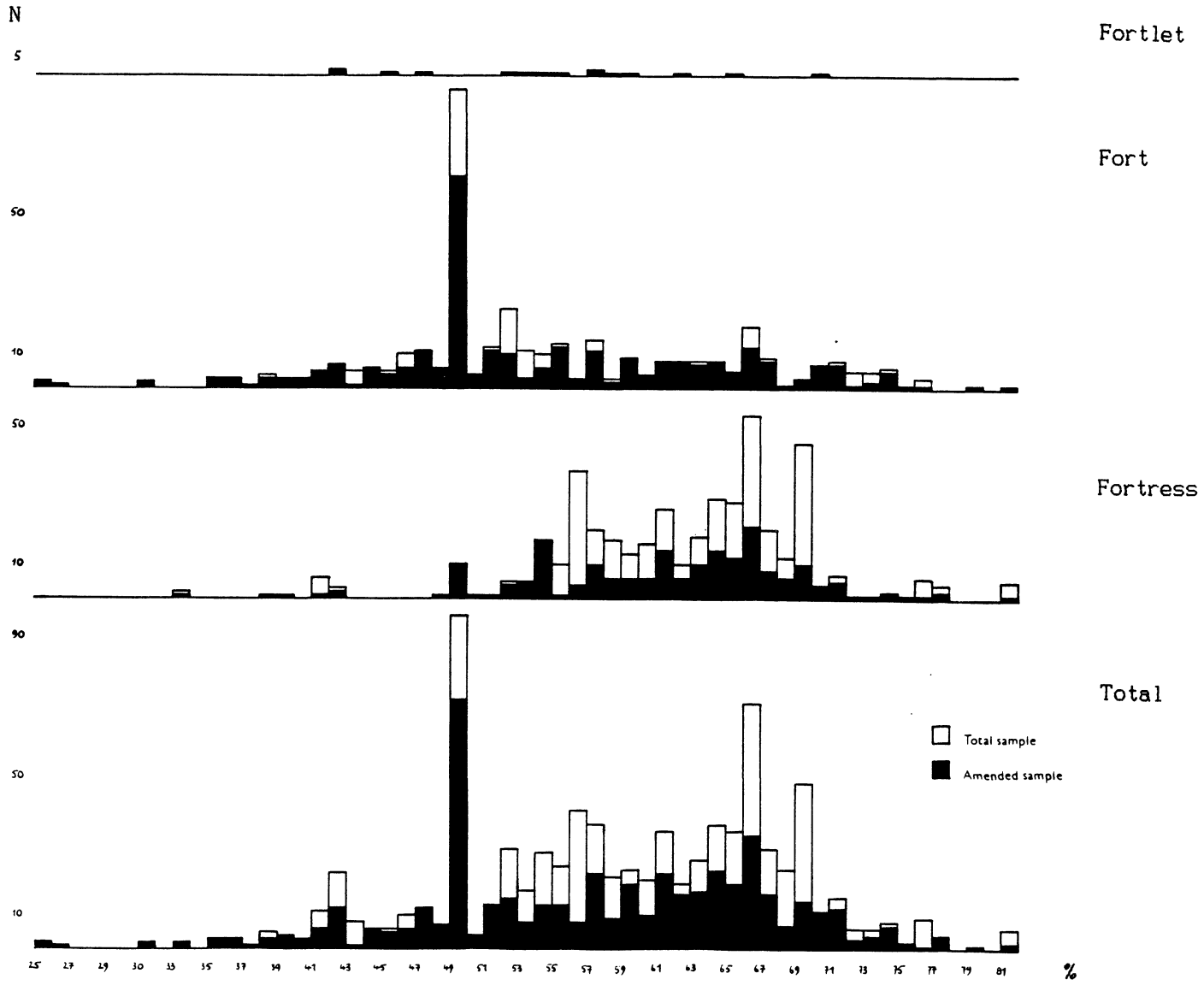


Fig 12 *Contubernium* Proportions: *Papilio/Arma*

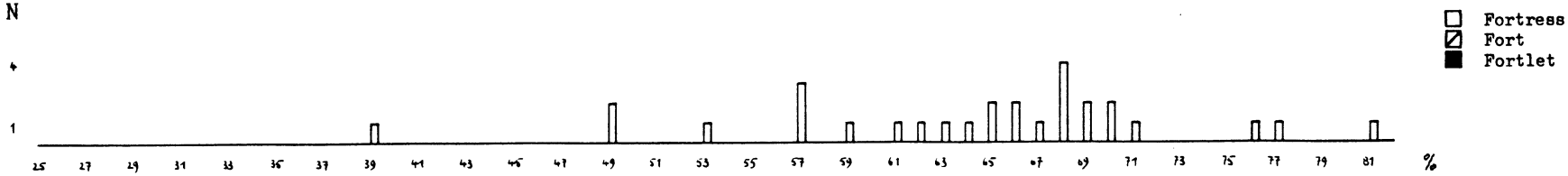


Fig 12.1 *Contubernium* Proportions - Augustan/Tiberian

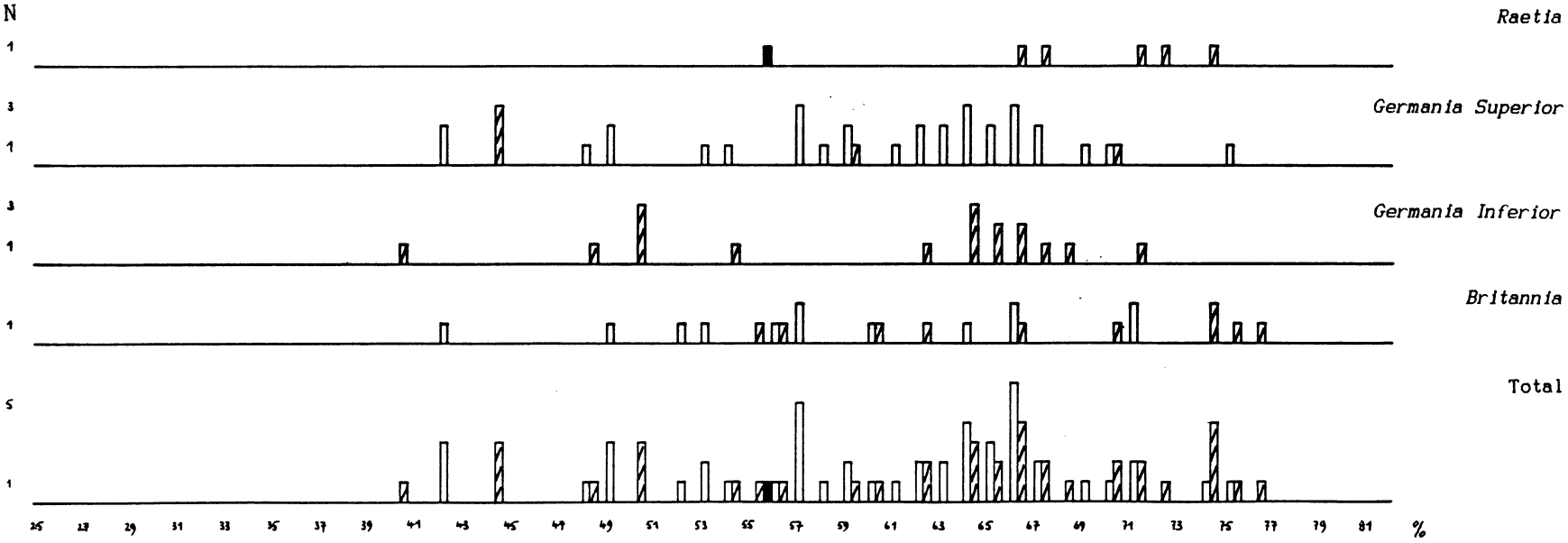


Fig 12.2 *Contubernium* Proportions - Claudian/Neronian

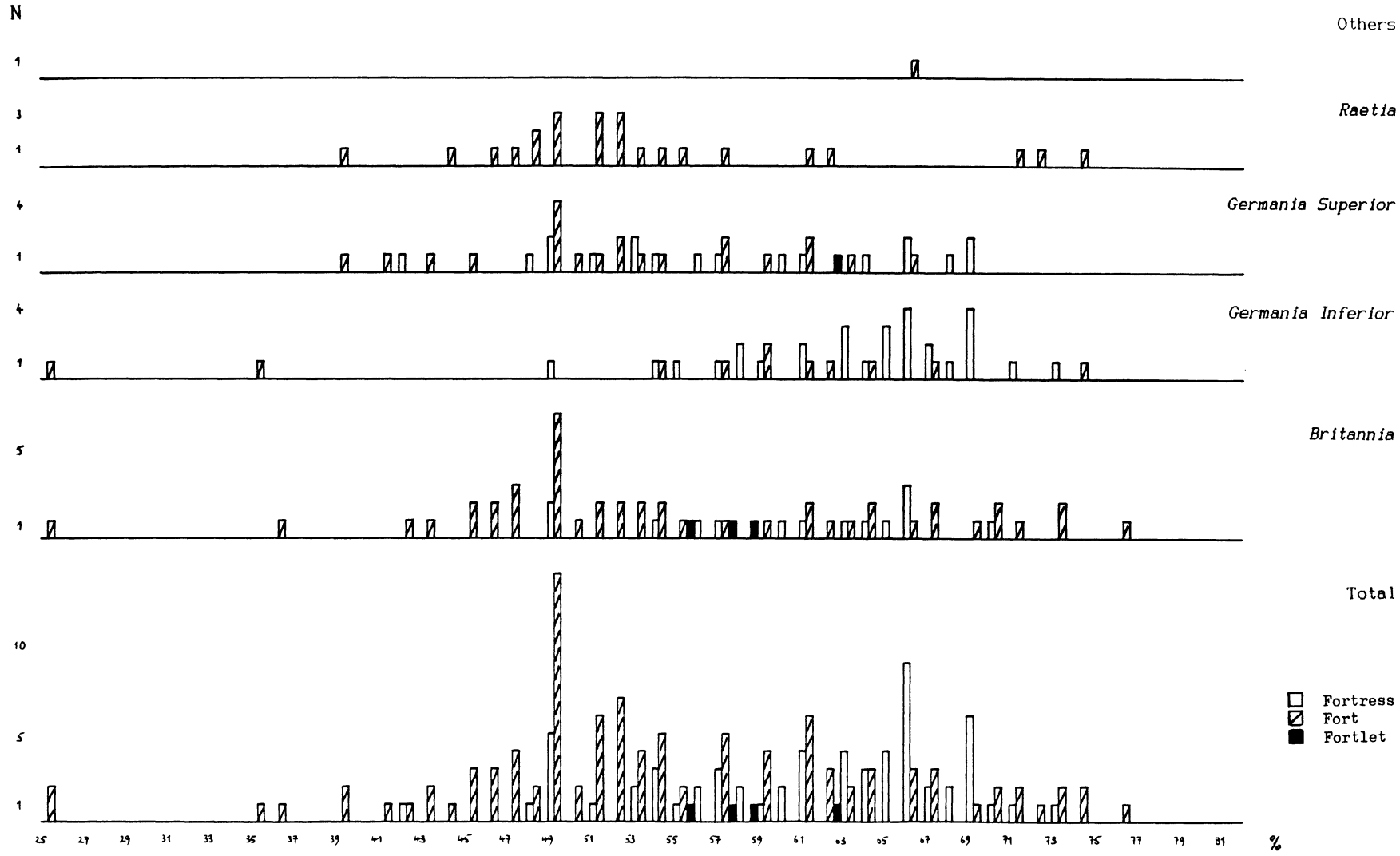


Fig 12.3 *Contubernium* Proportions - Flavian

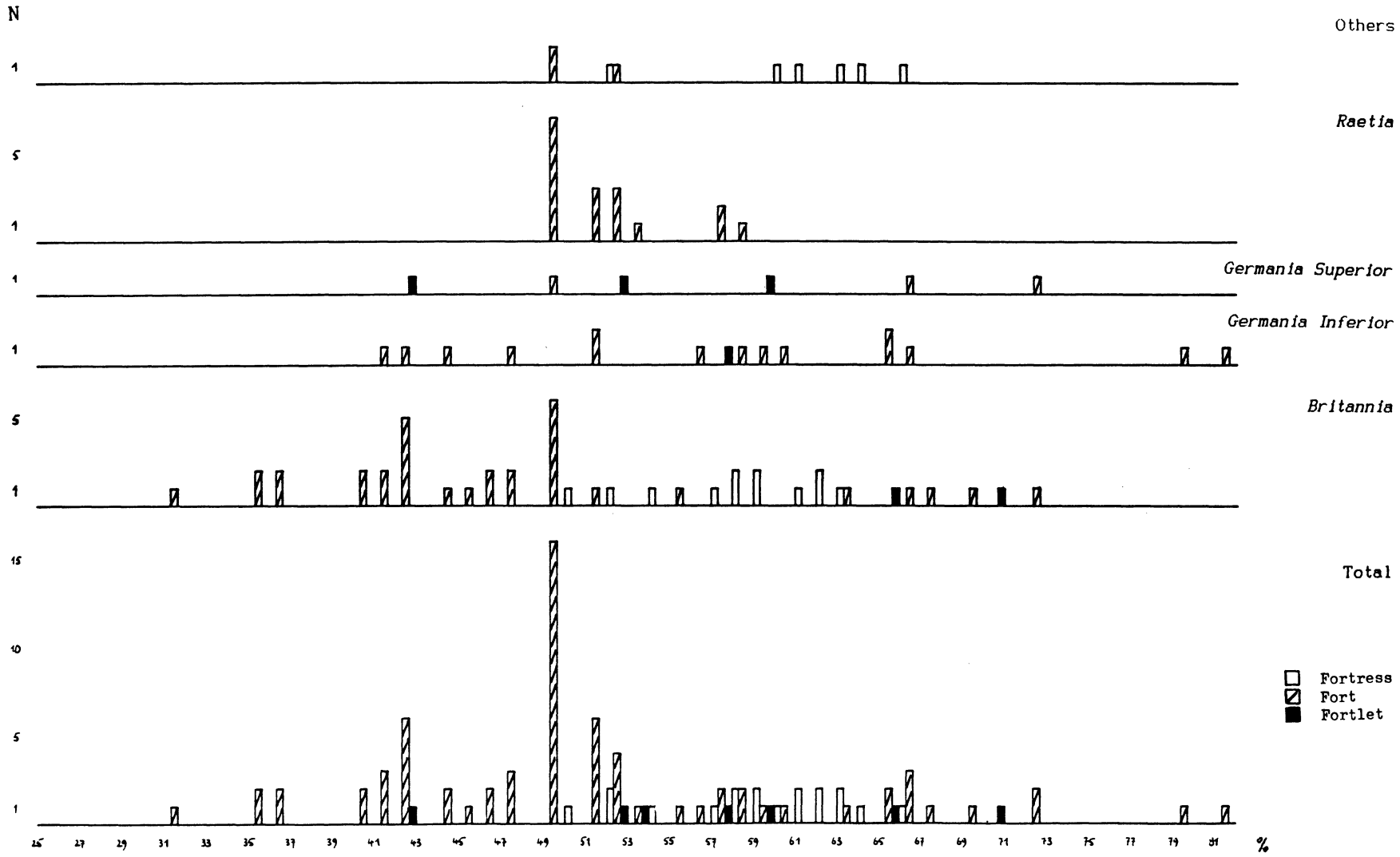


Fig 12.4 *Contubernium* Proportions - Trajanic/Hadrianic

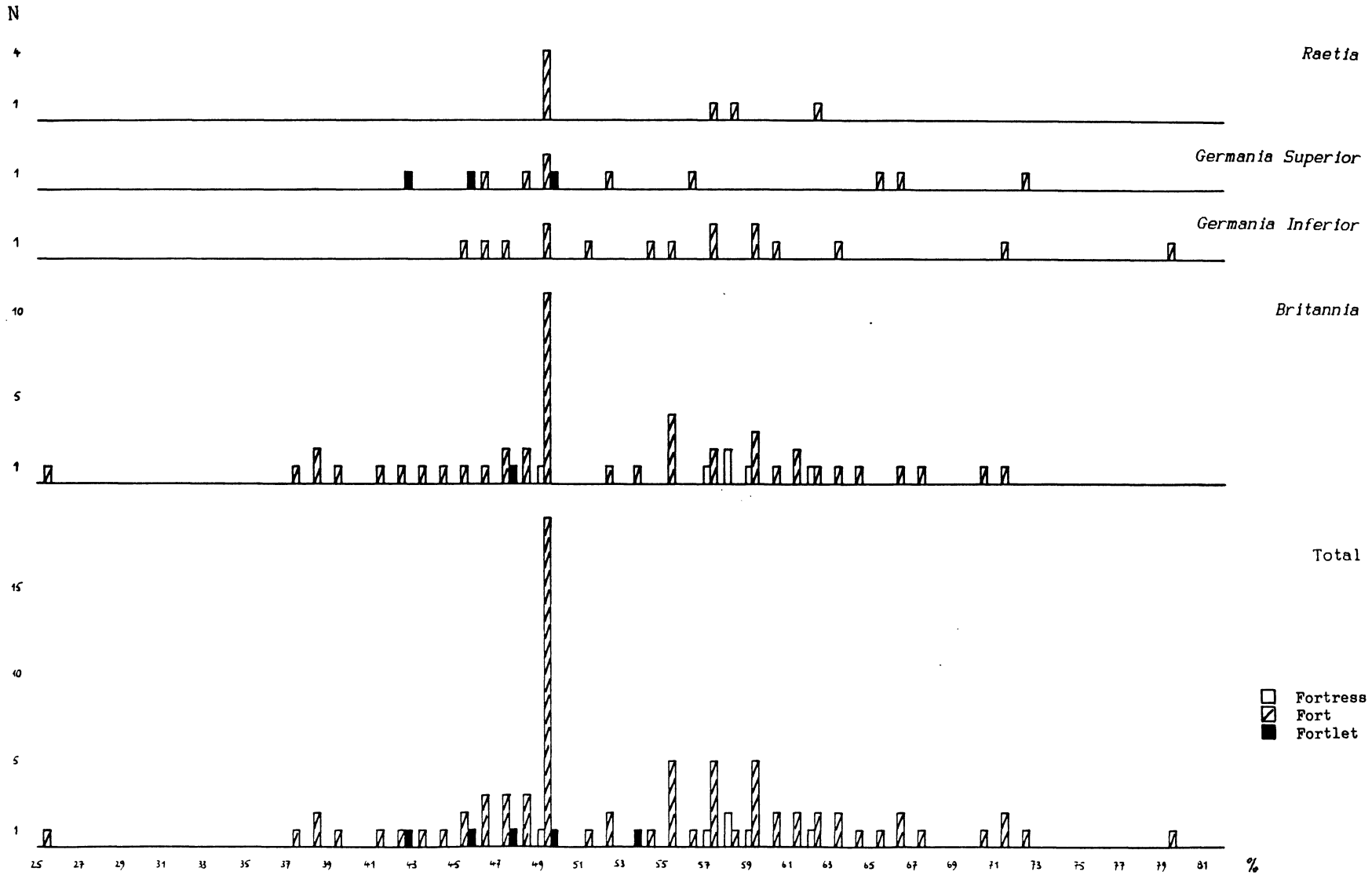


Fig 12.5 *Contubernium* Proportions - Antonine

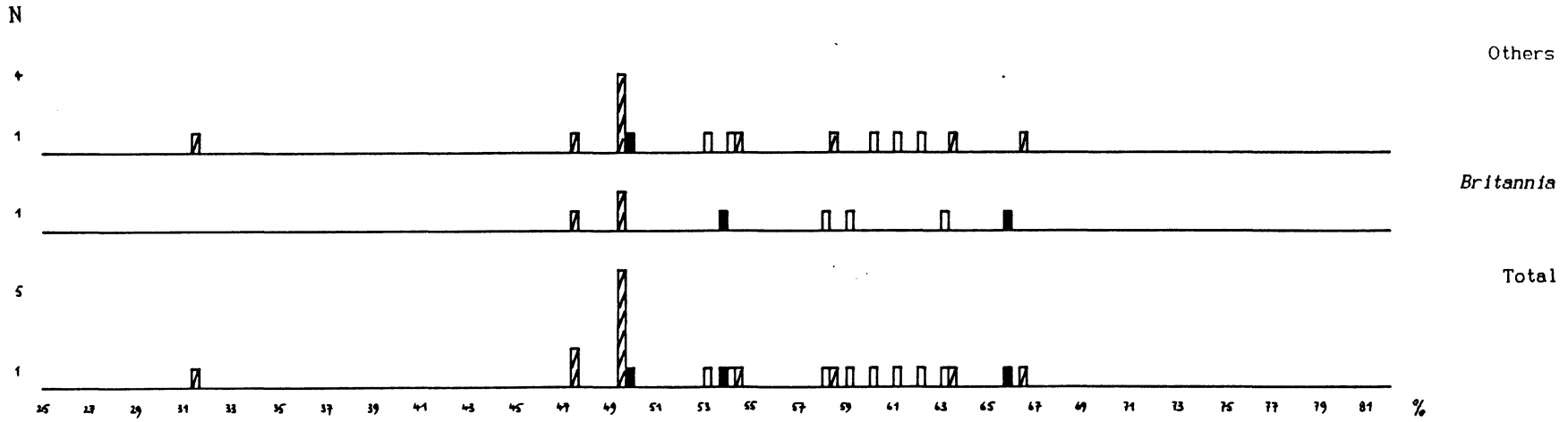


Fig 12.6 *Contubernium* Proportions - Severan

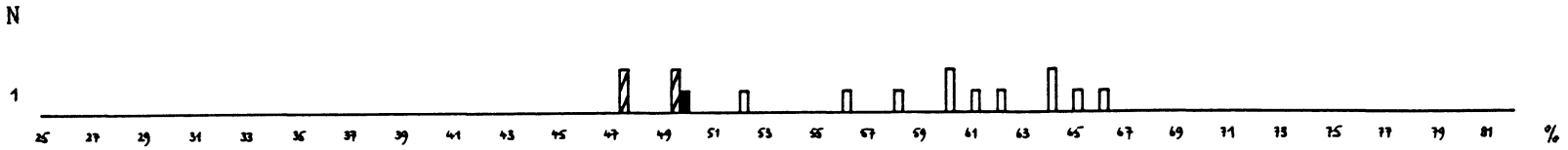


Fig 12.7 *Contubernium* Proportions - Third Century

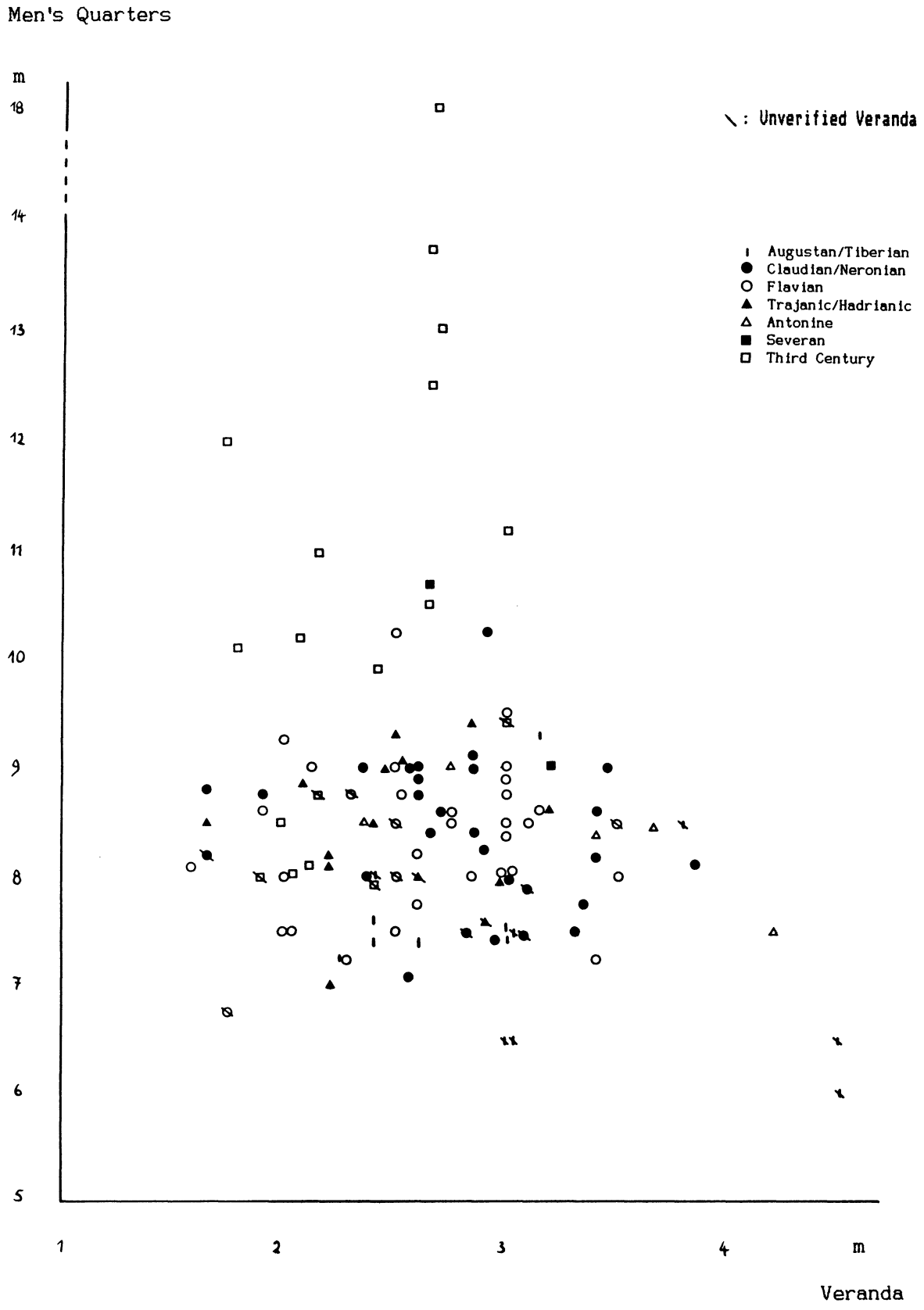


Fig 13 Men's Quarters and Verandas: Comparative Widths

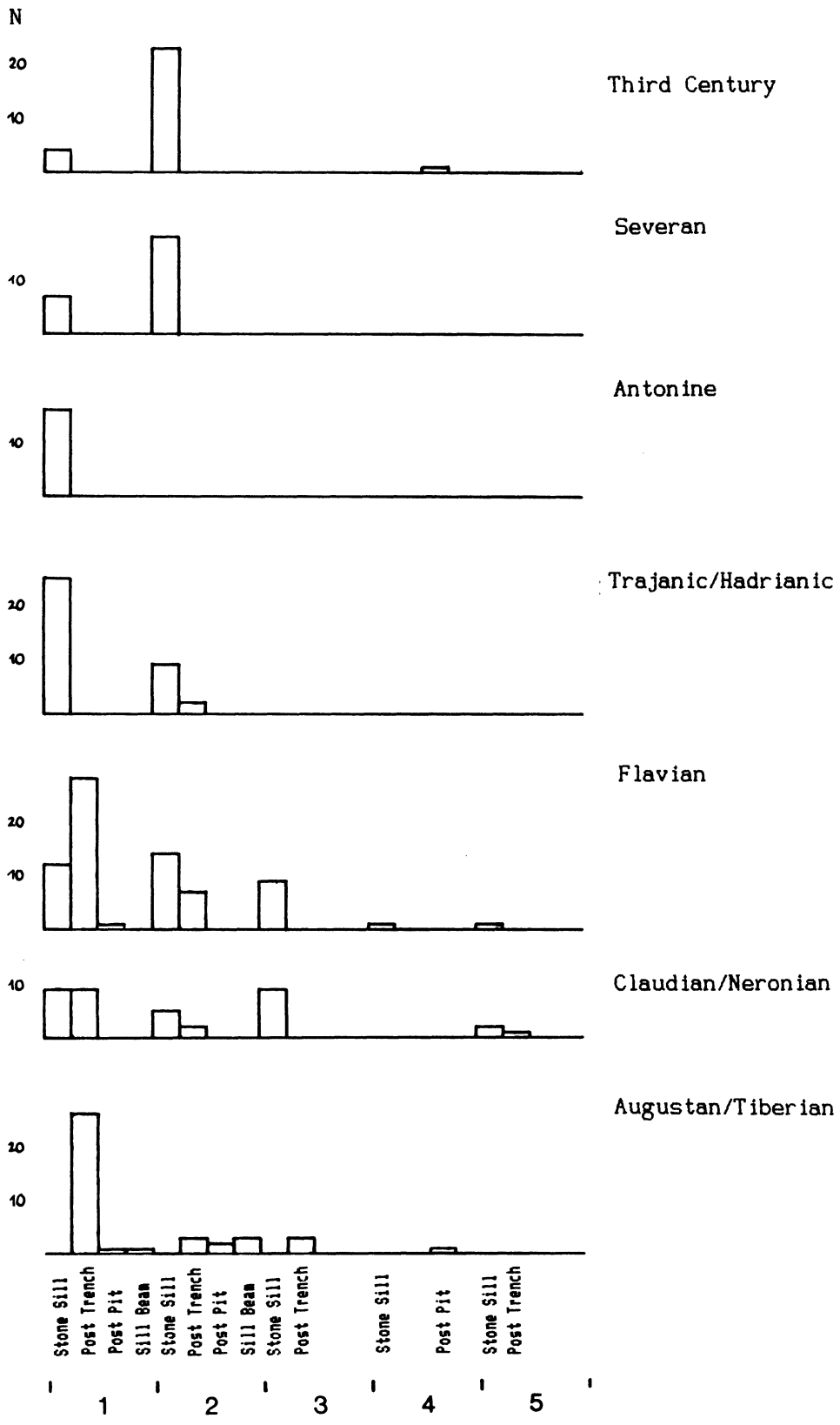


Fig 14 Rear Wall Construction

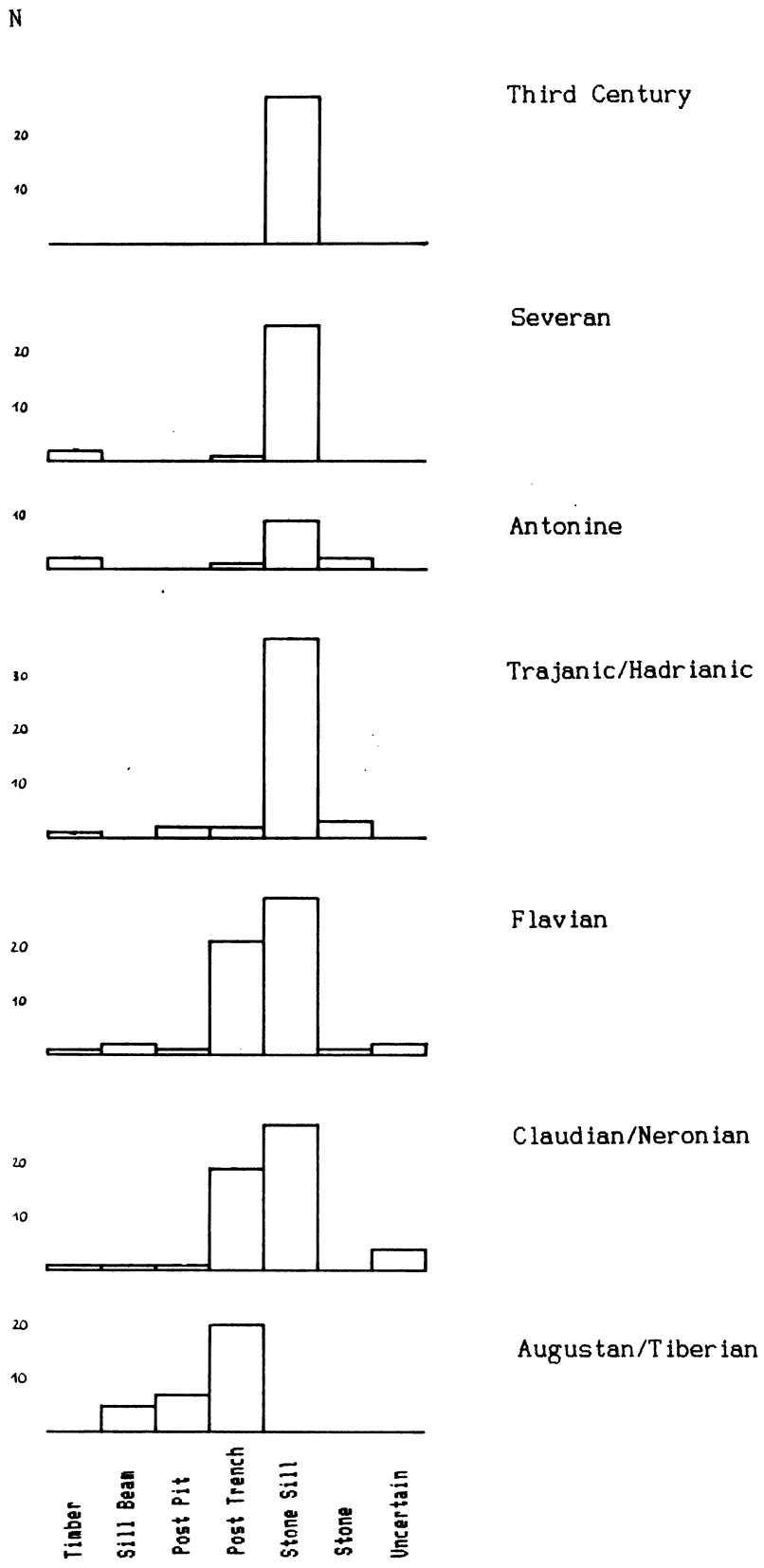


Fig 15 Construction Methods

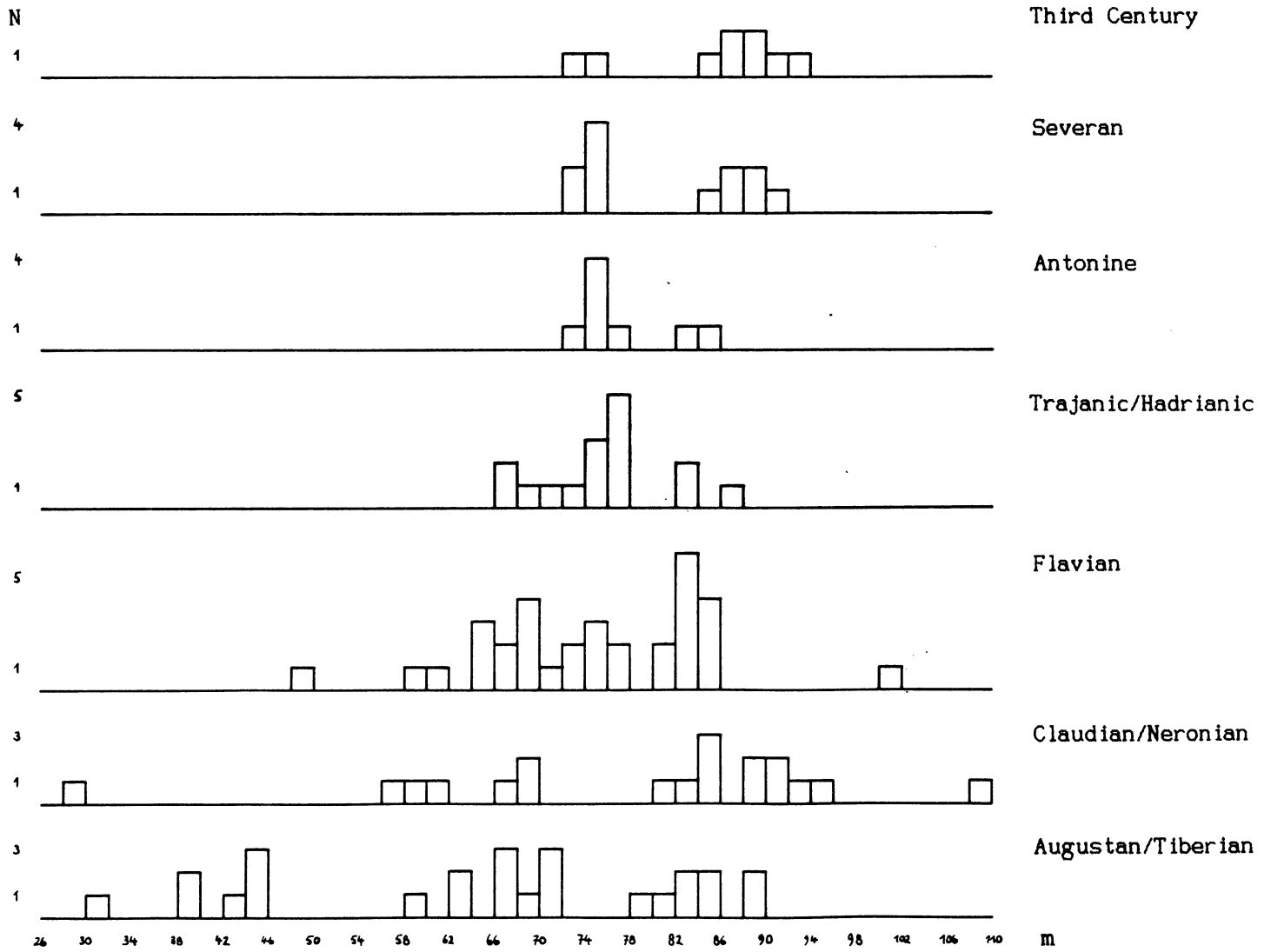


Fig 16 Barrack Lengths

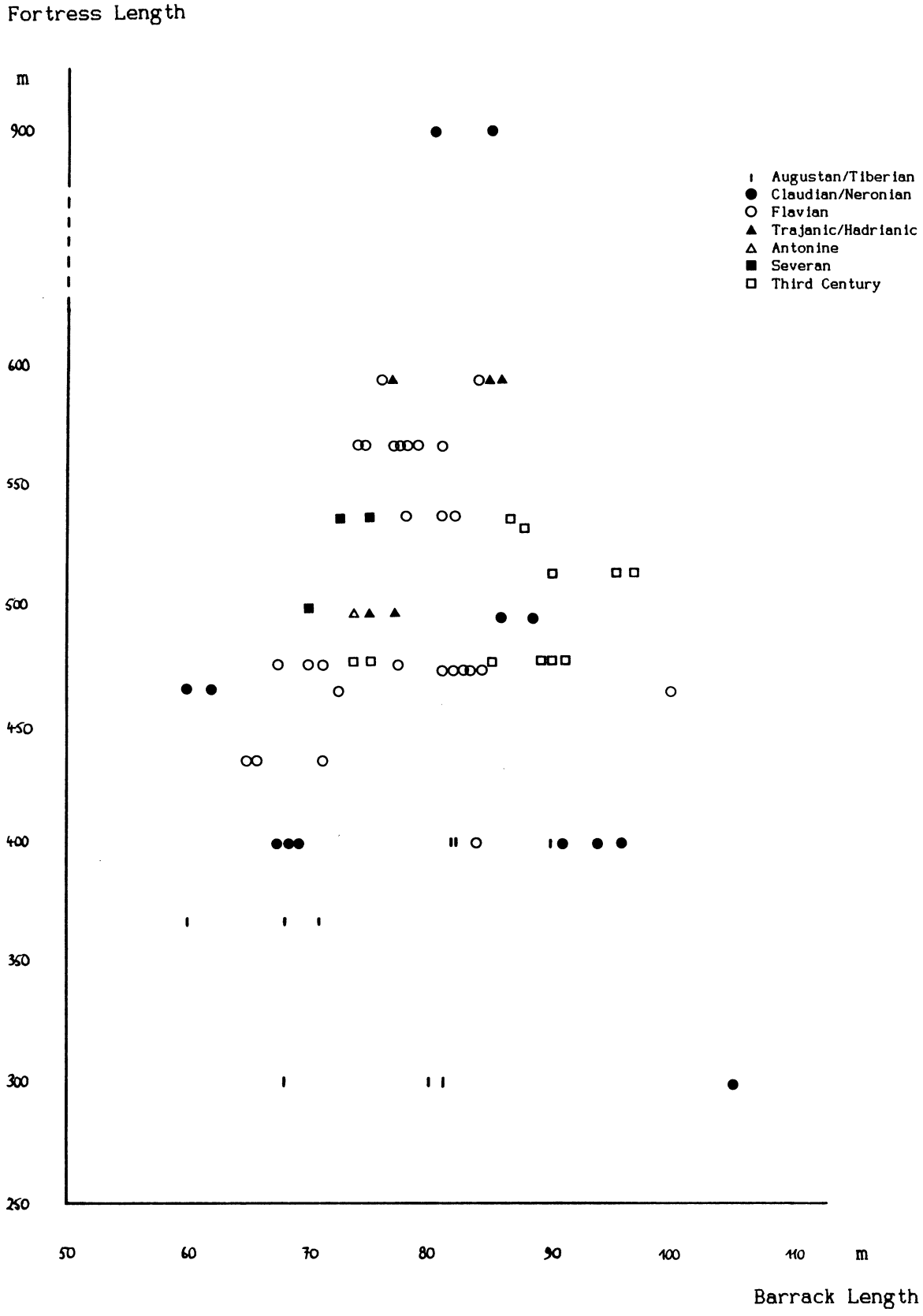


Fig 17 Barracks and Fortresses: Comparative Lengths

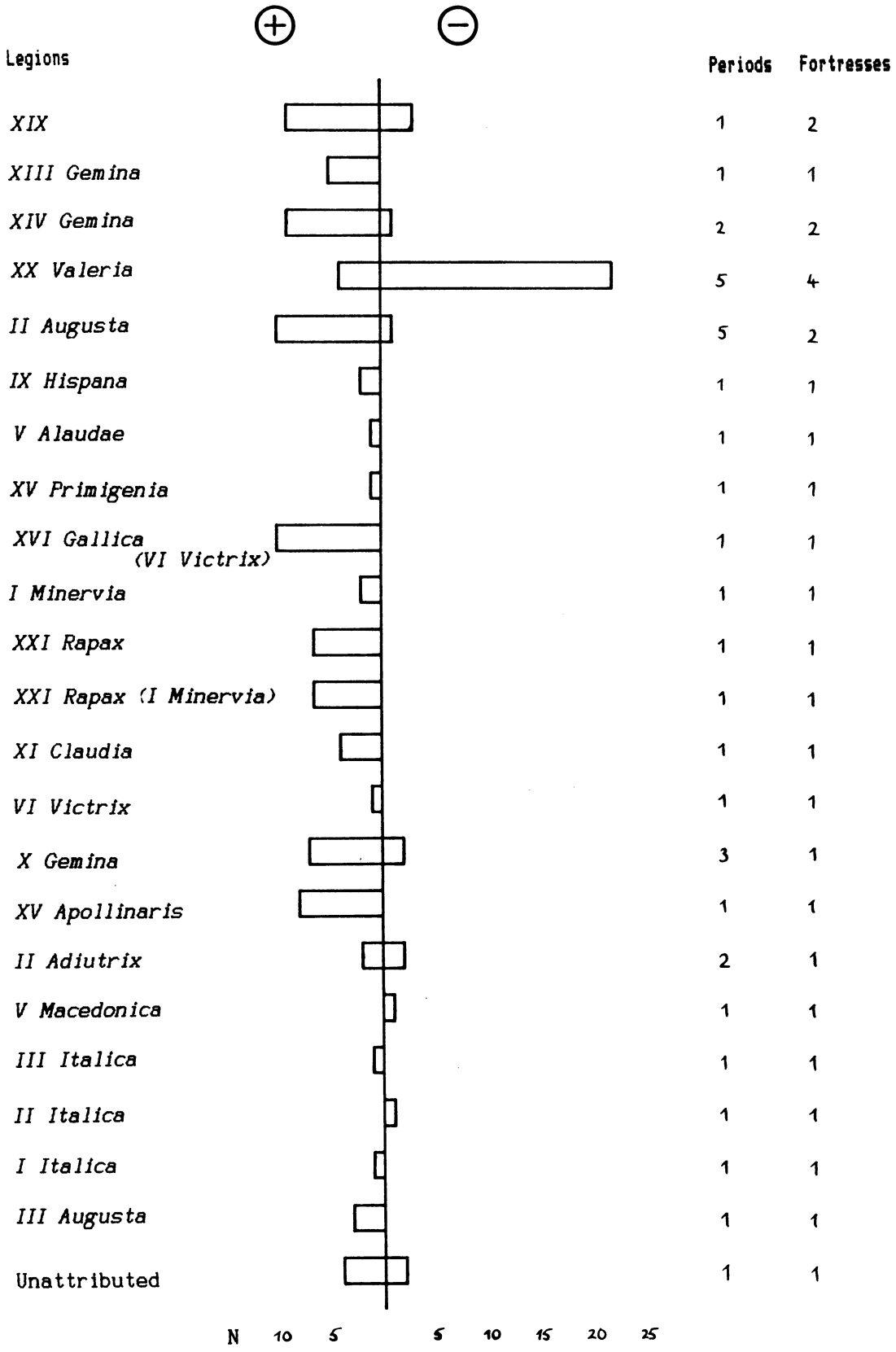


Fig 18 Centurions' Quarters: Integral and Non-integral

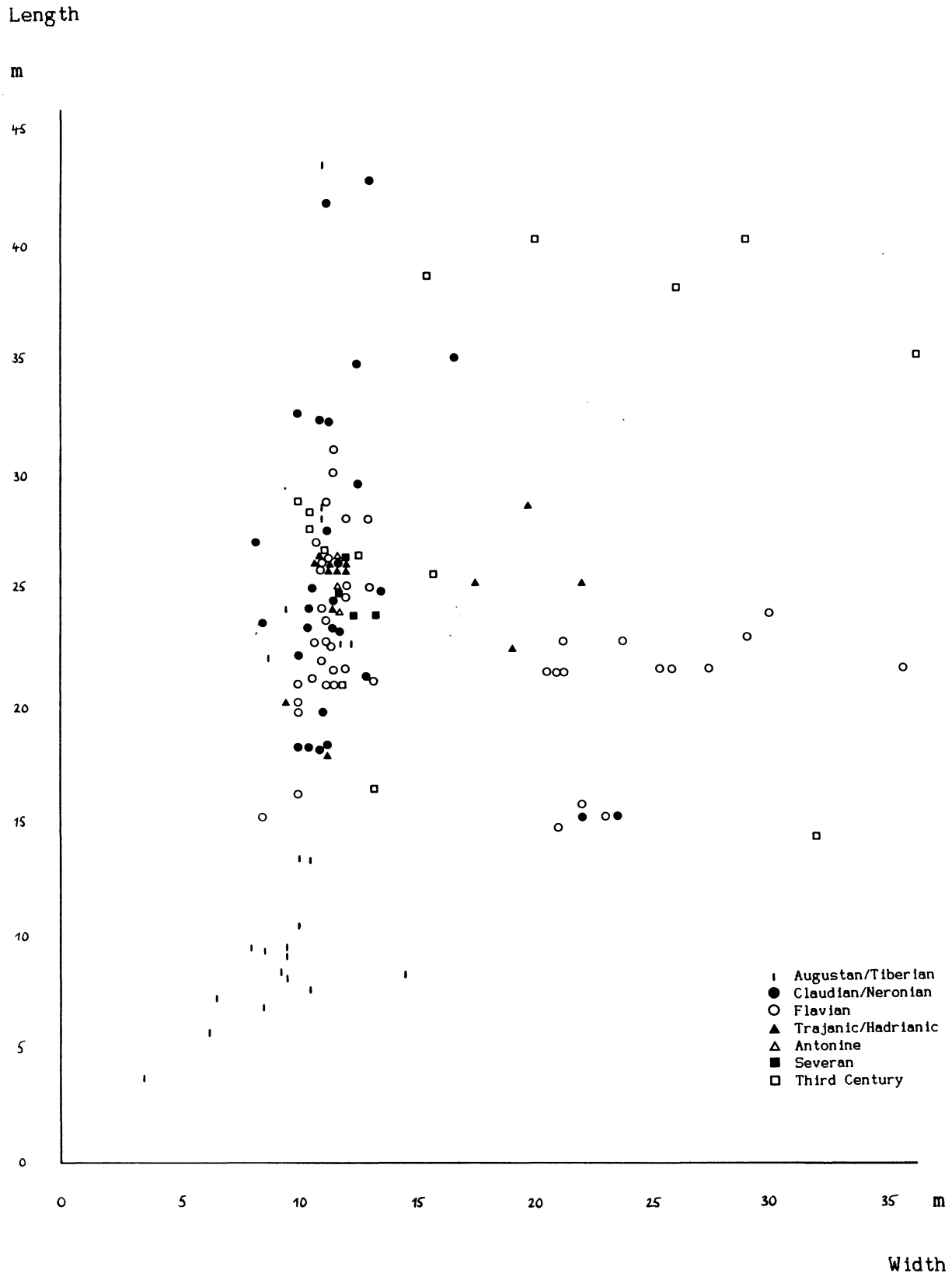


Fig 19 Centurions' Quarters: Dimensions

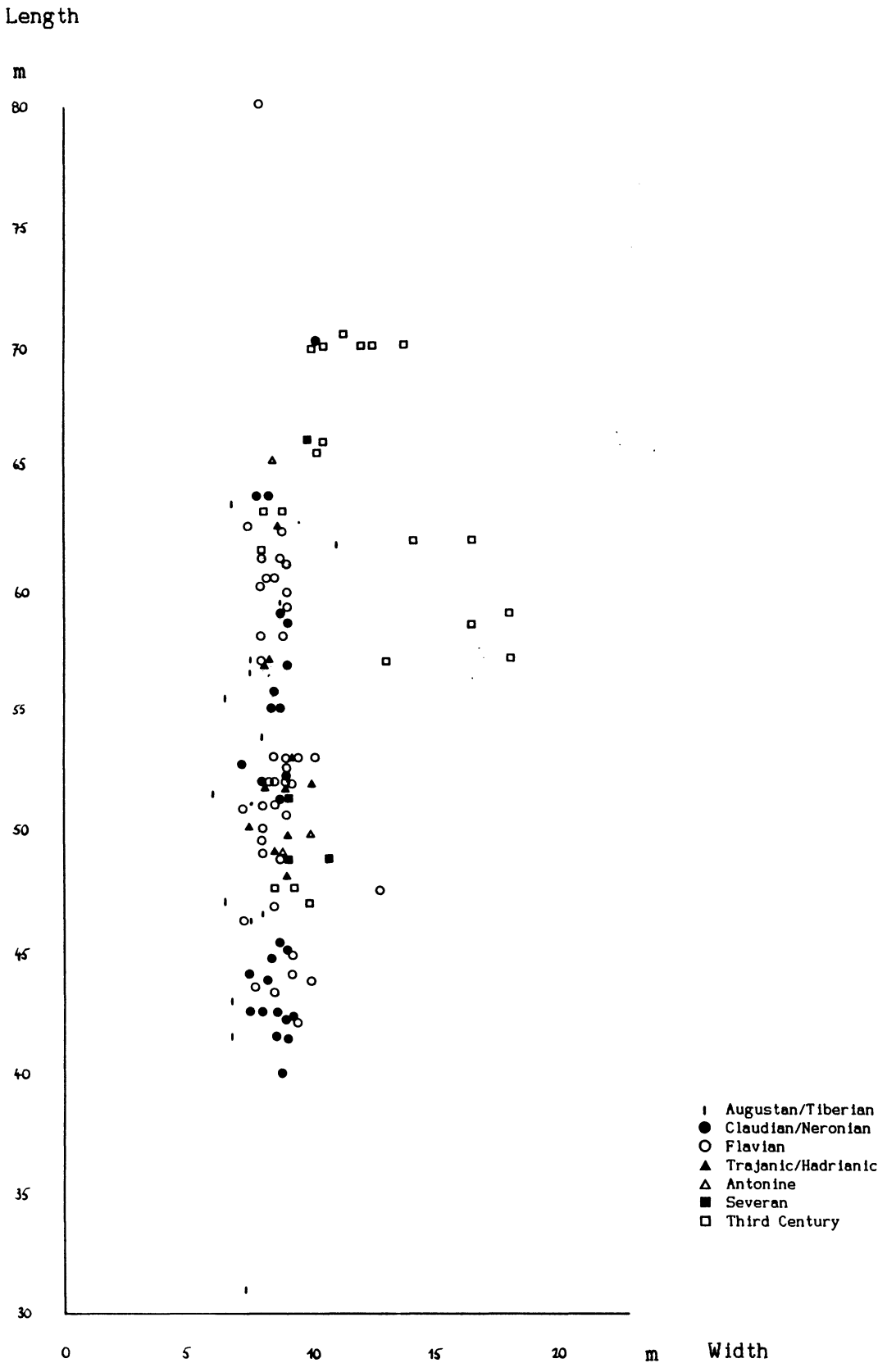


Fig 20 Men's Quarters: Dimensions

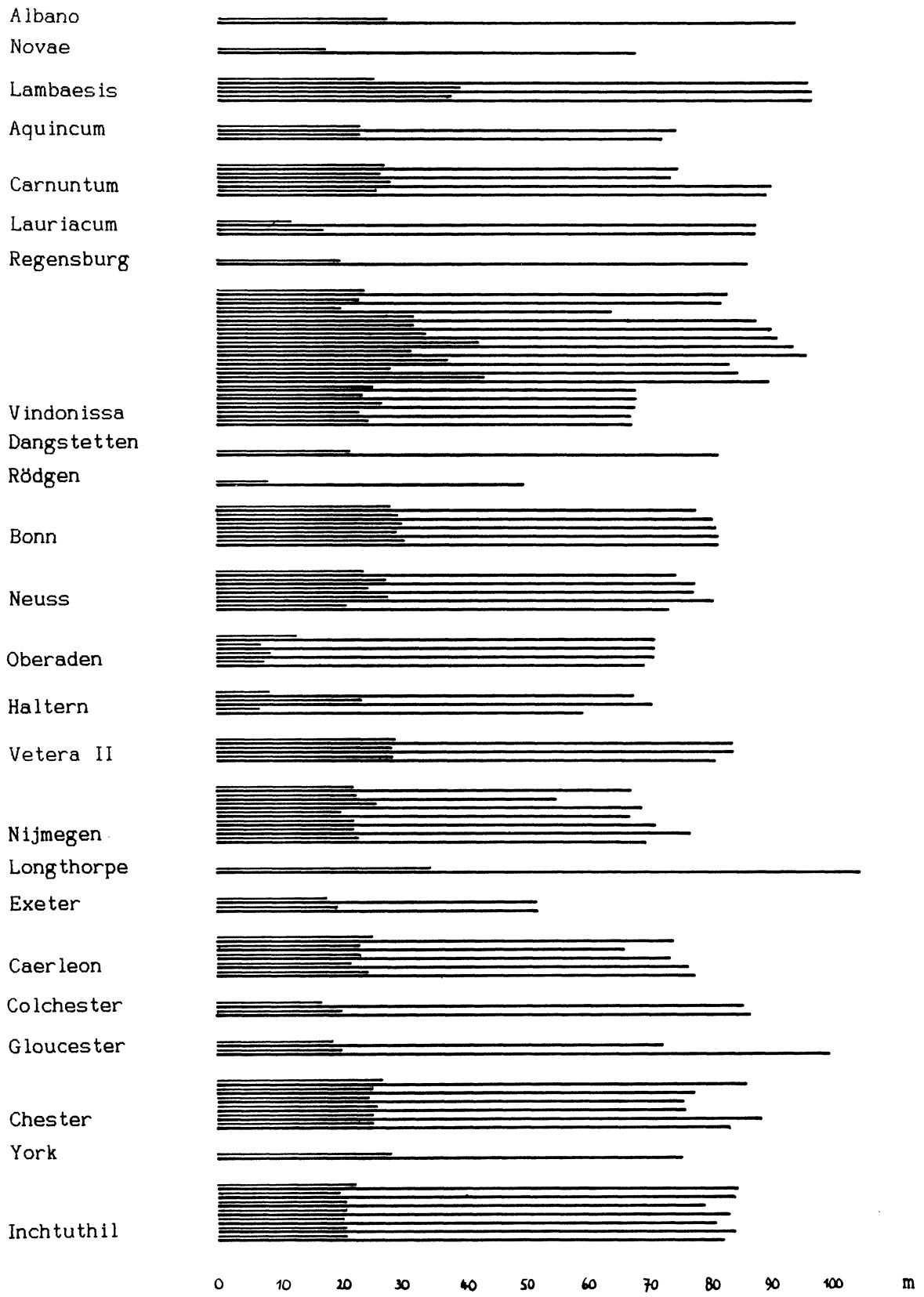


Fig 21 Centurions' Quarters and Barracks: Comparative Lengths

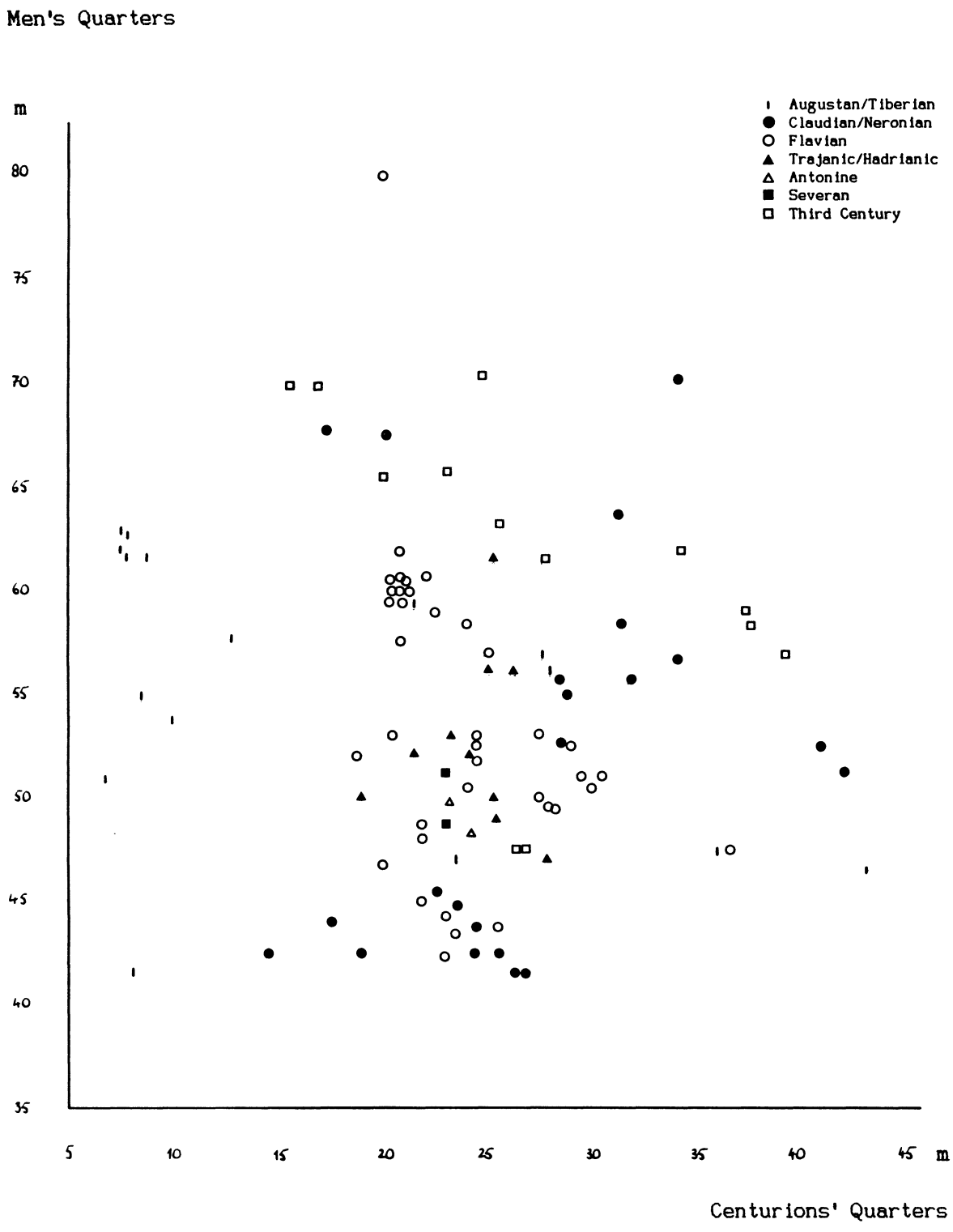


Fig 22 Centurions' and Men's Quarters: Comparative Lengths

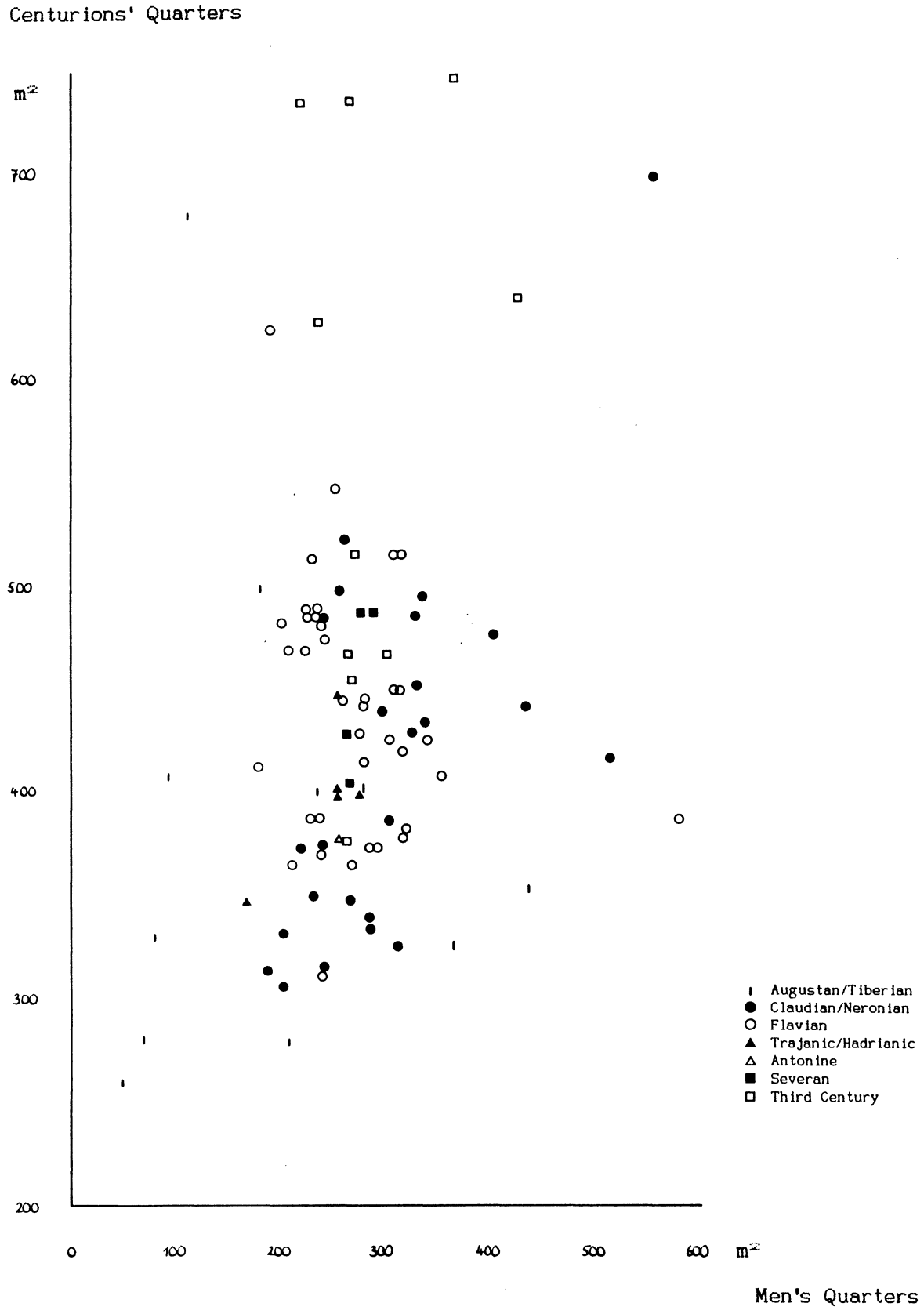


Fig 23 Centurions' and Men's Quarters: Comparative Areas

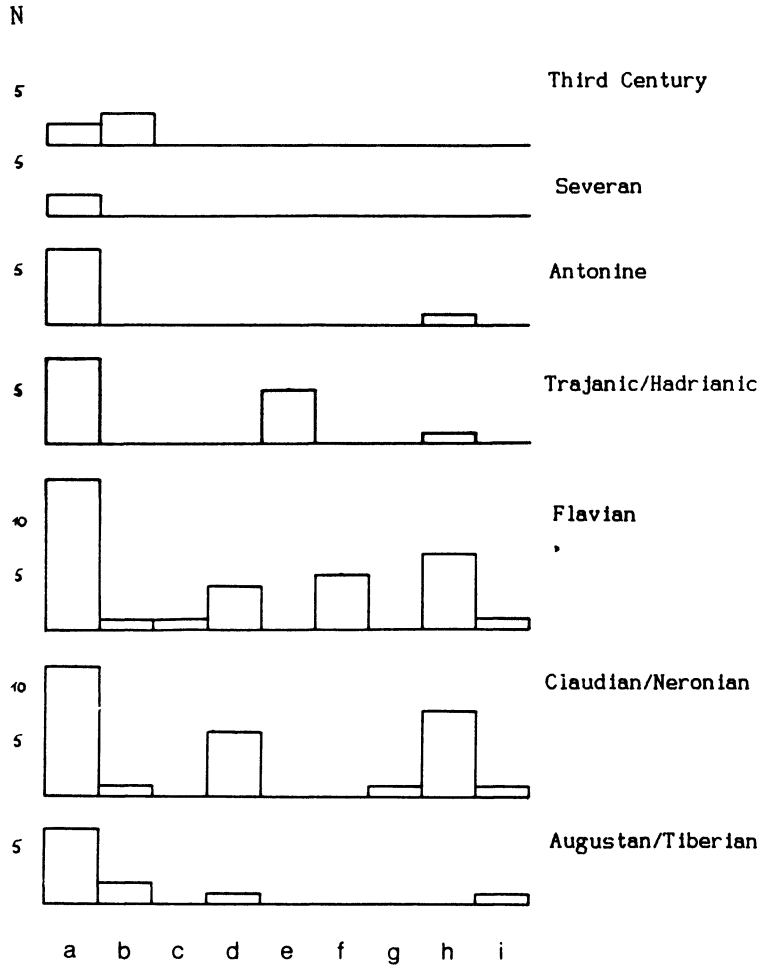


Fig 24 Special First *Contubernia*: Types

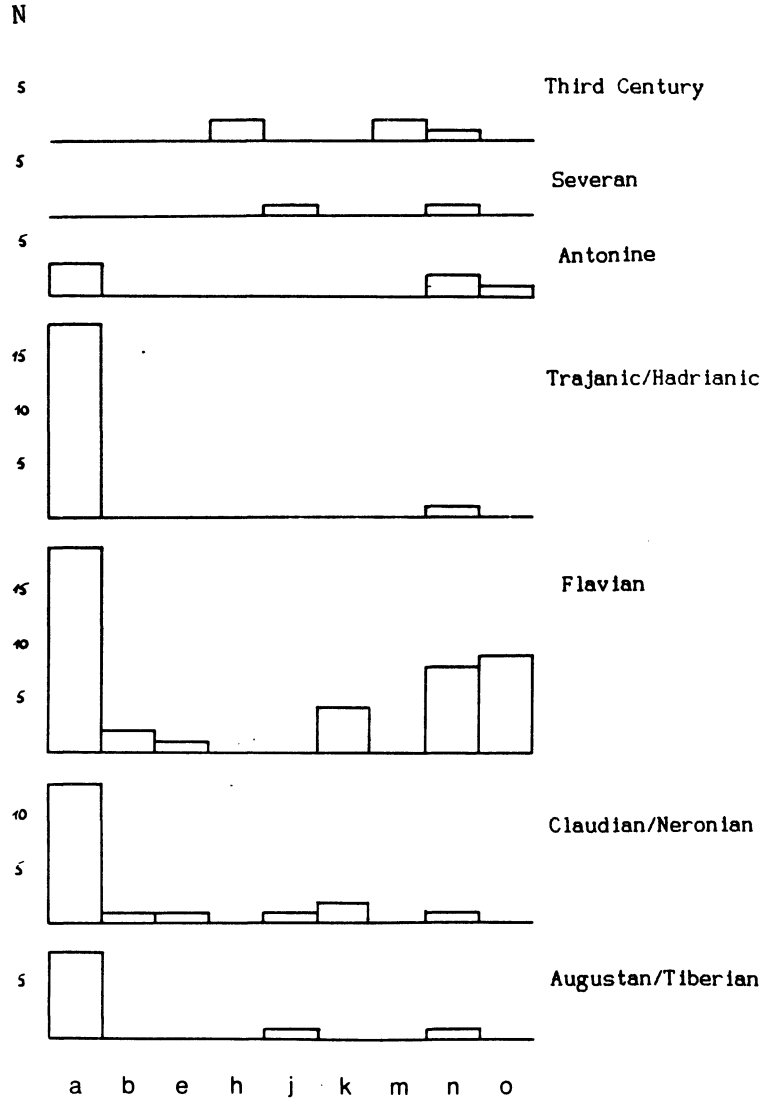


Fig 25 Special End *Contubernia*: Types

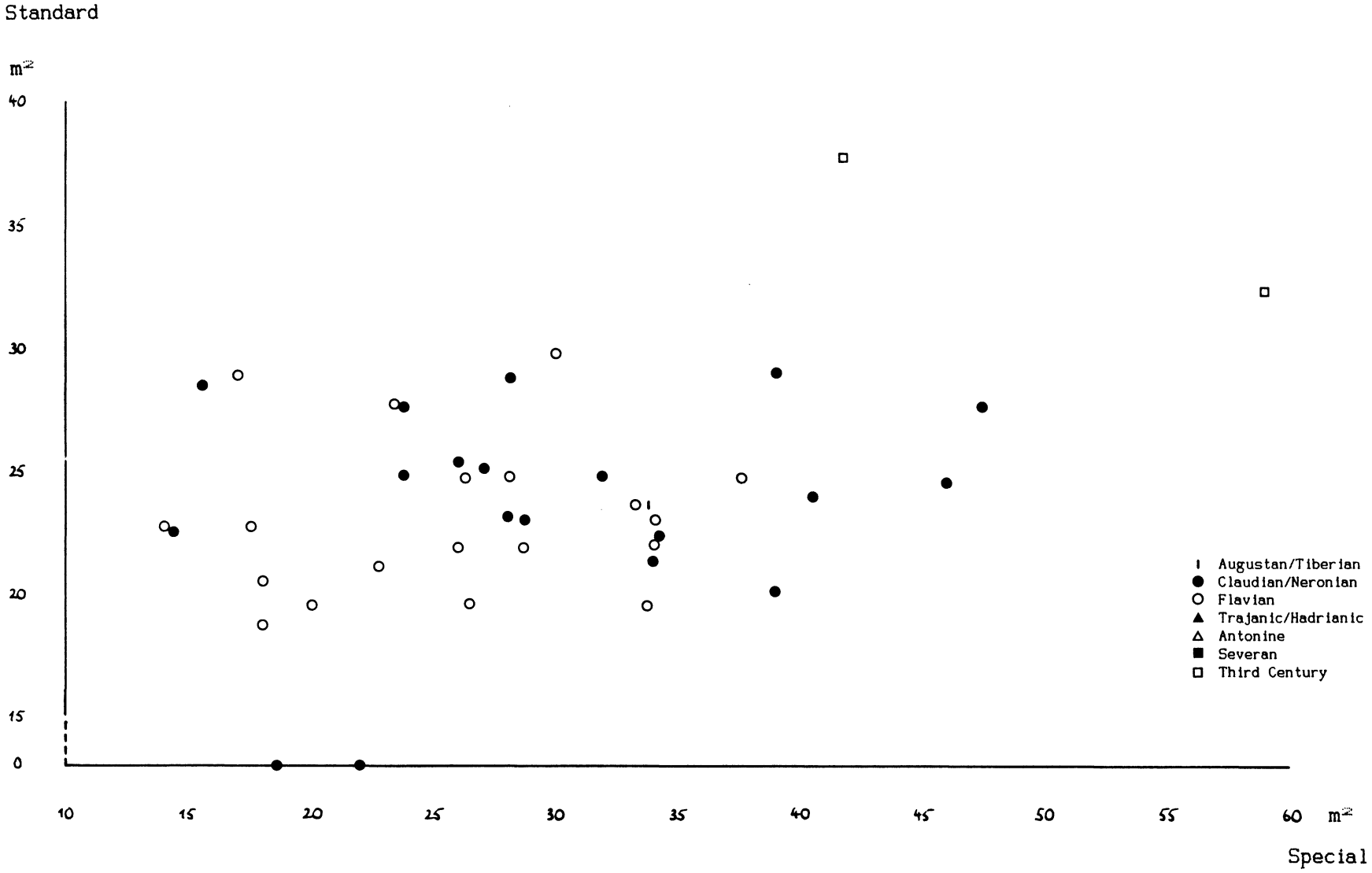


Fig 26 Special First and Standard *Contubernia*: Comparative Areas

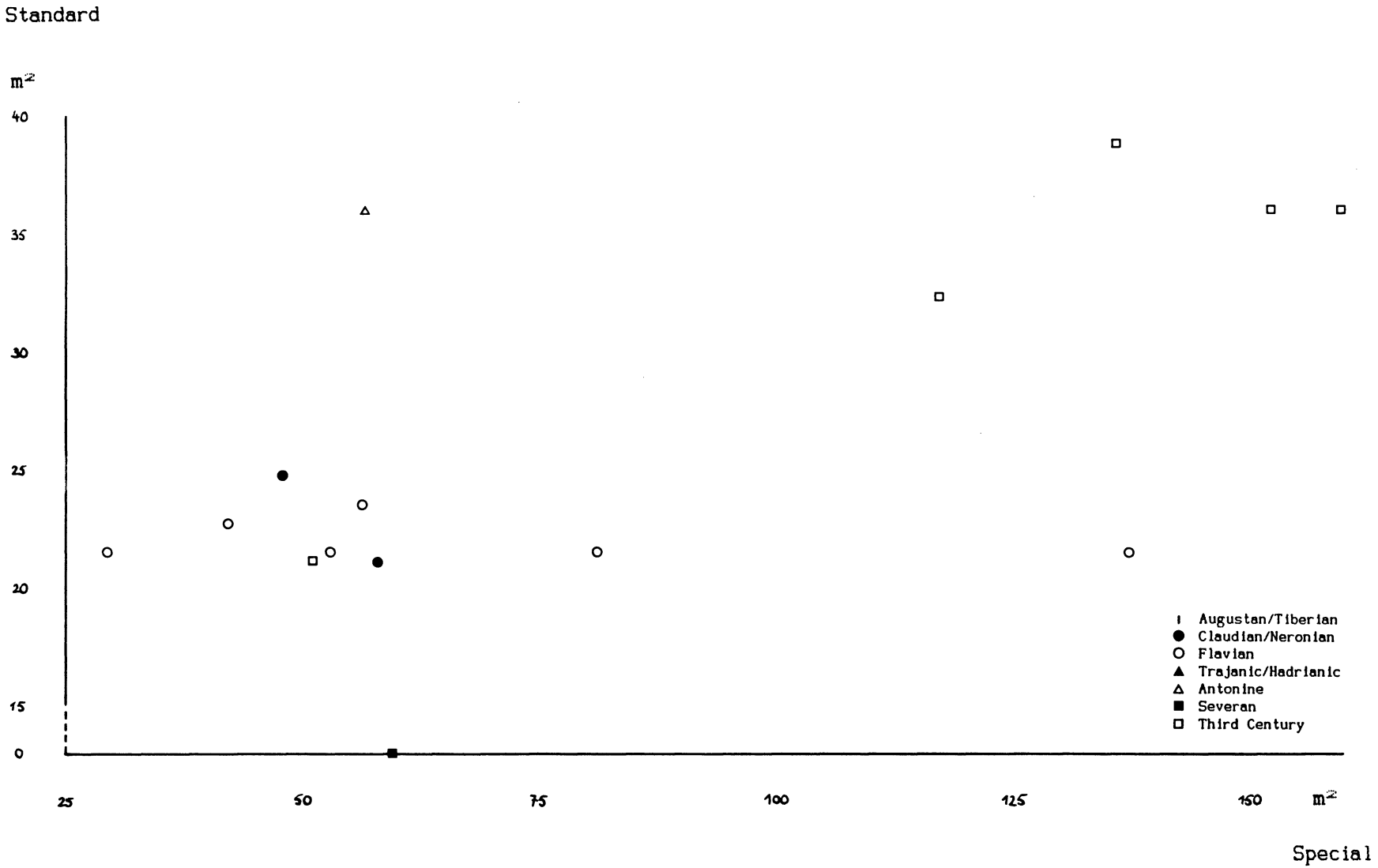


Fig 27 Special End and Standard *Contubernia*: Comparative Areas

Contubernium Totals

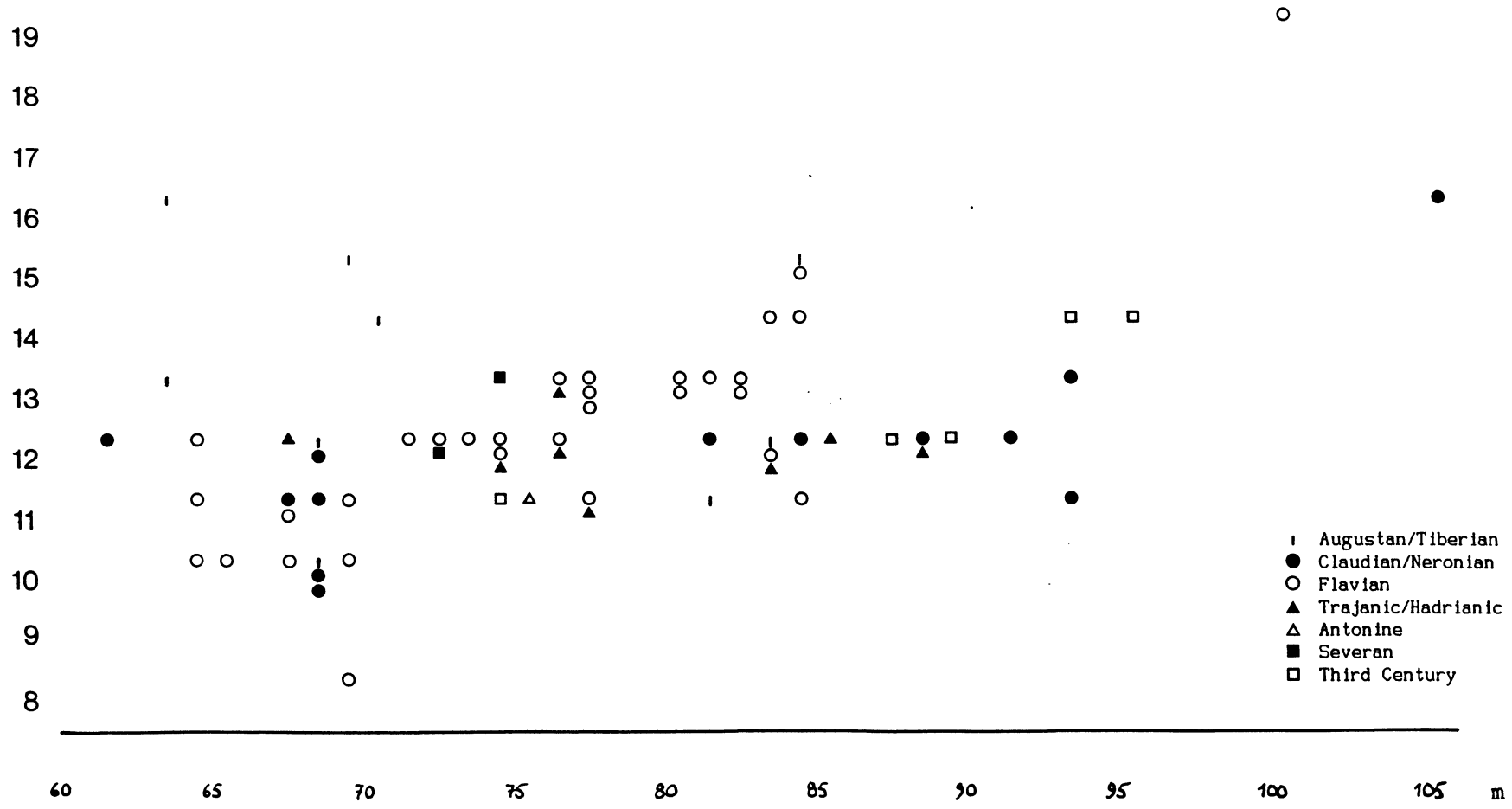


Fig 28 *Contubernium* Totals and Barrack Lengths

Contubernium Totals

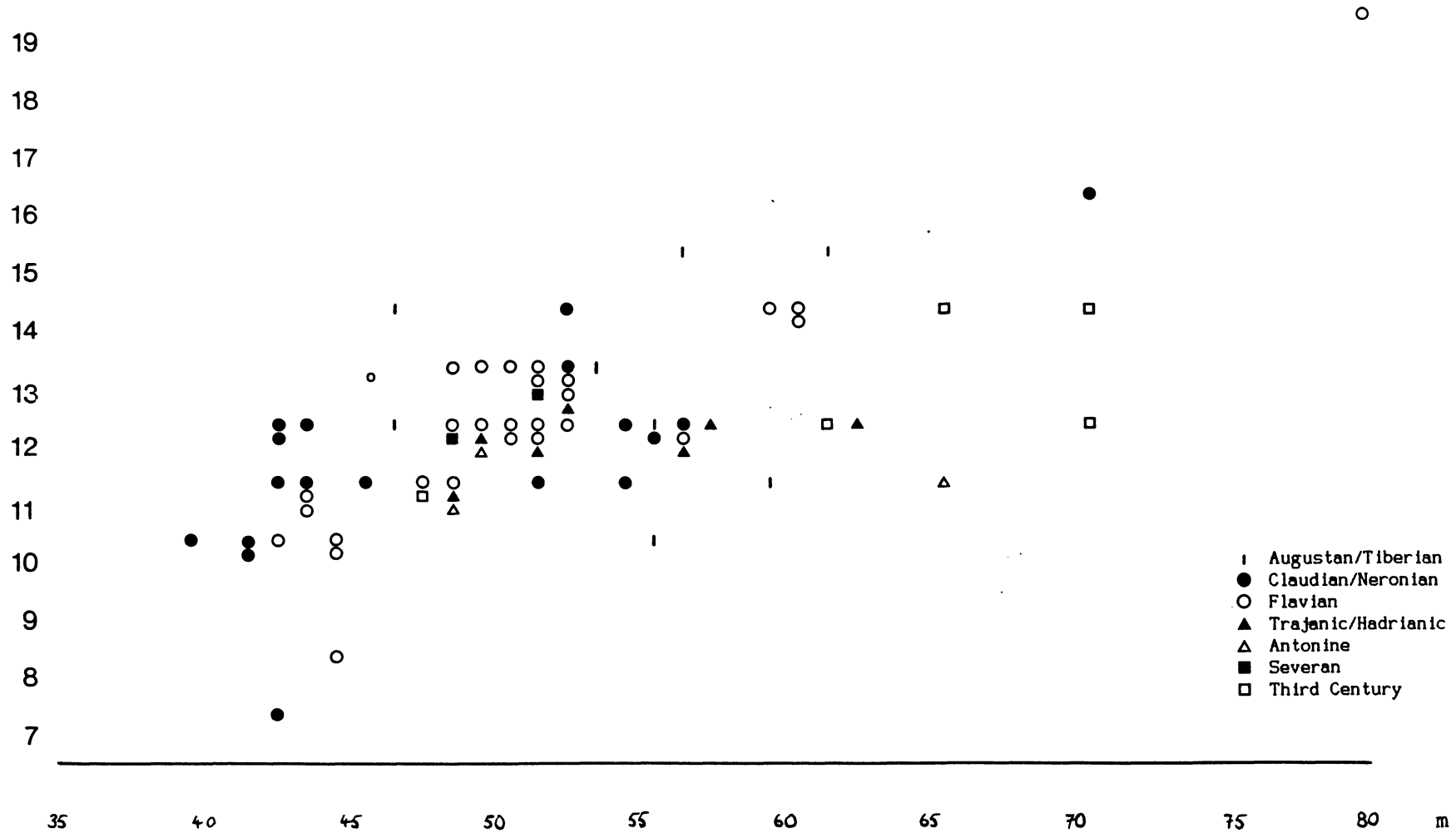


Fig 29 Contubernium Totals and Men's Quarters' Lengths

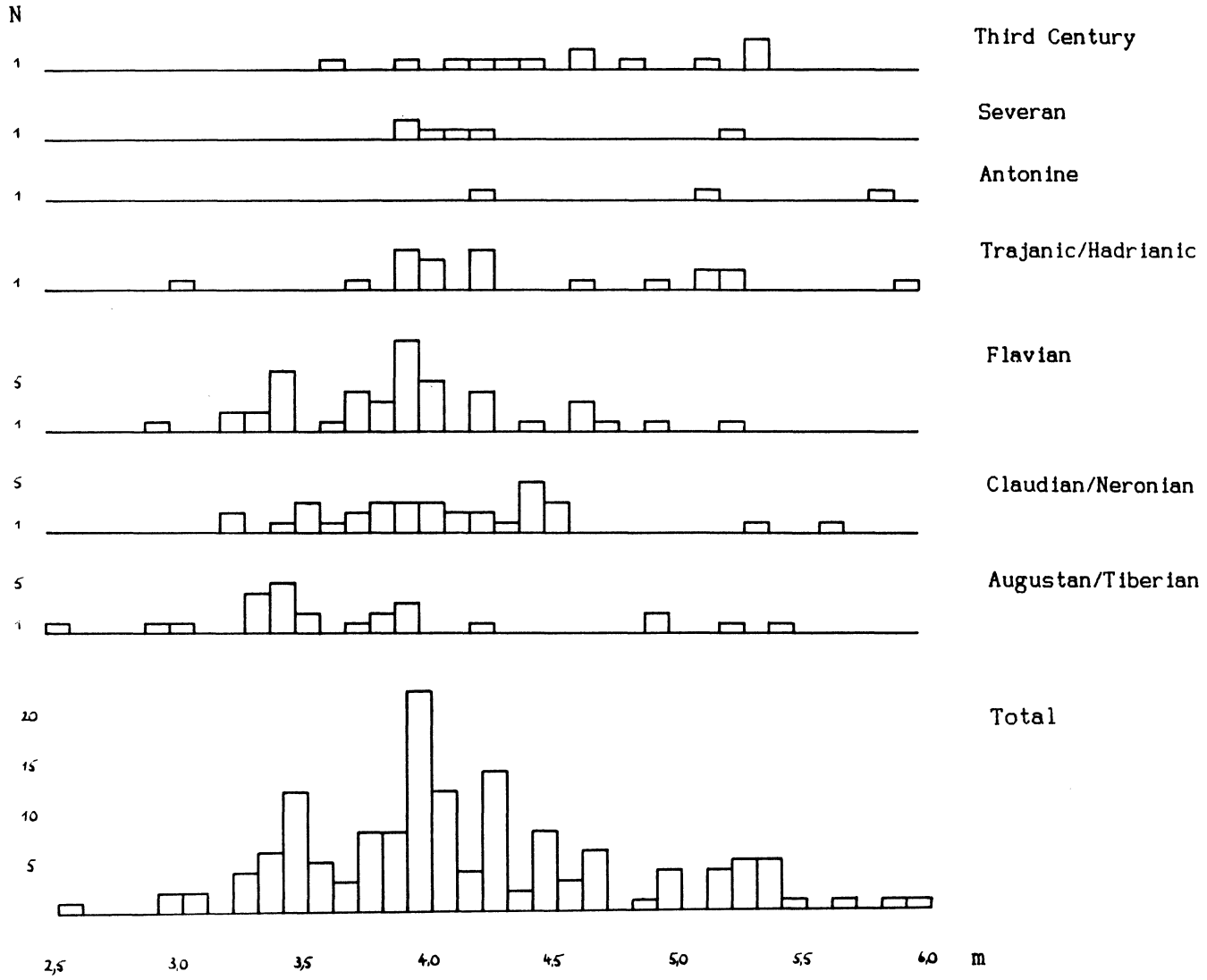


Fig 30 *Contubernium* Spacing

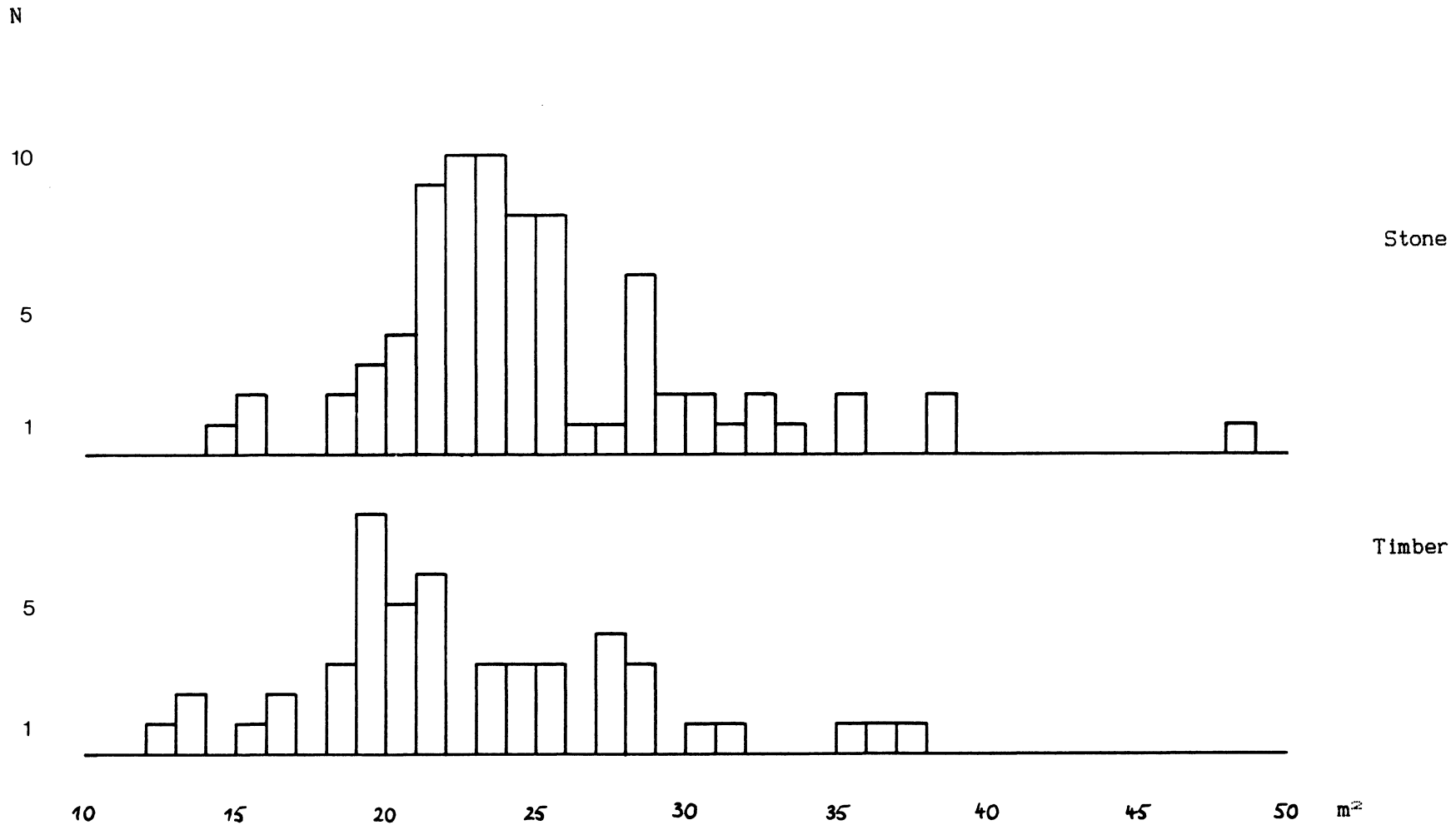


Fig 31 *Contubernium* Living Space (Timber/Stone)

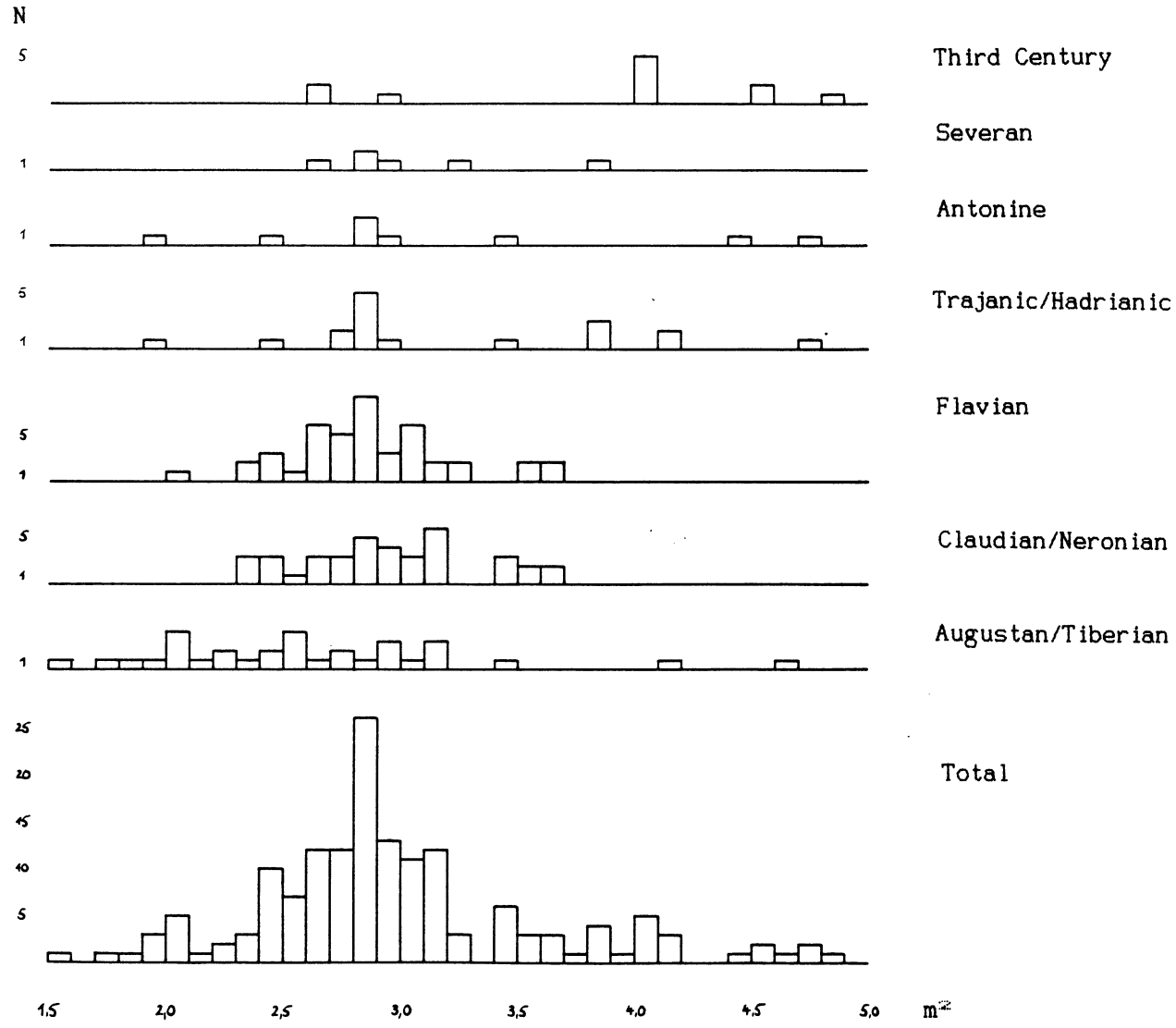


Fig 32 *Contubernium* Living Space per man

Papilio

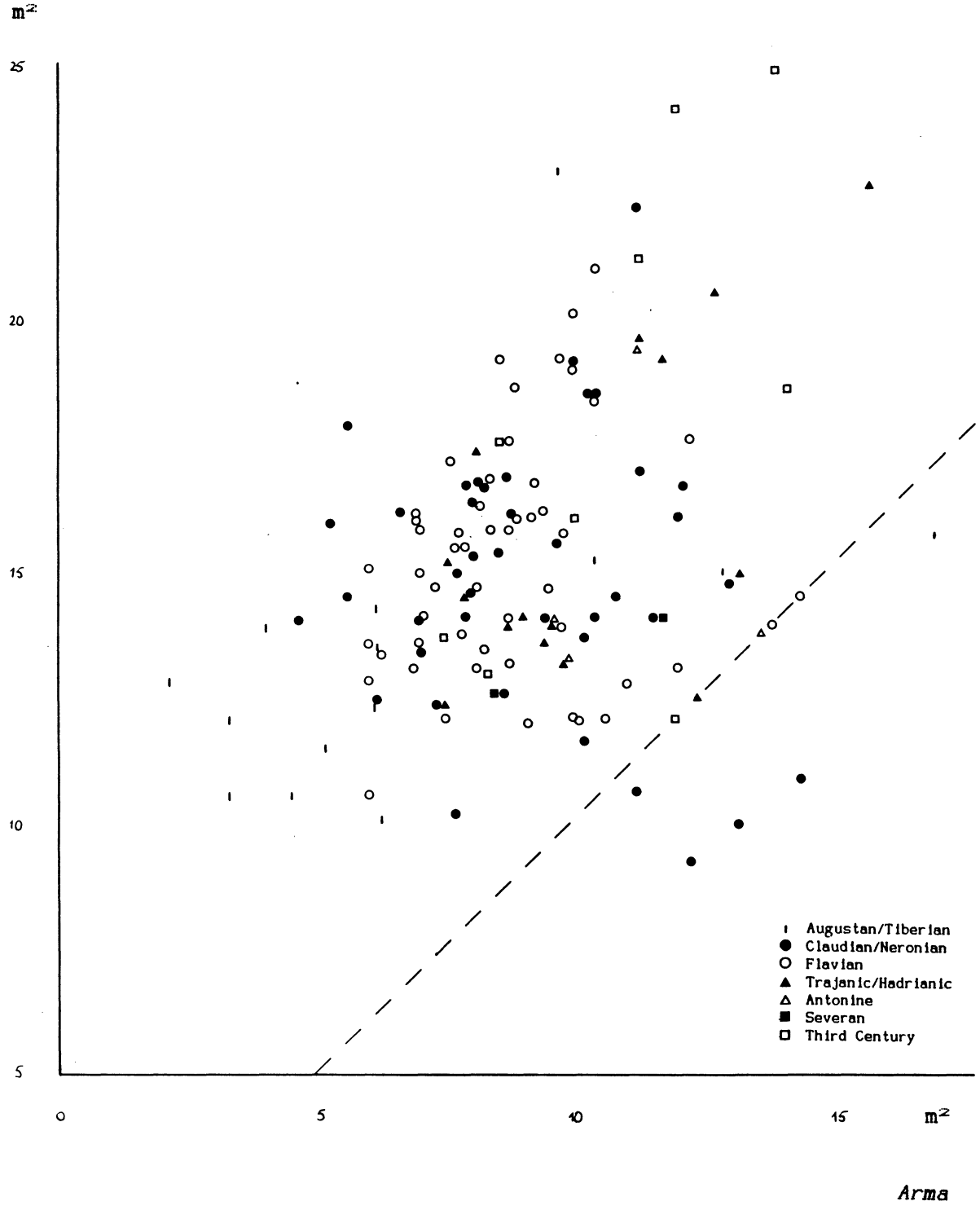


Fig 33 *Papilio/Arma*: Comparative Areas

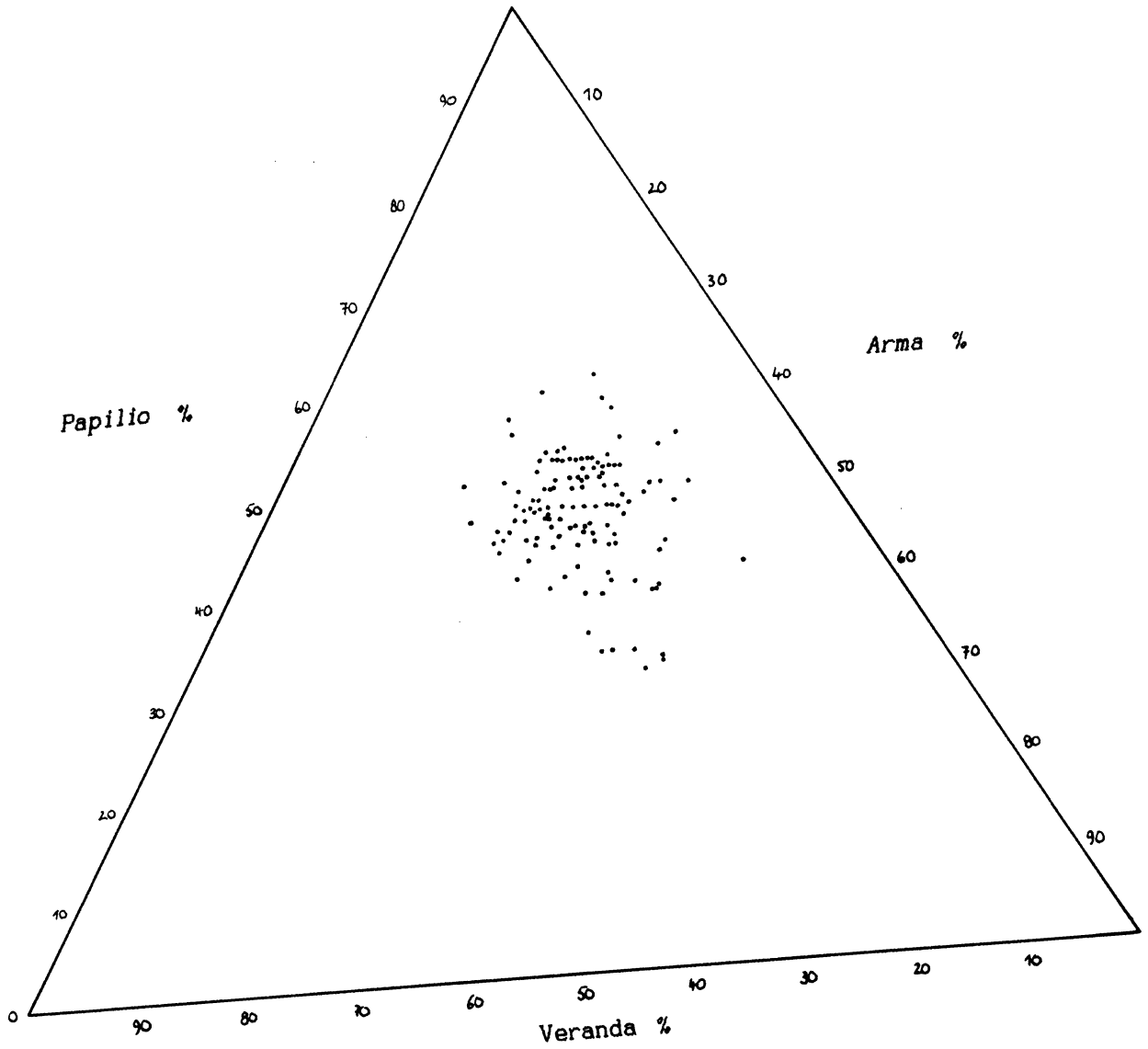


Fig 34 *Papilio/Arma*/Veranda: Comparative Proportions

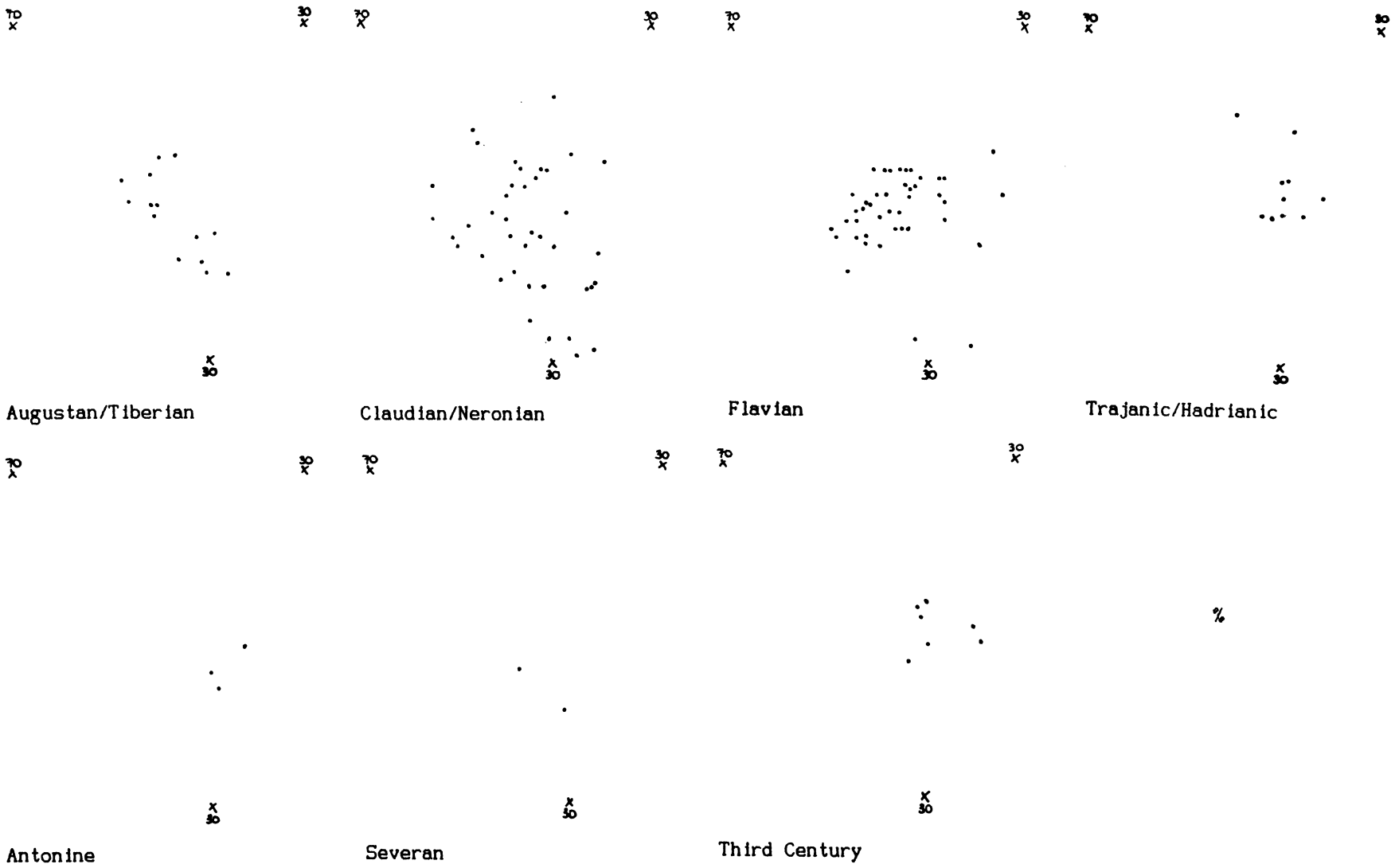


Fig 35 *Papilio/Arma*/Veranda: Comparative Proportions (Periods)

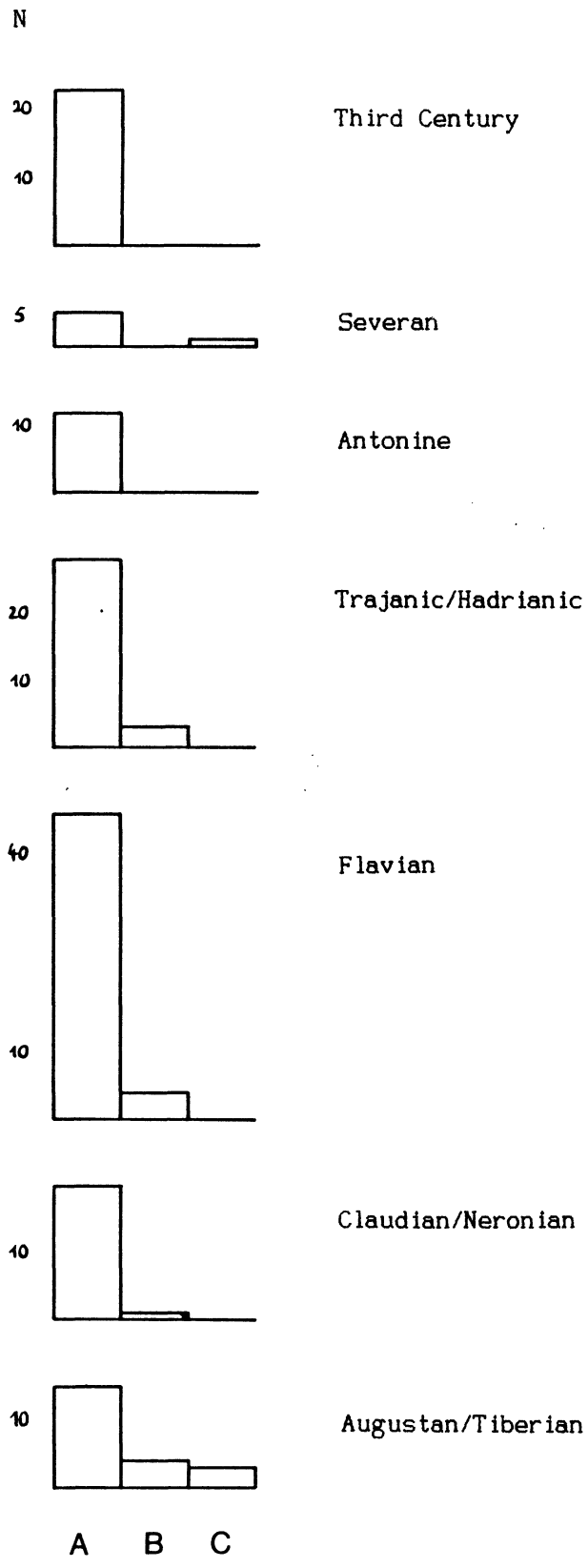


Fig 36 Cohort-Blocks: Barrack Pairing

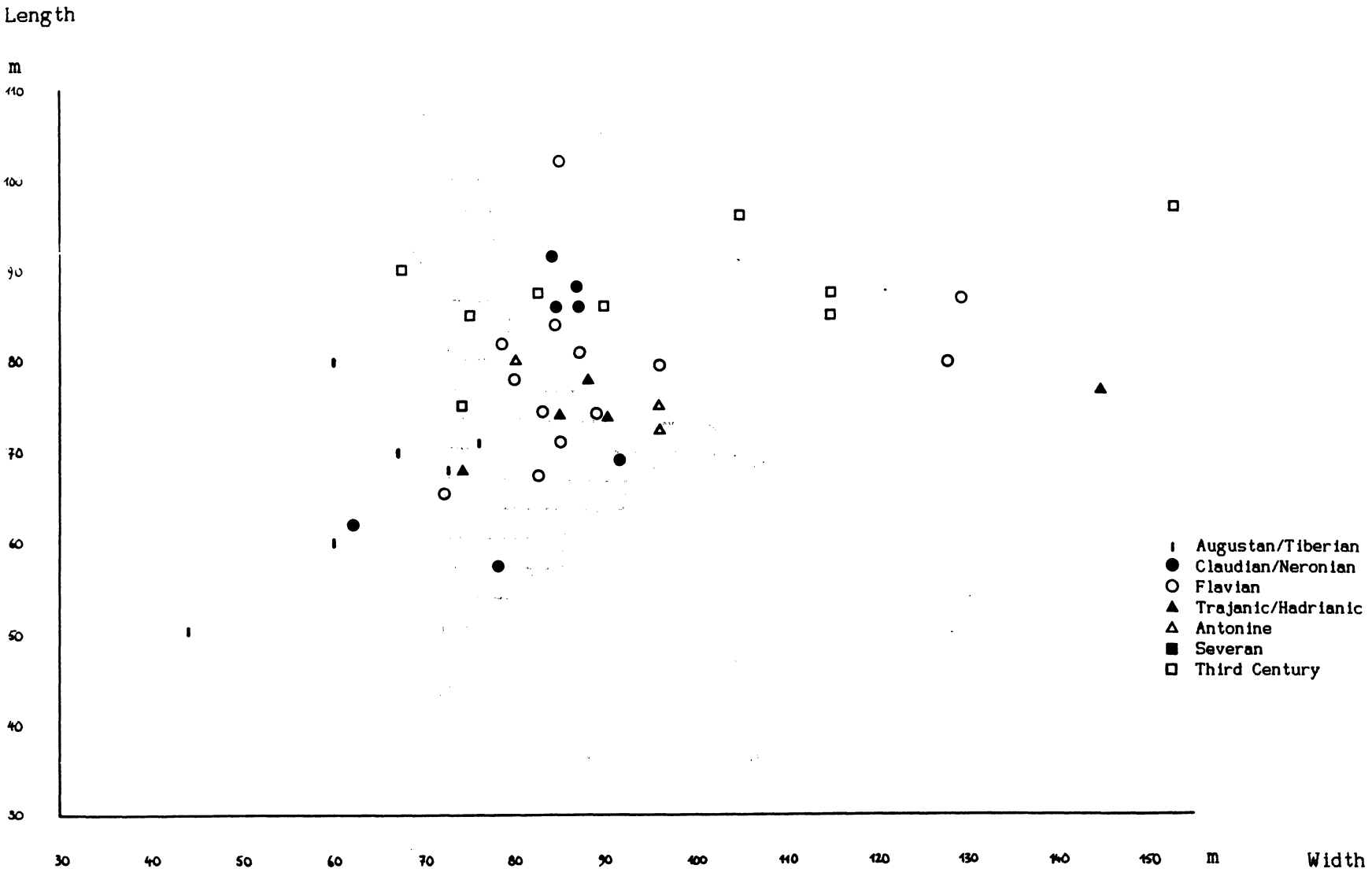


Fig 37 Cohort-Blocks: Dimensions

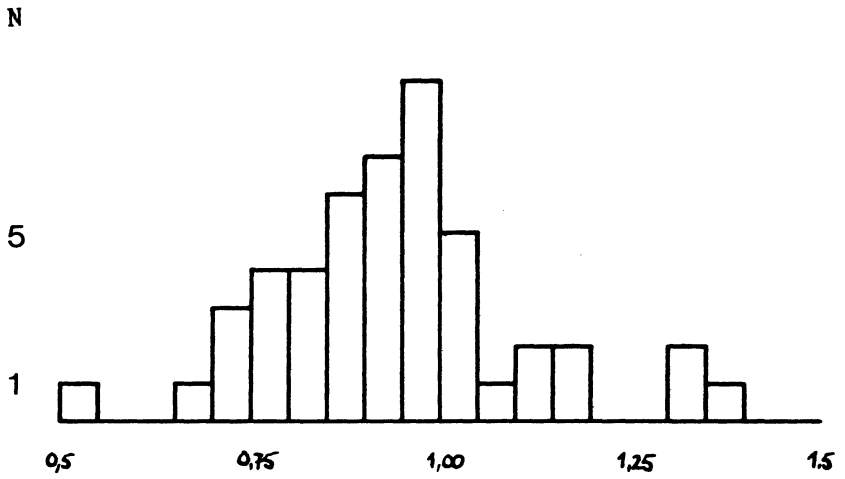


Fig 38 Cohort-Blocks: Proportions

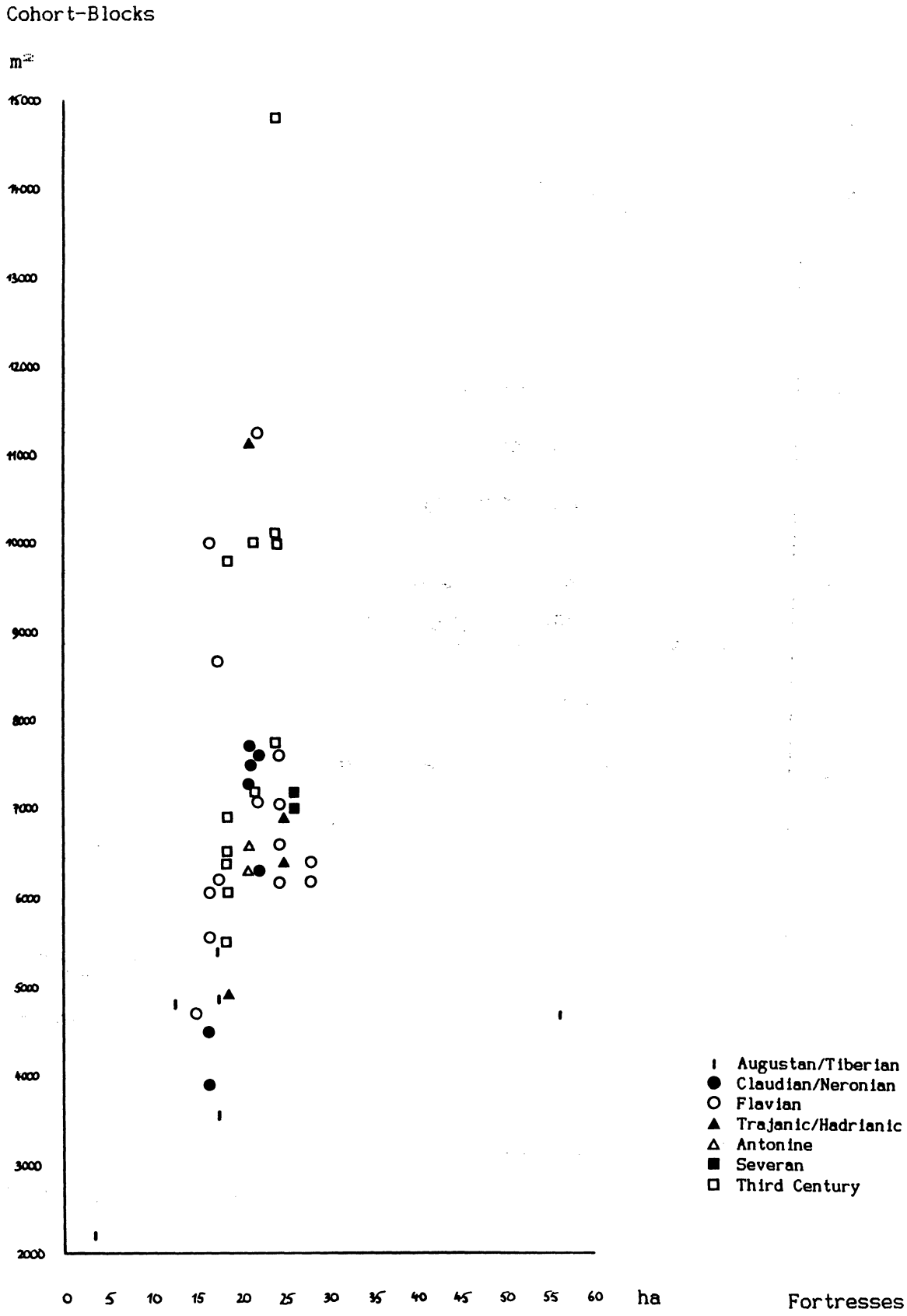


Fig 39 Cohort-Blocks and Fortresses: Comparative Areas

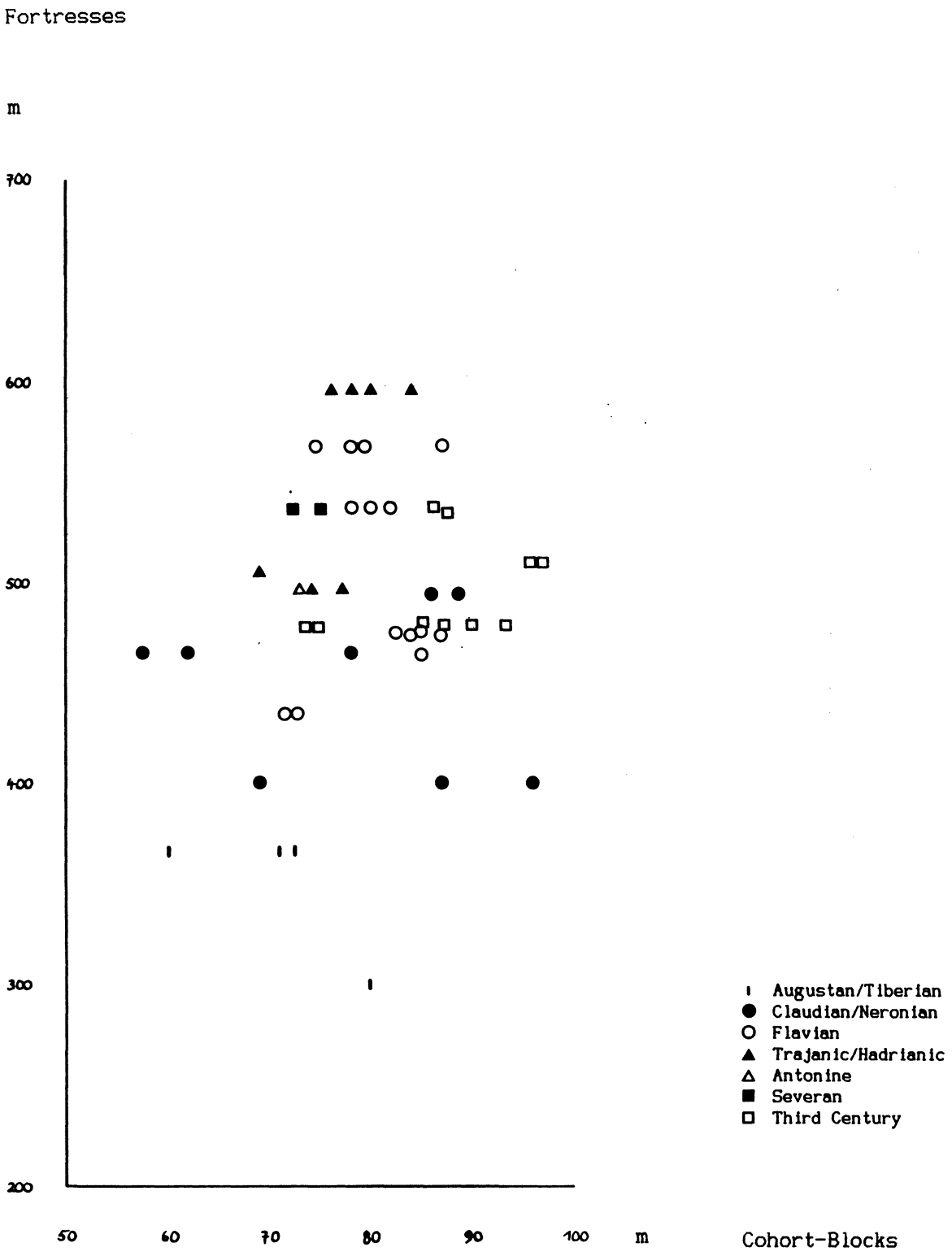


Fig 40 Cohort-Blocks and Fortresses: Comparative Lengths

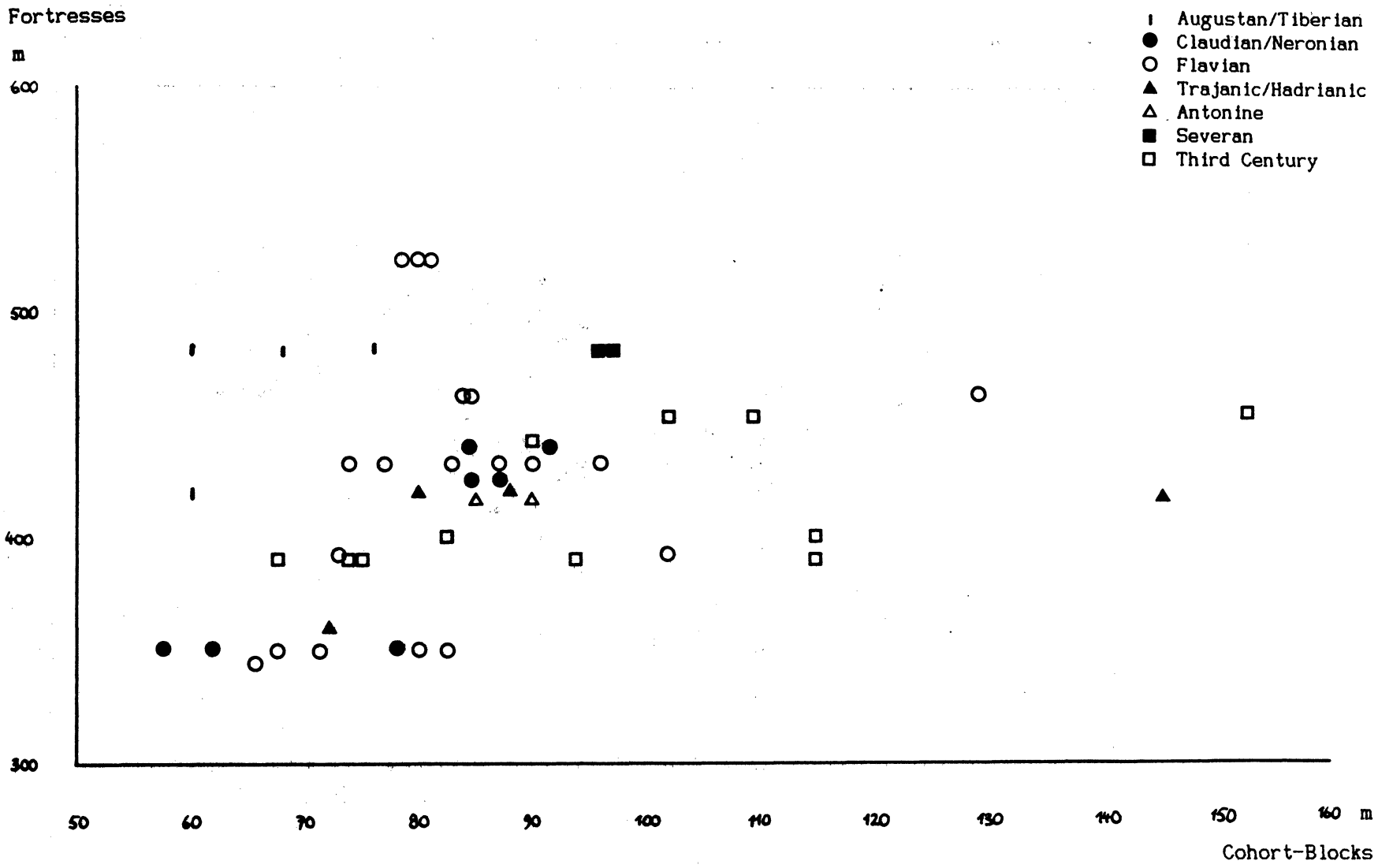


Fig 41 Cohort-Blocks and Fortresses: Comparative Widths

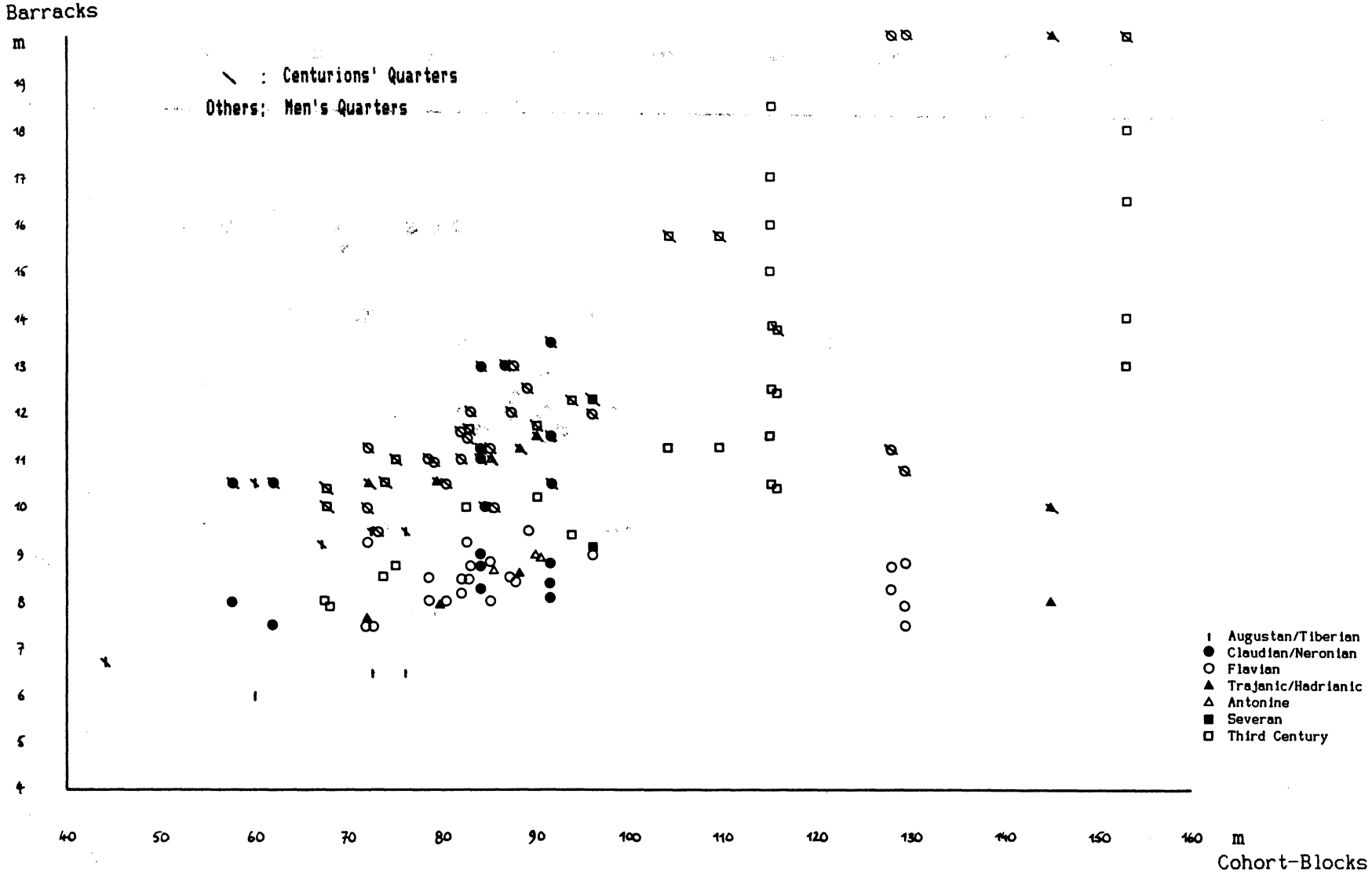


Fig 42 Cohort-Blocks and Barracks: Comparative Widths

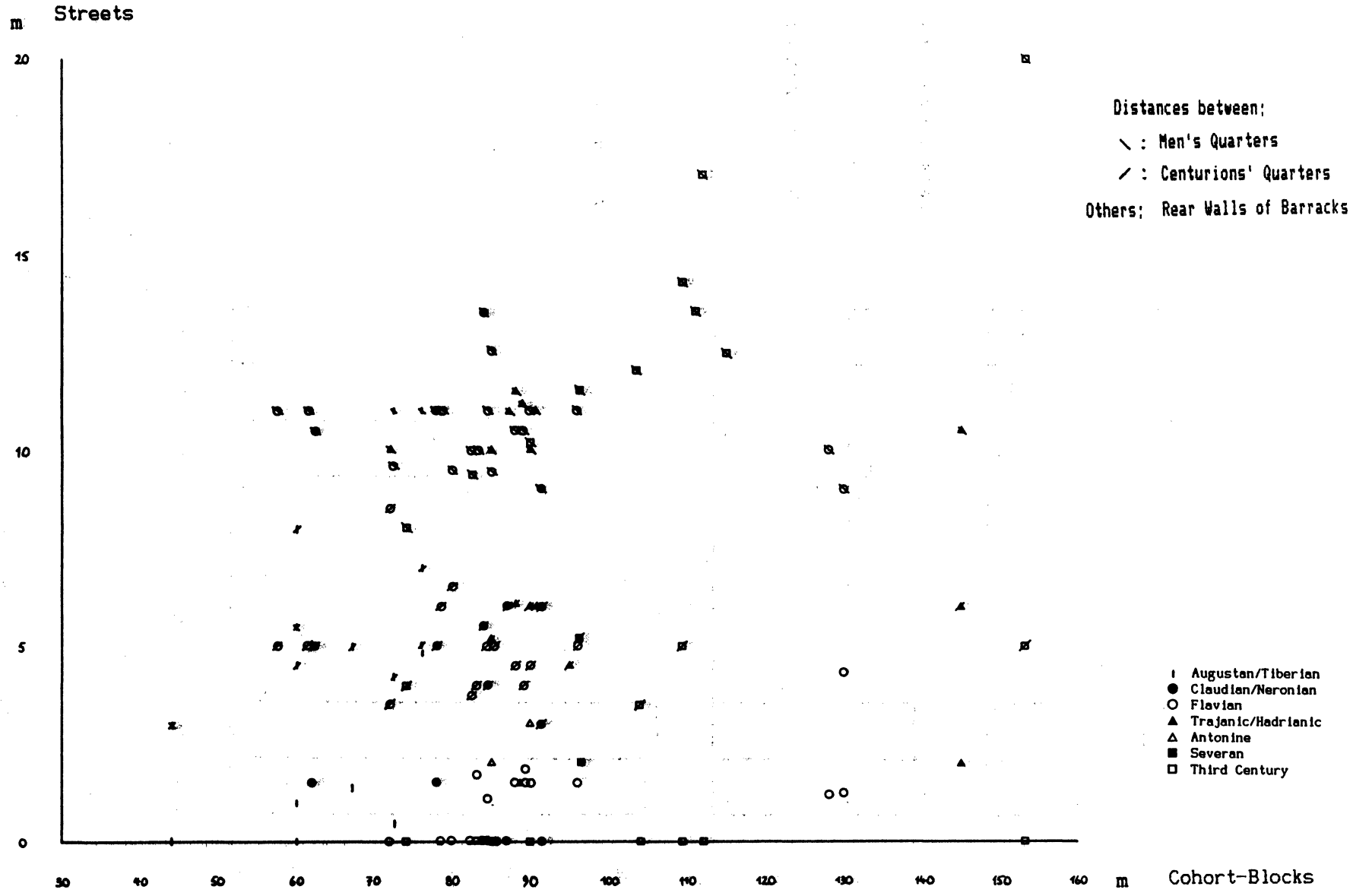


Fig 43 Cohort-Blocks and Streets: Comparative Widths

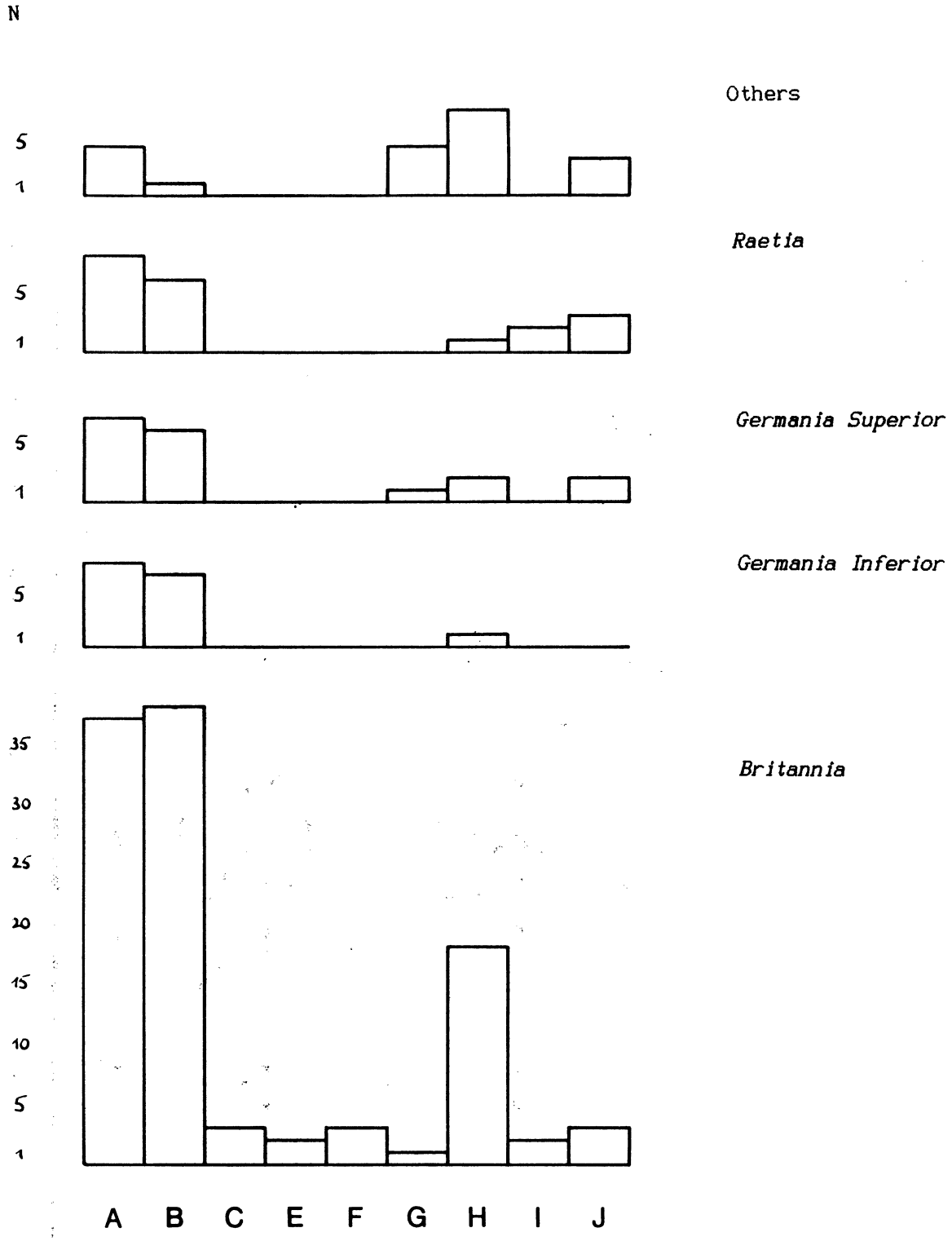


Fig 44 Building Types: Barracks

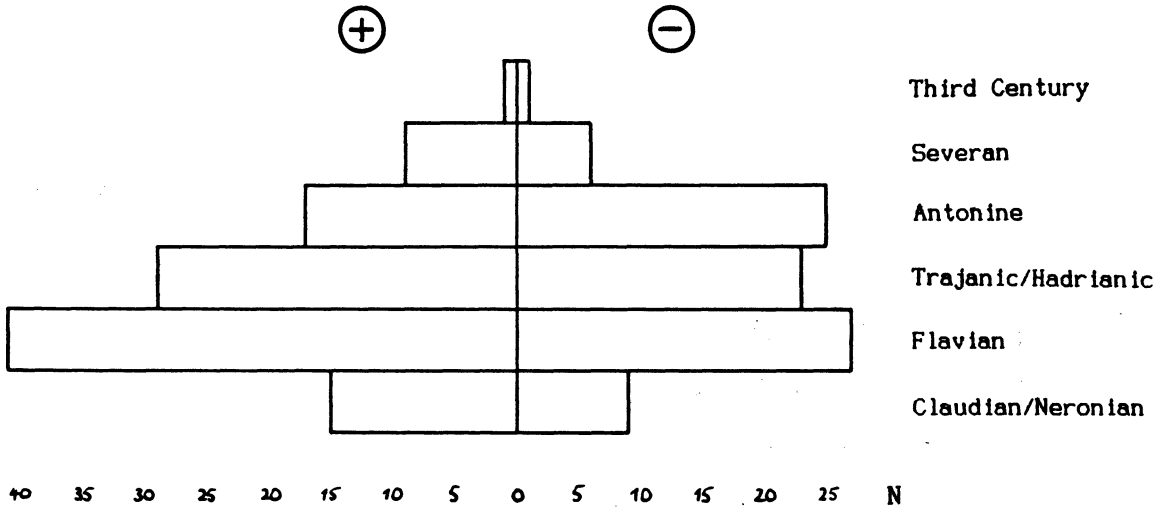


Fig 45 Barrack Porticus: Presence and Absence

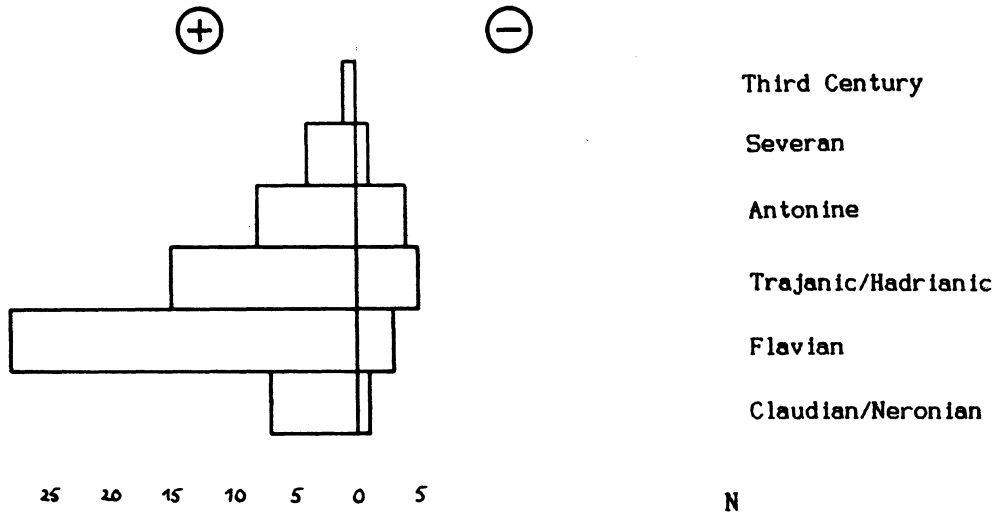


Fig 46 Barrack Porticus (Building Type A)

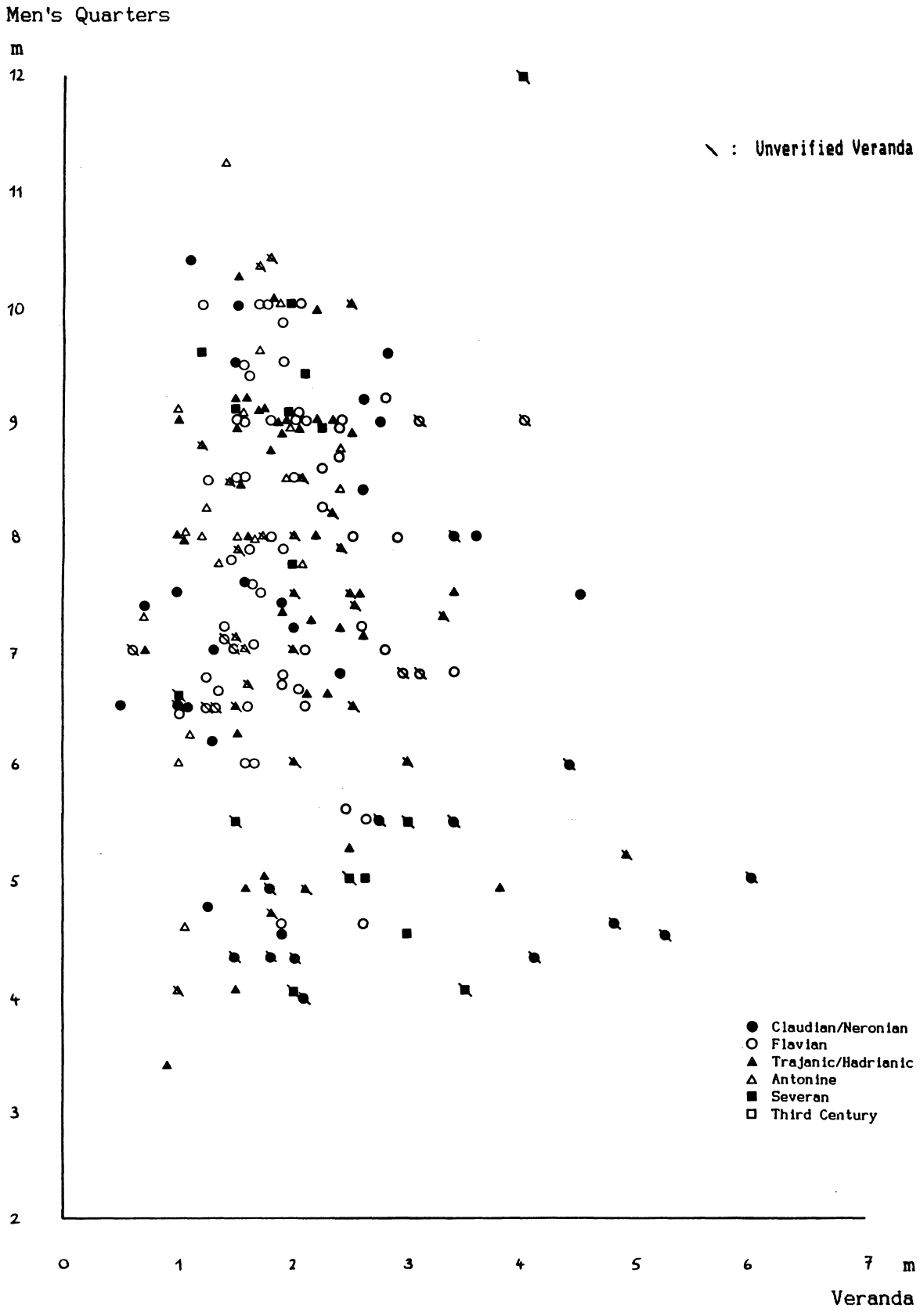


Fig 47 Men's Quarters and Veranda Space (Type A): Comparative Widths

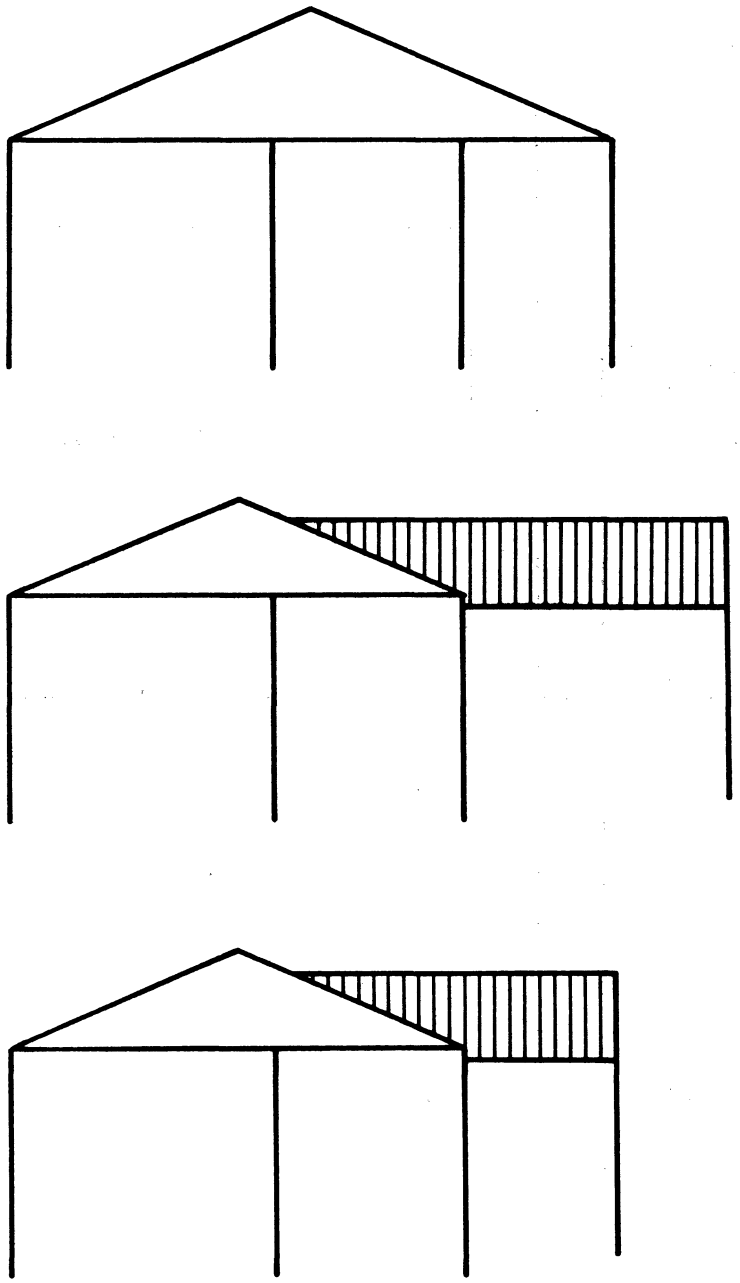


Fig 48 Building Type A: Comparative Rooflines

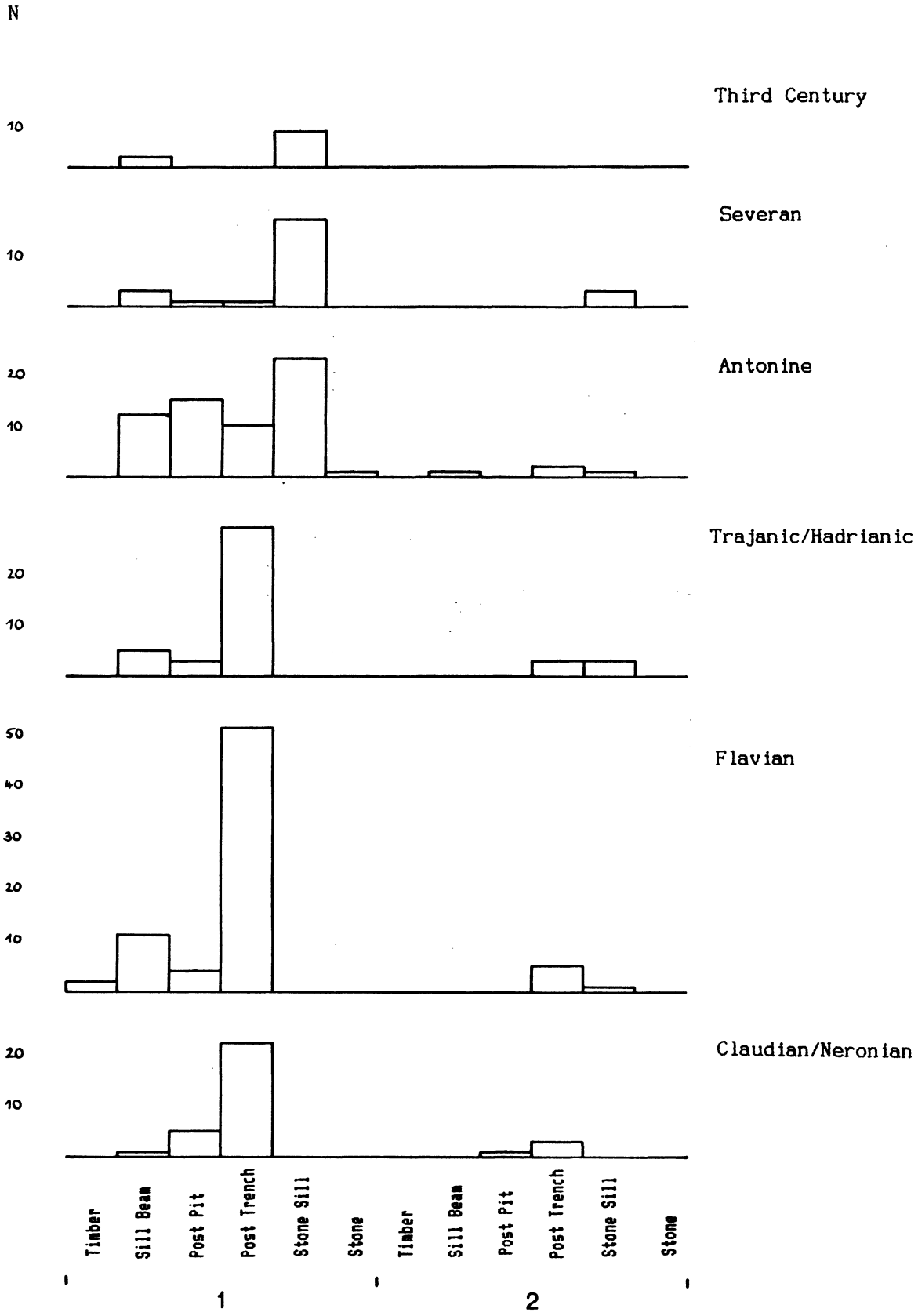


Fig 49 Rear Wall Construction

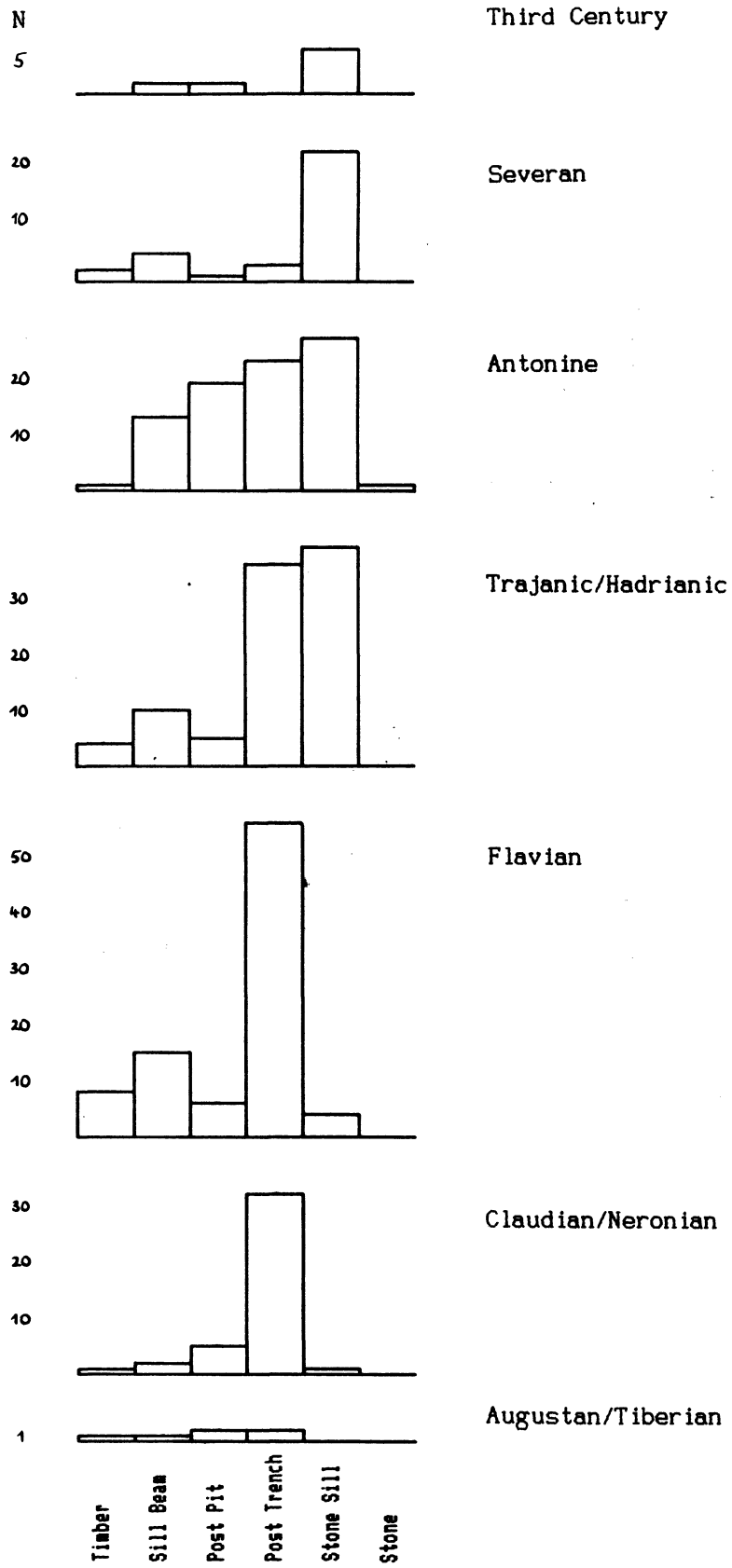


Fig 50 Construction Methods

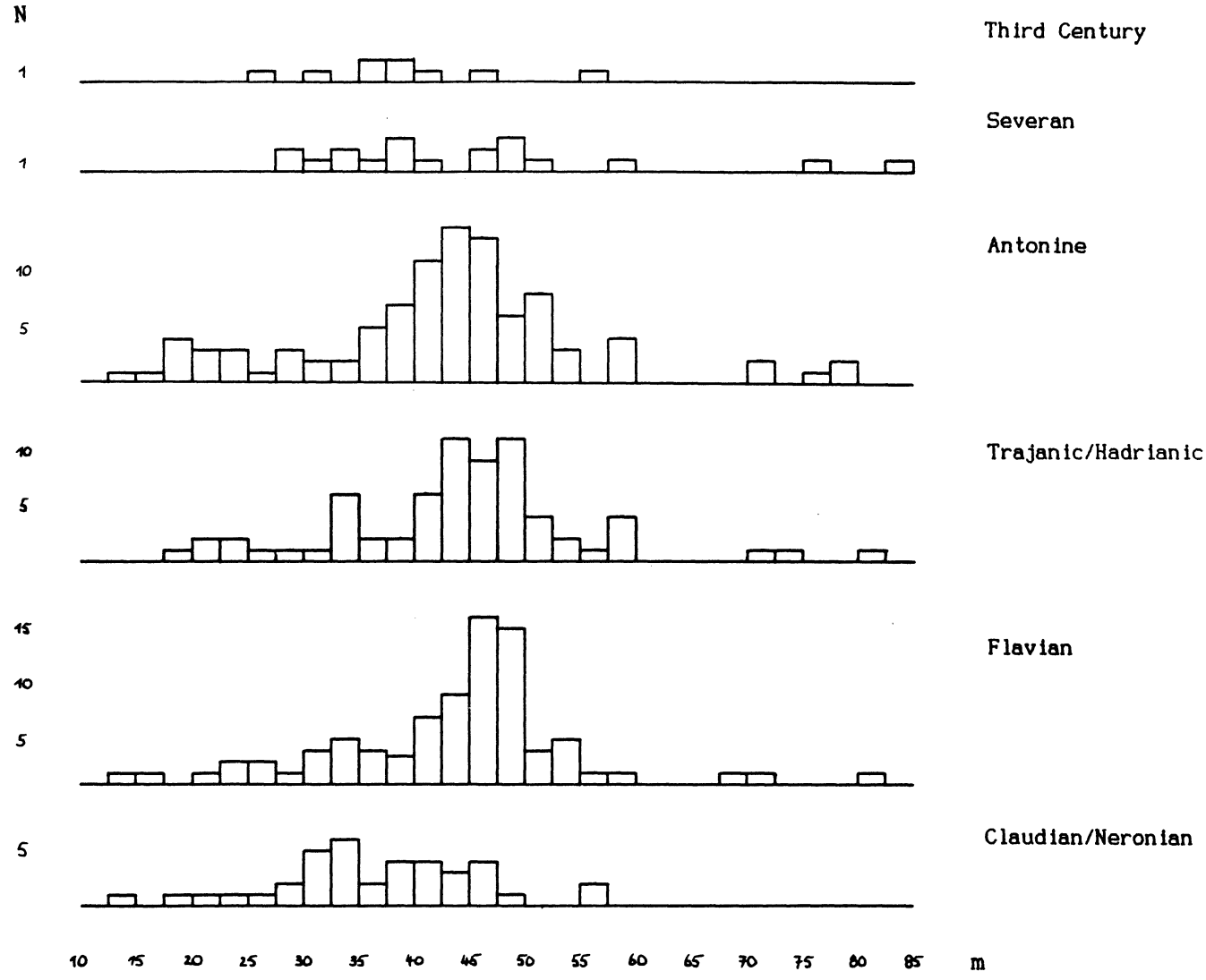


Fig 51 Barrack Lengths

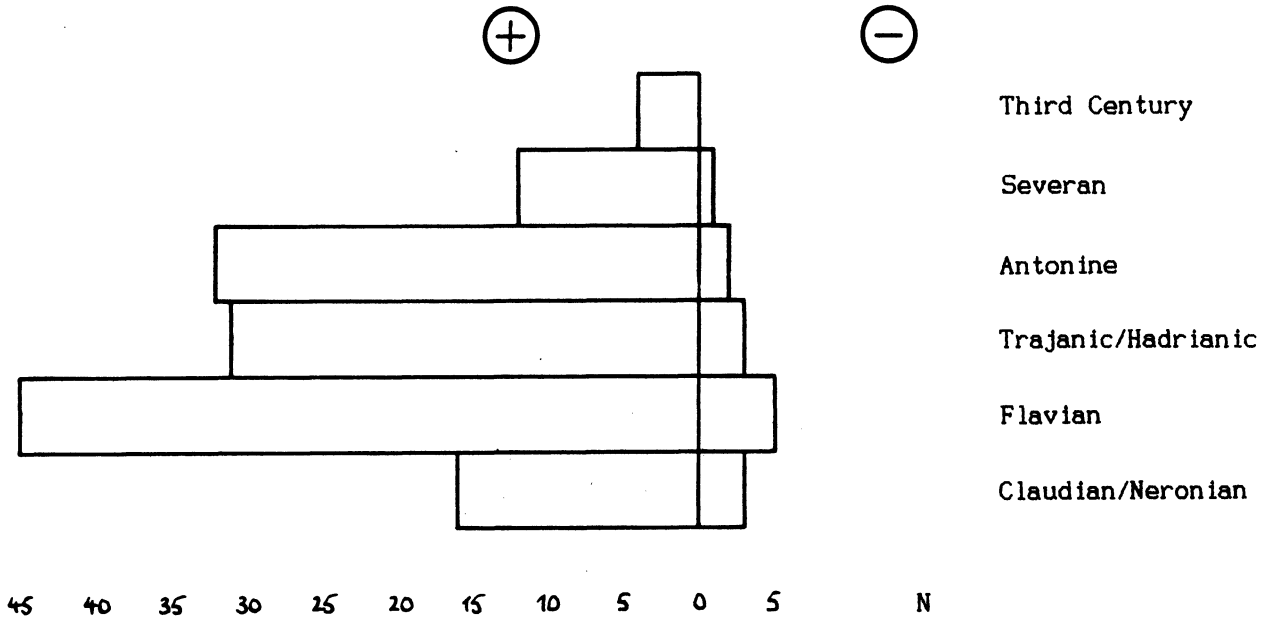


Fig 52 Officers' Quarters: Integral and Non-integral

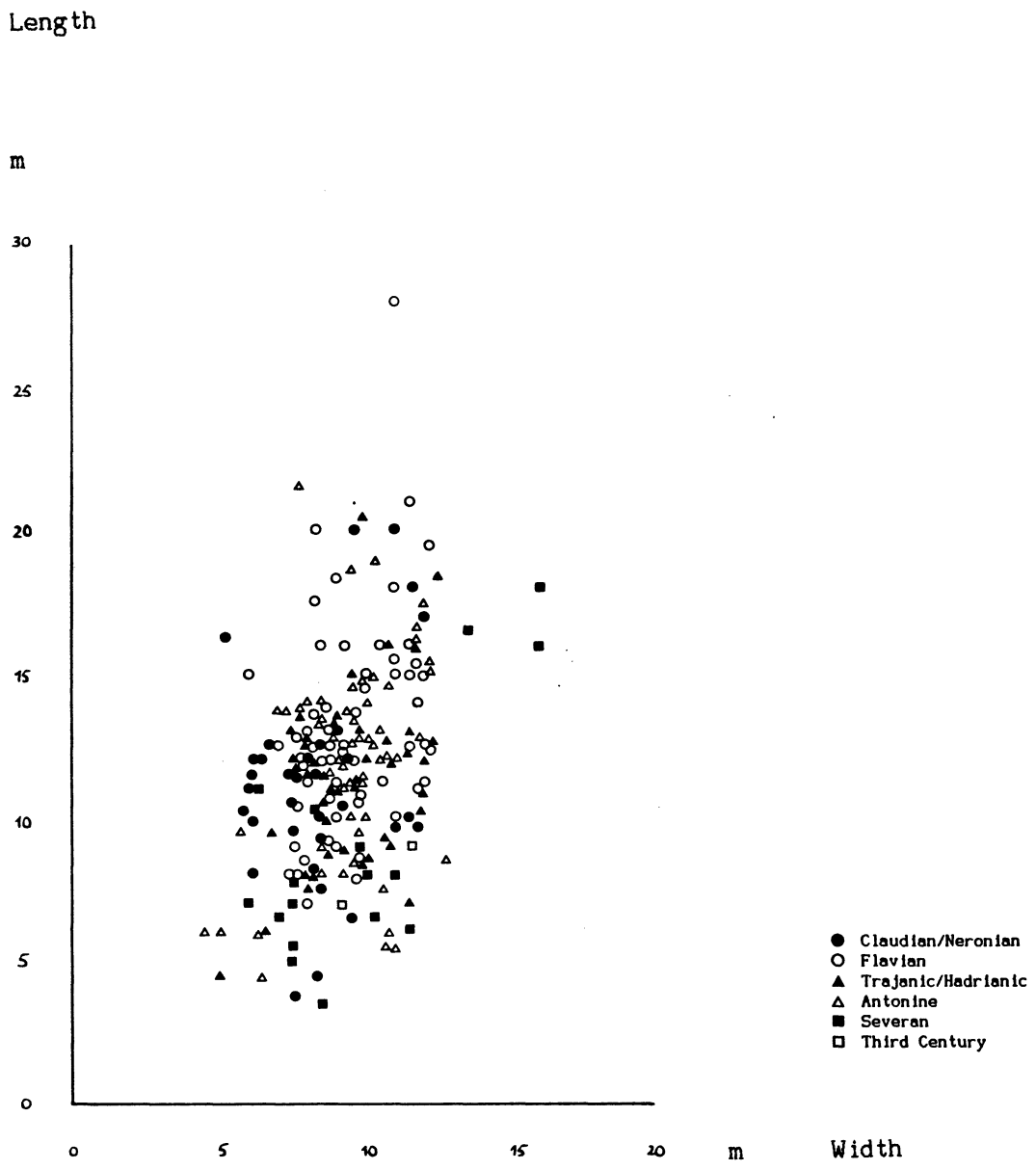


Fig 53 Officers' Quarters: Dimensions

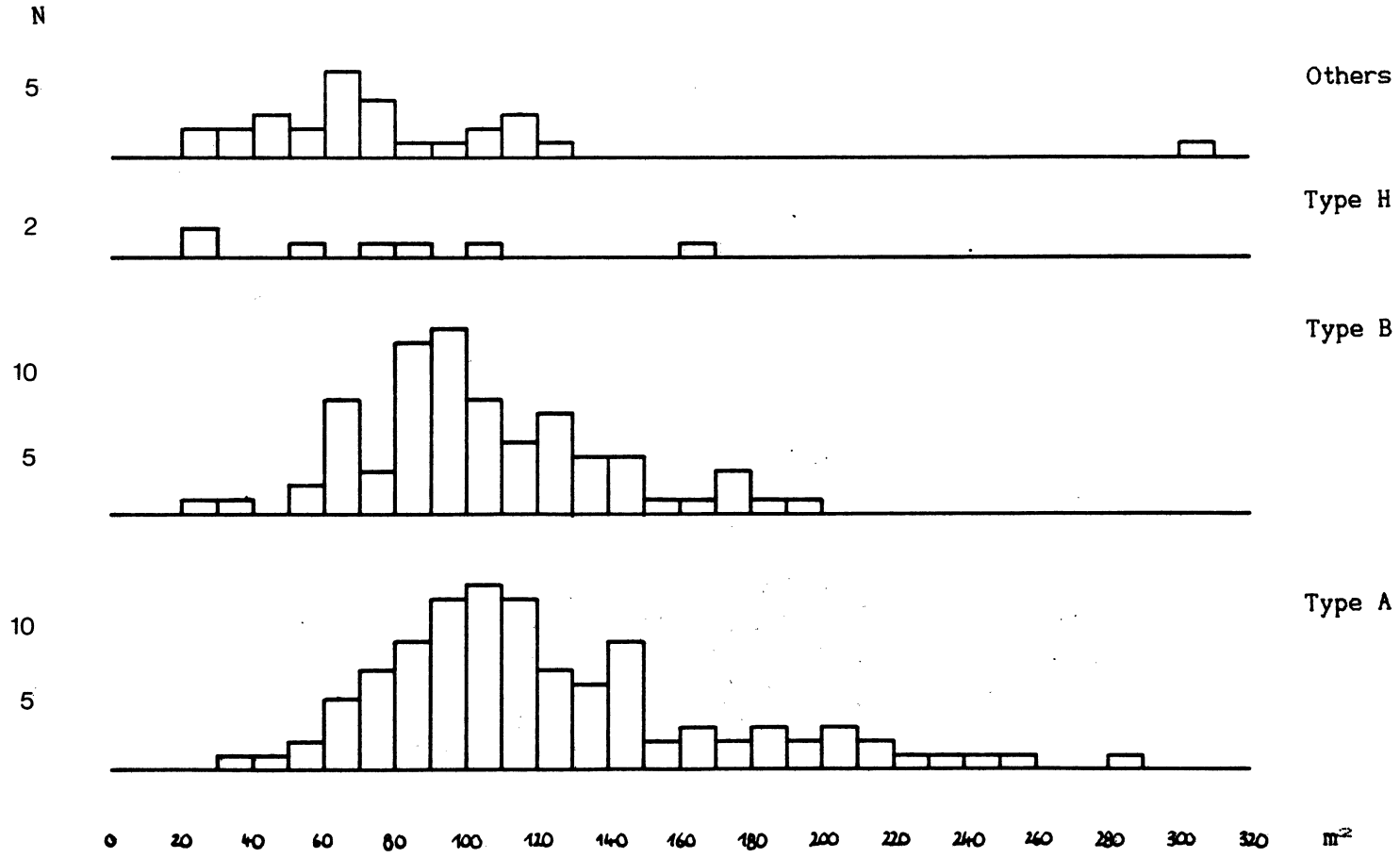


Fig 54 Officers' Quarters: Areas according to different Building Types

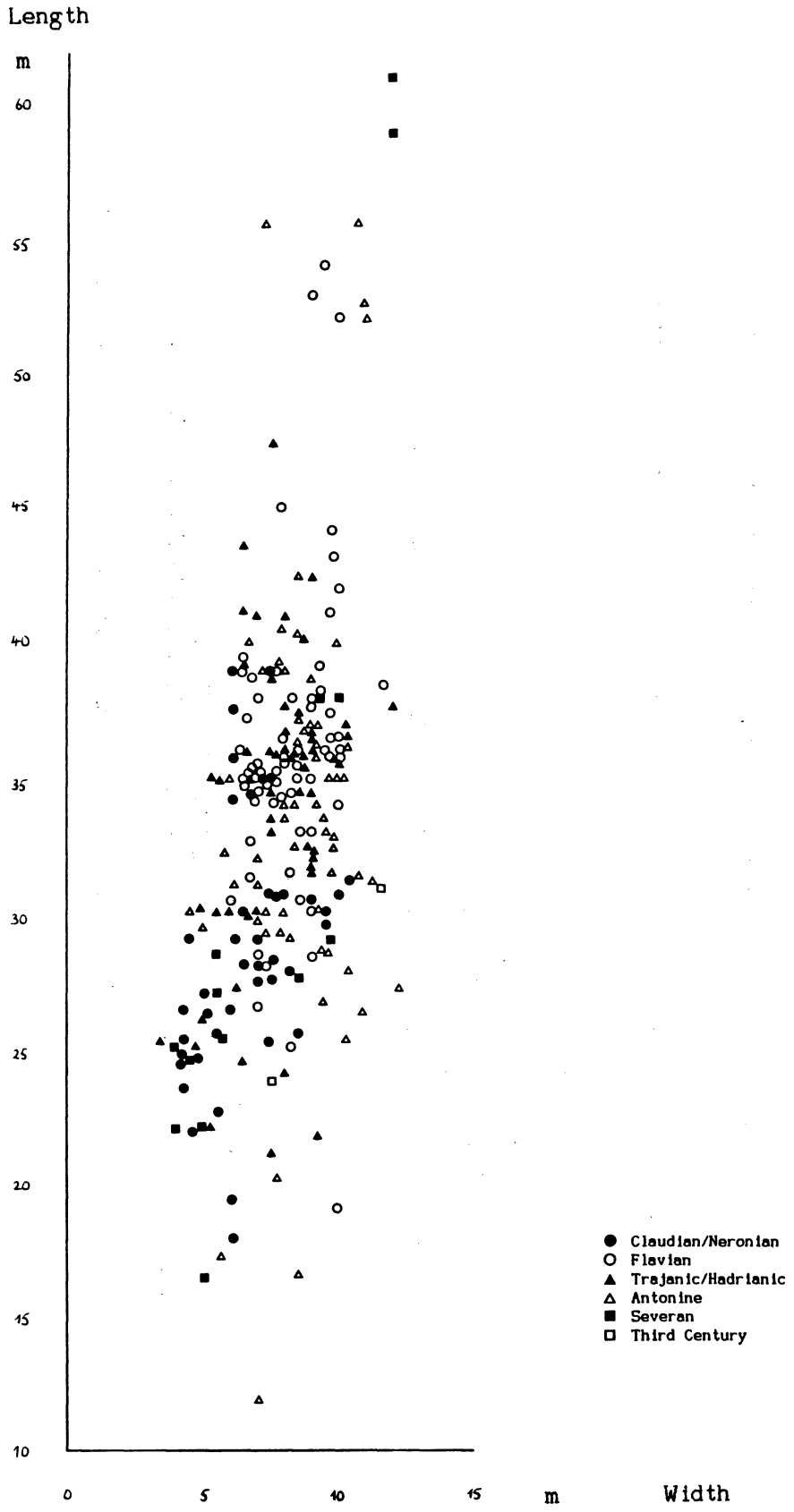


Fig 55 Men's Quarters: Dimensions

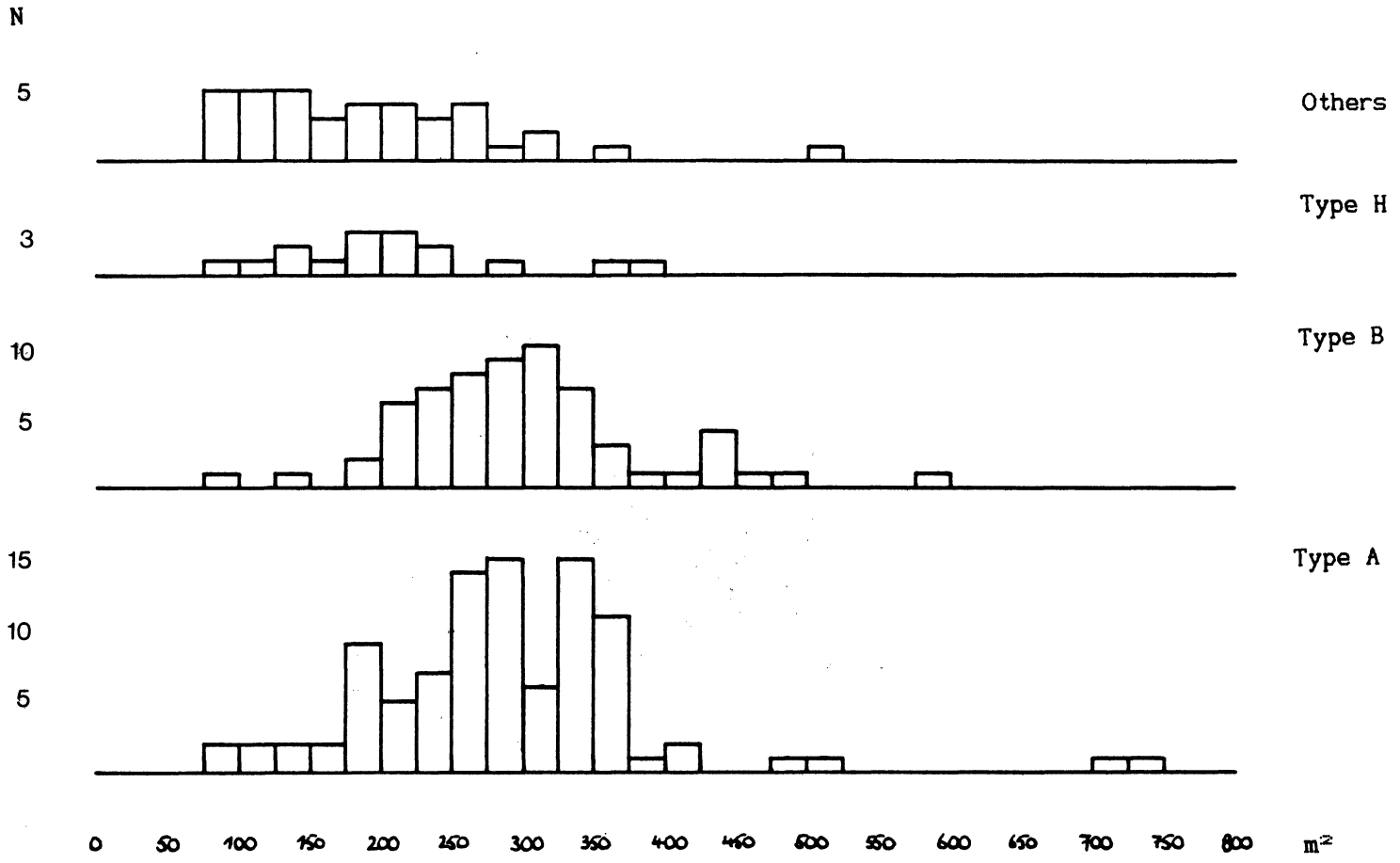


Fig 56 Men's Quarters: Areas according to different Building Types

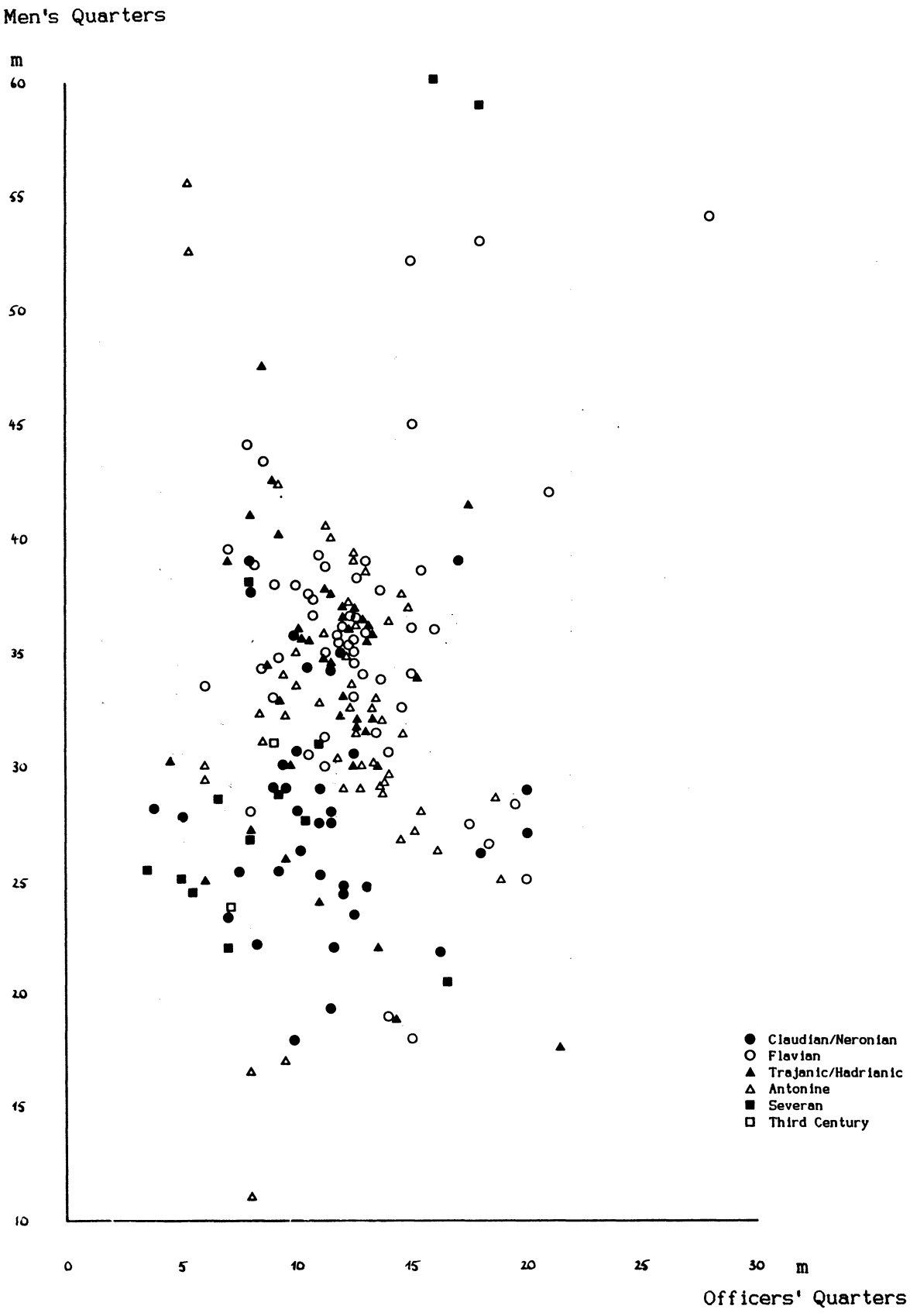


Fig 57 Officers' and Men's Quarters: Comparative Lengths

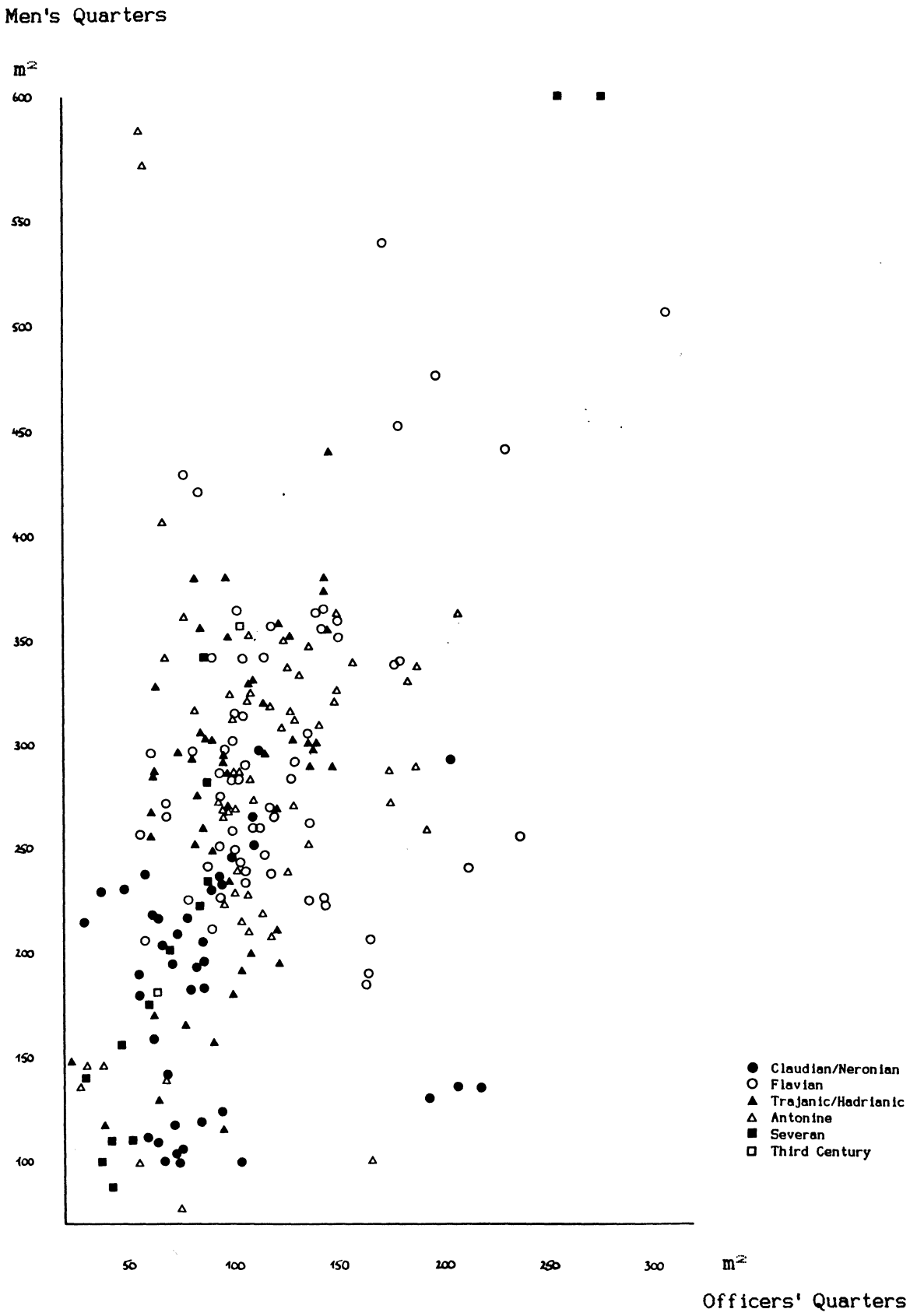


Fig 58 Officers' and Men's Quarters: Comparative Areas

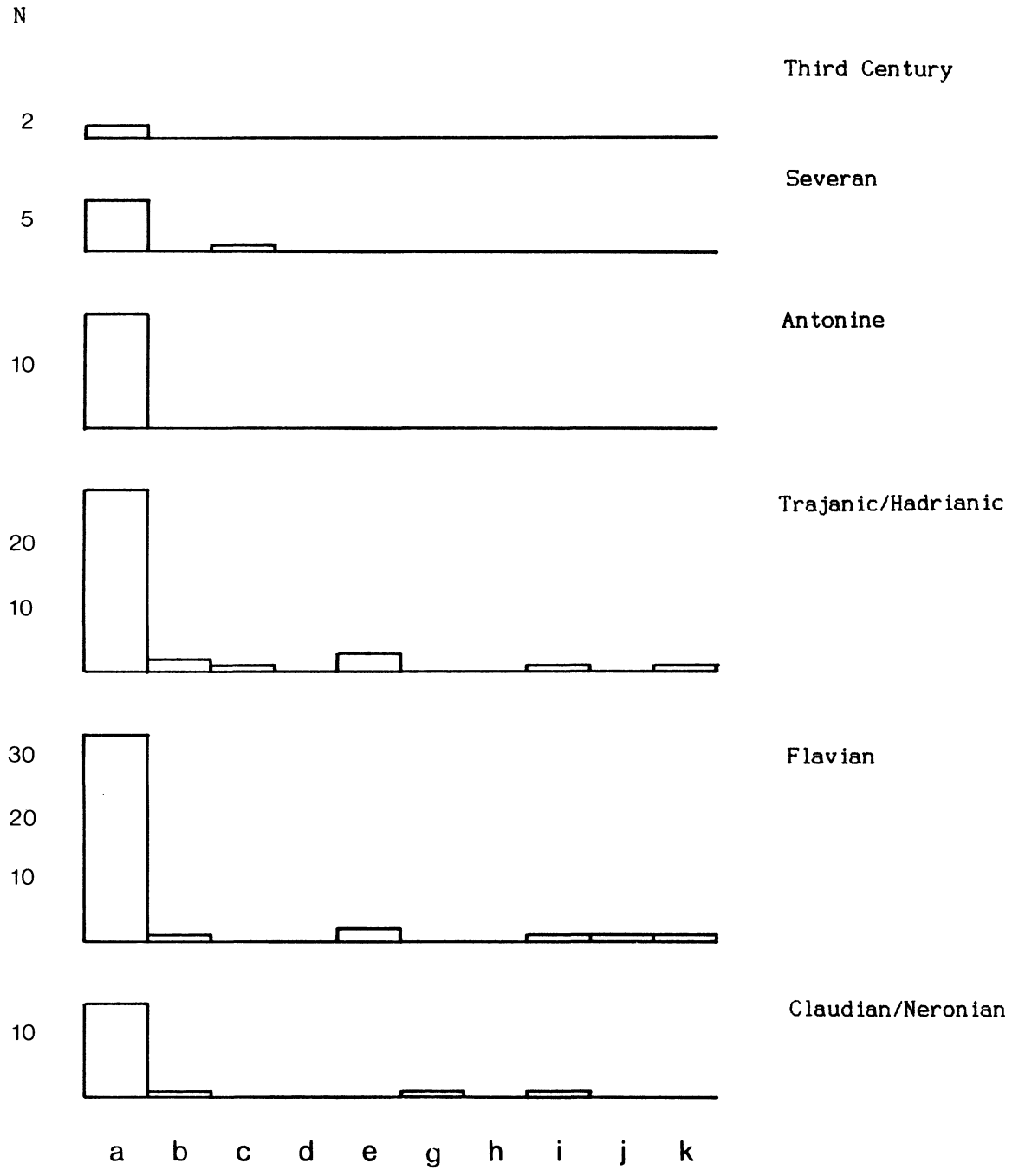


Fig 59 Special First *Contubernia*: Types

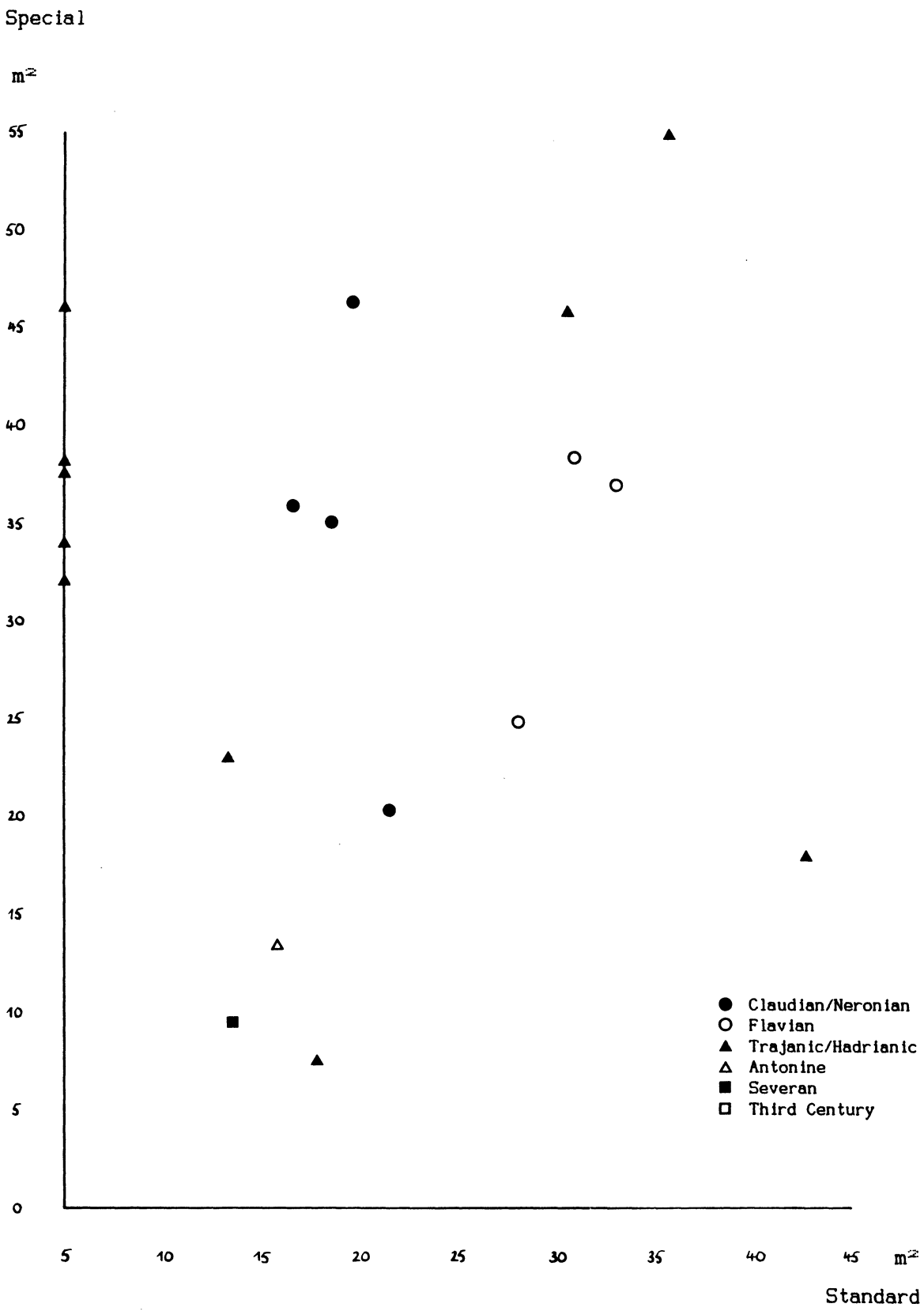


Fig 60 Special First and Standard *Contubernia*: Comparative Areas

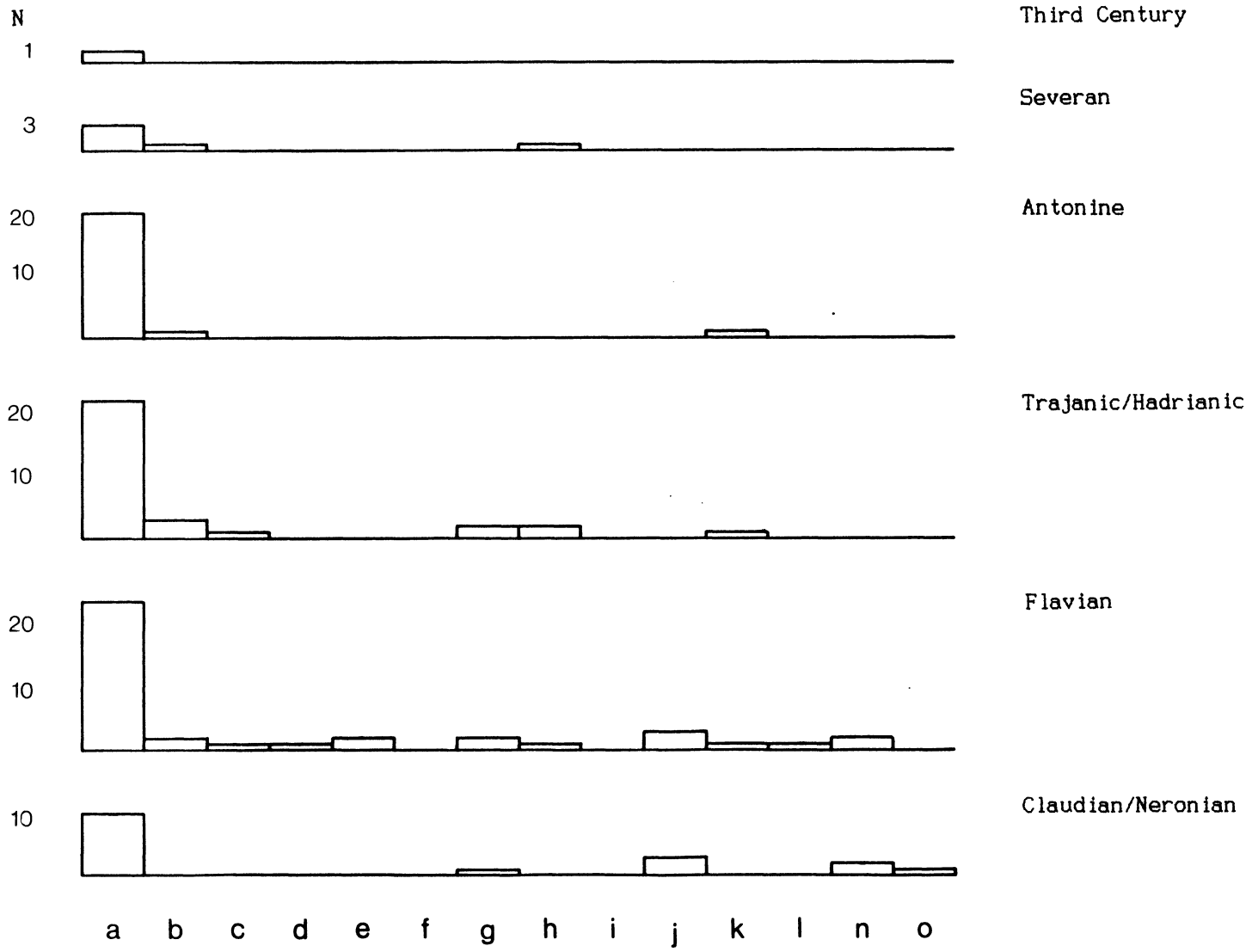


Fig 61 Special End *Contubernia*: Types

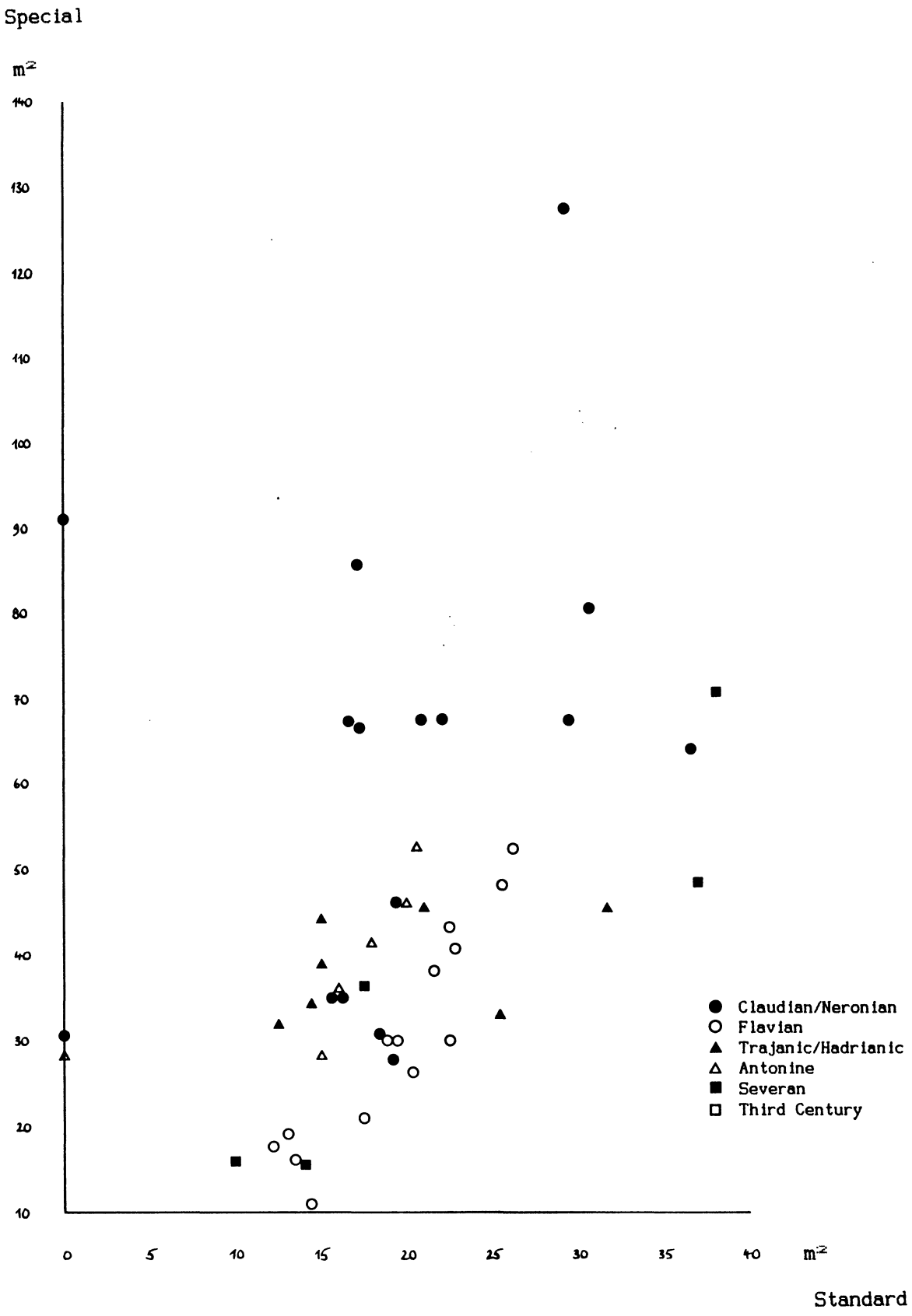


Fig 62 Special End and Standard *Contubernia*: Comparative Areas

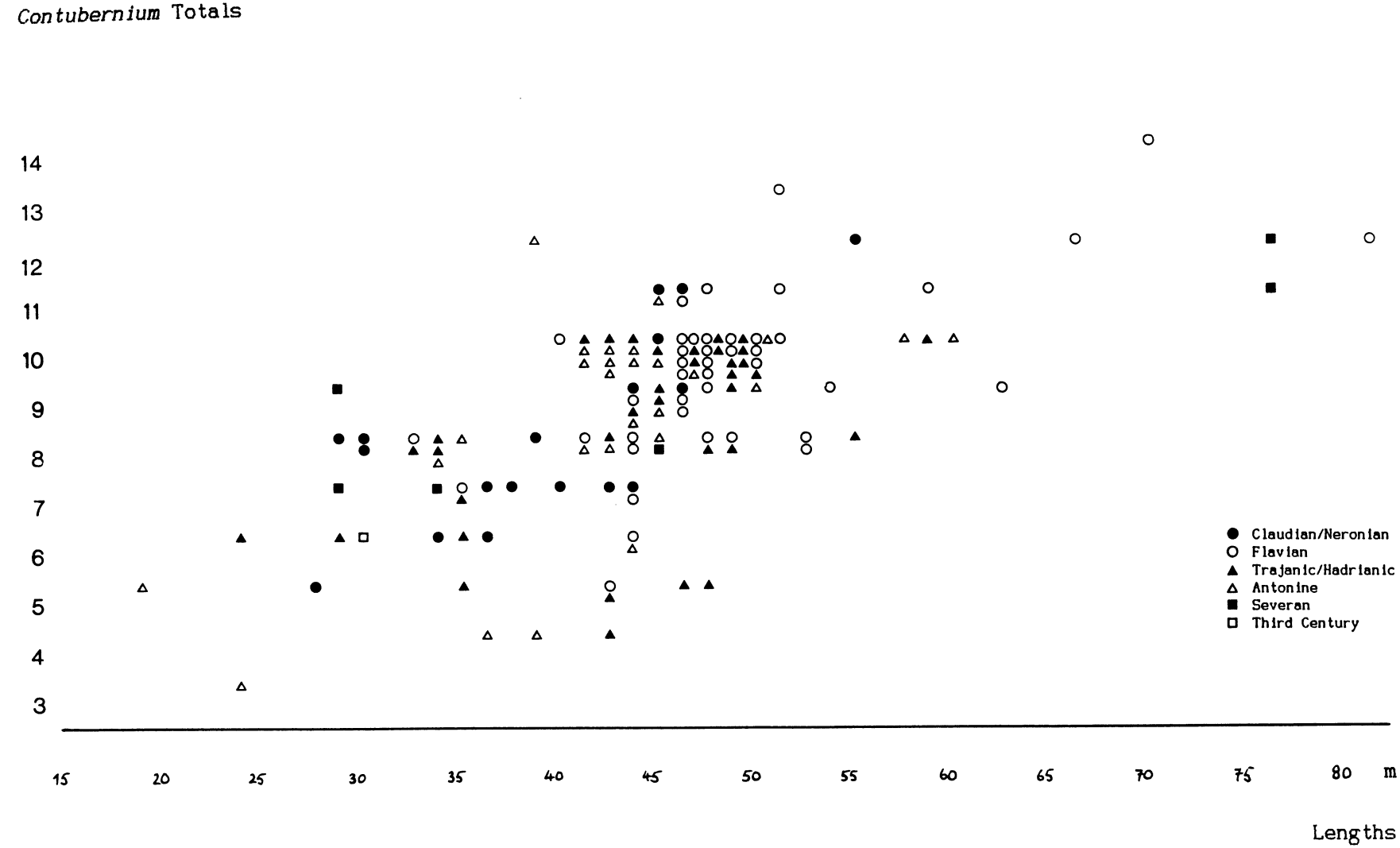


Fig 63 *Contubernium* Totals and Barrack Lengths

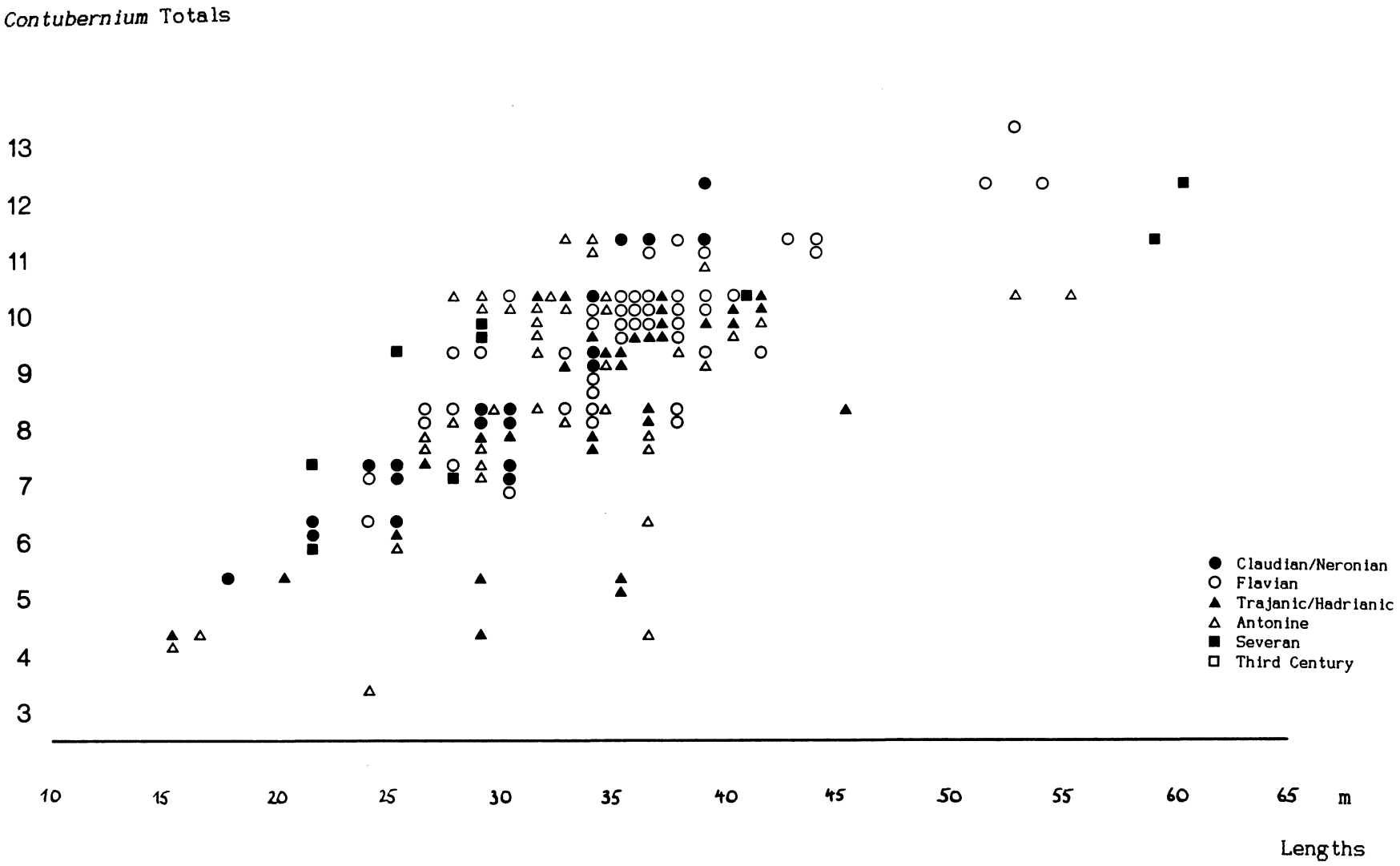


Fig 64 *Contubernium* Totals and Men's Quarters' Lengths

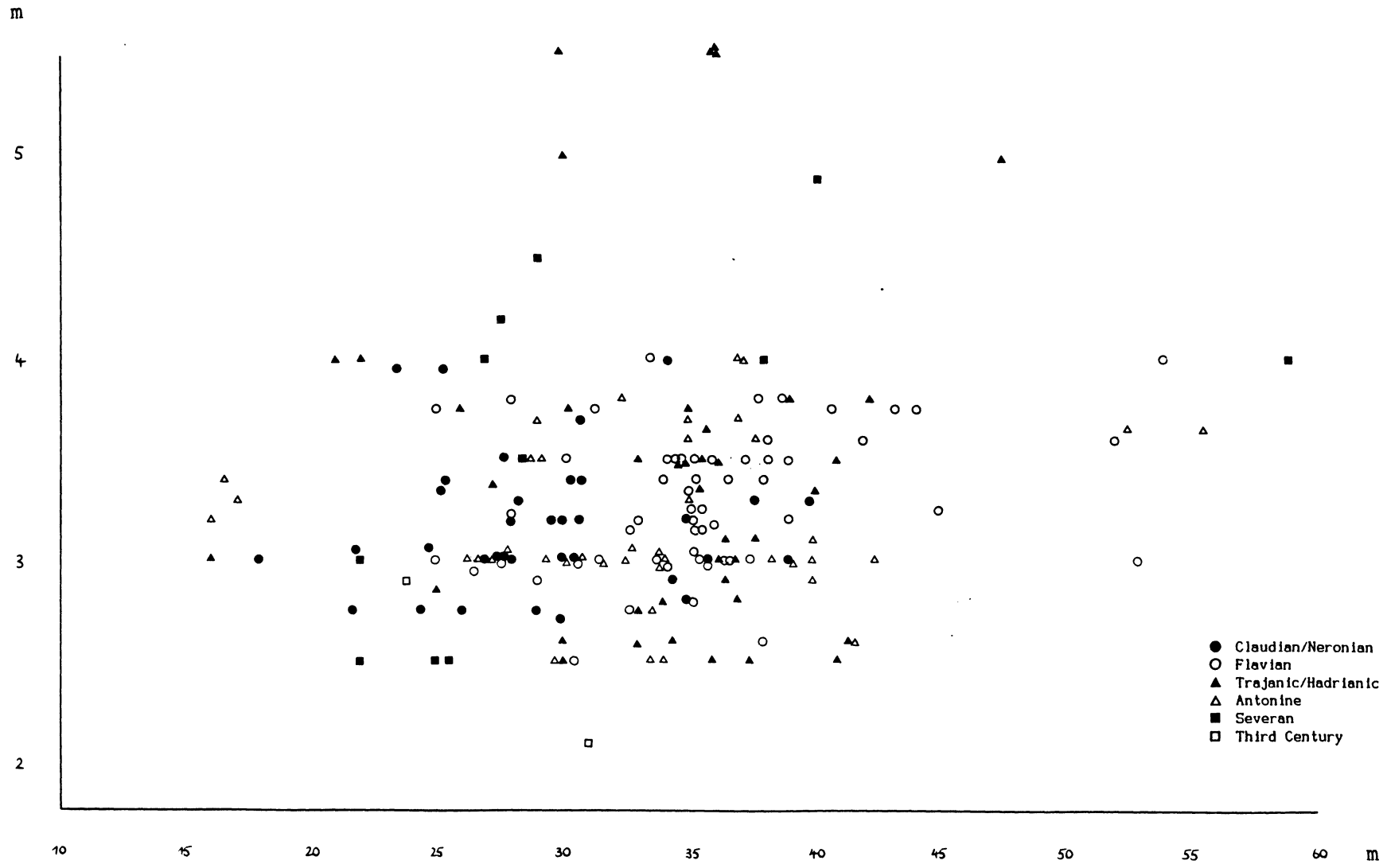


Fig 65 *Contubernium* Breadths and Men's Quarters' Lengths: Comparison

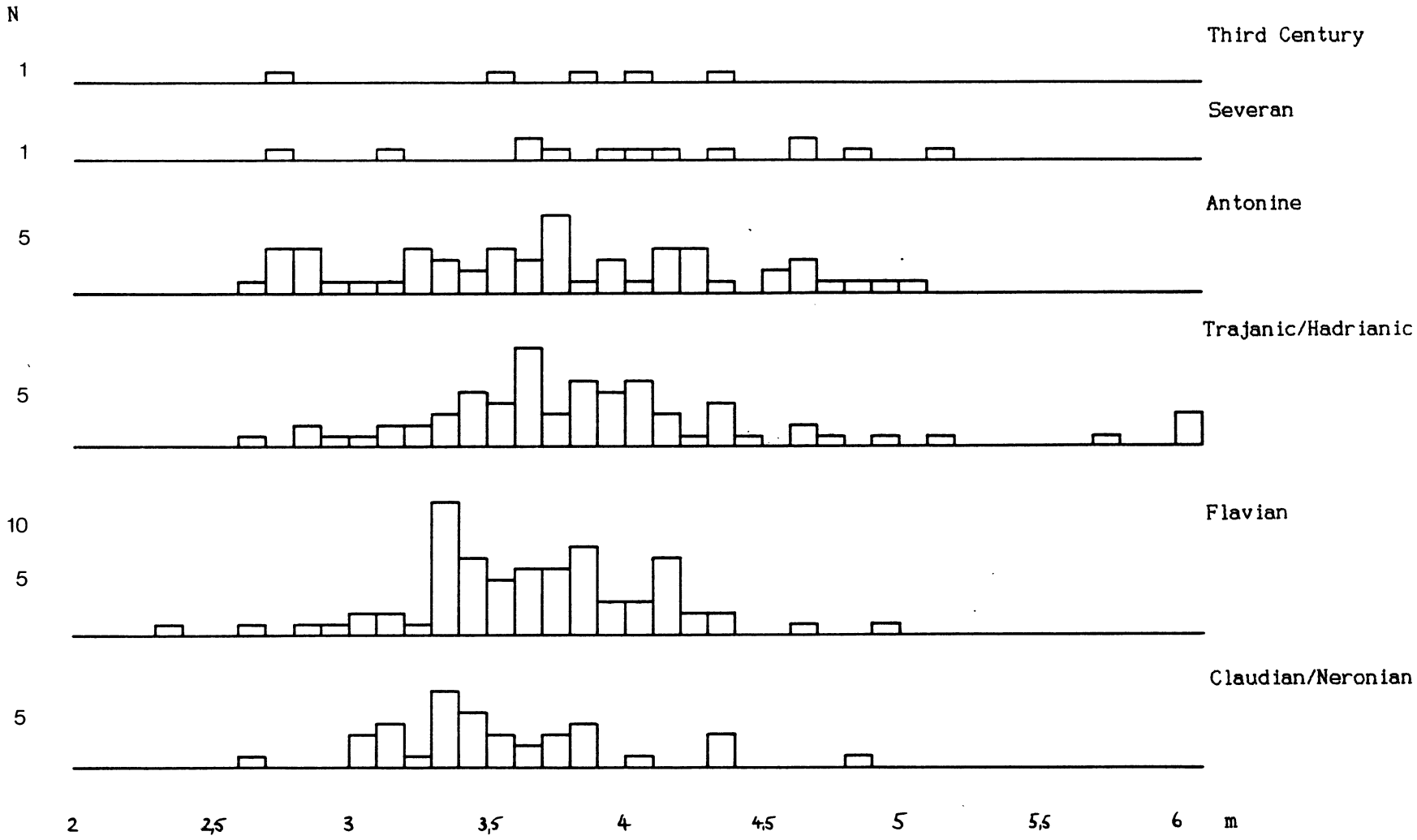


Fig 66 *Contubernium* Spacing

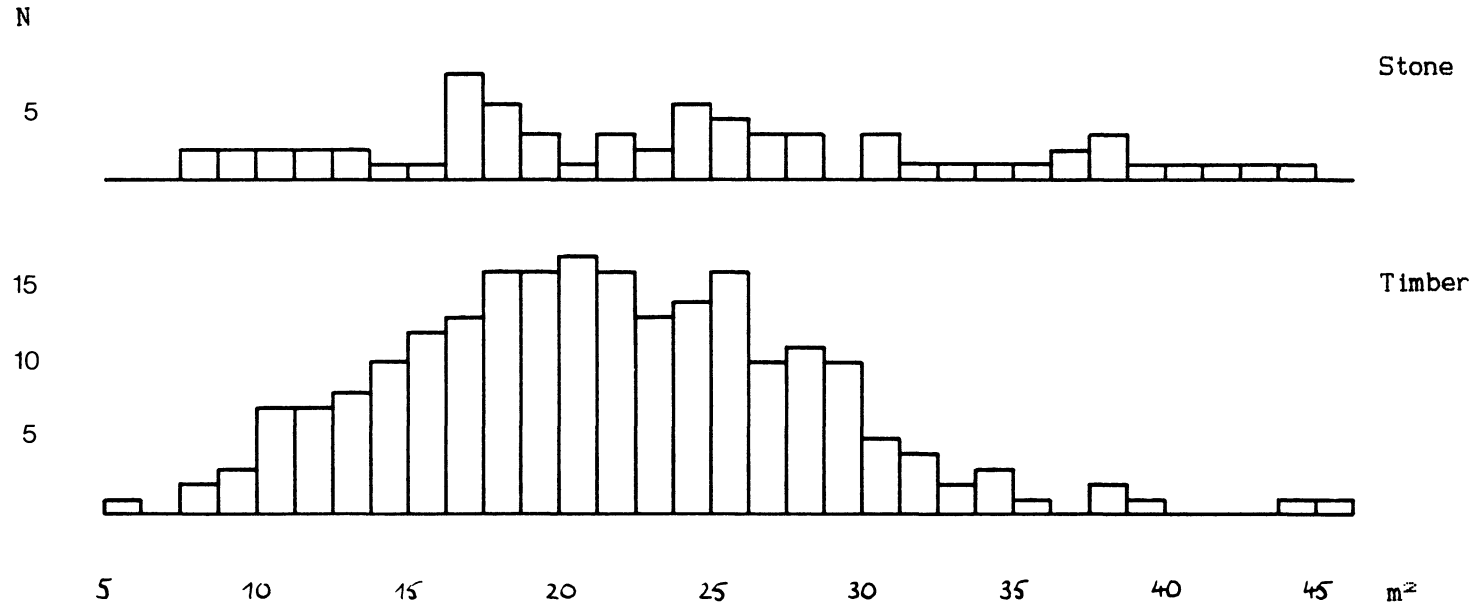


Fig 67 *Contubernium* Living Space (Timber/Stone)

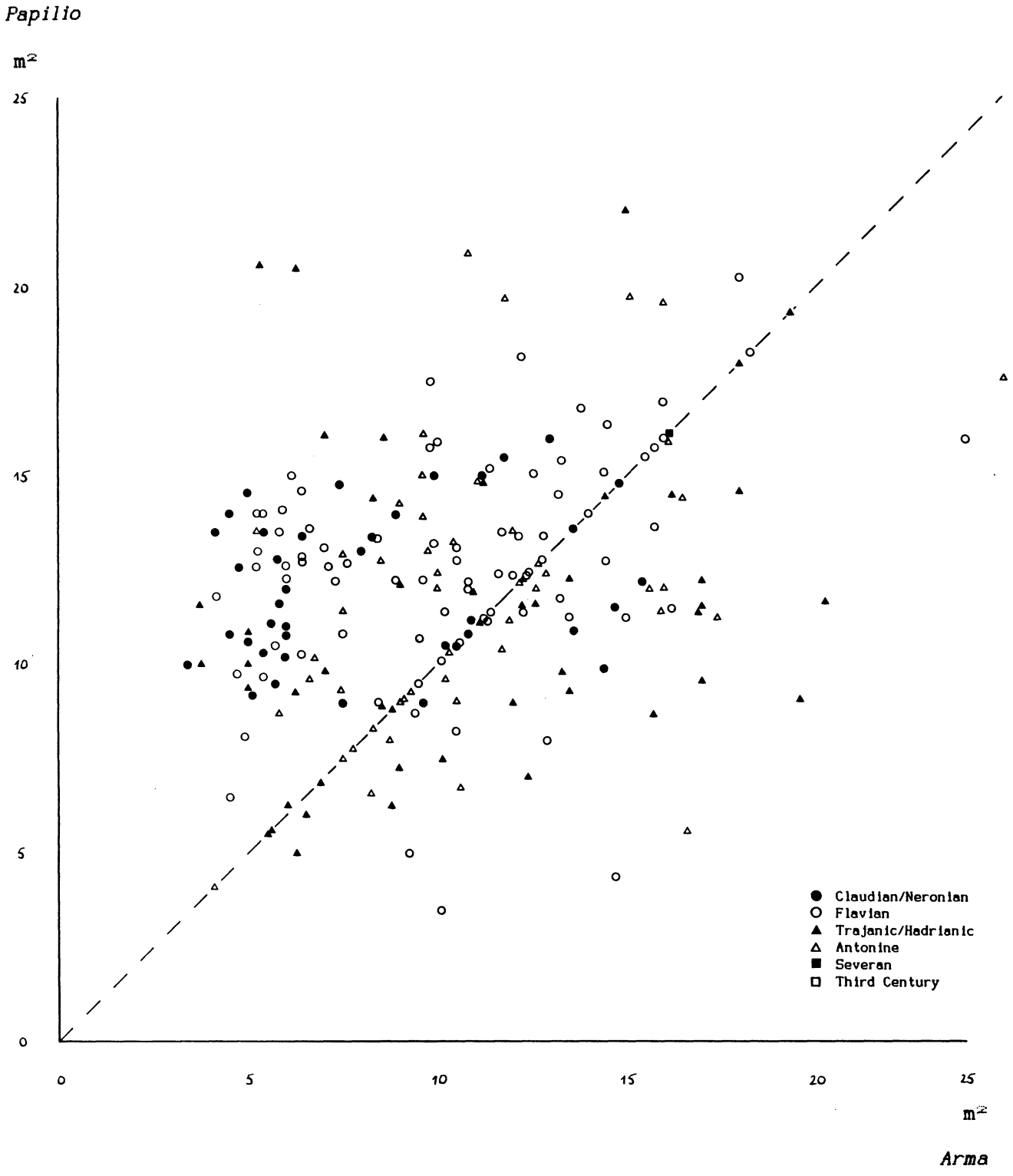


Fig 68 *Papilio/Arma*: Comparative Areas

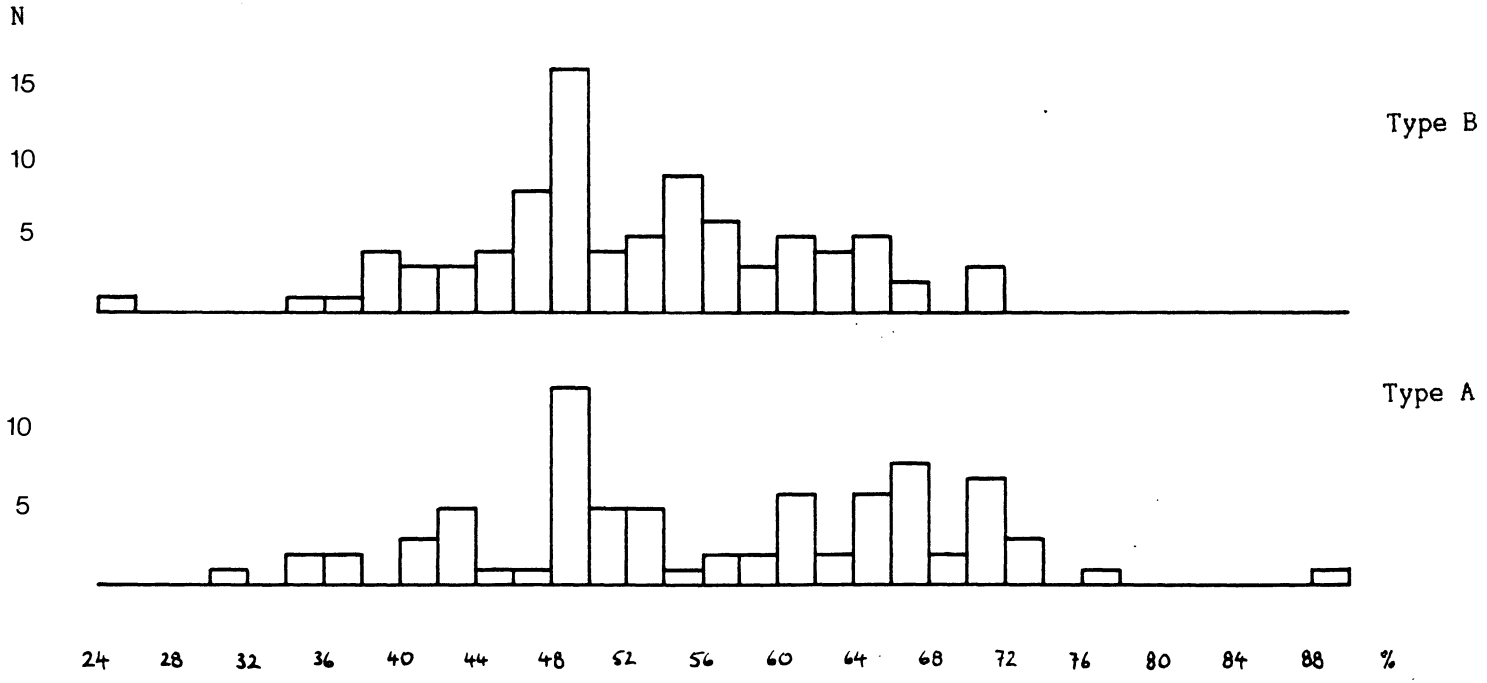


Fig 69 *Papilio/Arma*: Comparative Proportions (Building Types A and B)

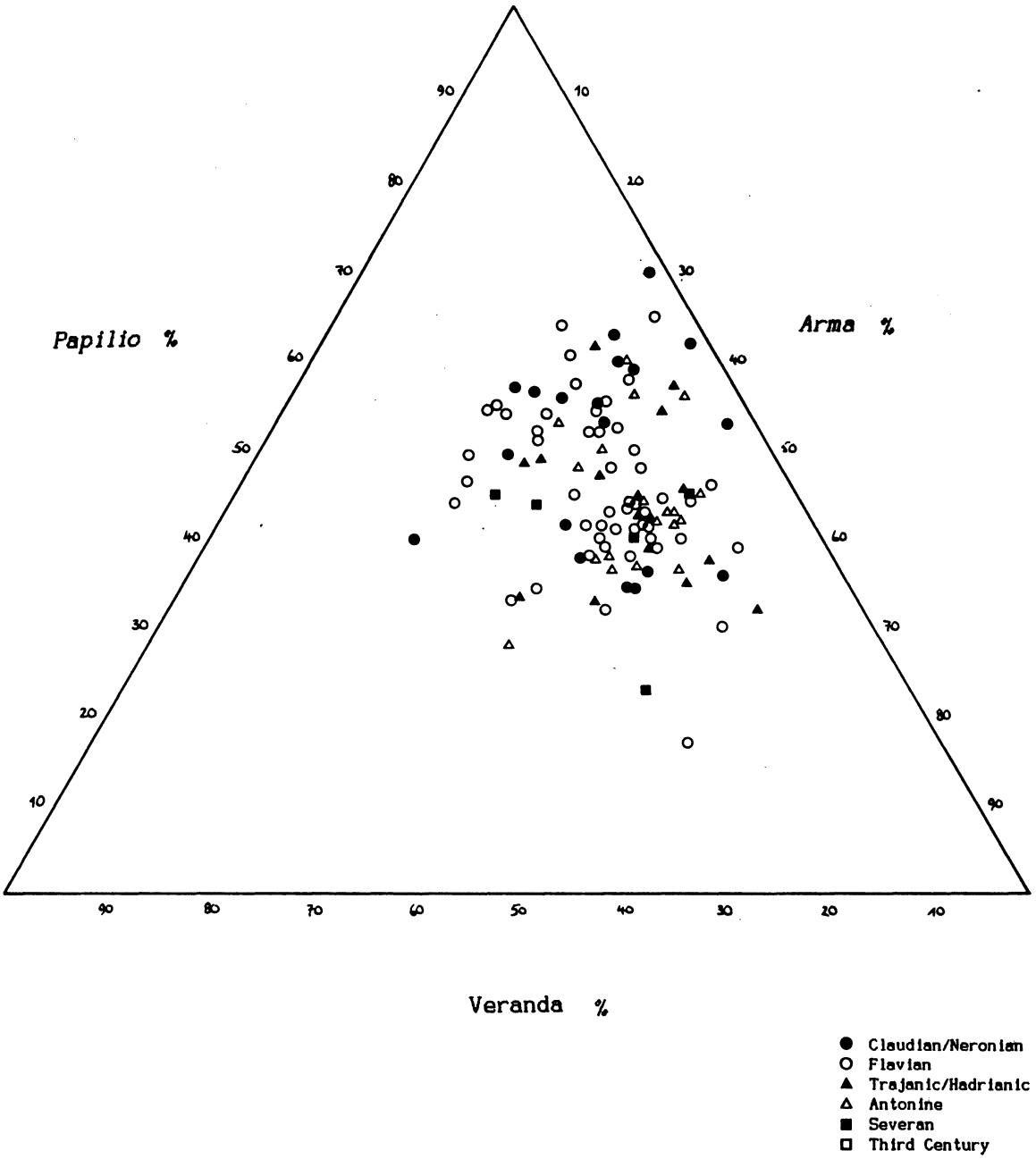


Fig 70 *Papilio/Arma*/Veranda: Comparative Proportions

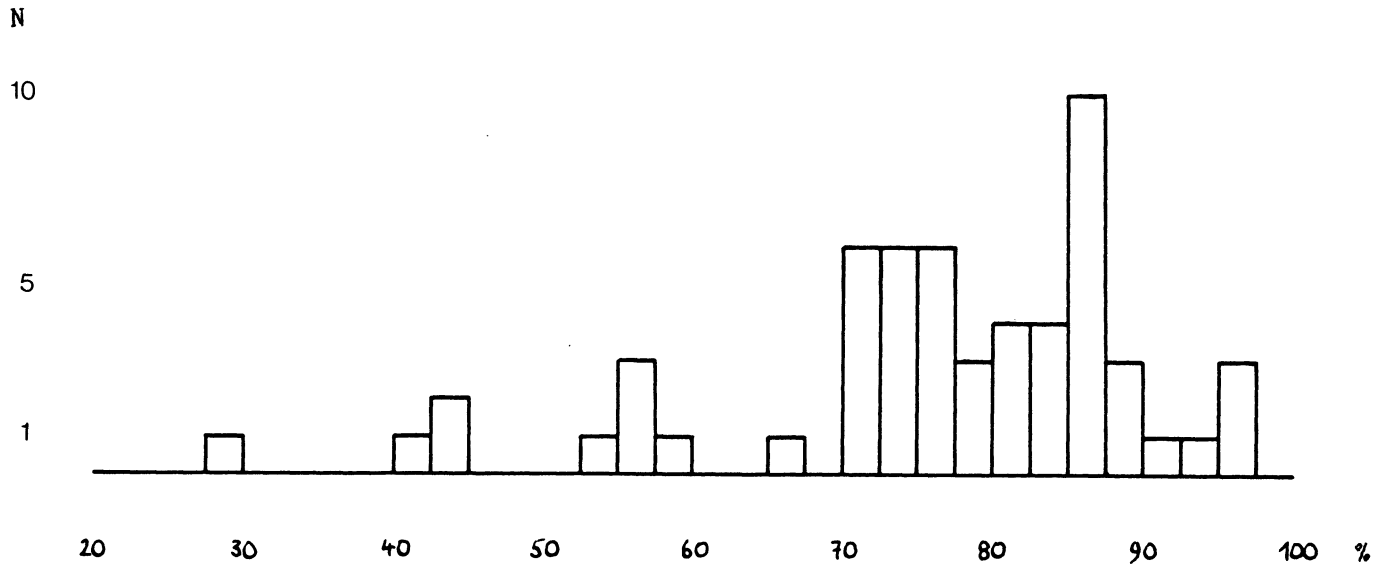


Fig 71 *Contubernium*/Veranda: Proportions of Building Width

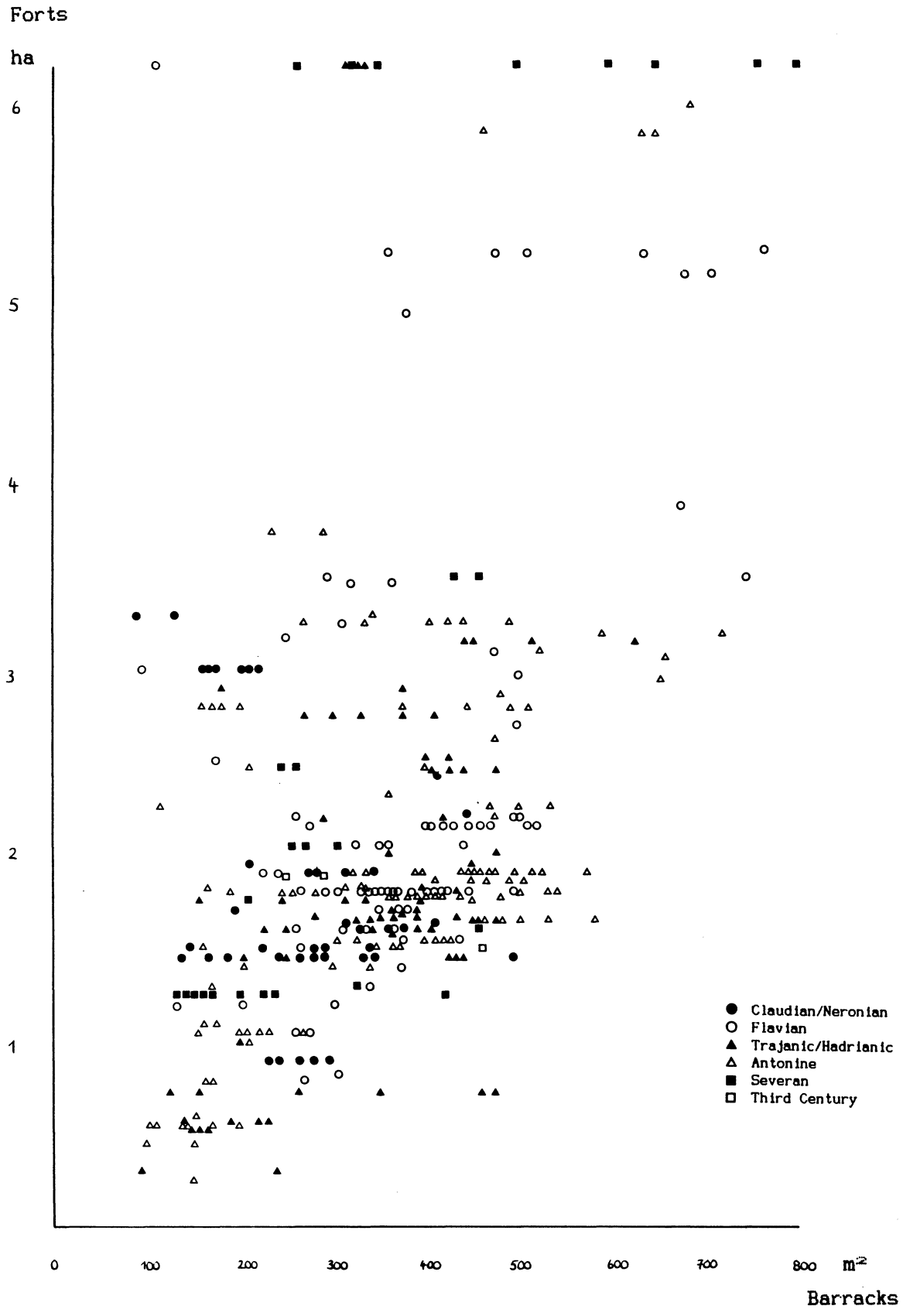


Fig 72 Barracks and Forts: Comparative Areas

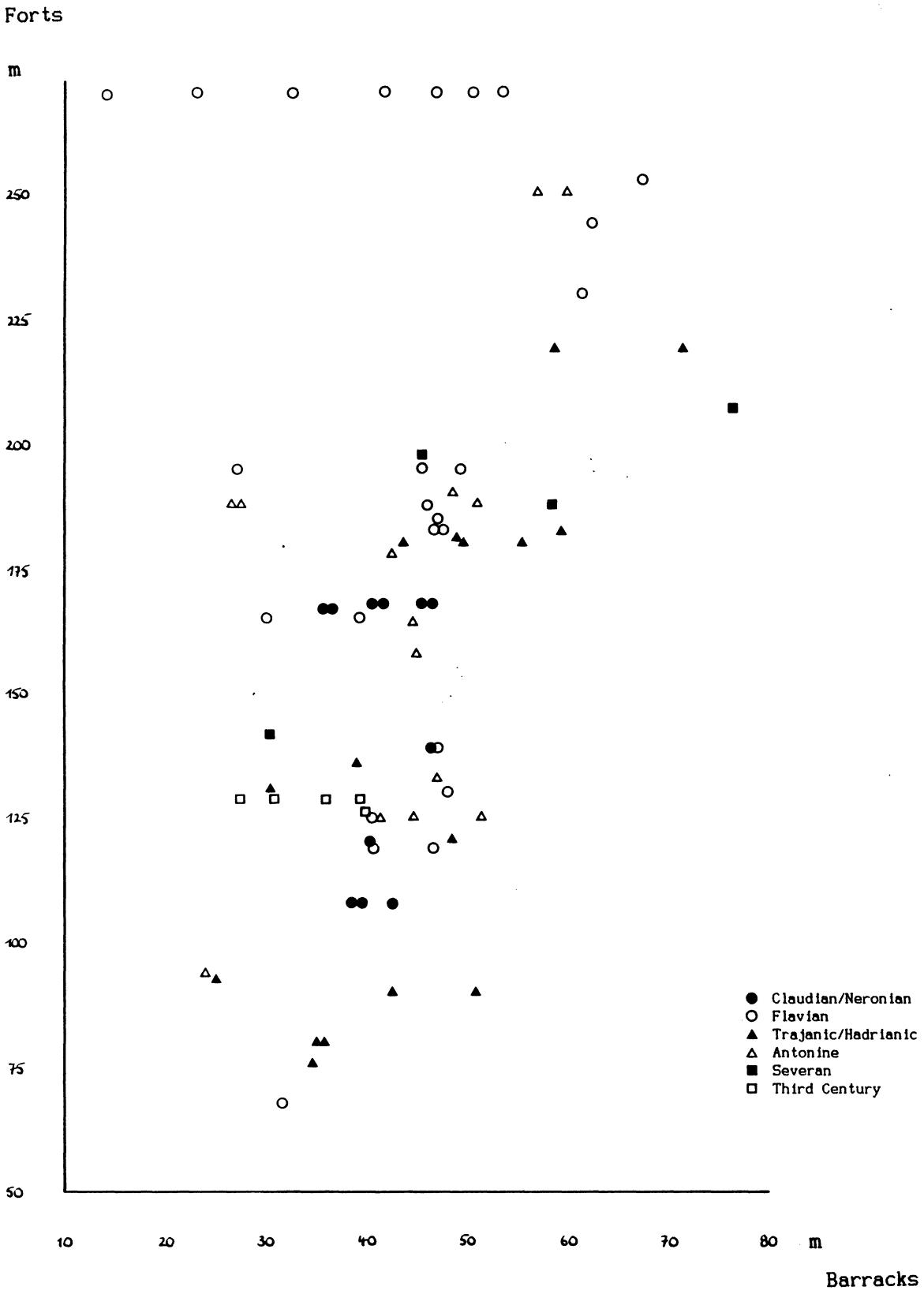


Fig 73 Barracks (*per strigas*) and Forts: Comparative Lengths

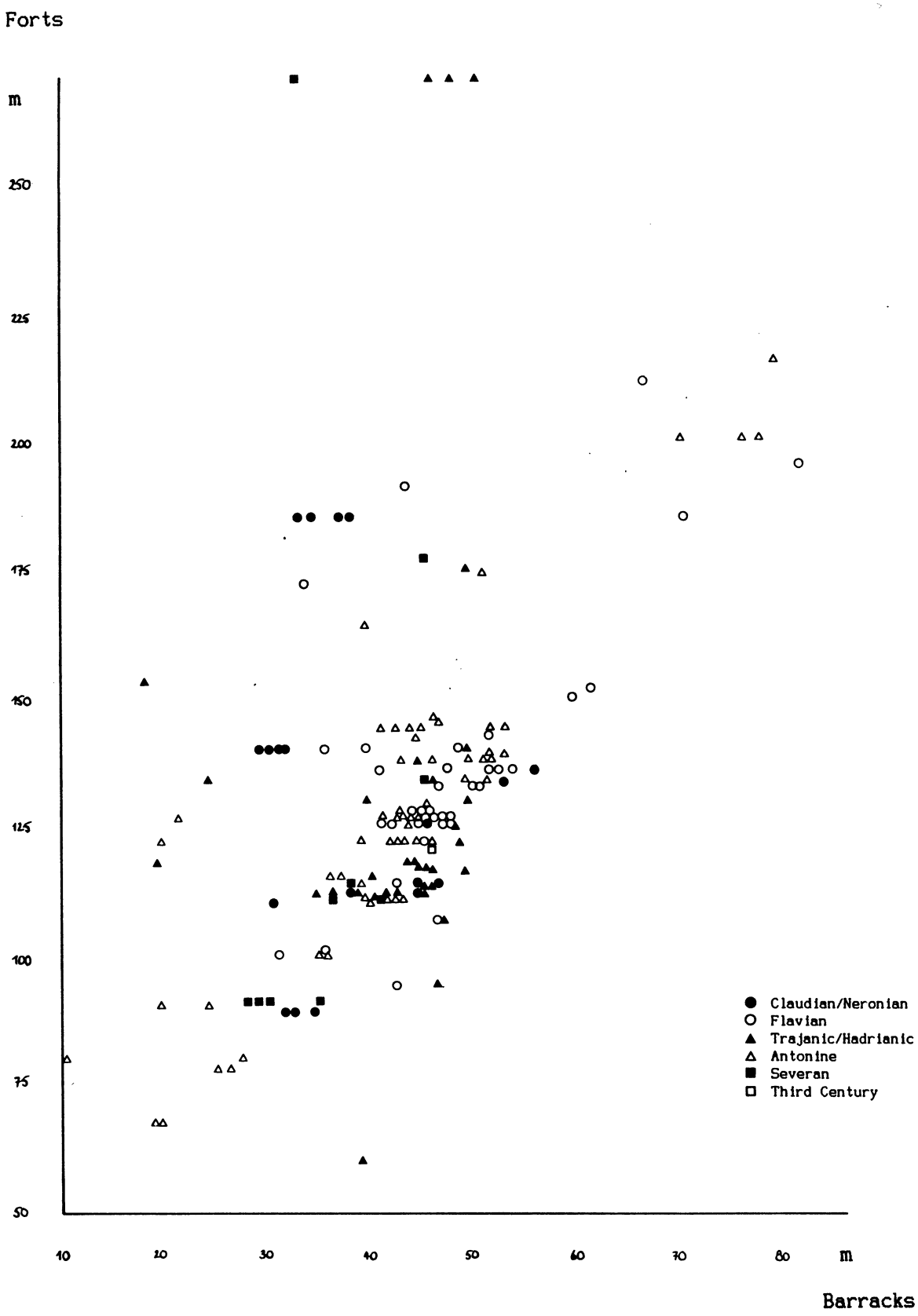


Fig 74 Barrack (*per scamna*) Lengths and Fort Widths: Comparison

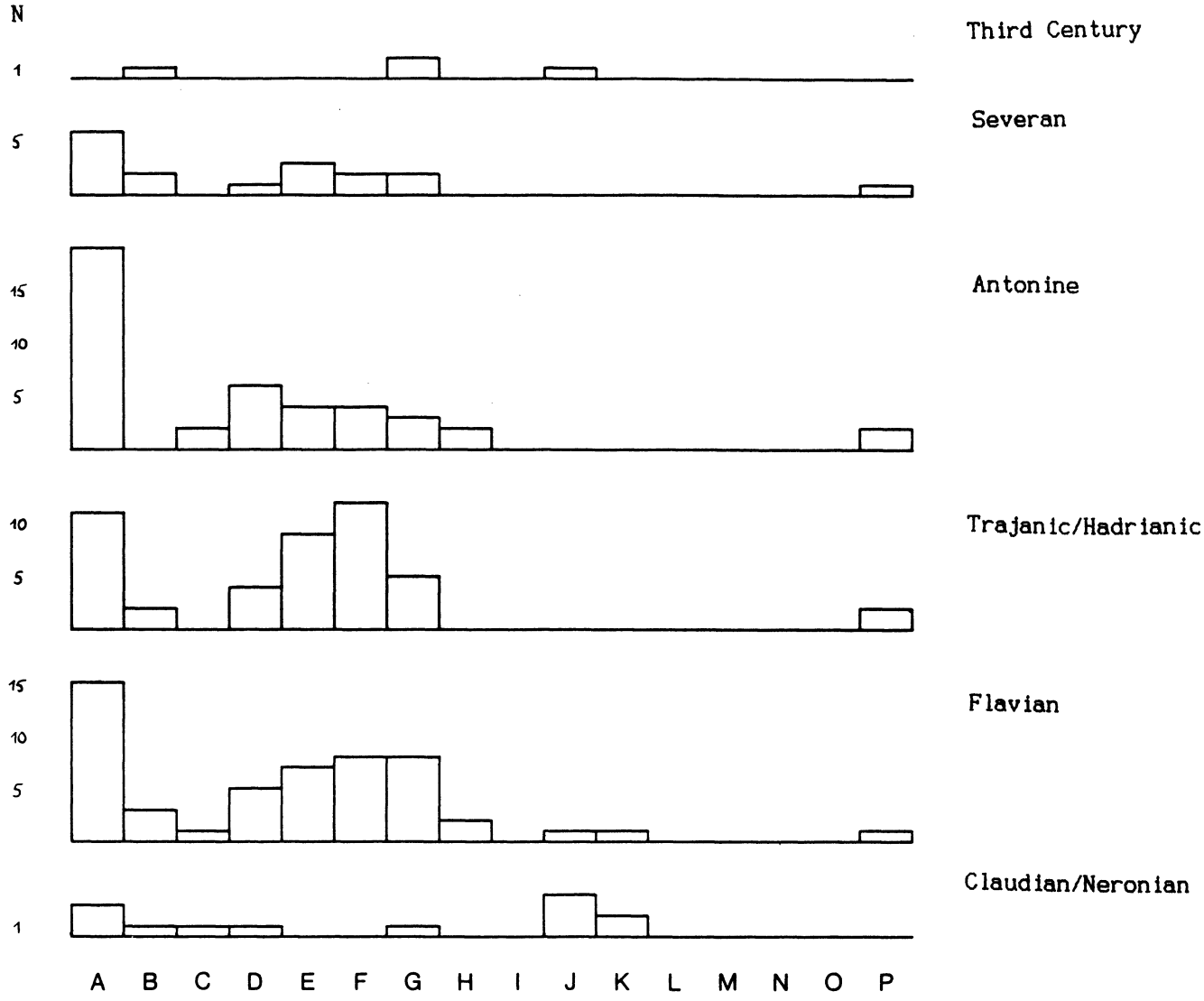


Fig 75 Fort Layout Types

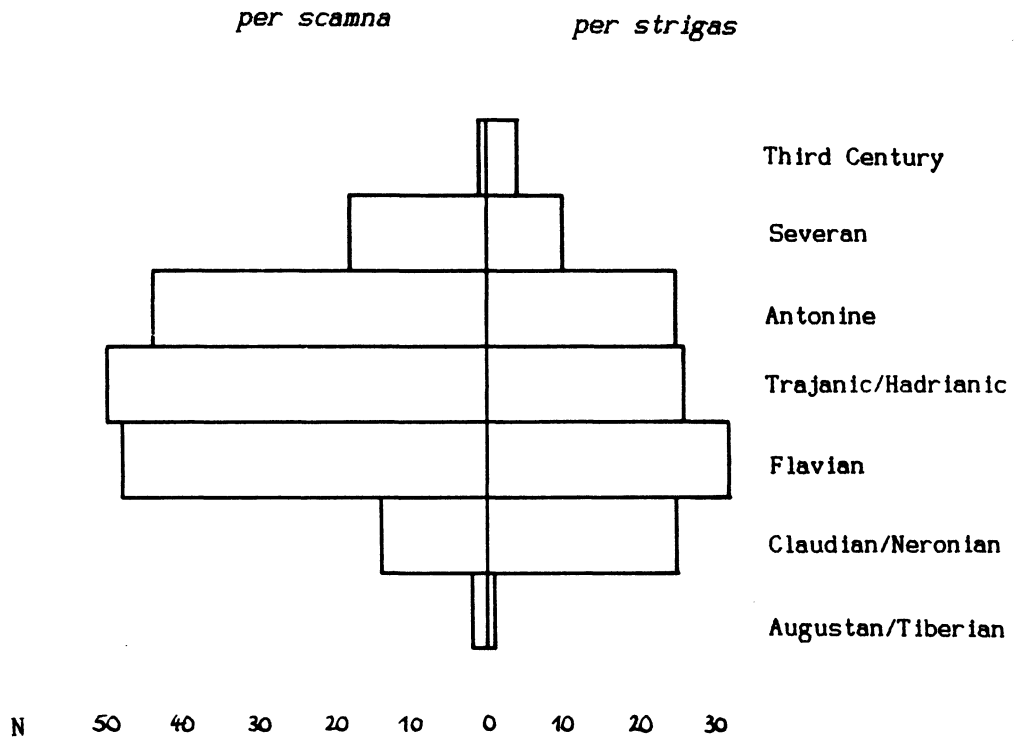


Fig 76 Barrack Orientation

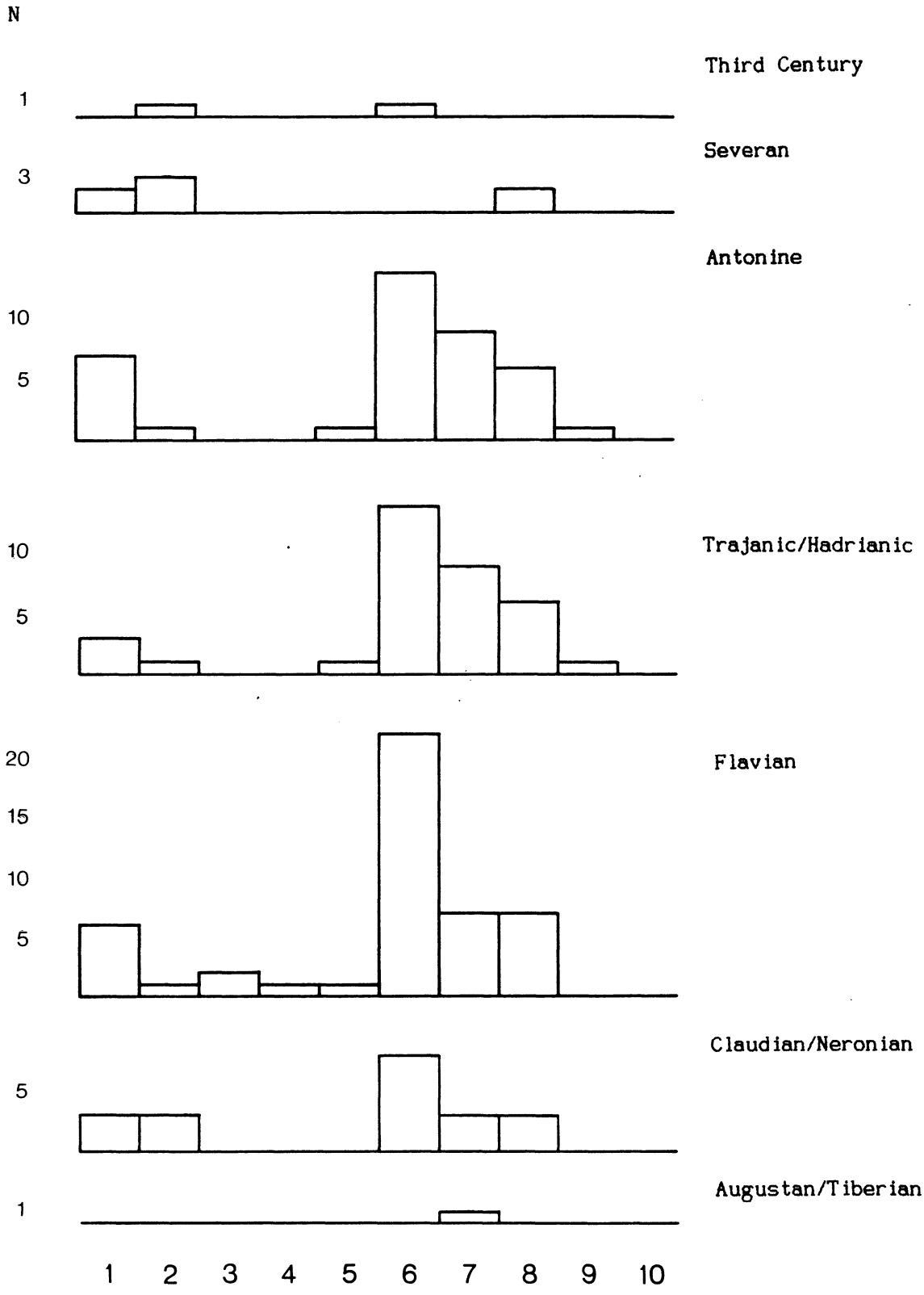


Fig 77 Barrack-Group Configurations

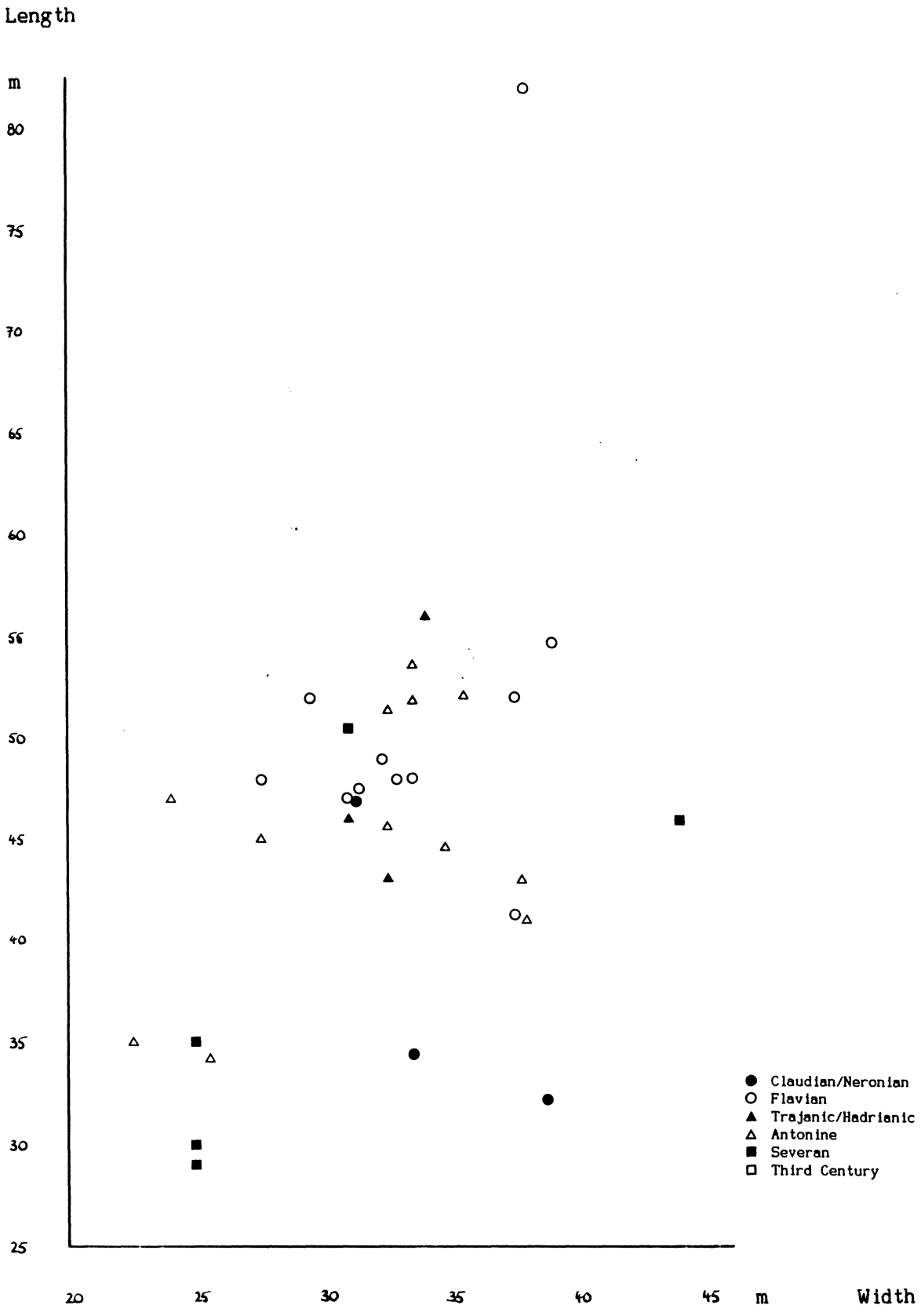


Fig 78 Three-Barrack Groups: Dimensions

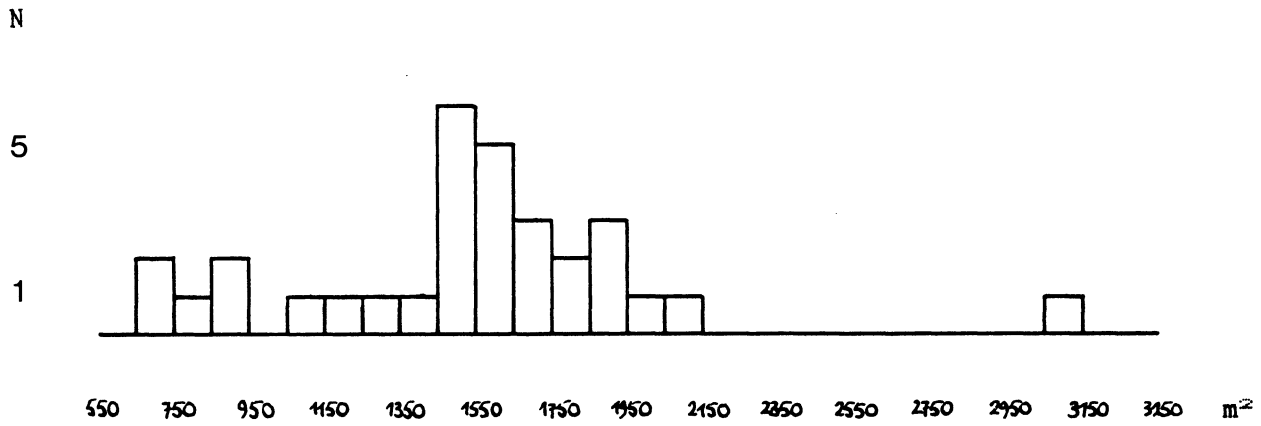


Fig 79 Three-Barrack Groups: Areas

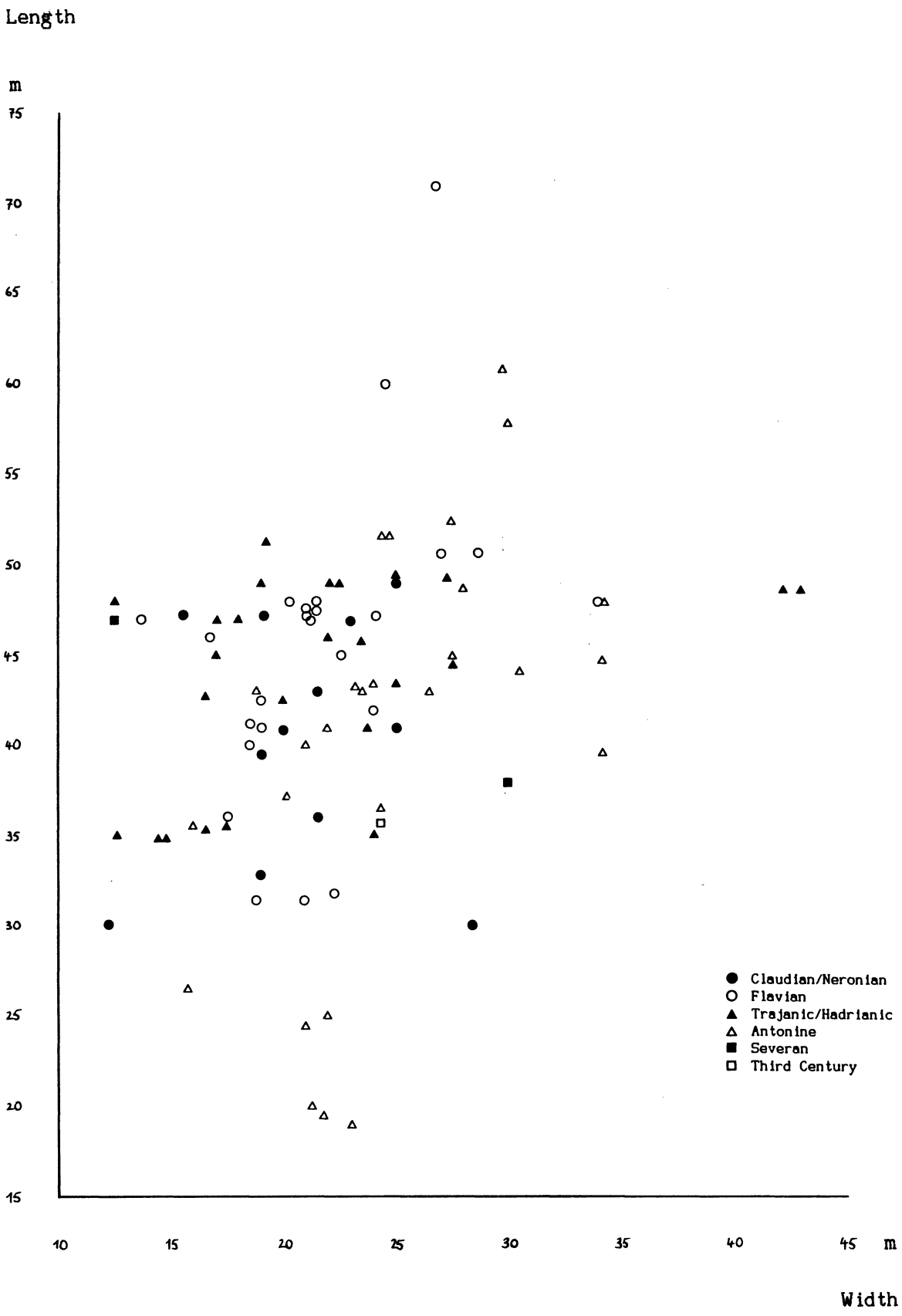


Fig 80 Barrack Pairs: Dimensions

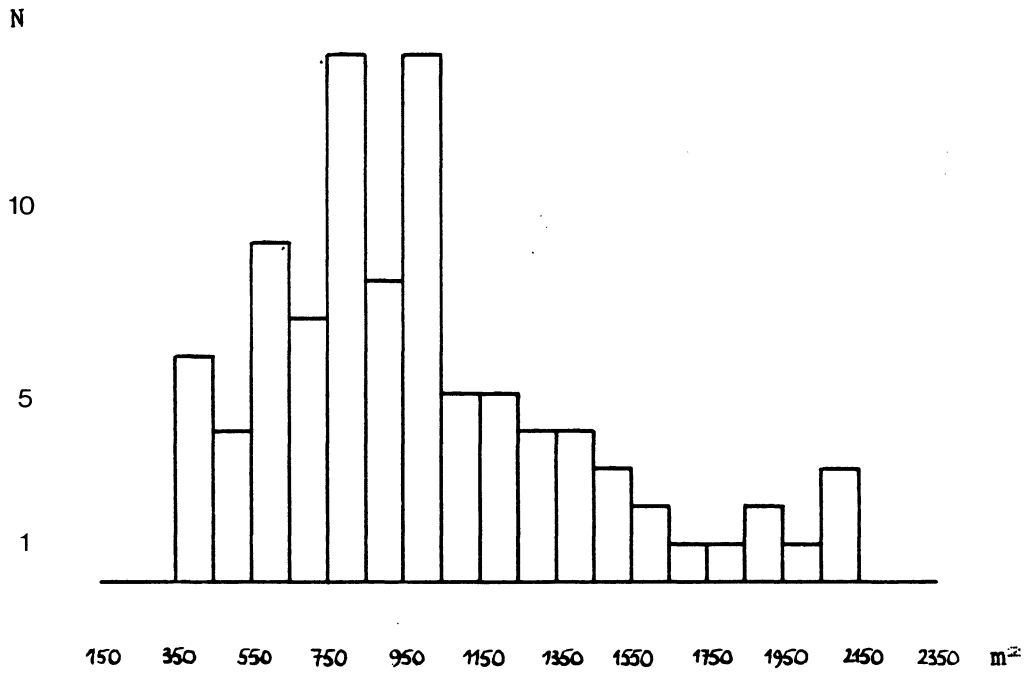


Fig 81 Barrack Pairs: Areas

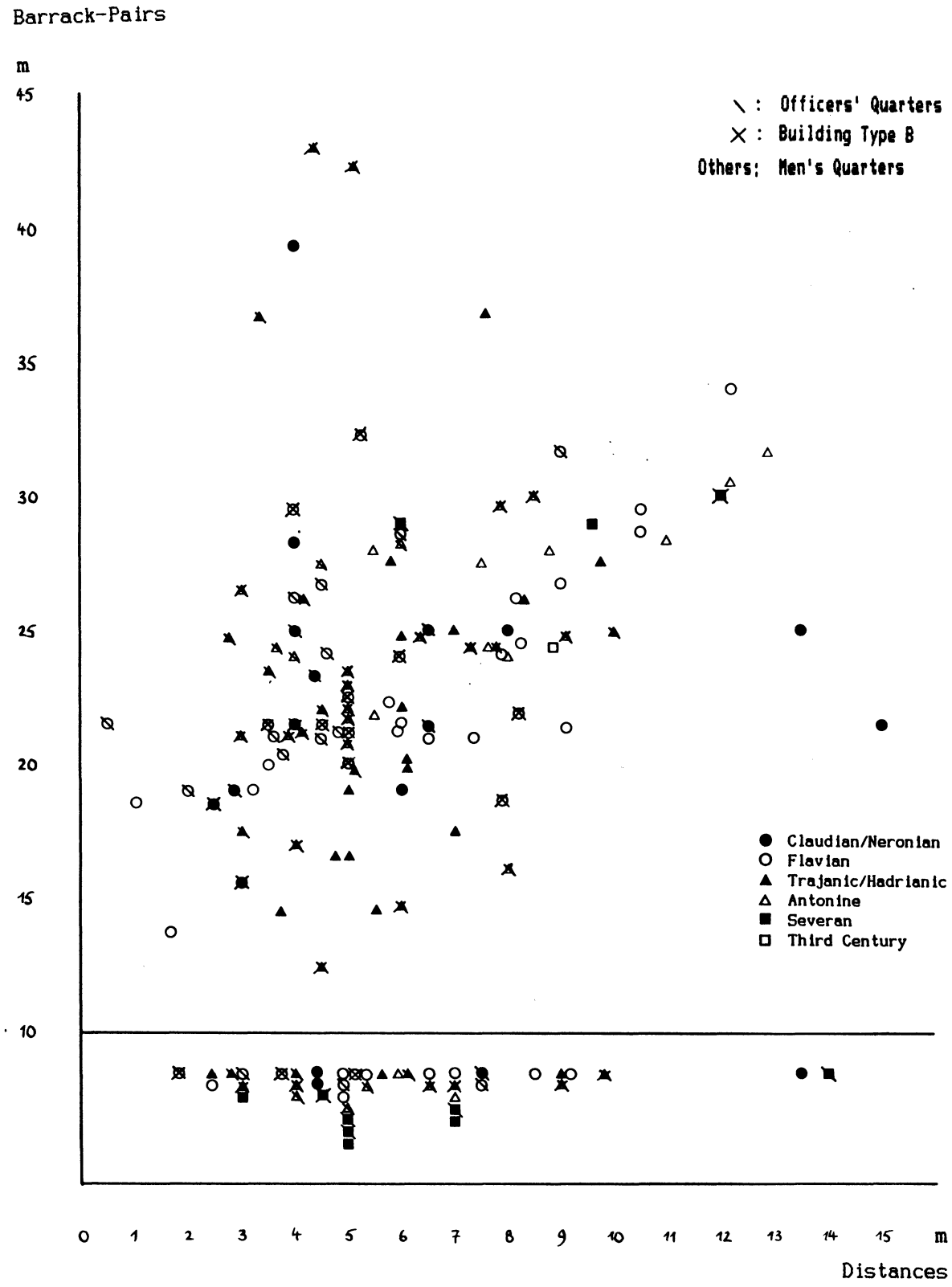


Fig 82 Barrack Pair Width / Distances between Quarters: Comparison

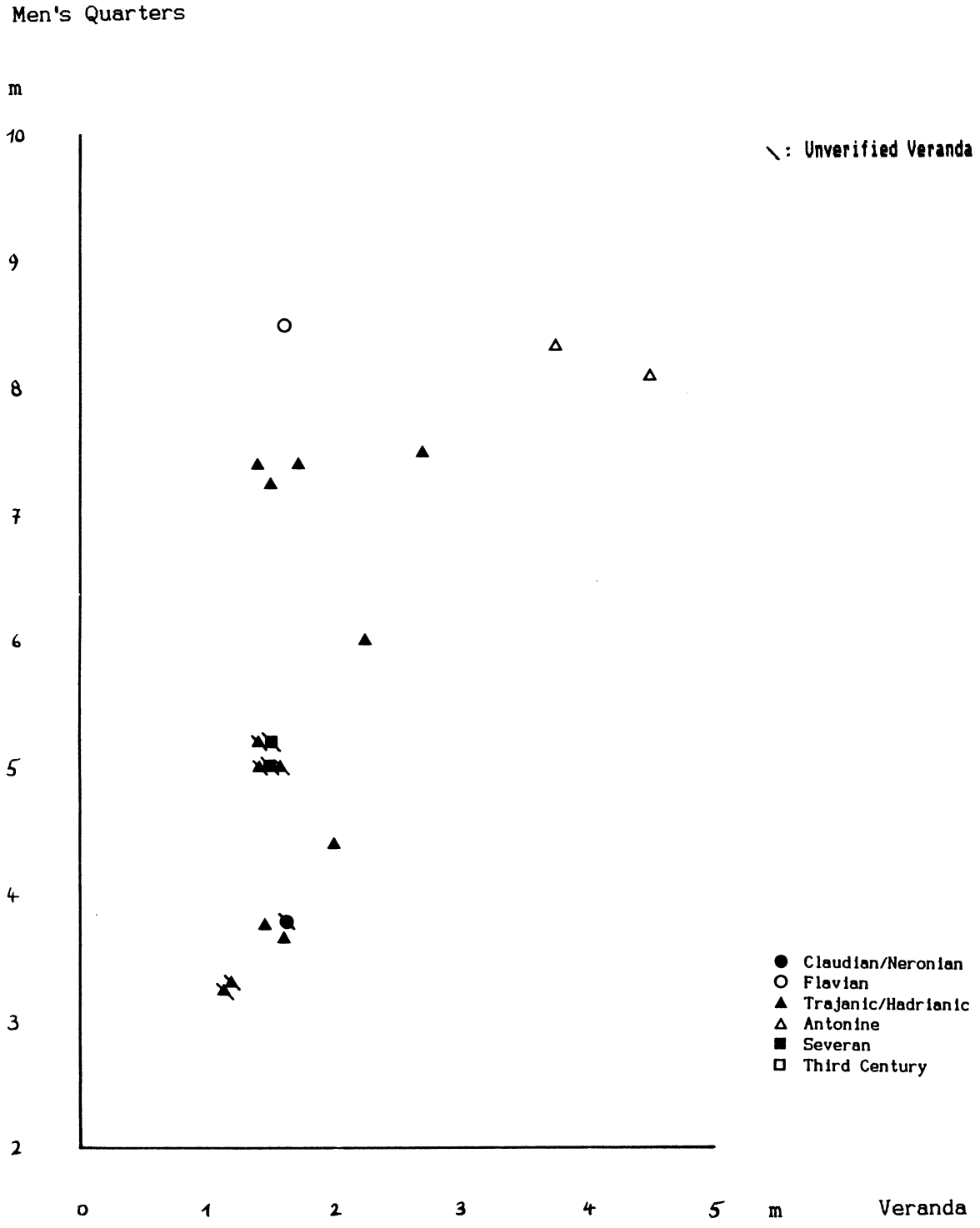


Fig 83 Men's Quarters and Veranda Space: Comparative Widths

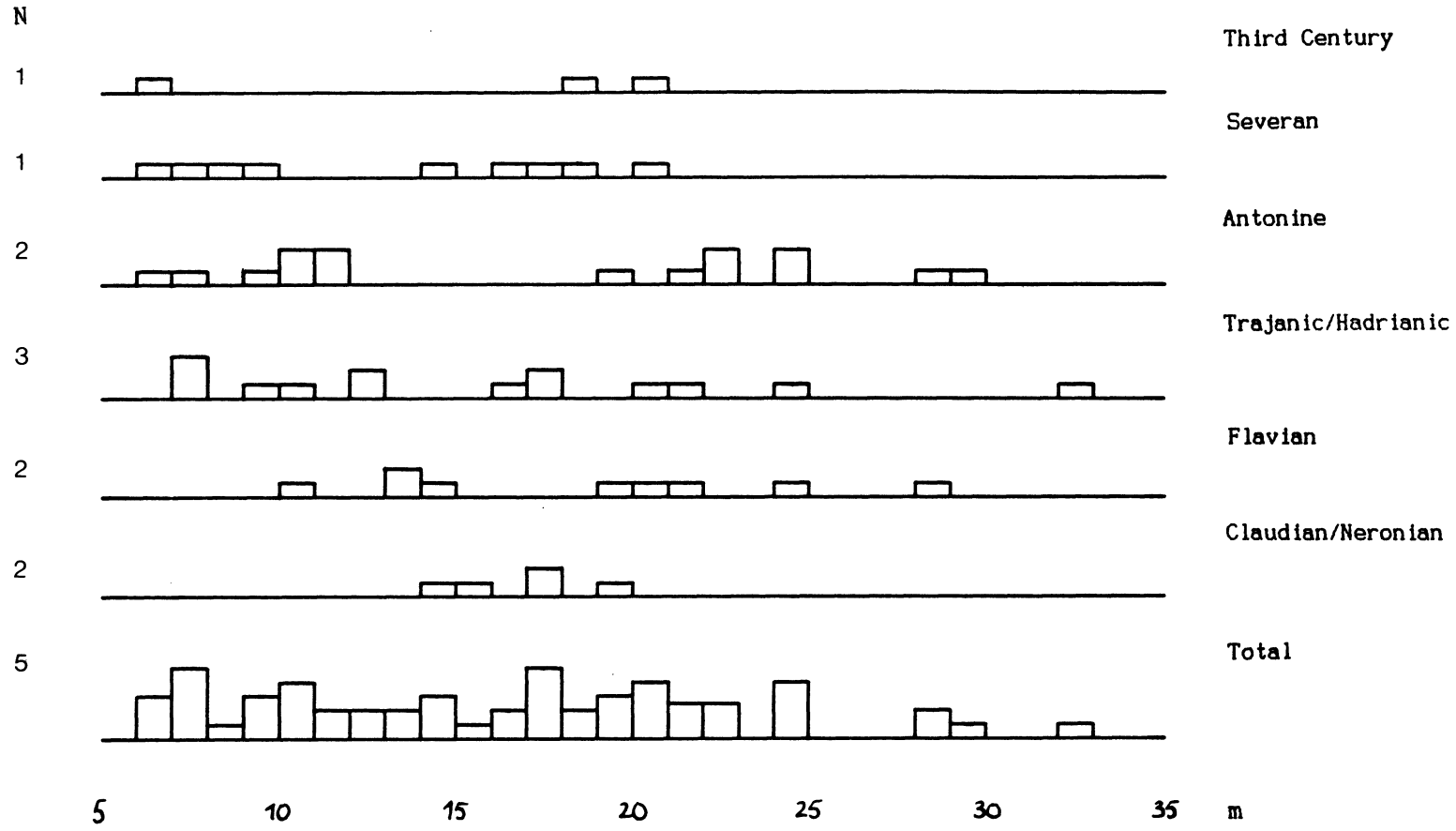


Fig 84 Barrack Lengths

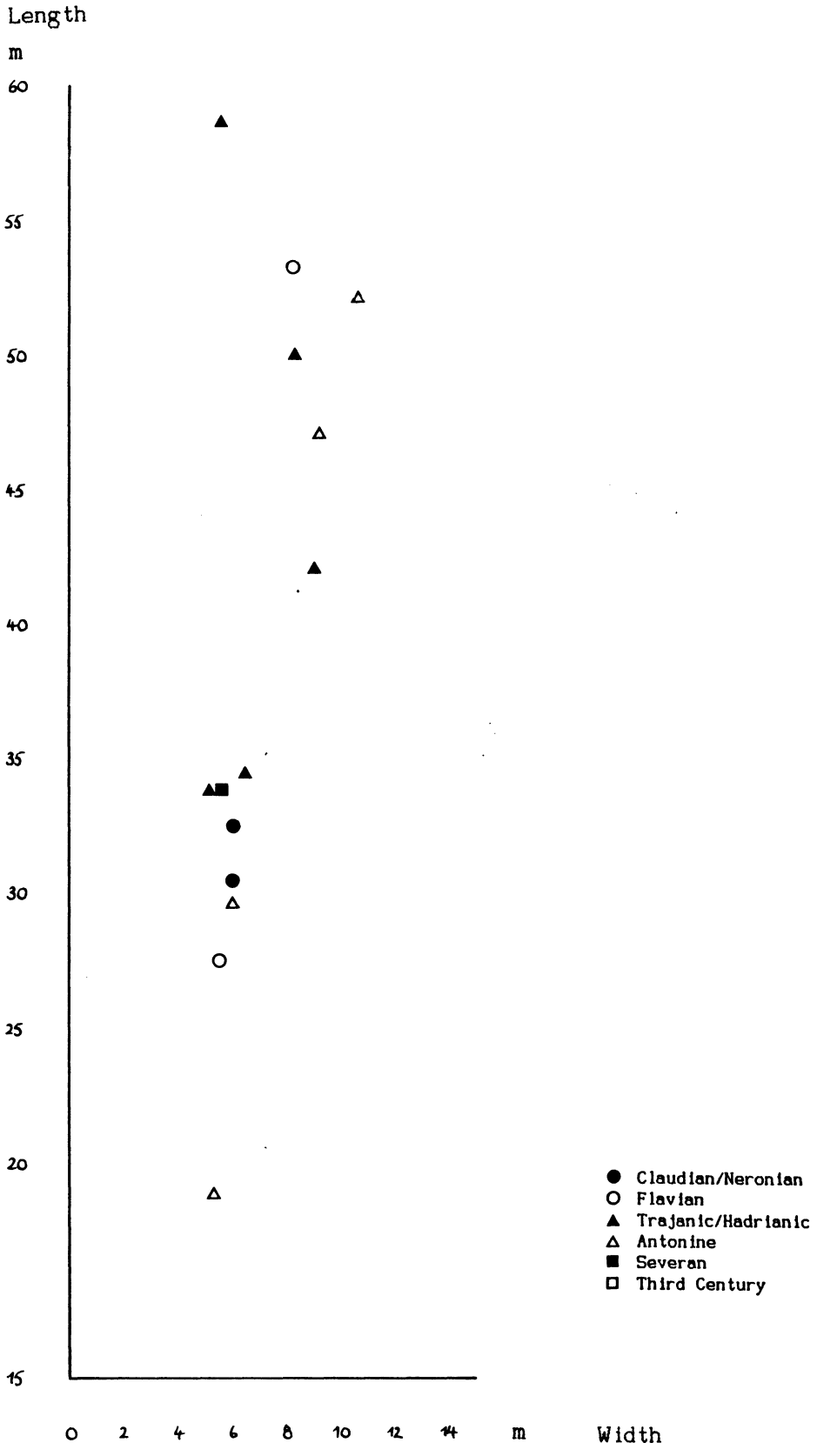


Fig 85 Projected Centurial Barracks: Dimensions

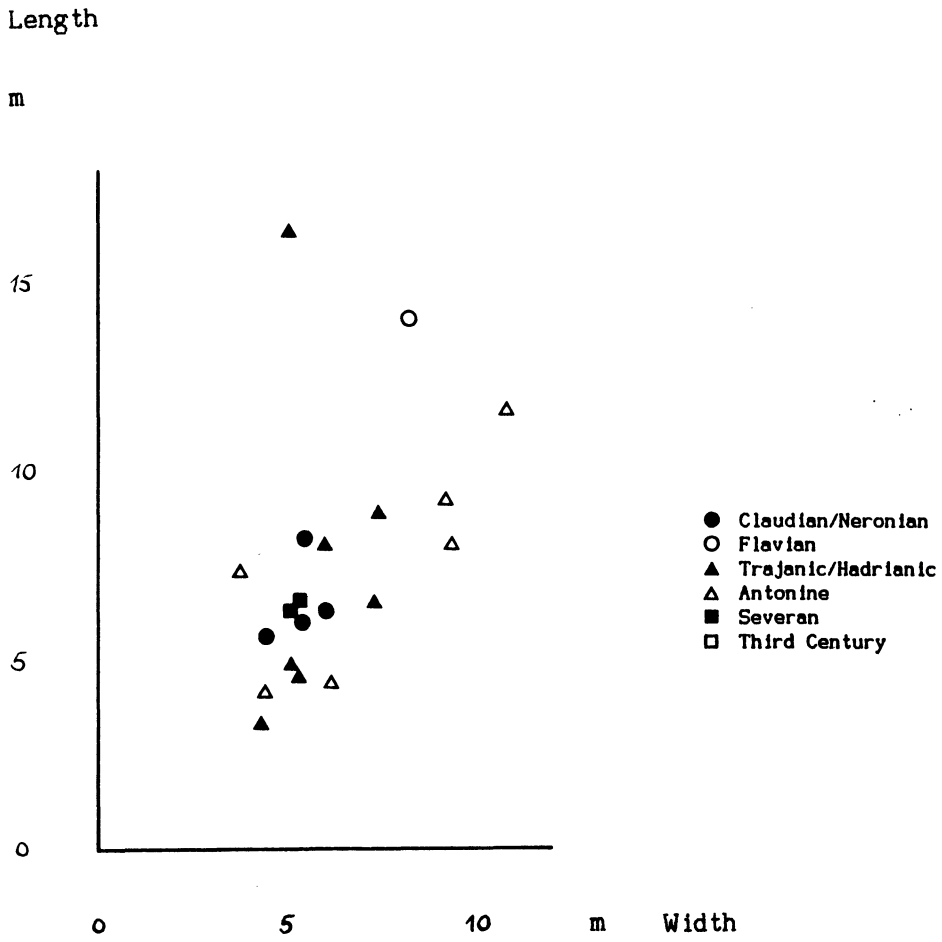


Fig 86 Officers' Quarters: Dimensions

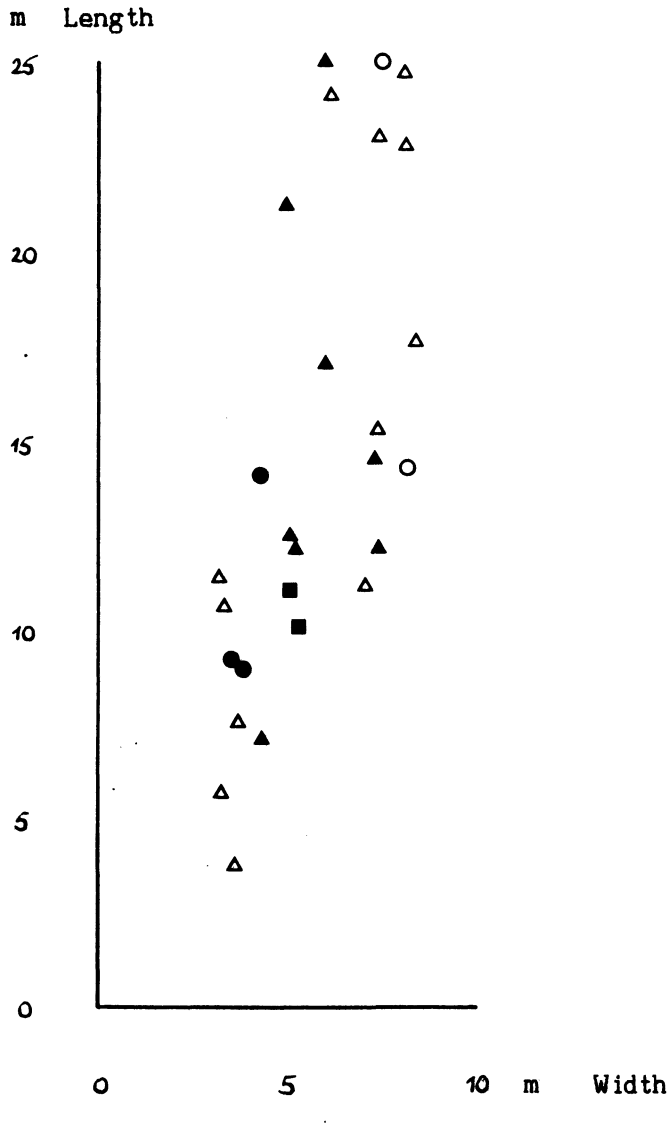


Fig 87 Men's Quarters: Dimensions

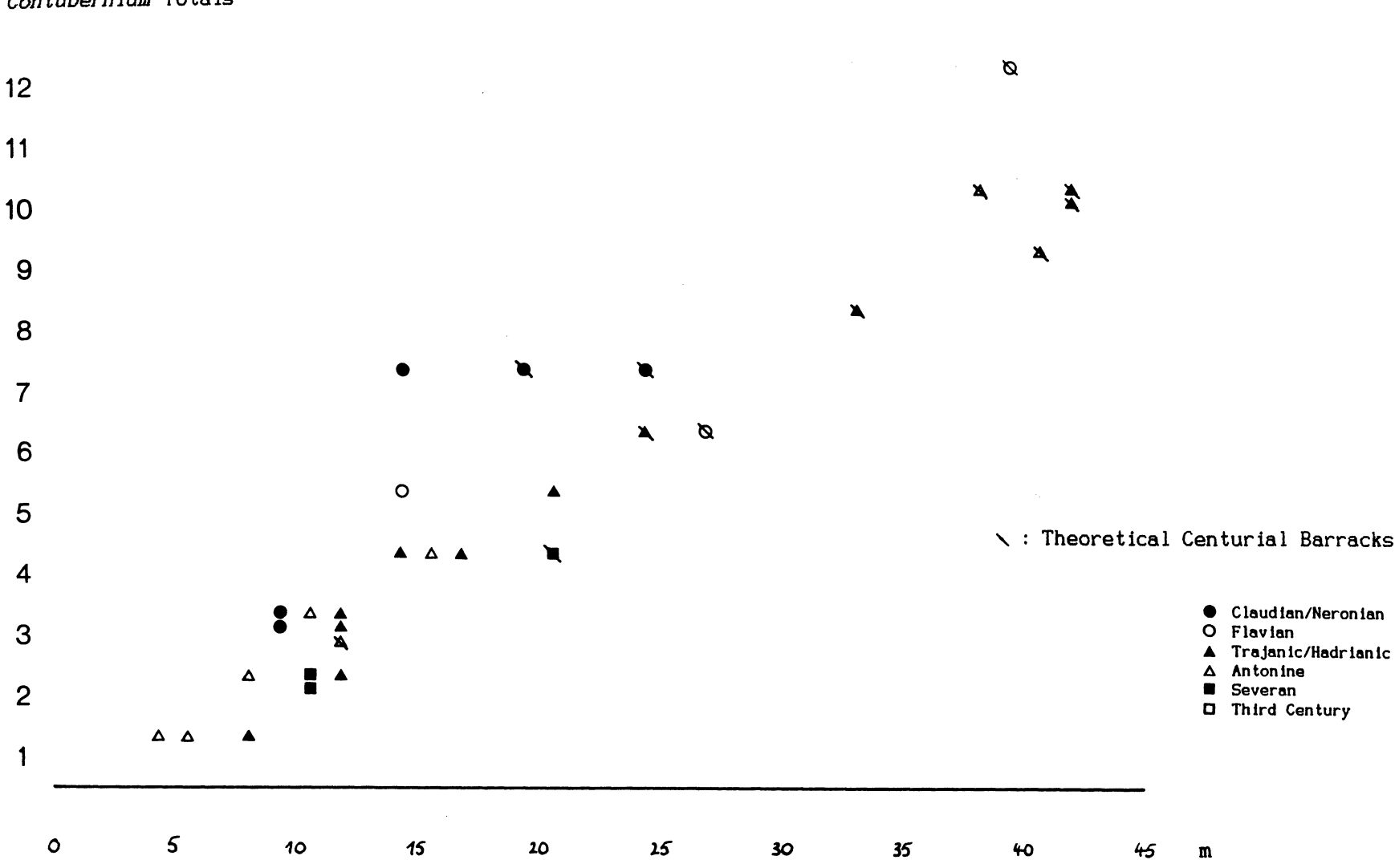


Fig 88 *Contubernium* Totals and Men's Quarters Lengths

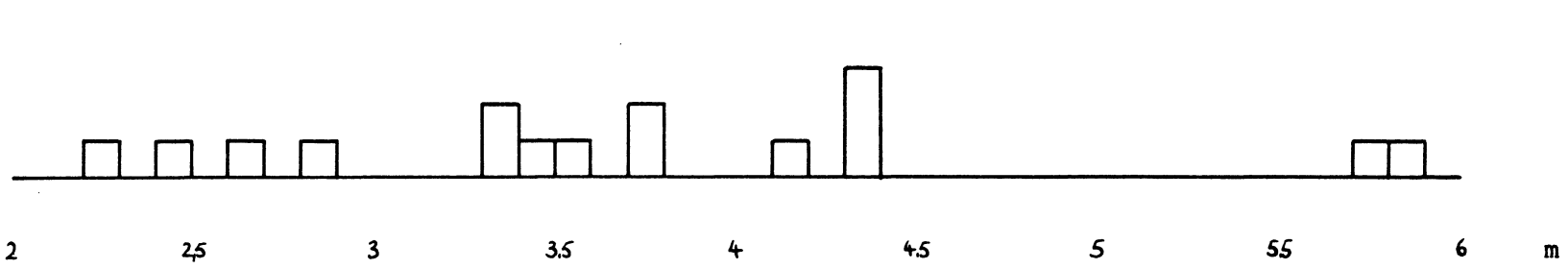


Fig 89 *Contubernium* Spacing

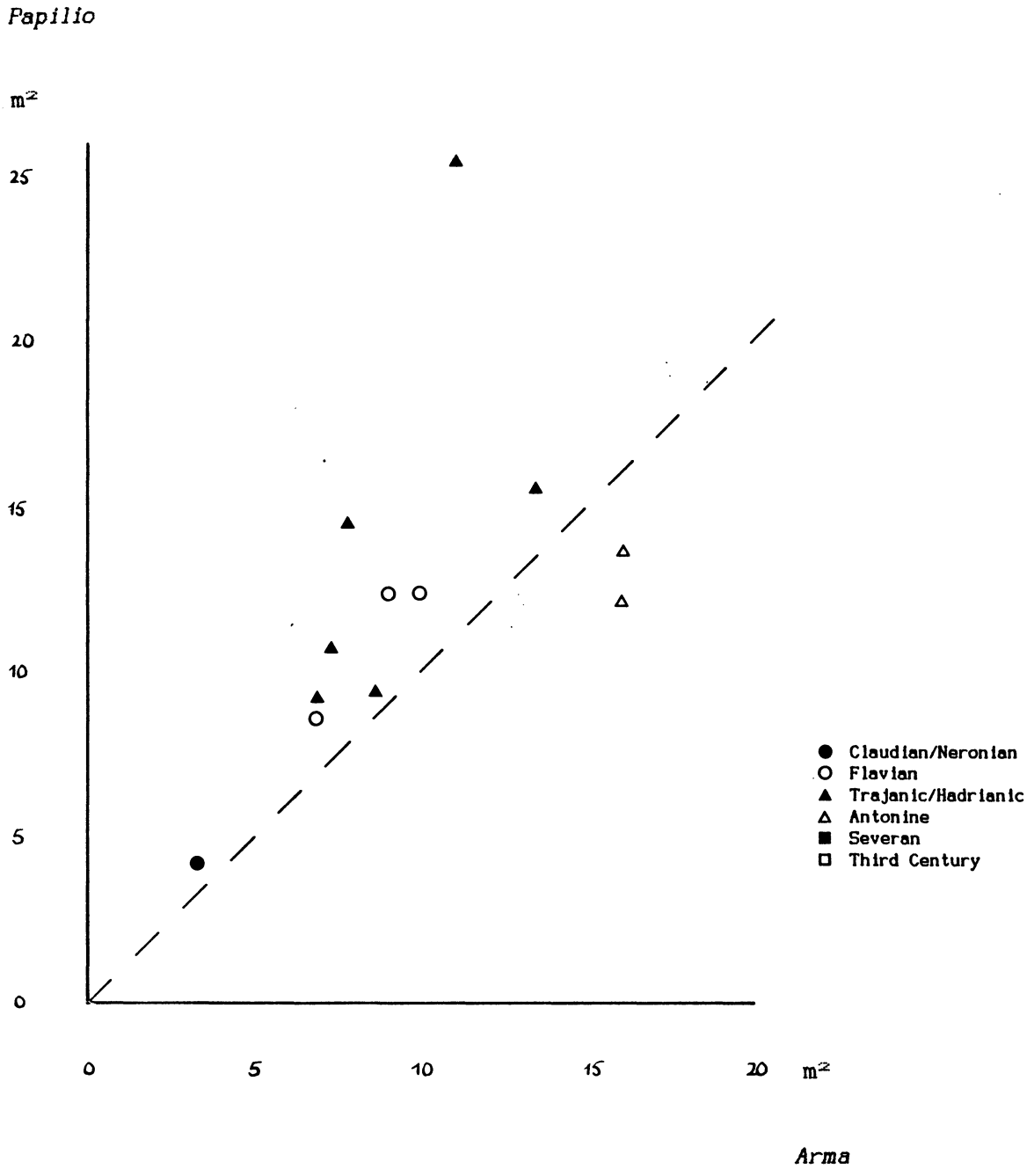


Fig 90 *Papilio/Arma*: Comparative Areas

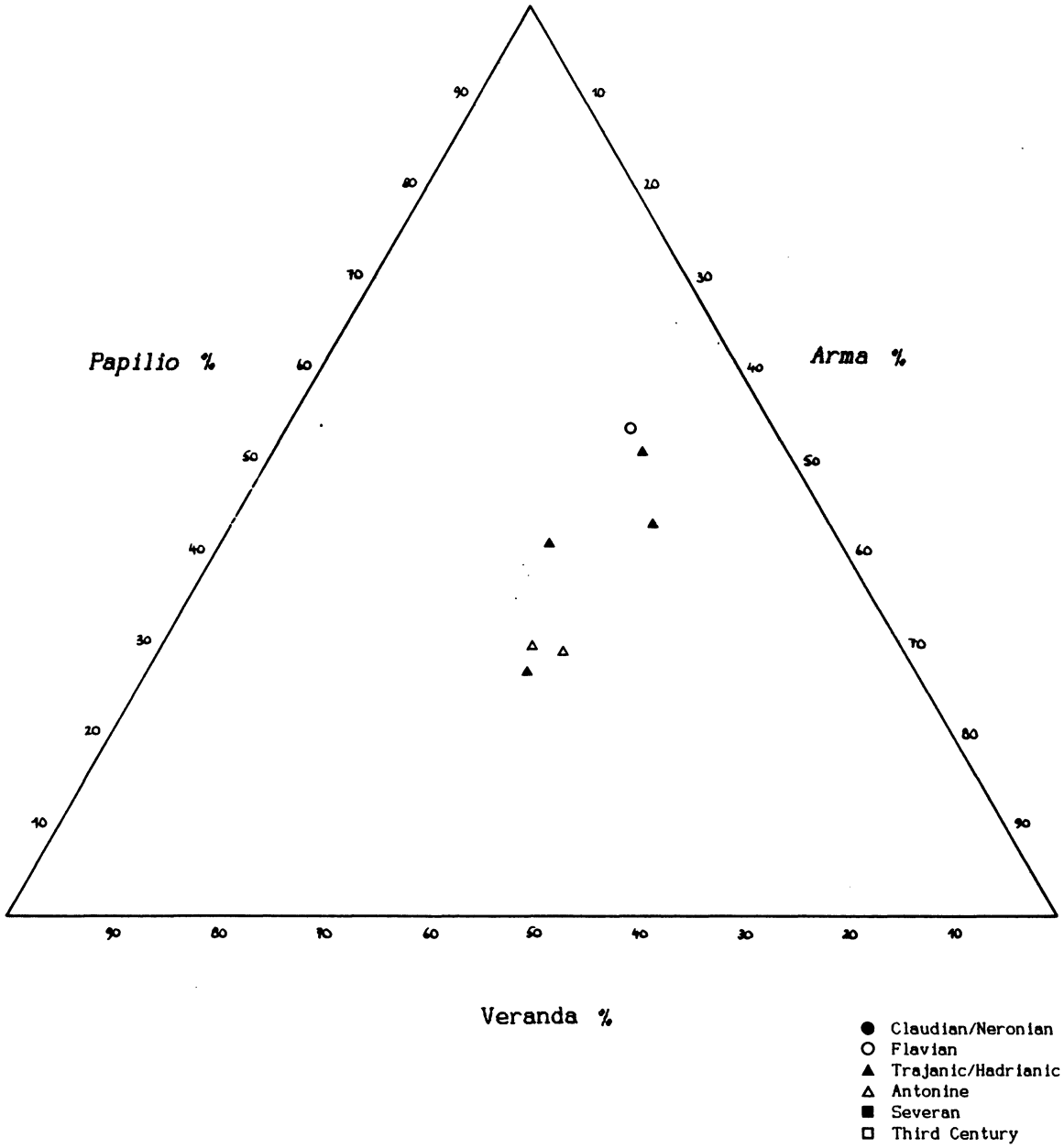


Fig 91 *Papilio/Arma*/Veranda: Comparative Proportions

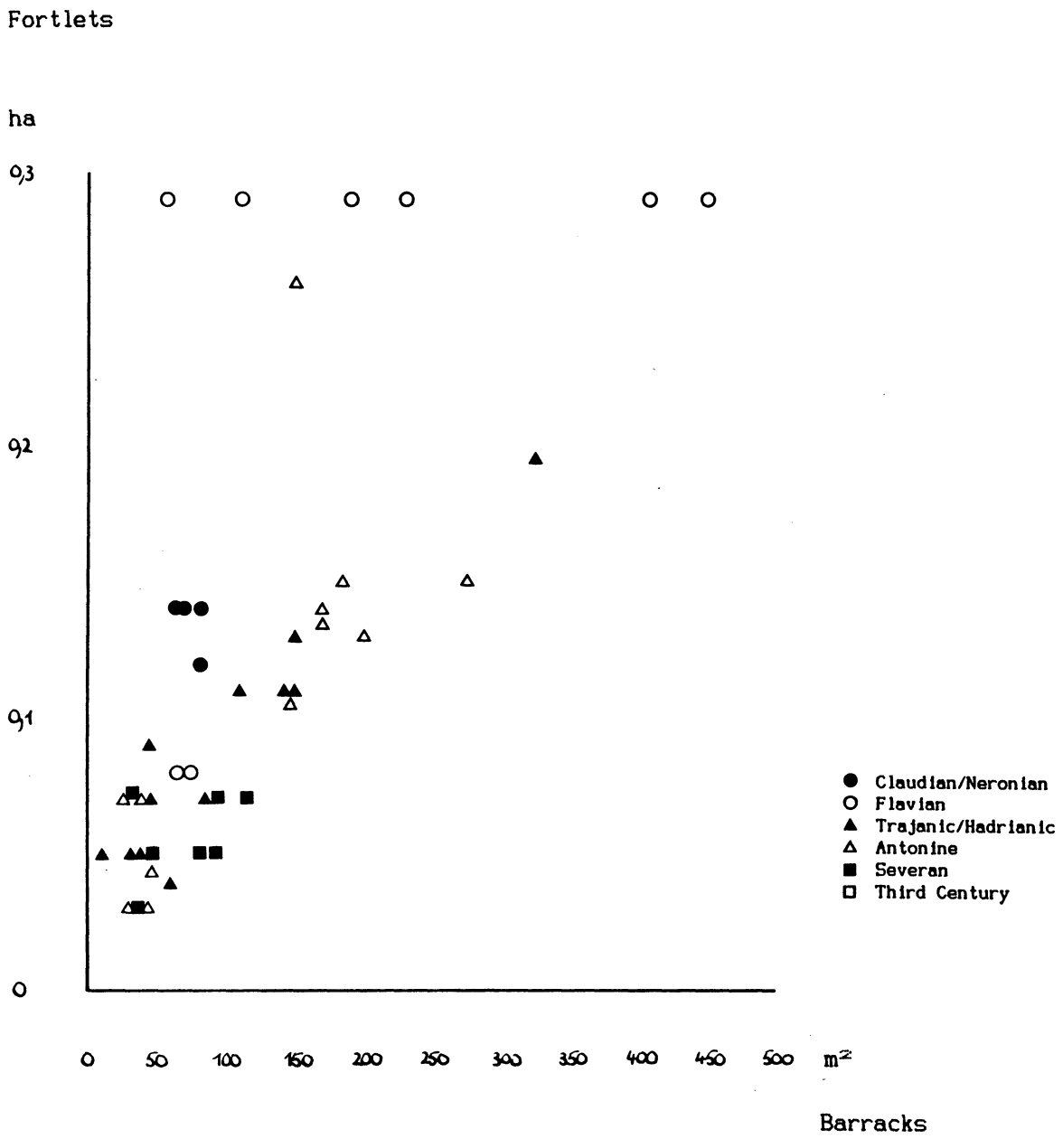


Fig 92 Barracks and Fortlets: Comparative Areas

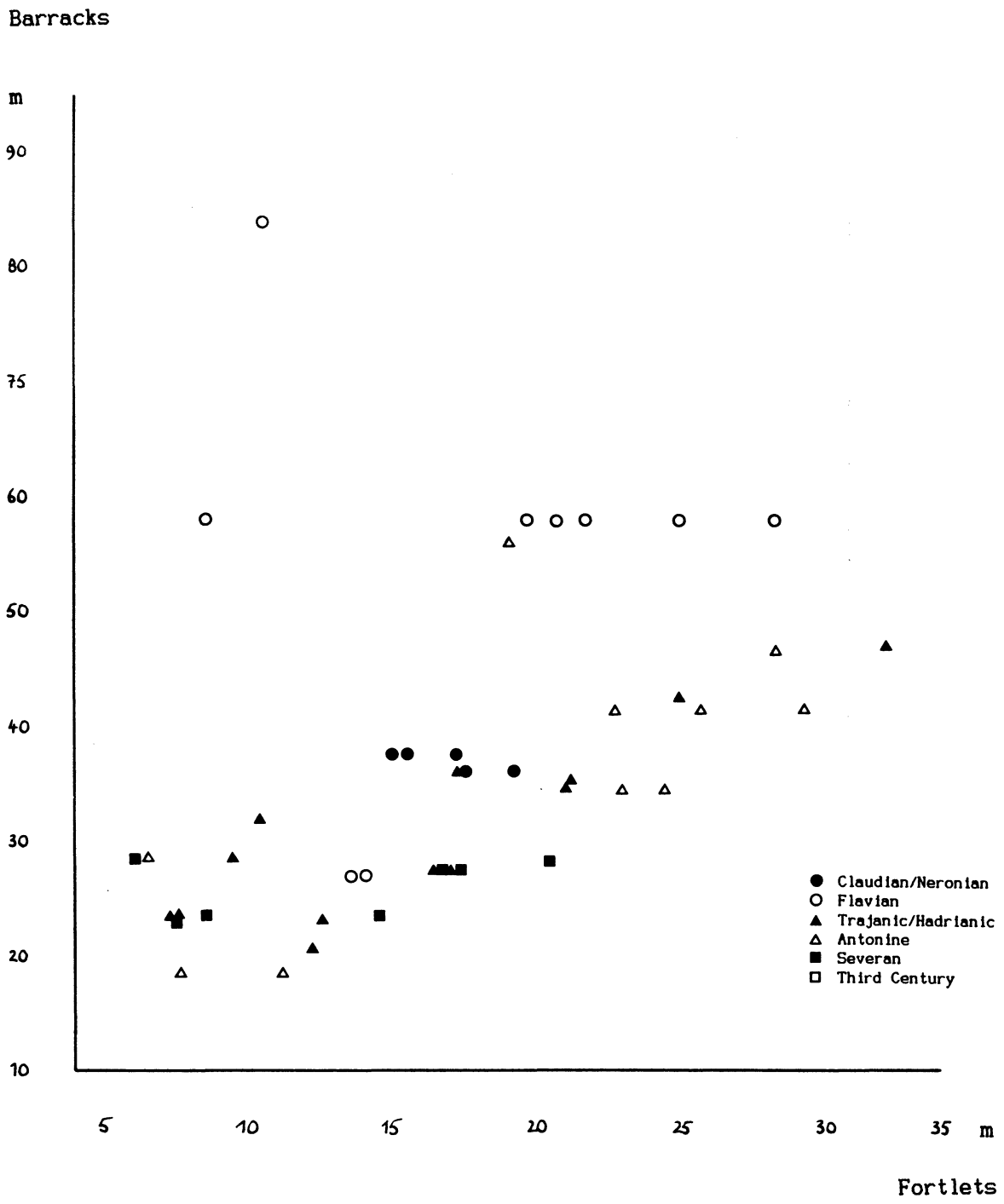


Fig 93 Barracks and Fortlets: Comparative Lengths

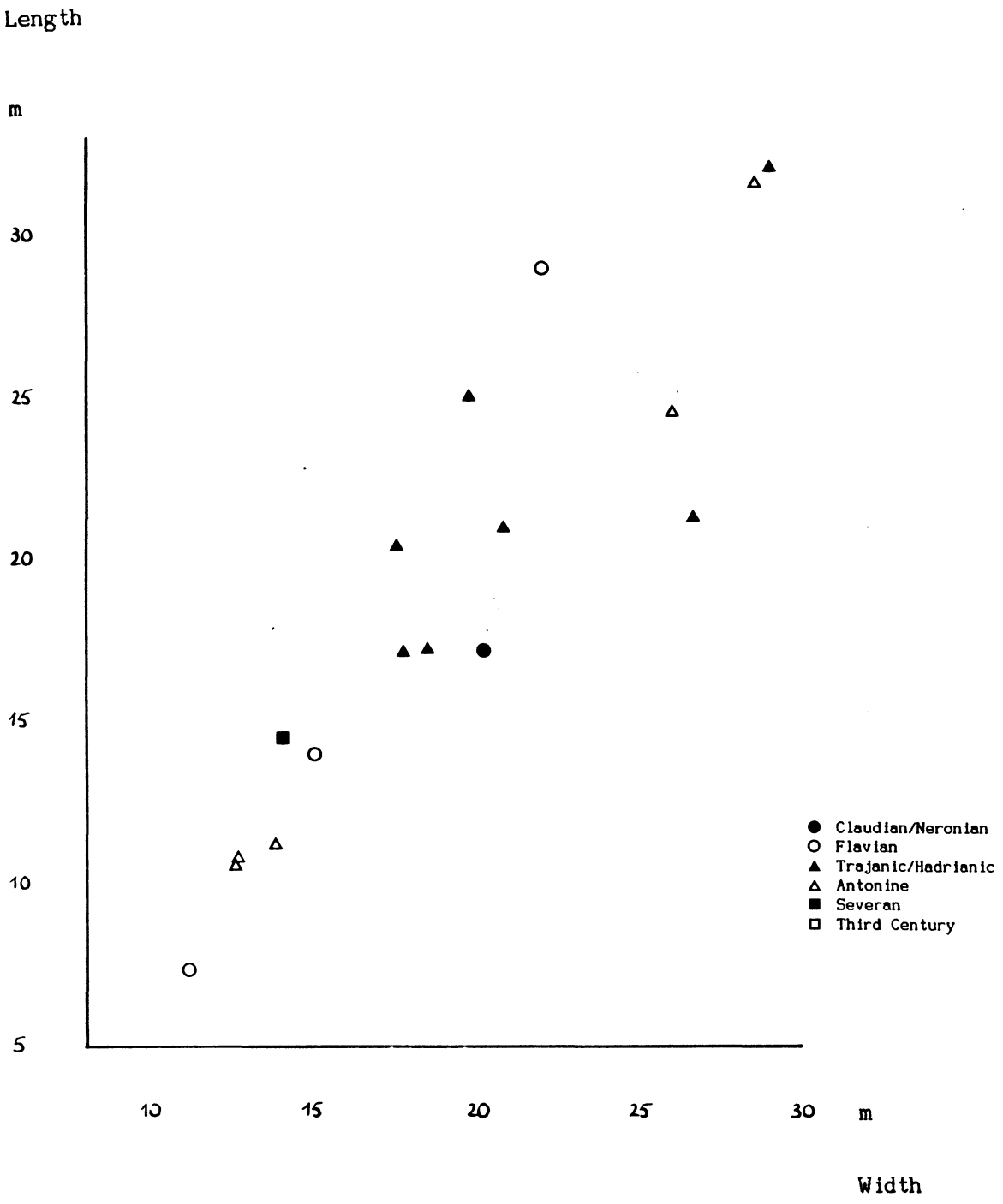


Fig 94 Building Pairs: Dimensions

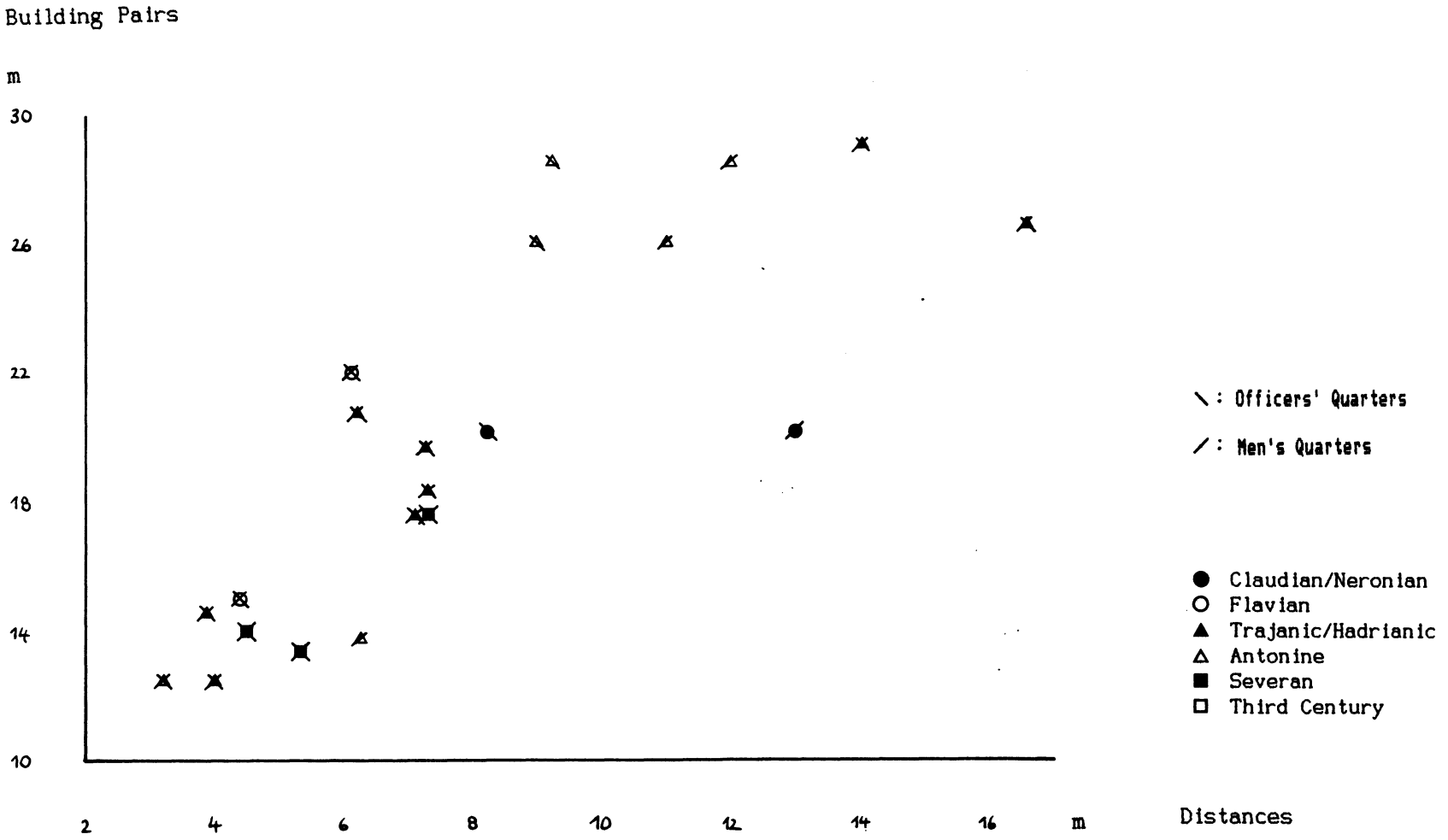


Fig 95 Widths of Building Pairs / Distances between Quarters: Comparison

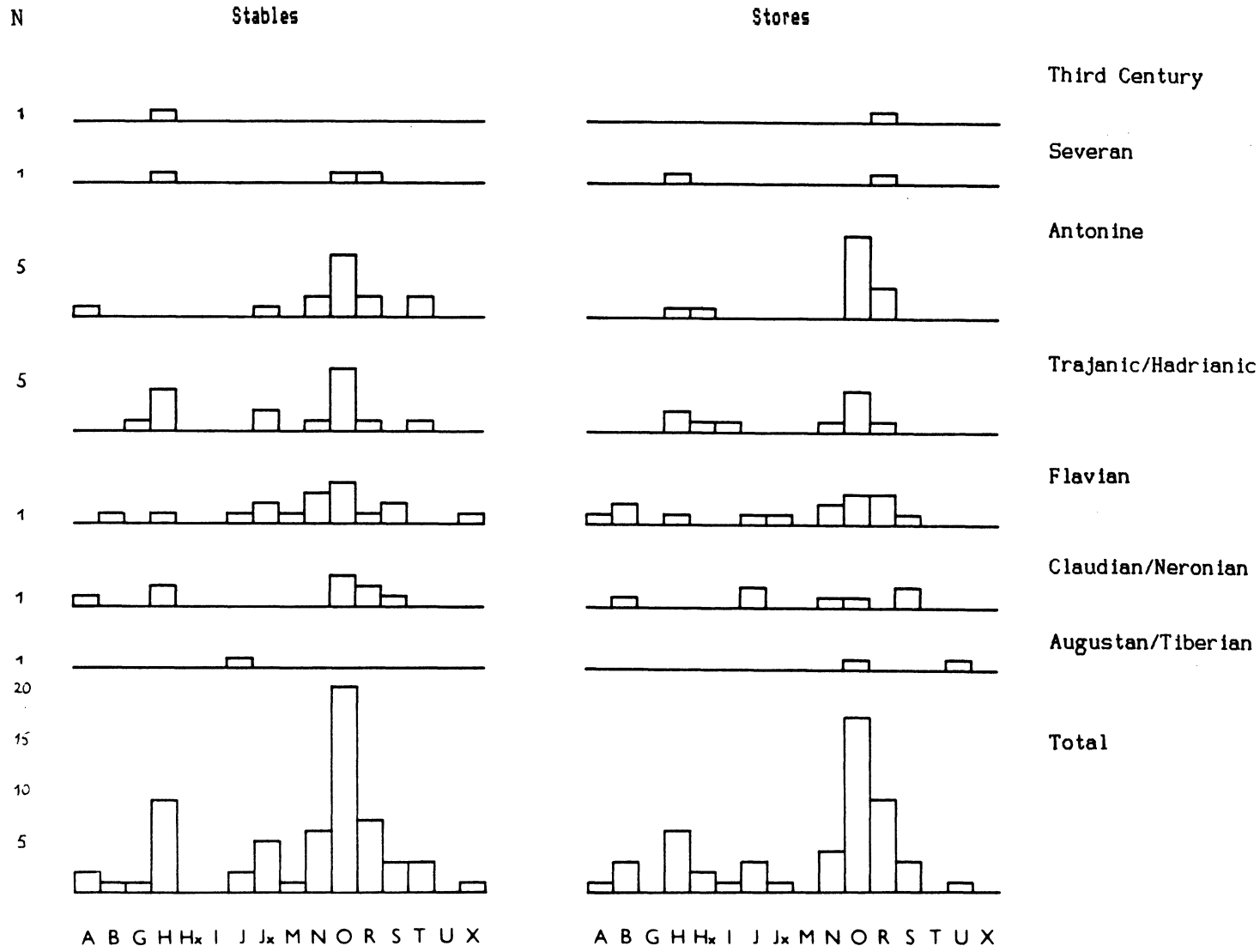


Fig 96 Building Types

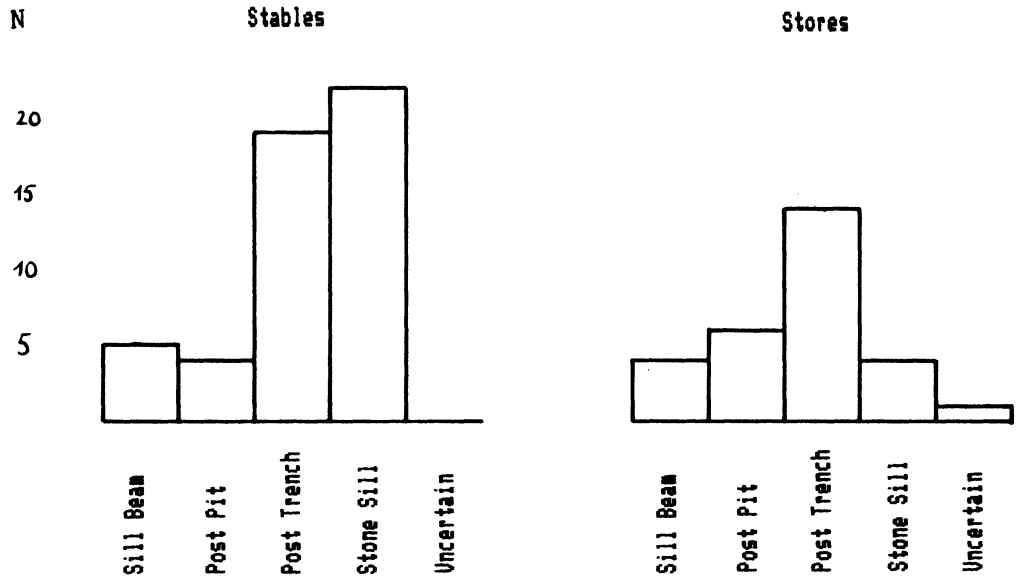


Fig 97 Construction Methods

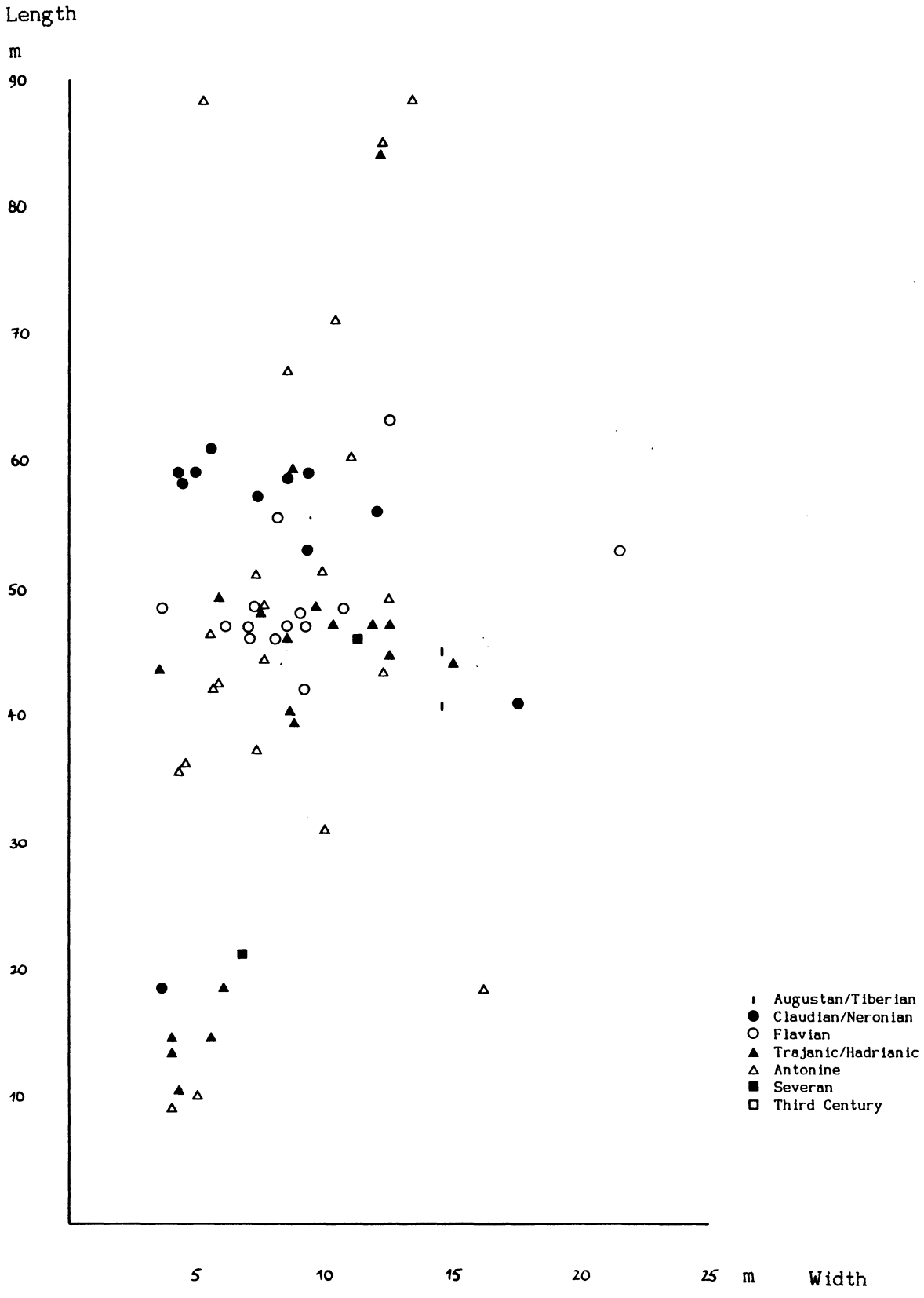


Fig 98 Stables: Dimensions

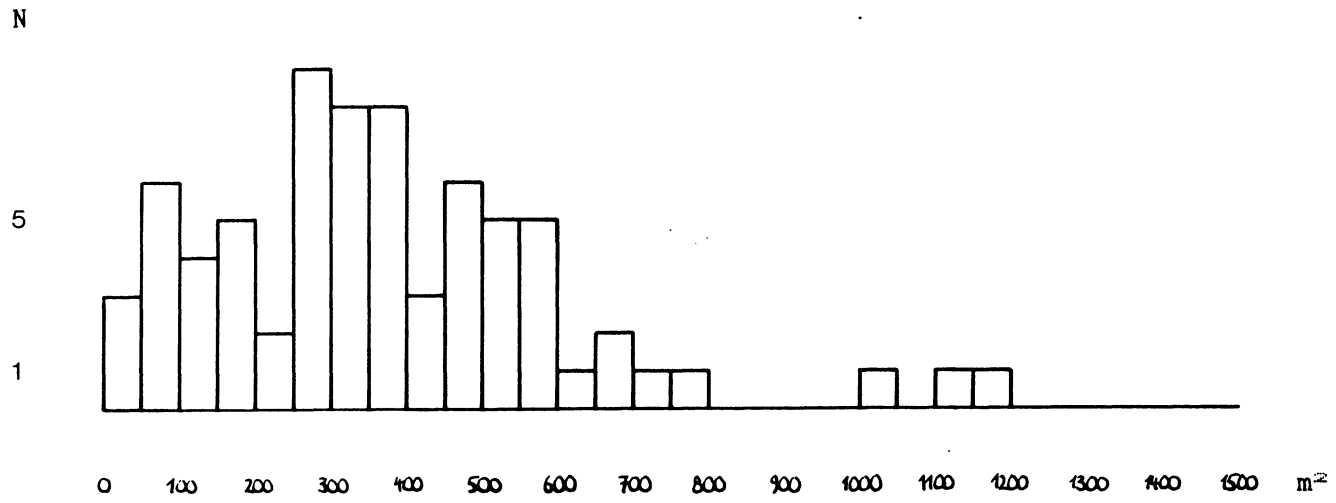


Fig 99 Stables: Areas

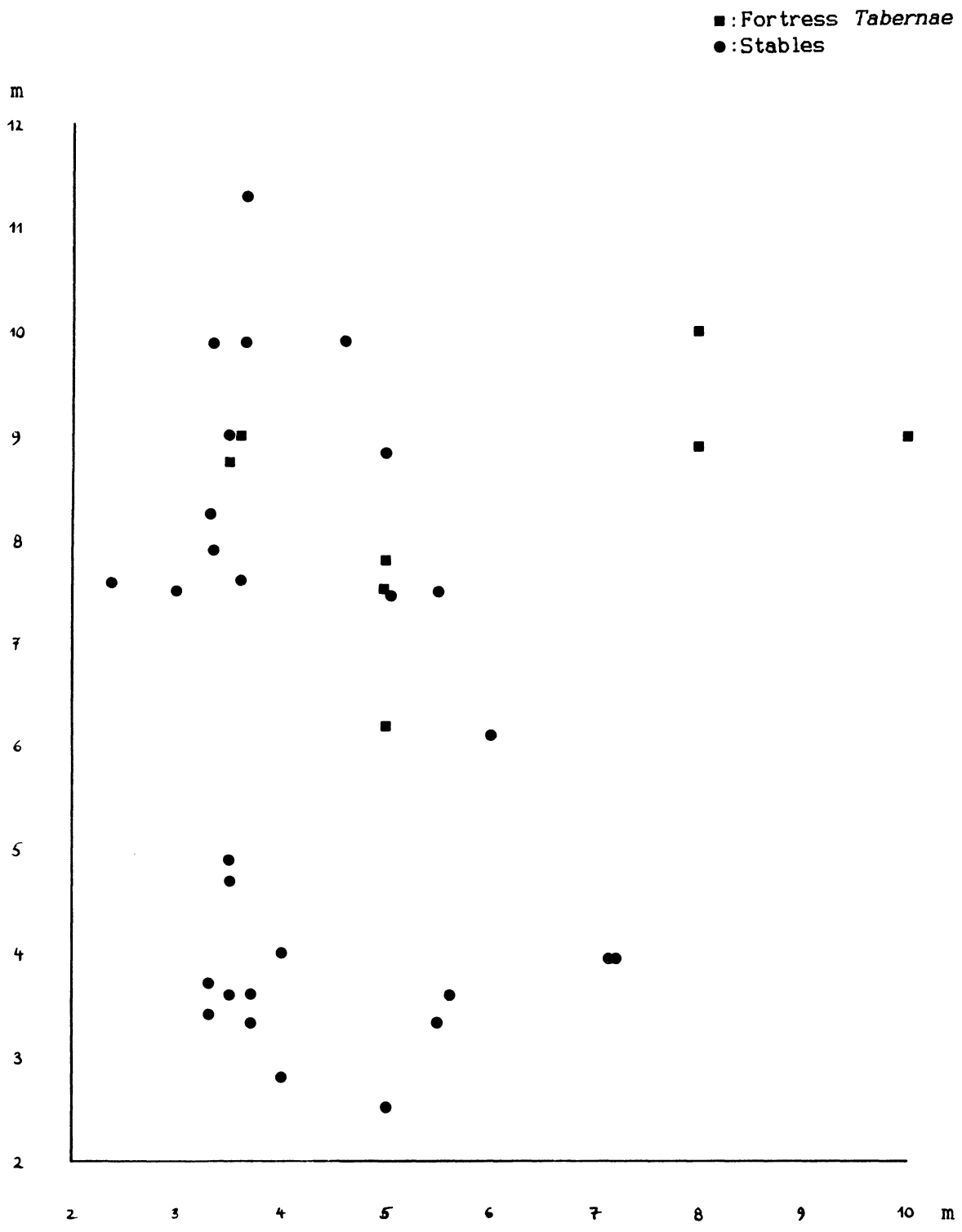


Fig 100 Stables: Dimensions of Internal Divisions

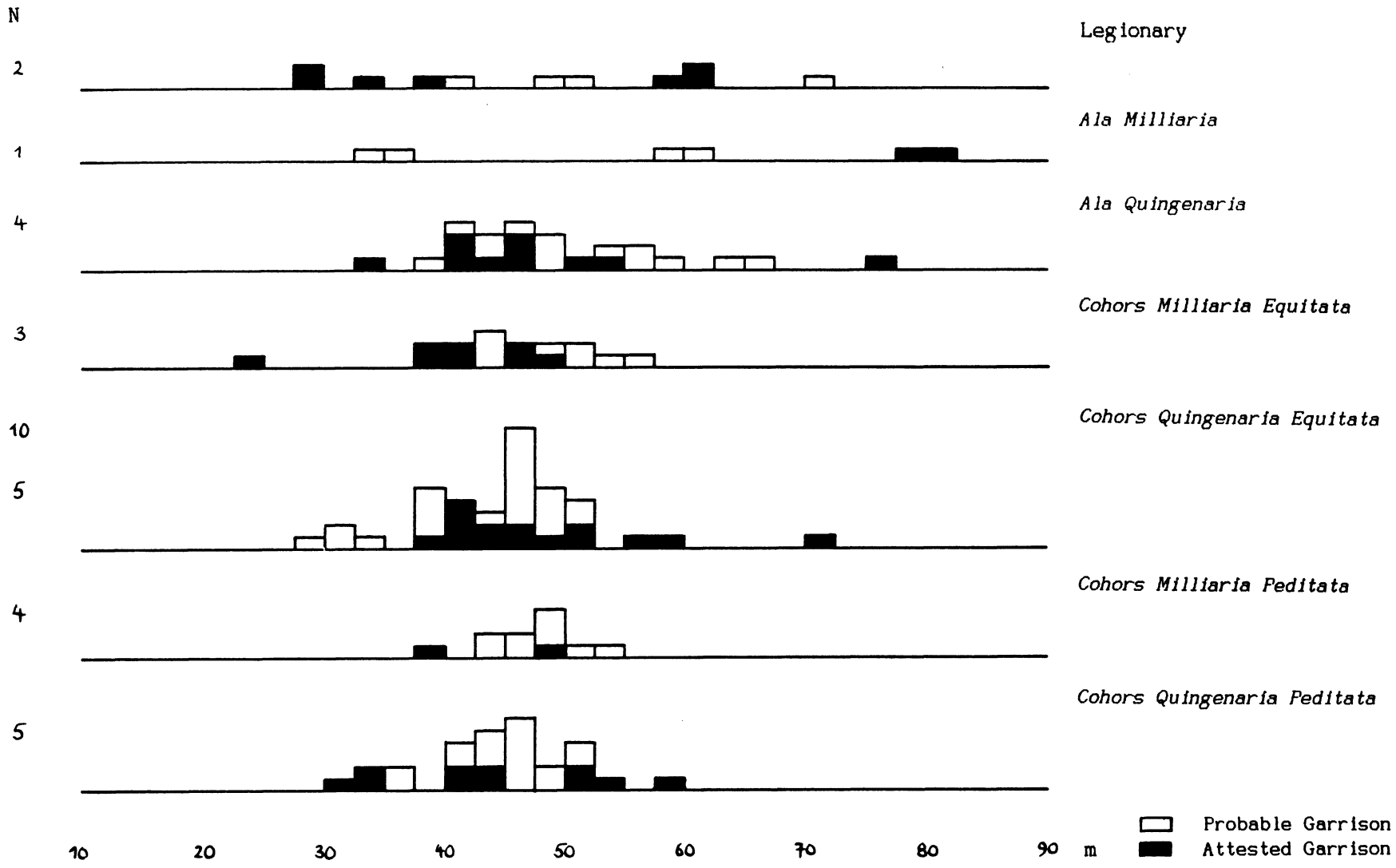


Fig 101 Attested Garrisons: Barrack Lengths

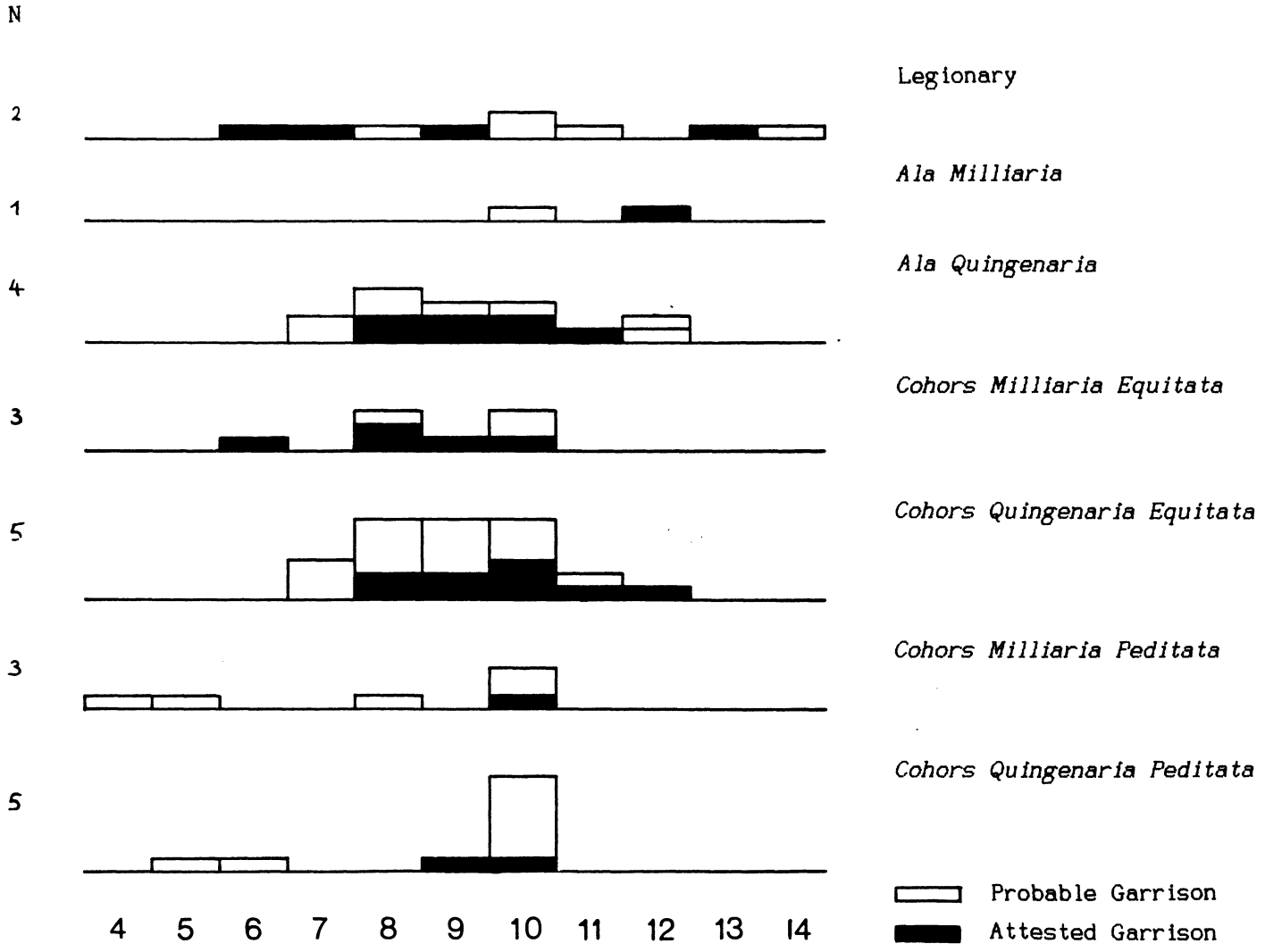


Fig 102 Attested Garrisons: *Contubernium* Totals

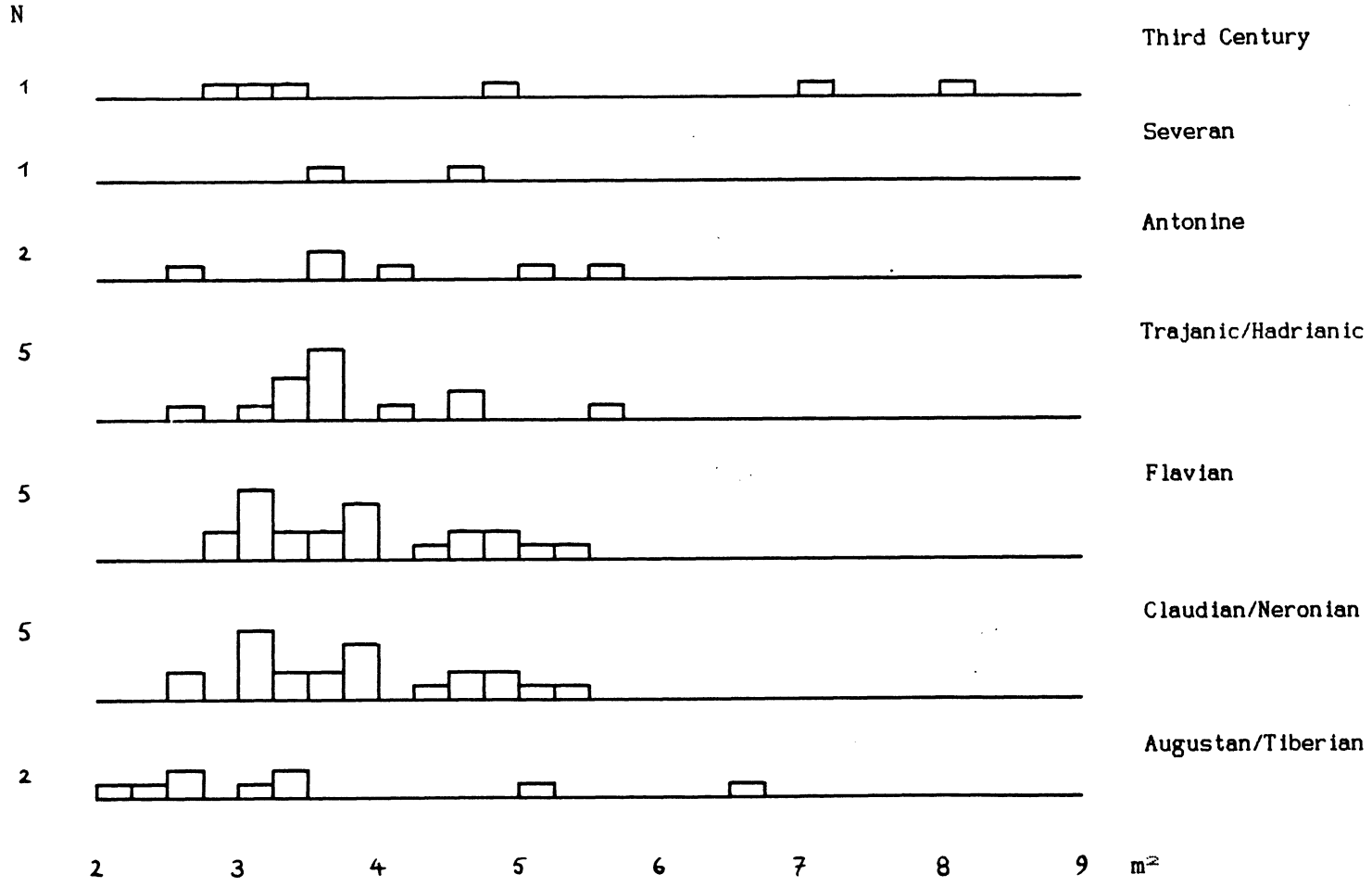


Fig 103 Legionary Barracks: Living Space per Man

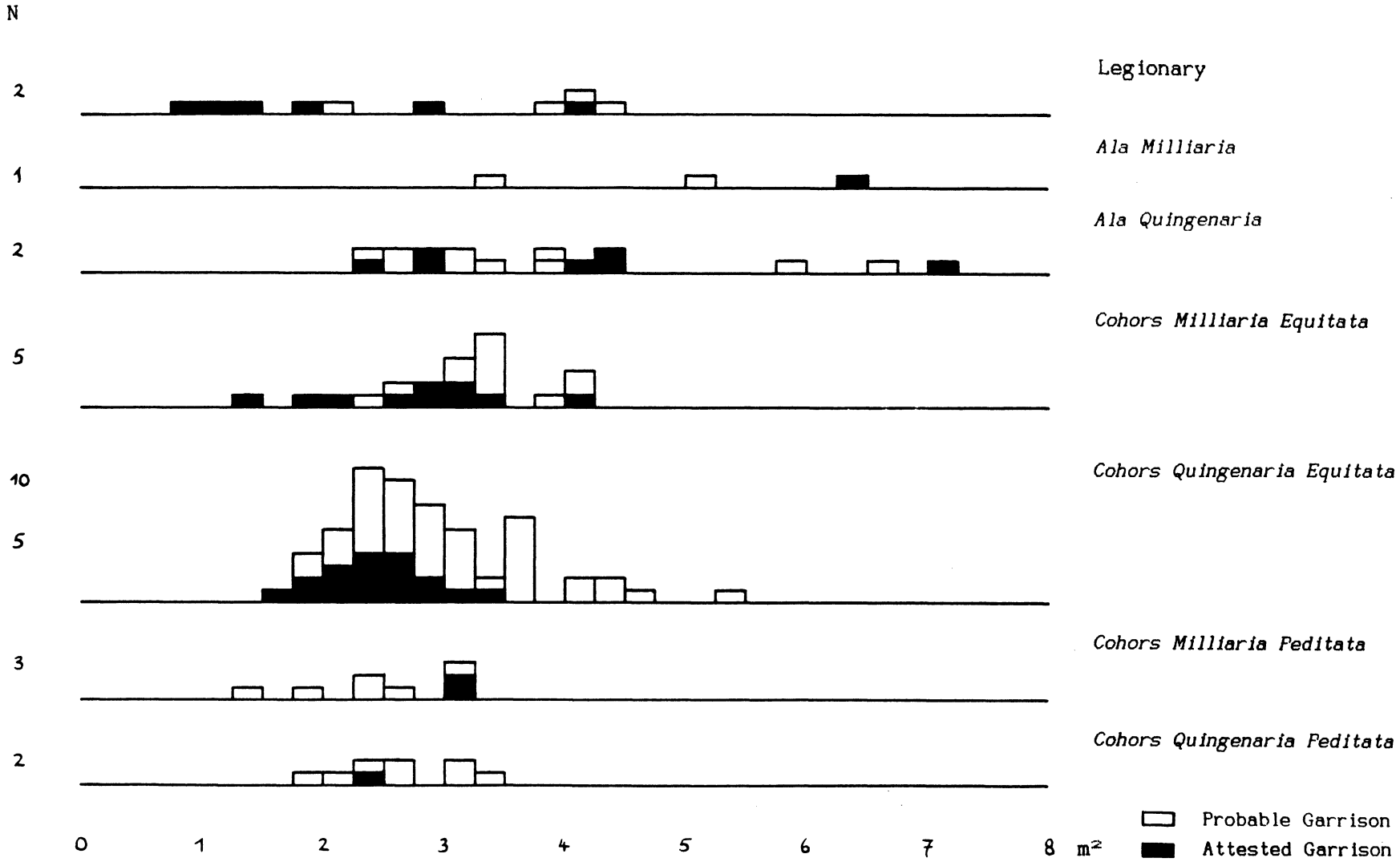


Fig 104 Attested Garrisons: Living Space per Man

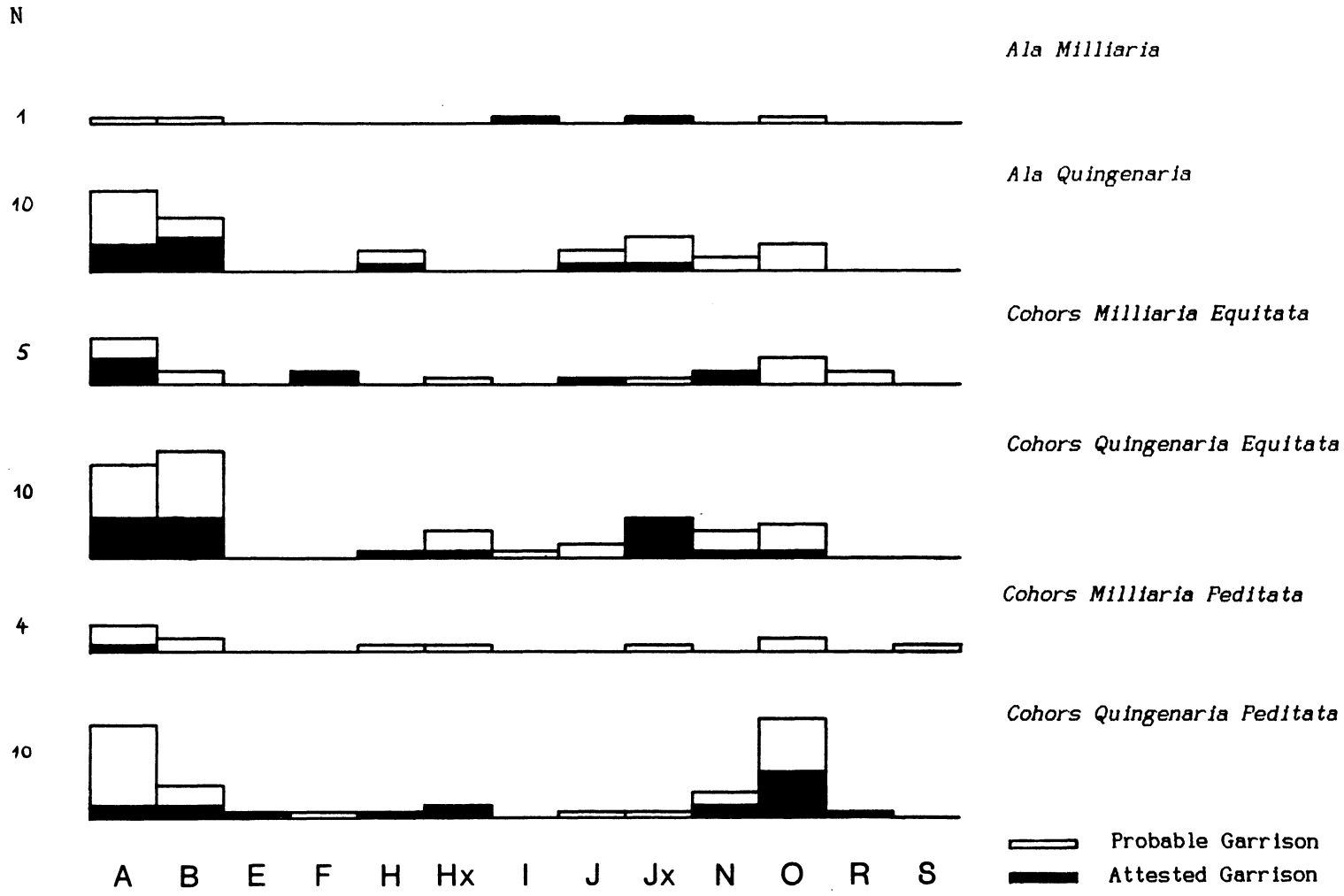


Fig 105 Attested Garrisons: Barrack Building Types

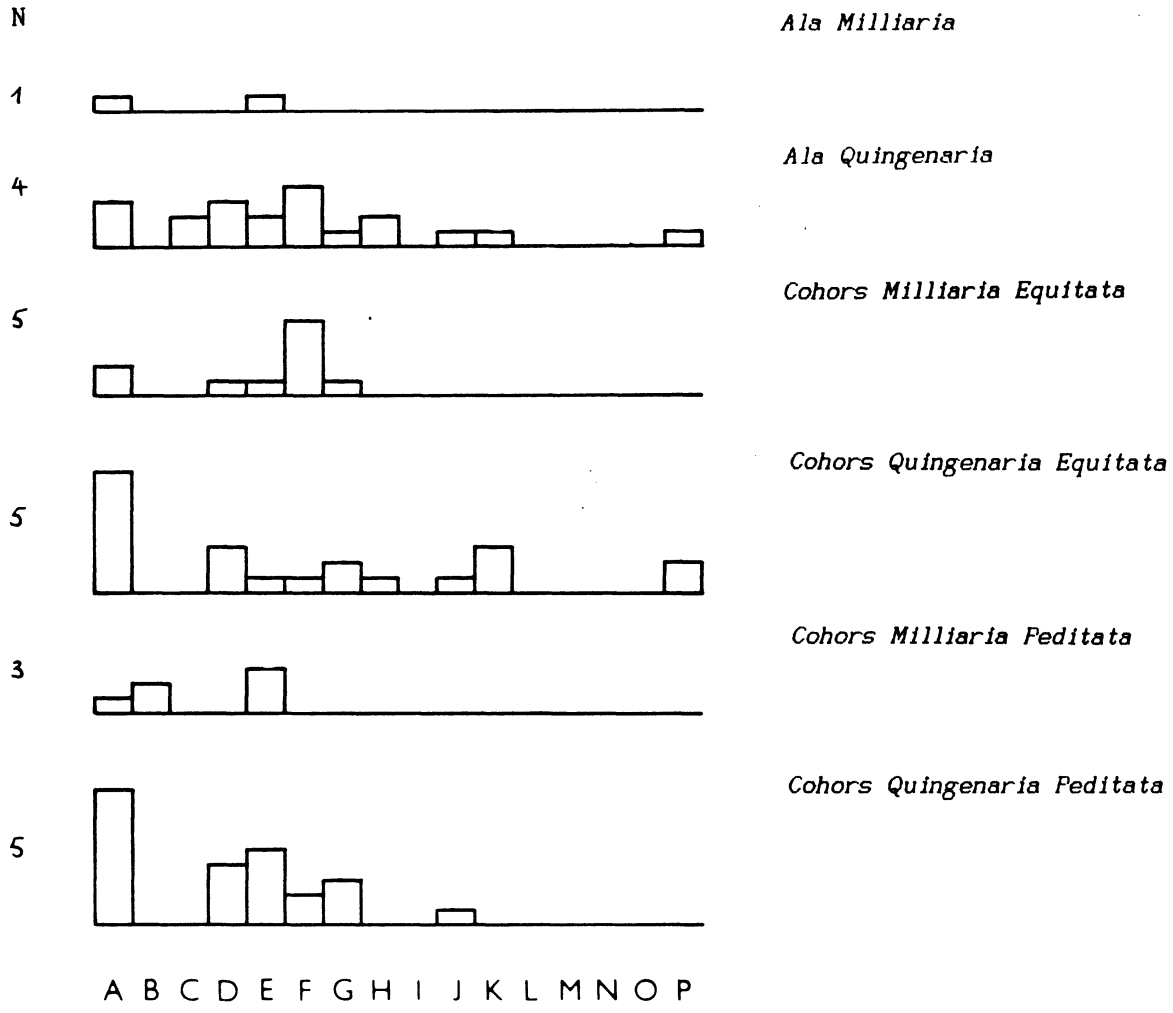


Fig 106 Attested Garrisons: Fort Layout Types

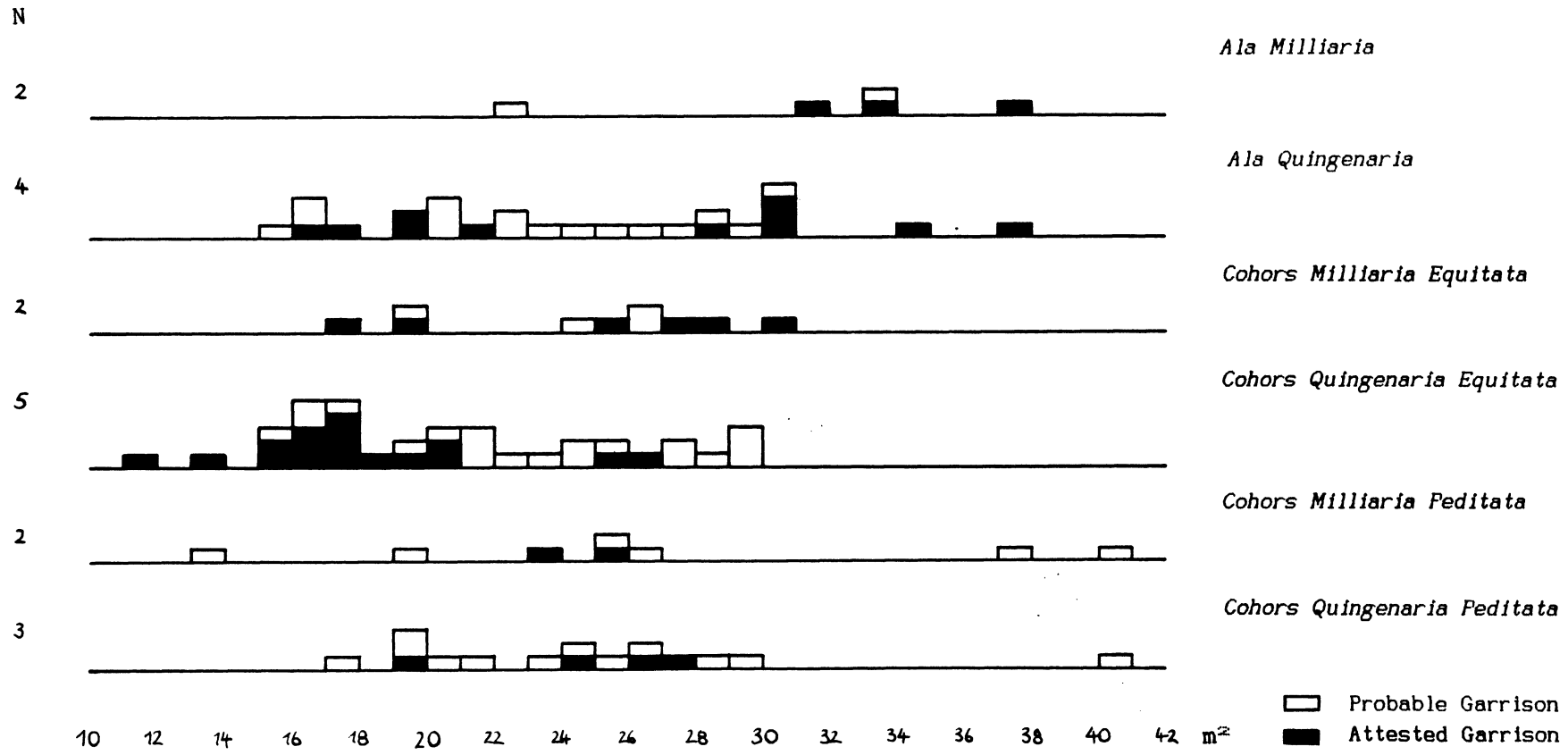


Fig 107 Attested Garrisons: *Contubernium* Living Space

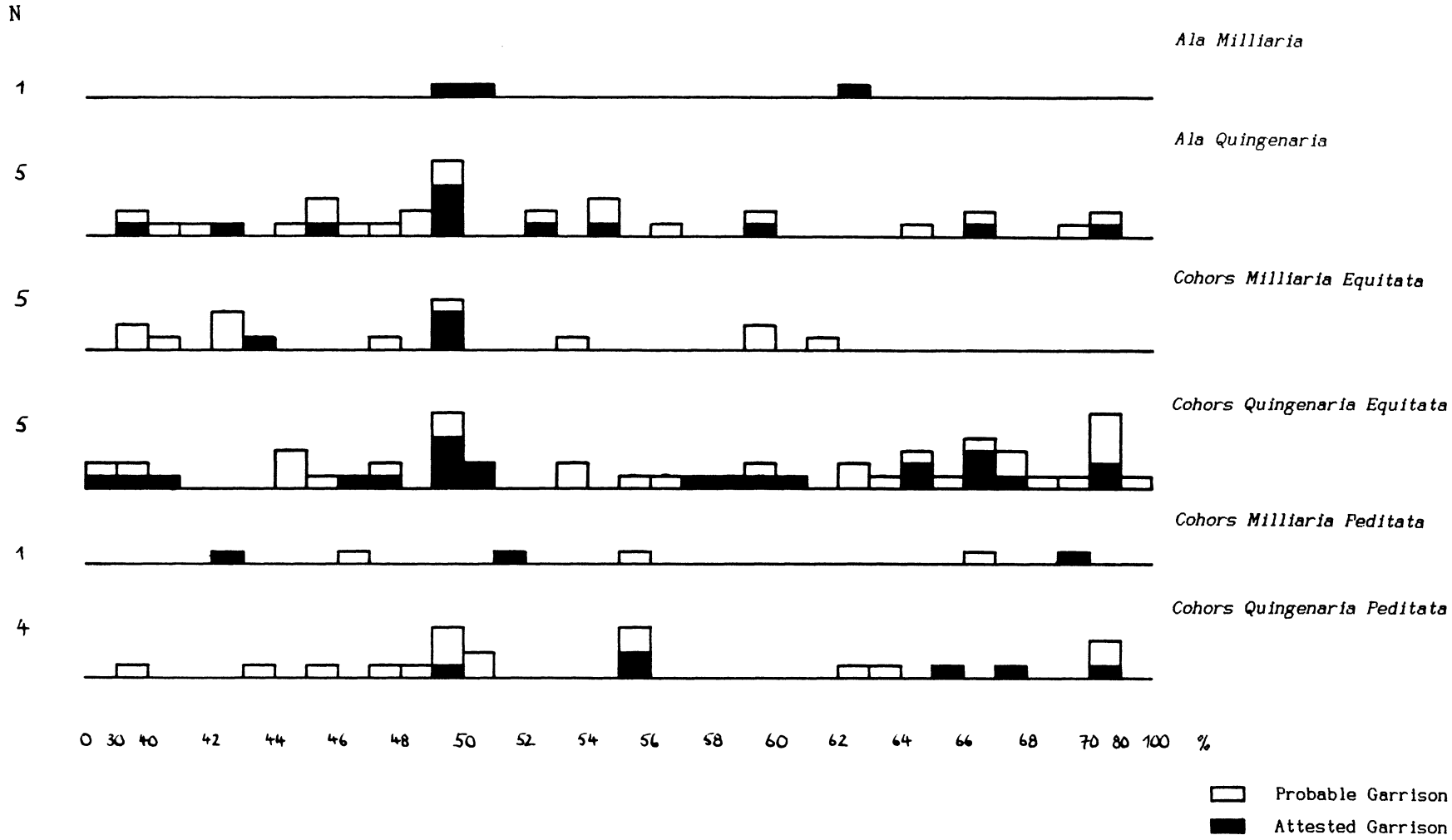


Fig 108 Attested Garrisons: *Contubernium* Proportions

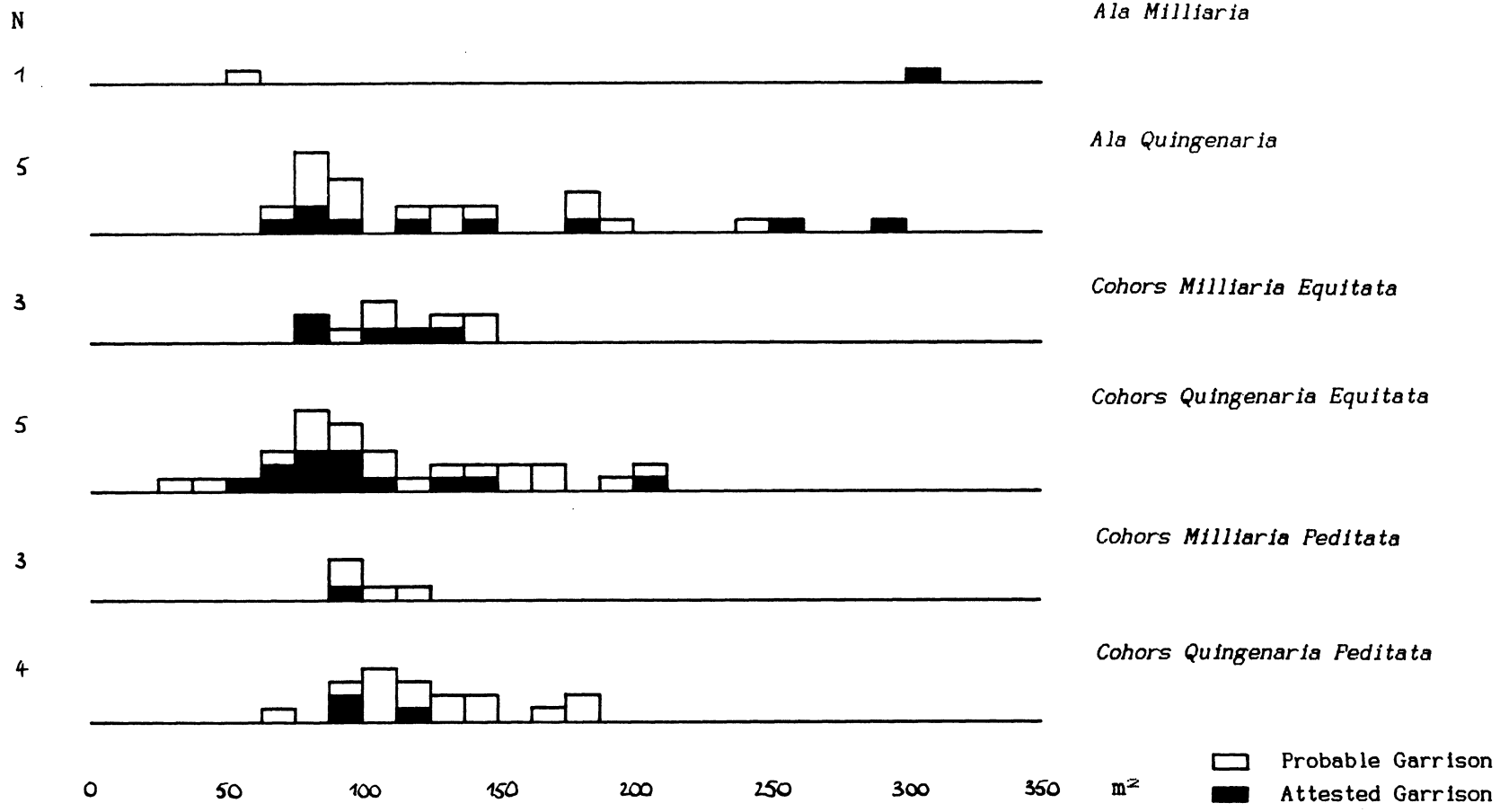


Fig 109 Attested Garrisons: Areas of Officers' Quarters

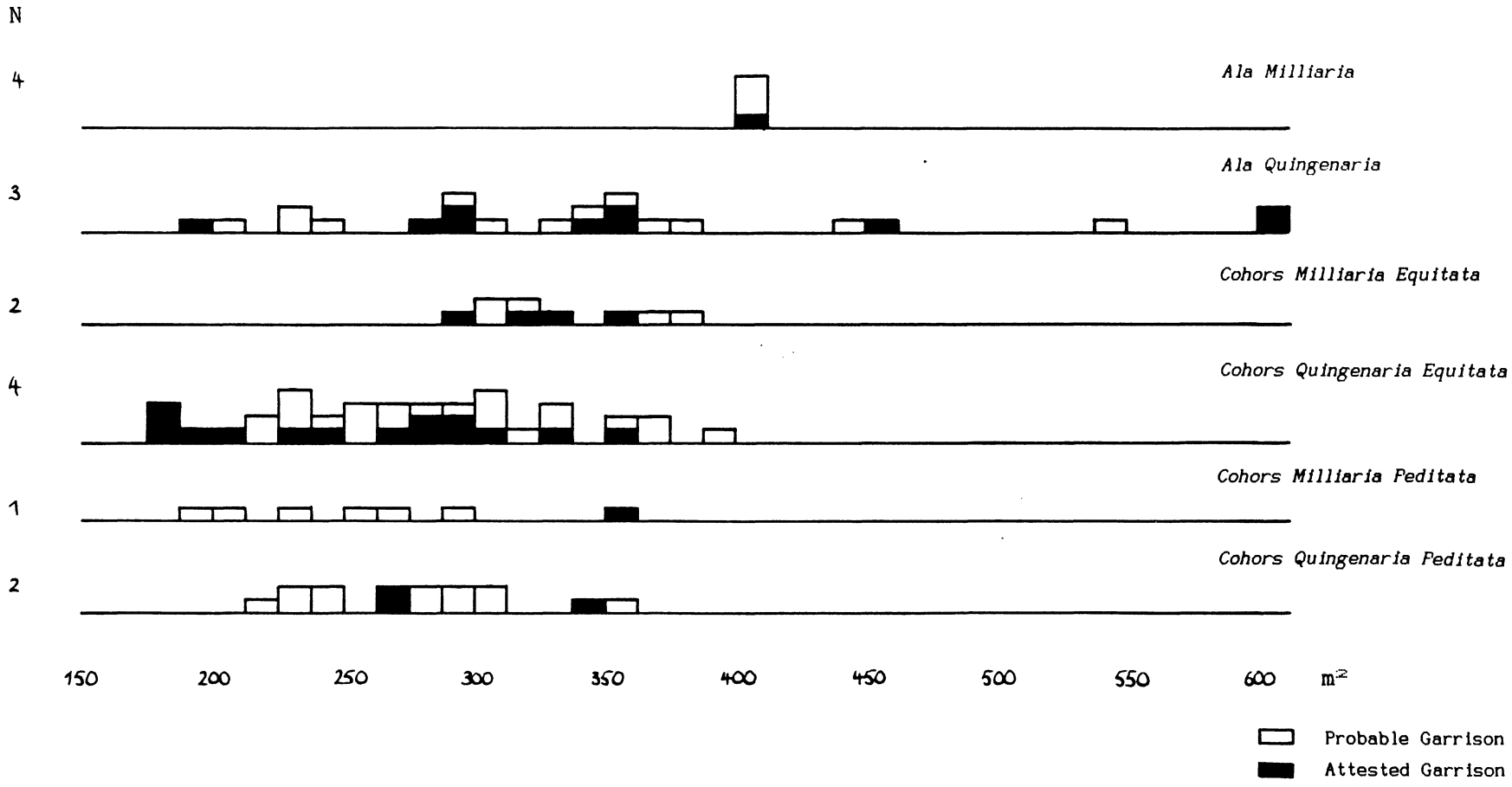


Fig 110 Attested Garrisons: Areas of Men's Quarters

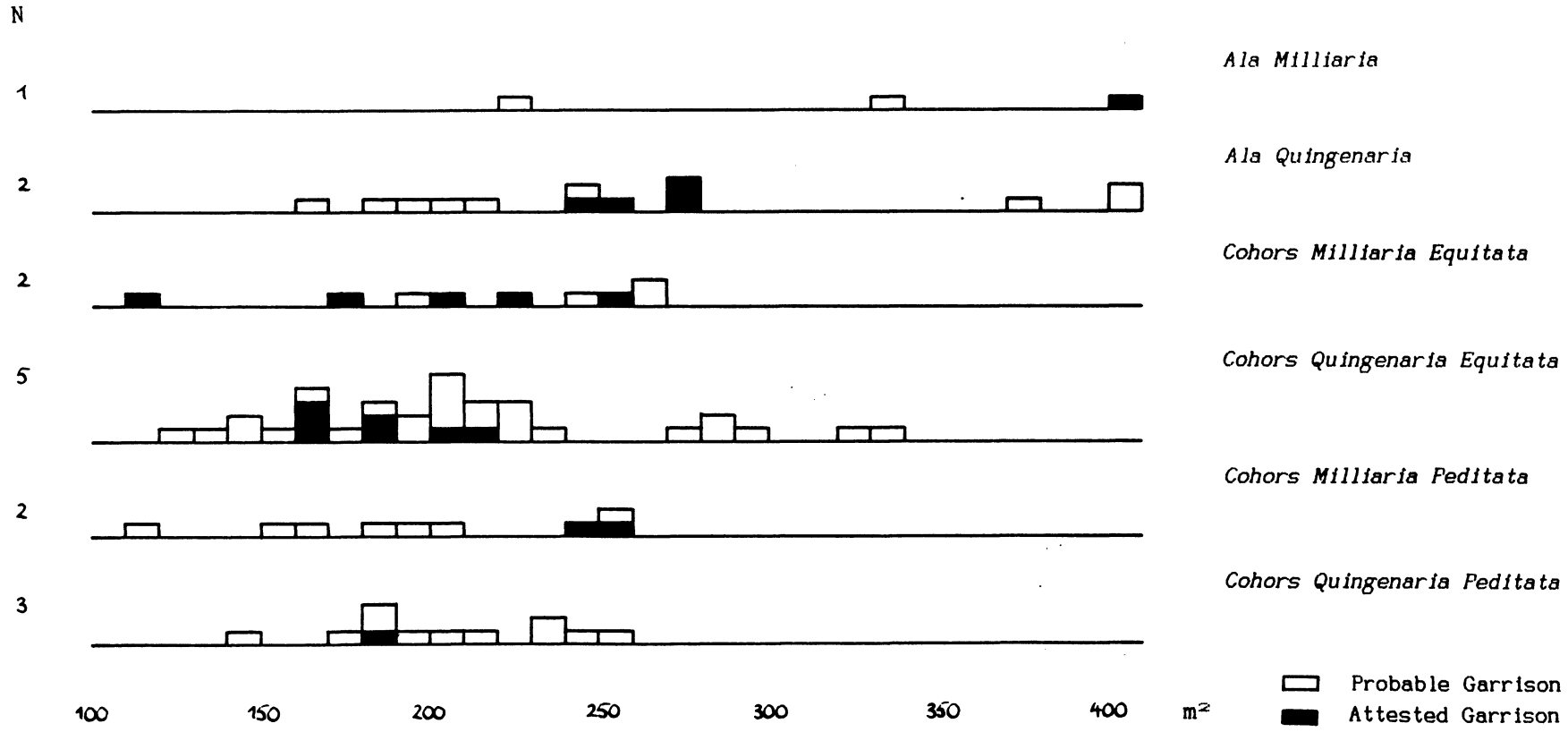


Fig 111 Attested Garrisons: Total Living Space per Barrack

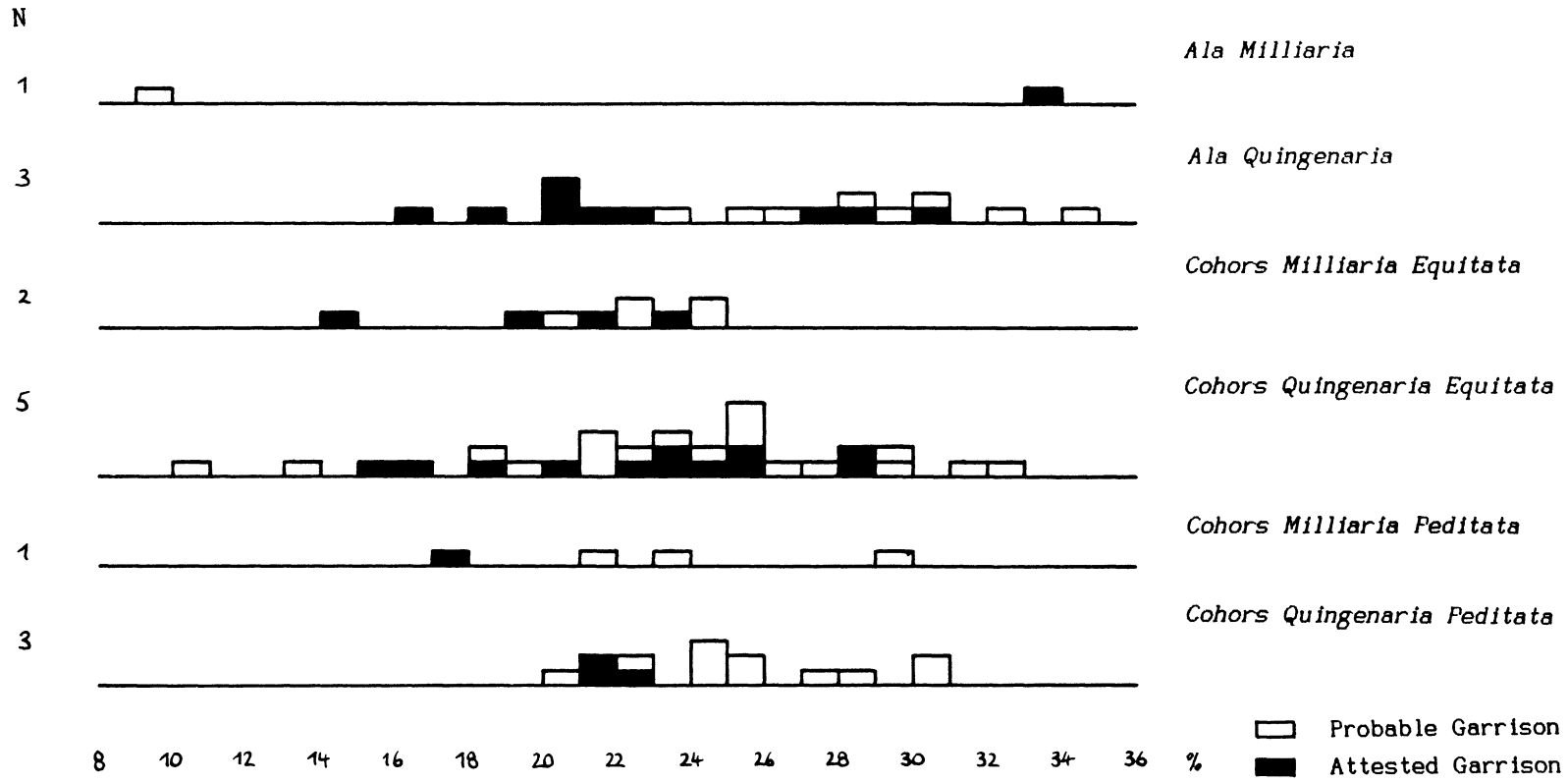


Fig 112 Attested Garrisons: Barrack Length Proportions

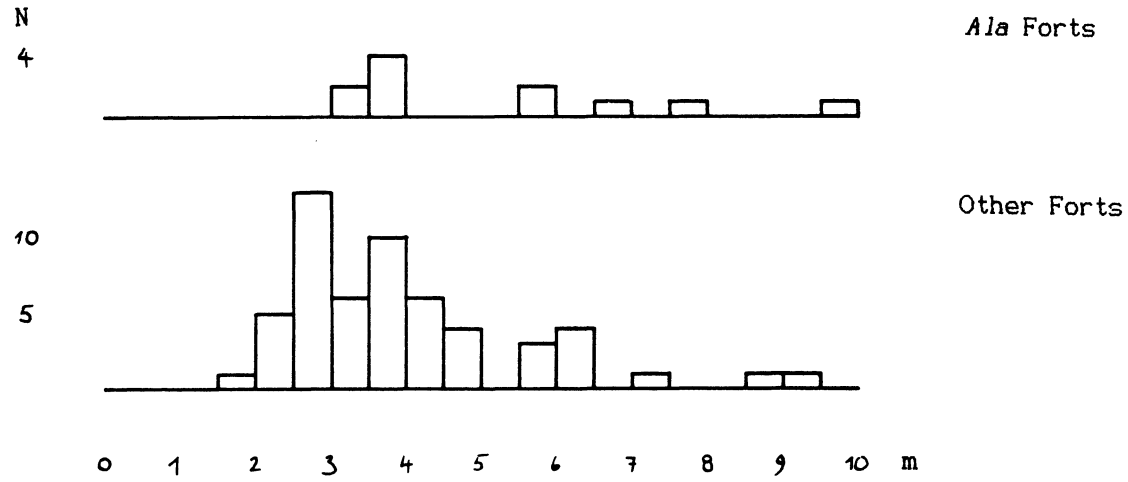


Fig 113 *Viae Sagulares*: Widths

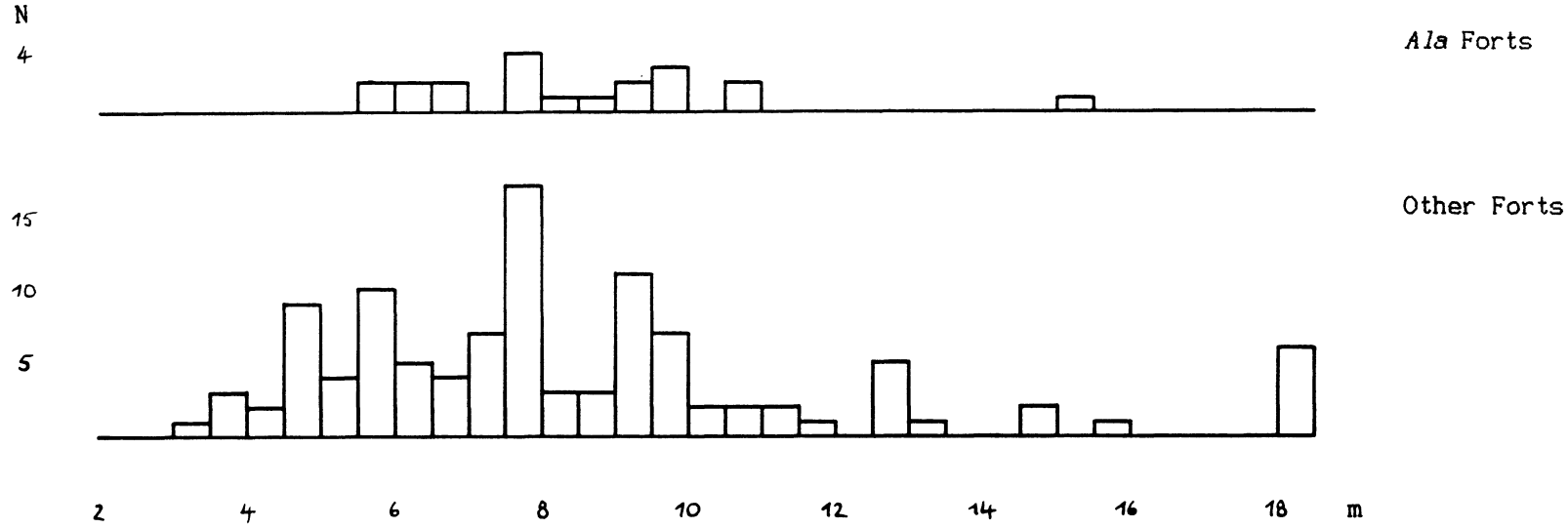


Fig 114 *Intervallum* Space: Widths

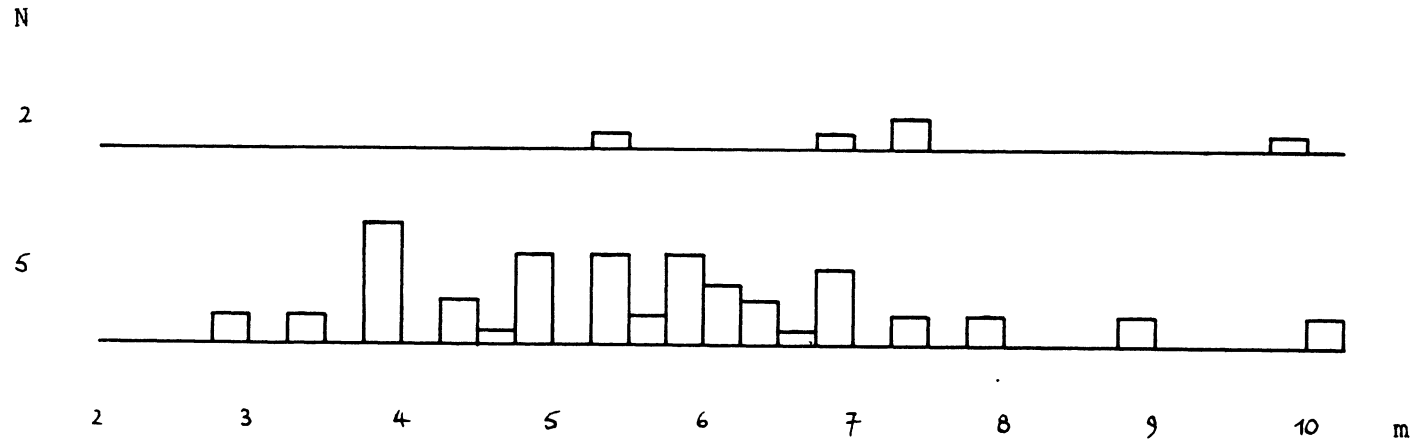


Fig 115 *Viae Praetoriae*: Widths

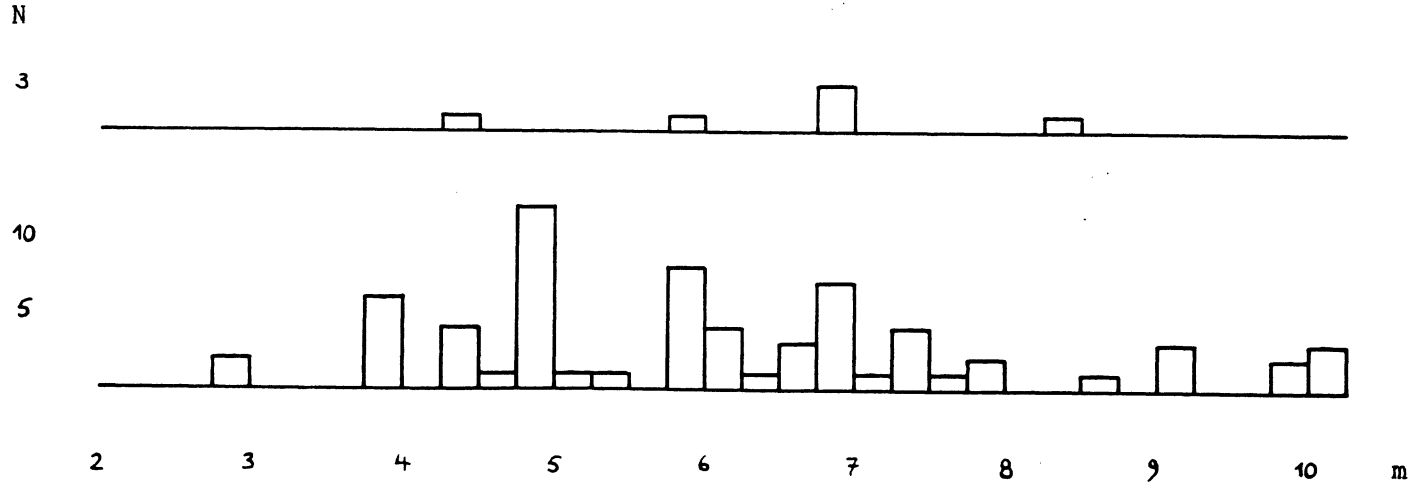


Fig 116 *Viae Principales*: Widths

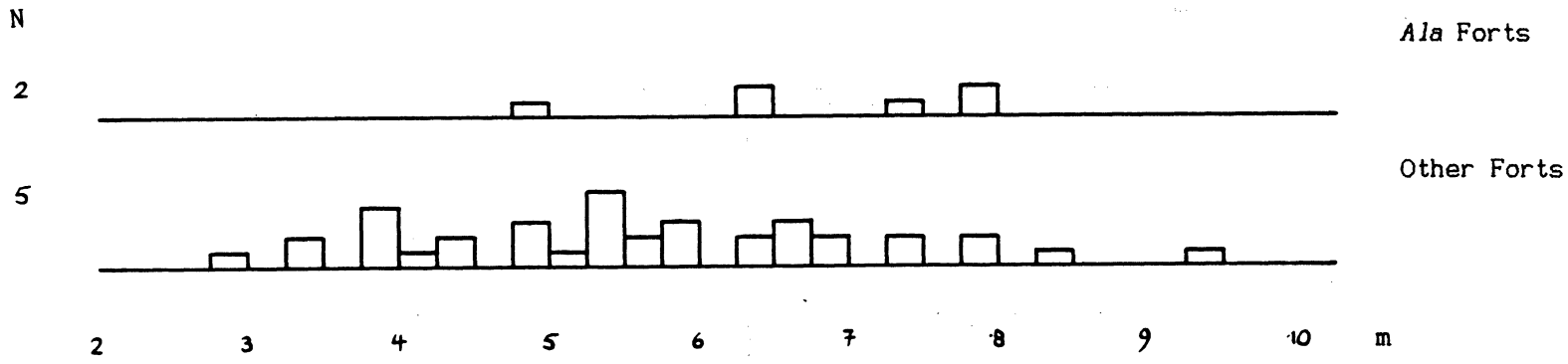


Fig 117 *Viae Decumanae*: Widths

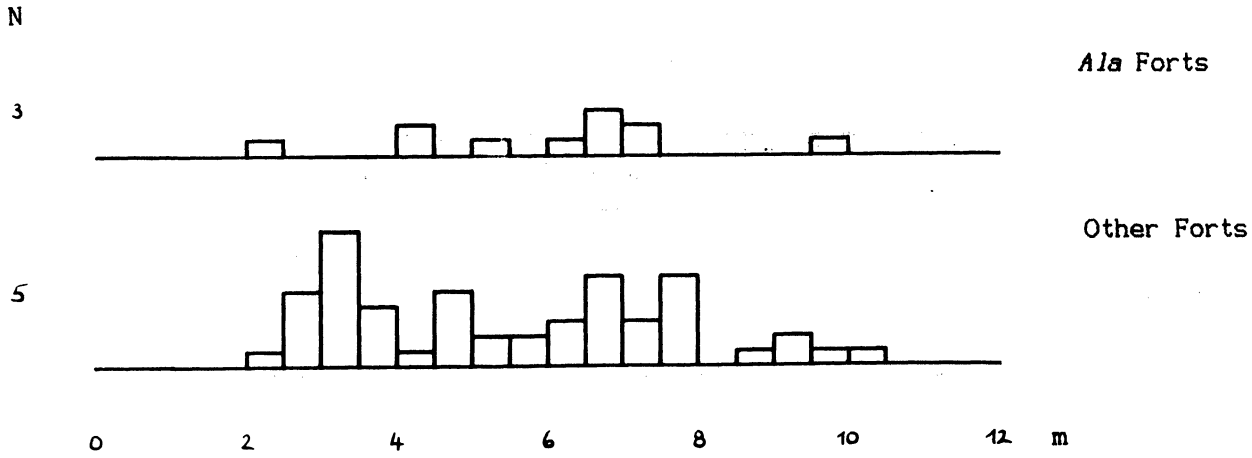


Fig 118 *Portae Praetoriae*: Widths

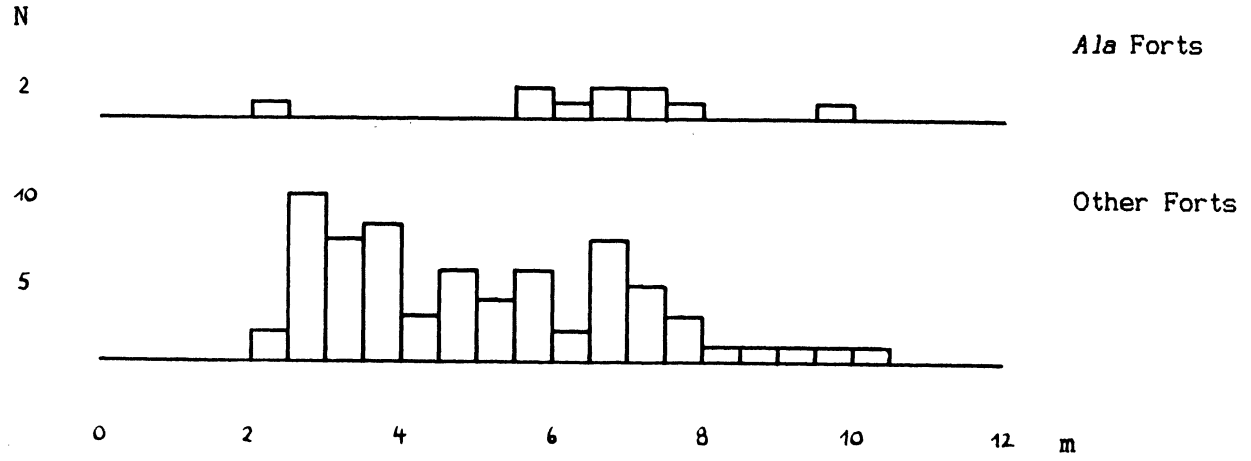


Fig 119 *Portae Principales*: Widths

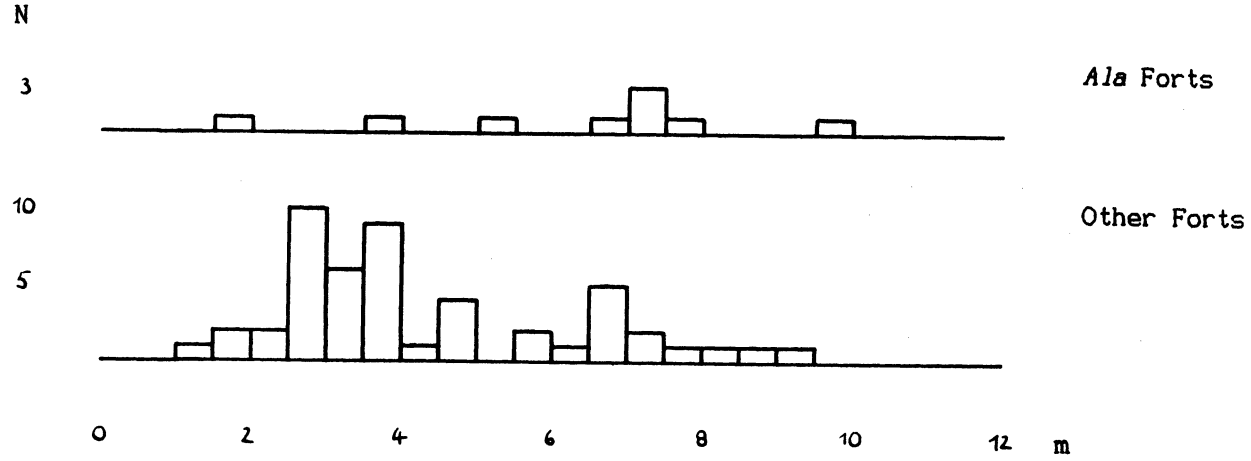


Fig 120 *Portae Decumanae*: Widths

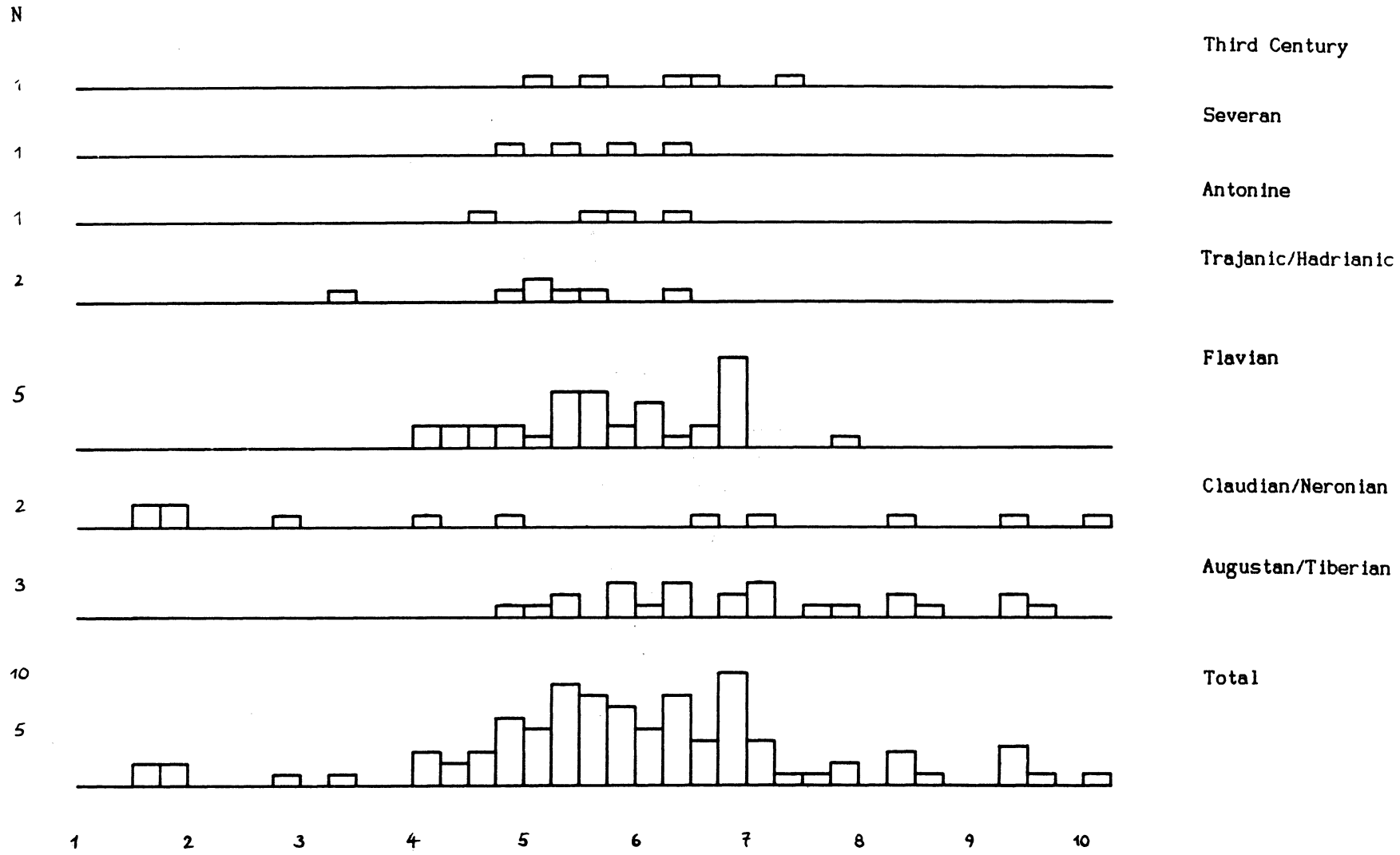


Fig 121 *Contubernium* Width into Centurion's Quarters Length (Fortresses)

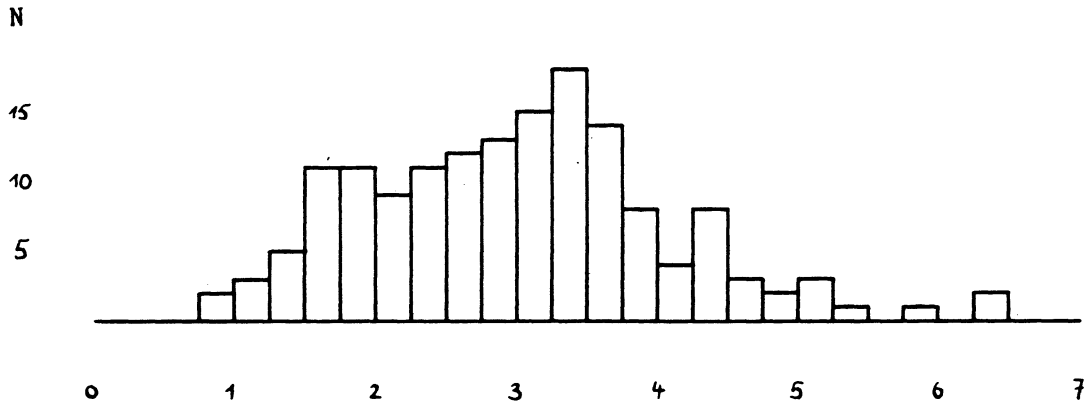


Fig 122 *Contubernium* Width into Officers' Quarters Length (Forts)

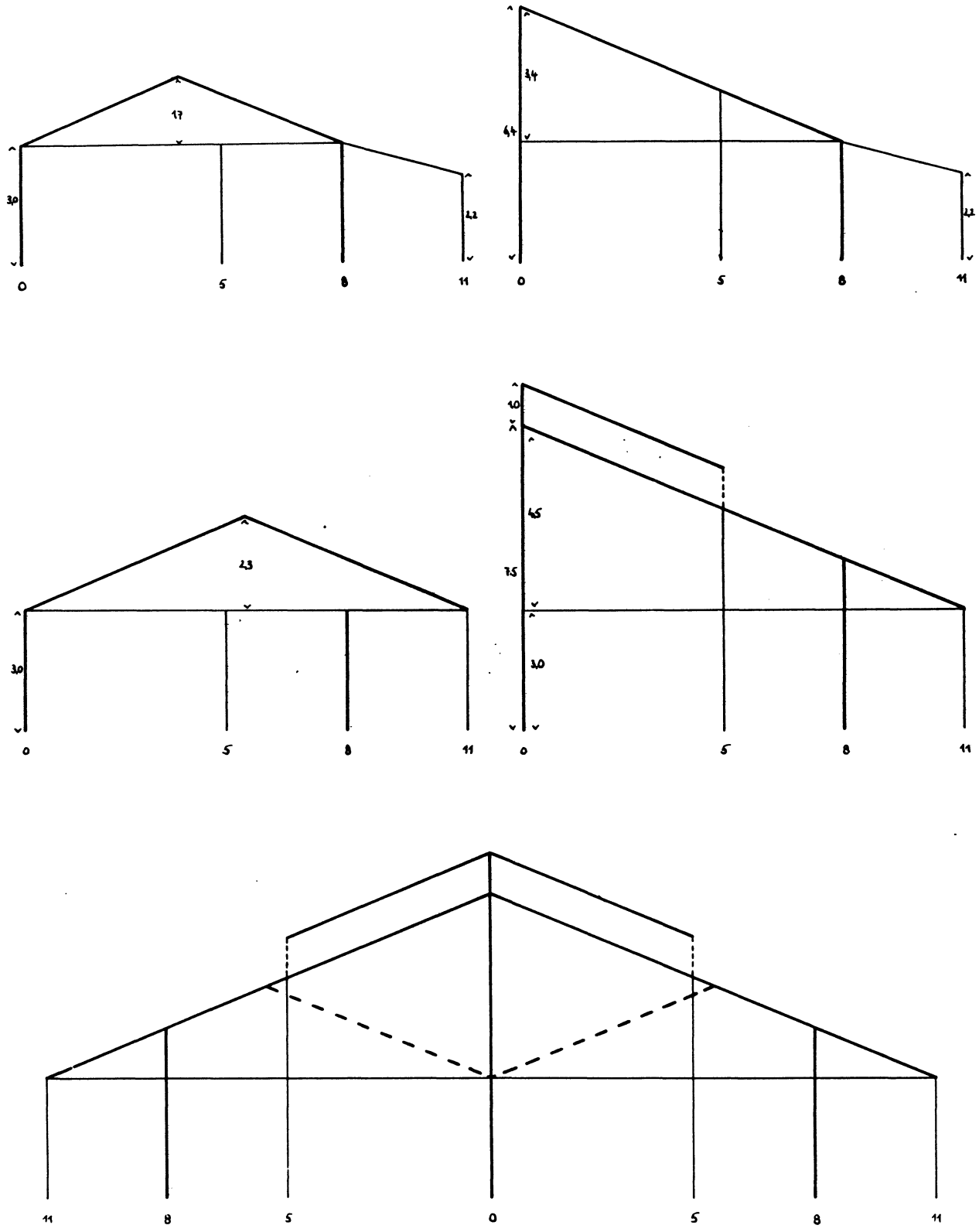
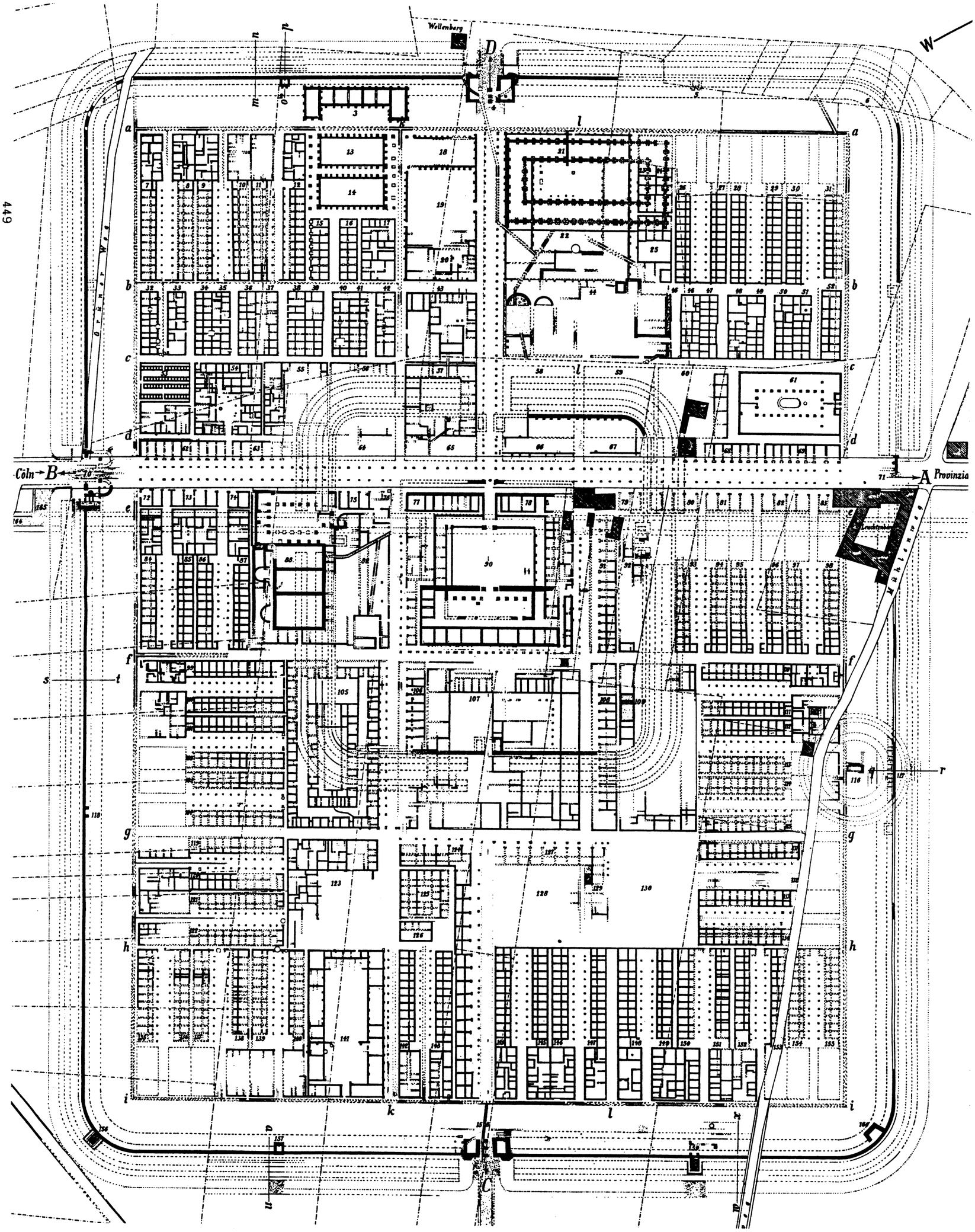
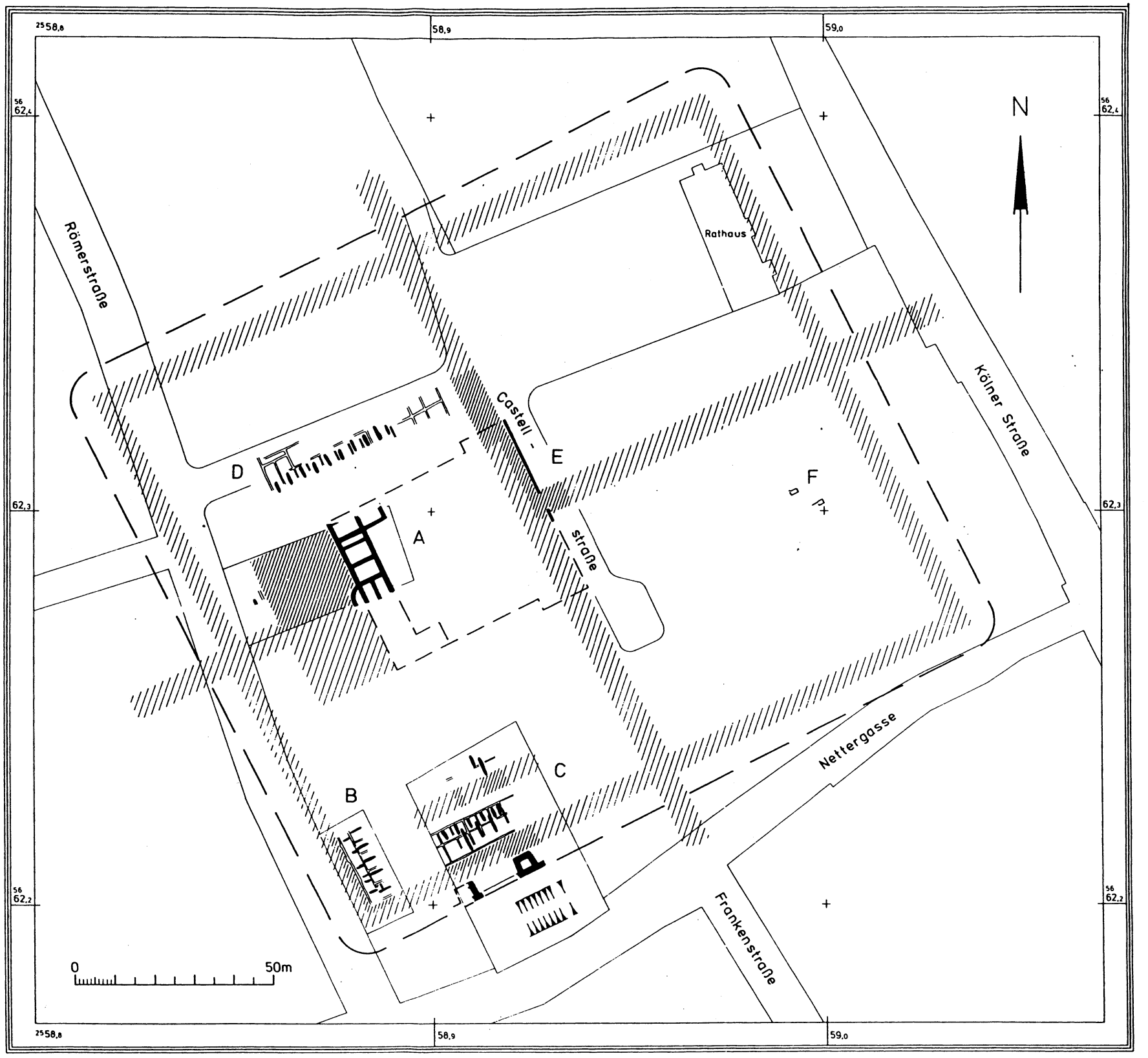


Fig 123 Roof Elevations



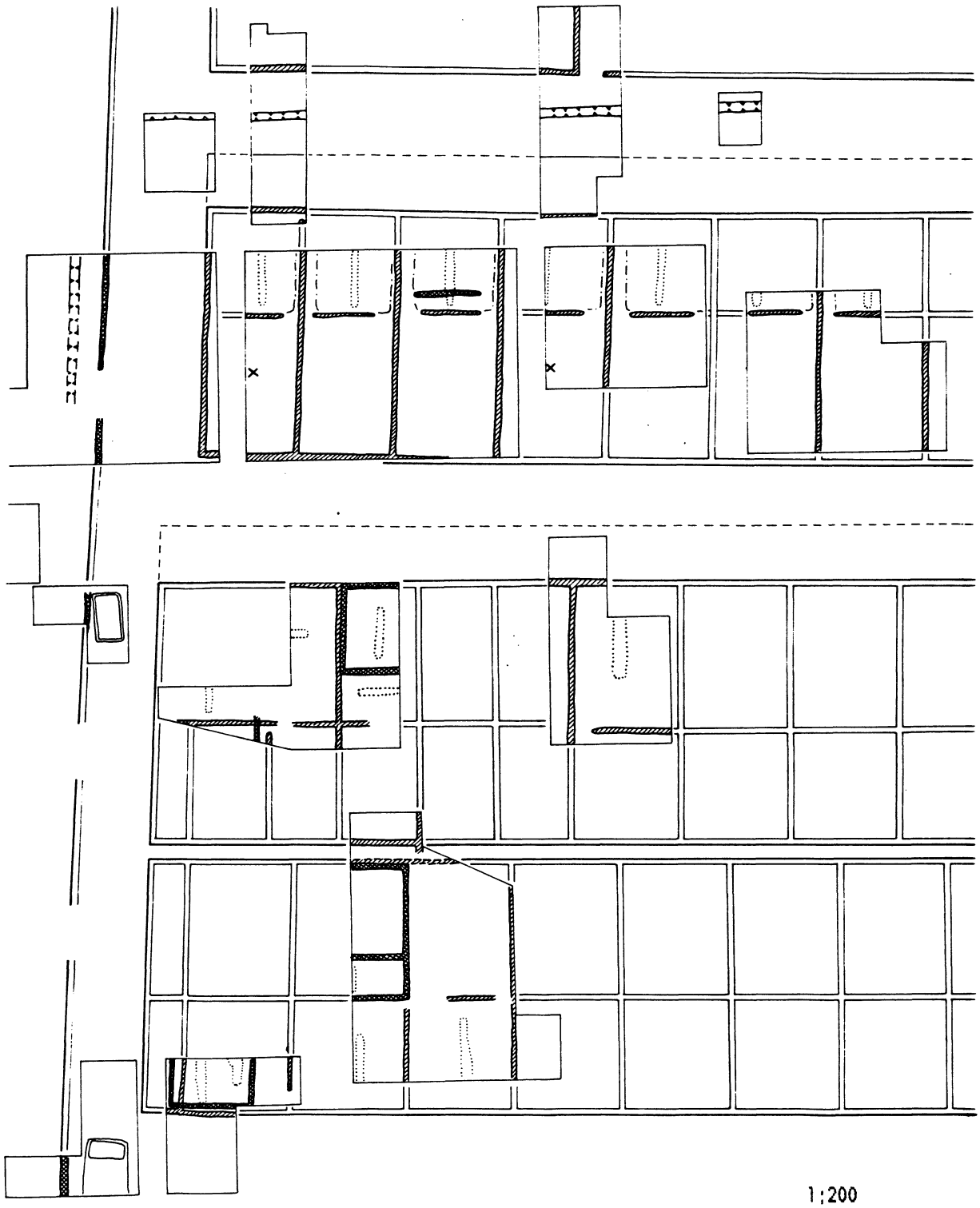
Plan 1 Neuss - *Novaesium* (After Koenen 1904, Taf III)



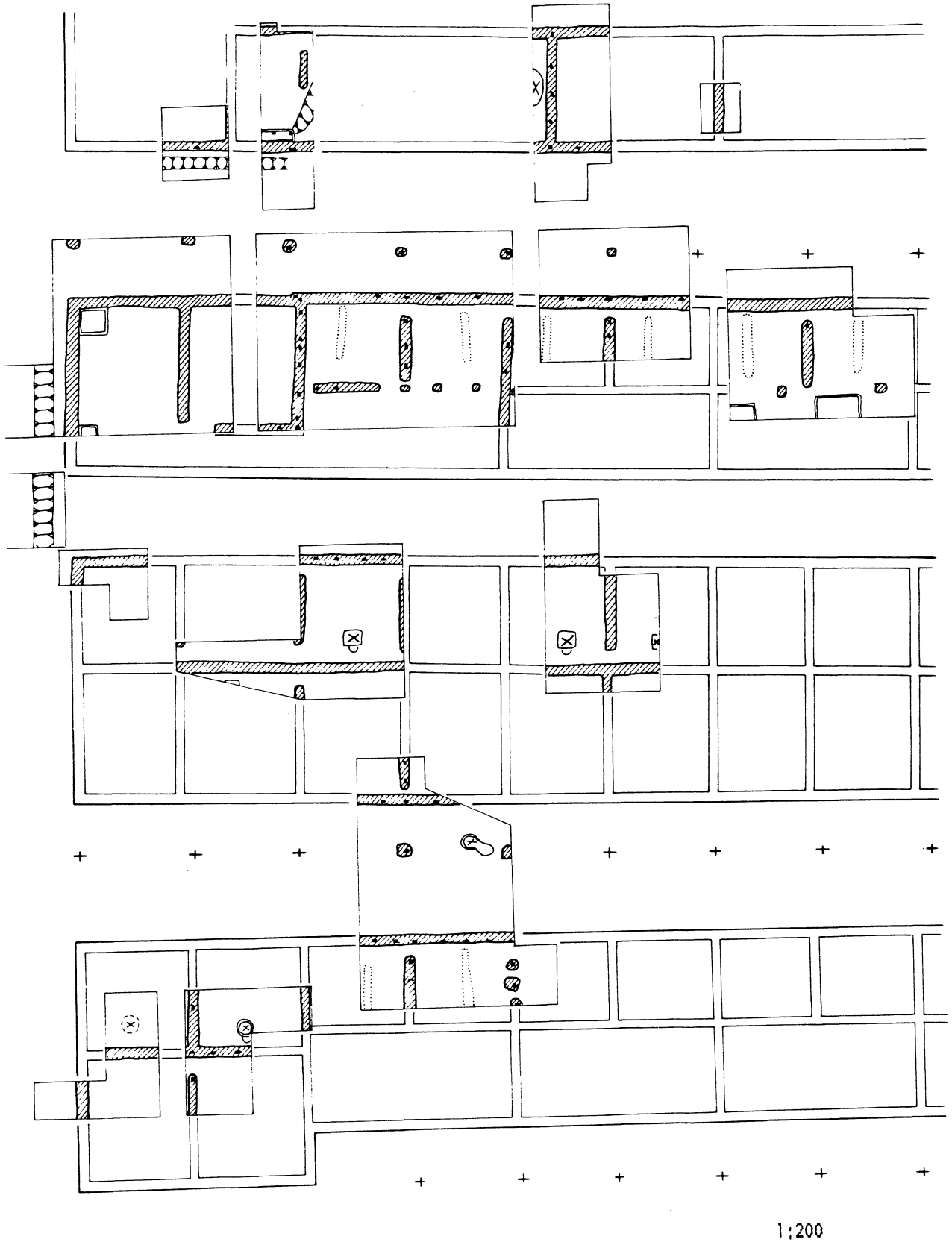
Dormagen, Auxiliarkastell. Übersichtsplan. – M. 1 : 1250.

Plan 2 Dormagen

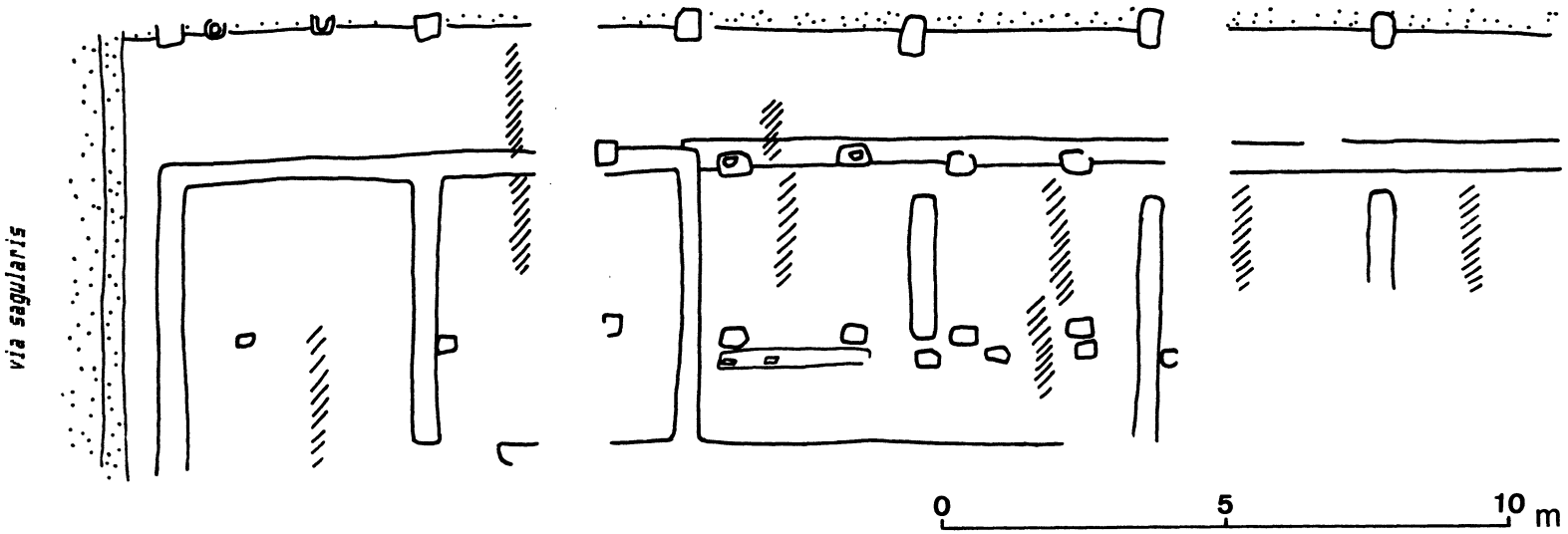
(After Müller 1979a, Taf 8)

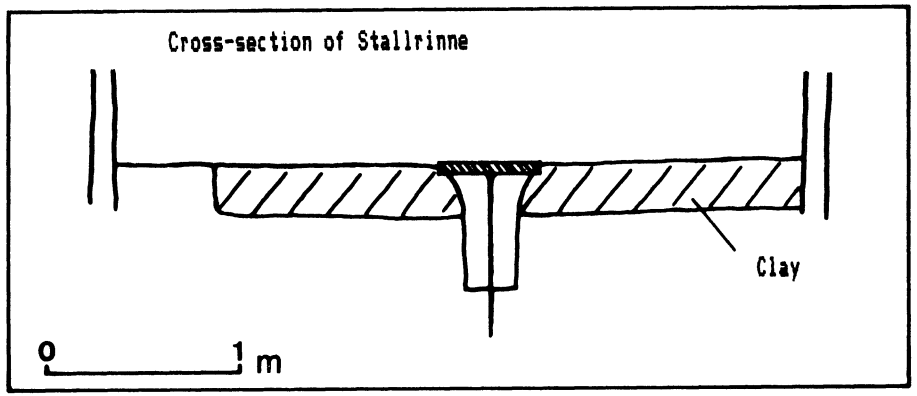


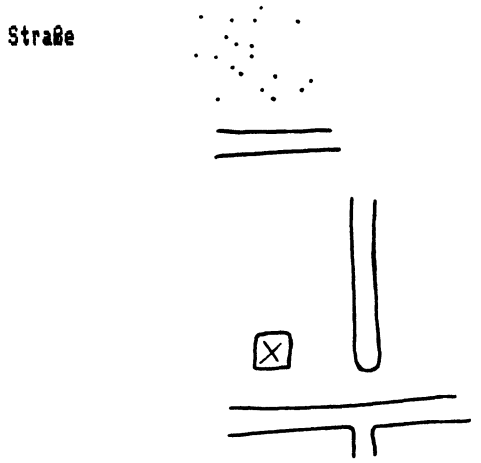
Plan 3 Krefeld-Gellep Period II Flavian (After Reichmann, C. pers comm)



Plan 4 Krefeld-Gellep Period III *c* AD 100 (After Reichmann, C. pers comm)

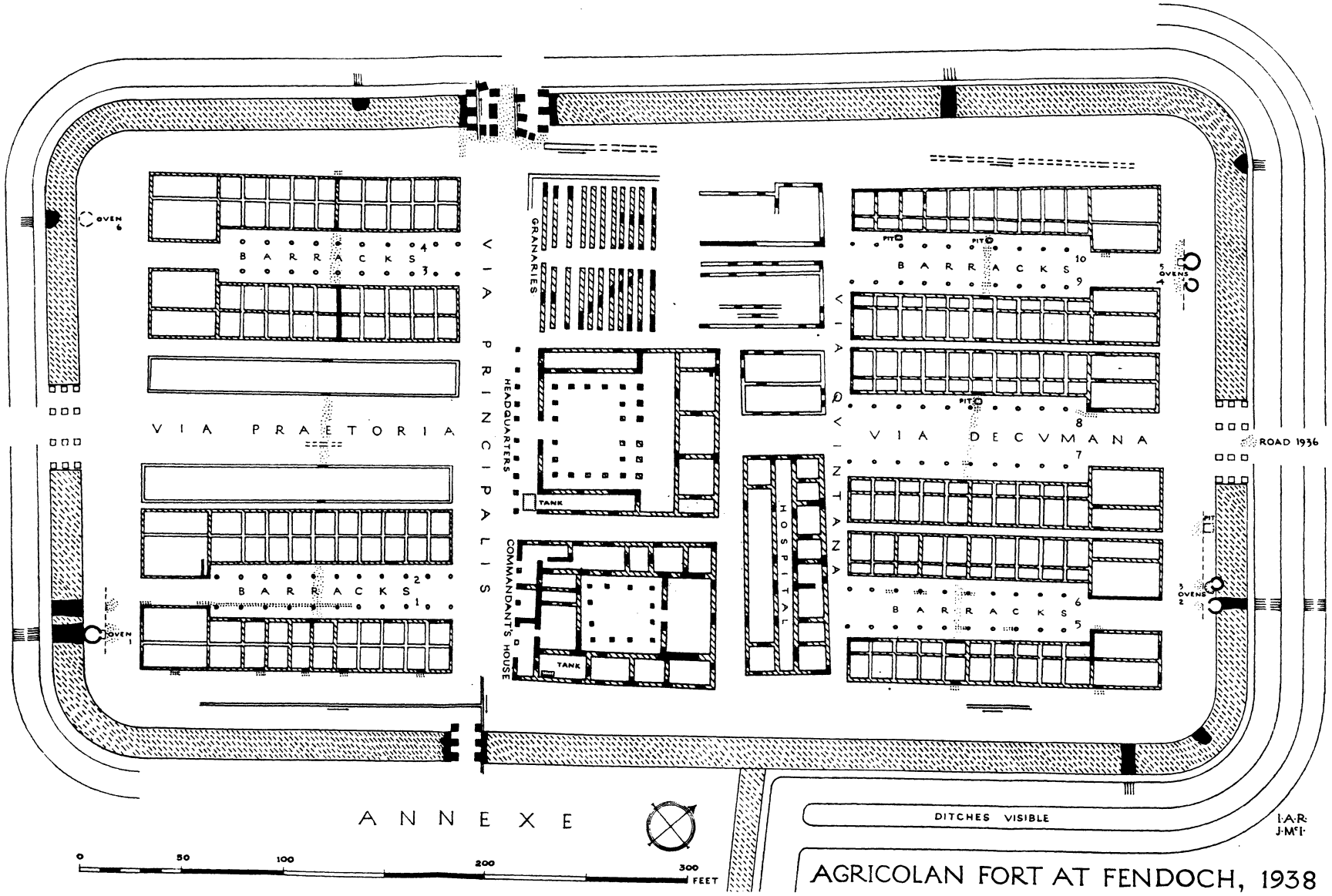






Plan 5 Krefeld-Gellep Period IV Phases a and b

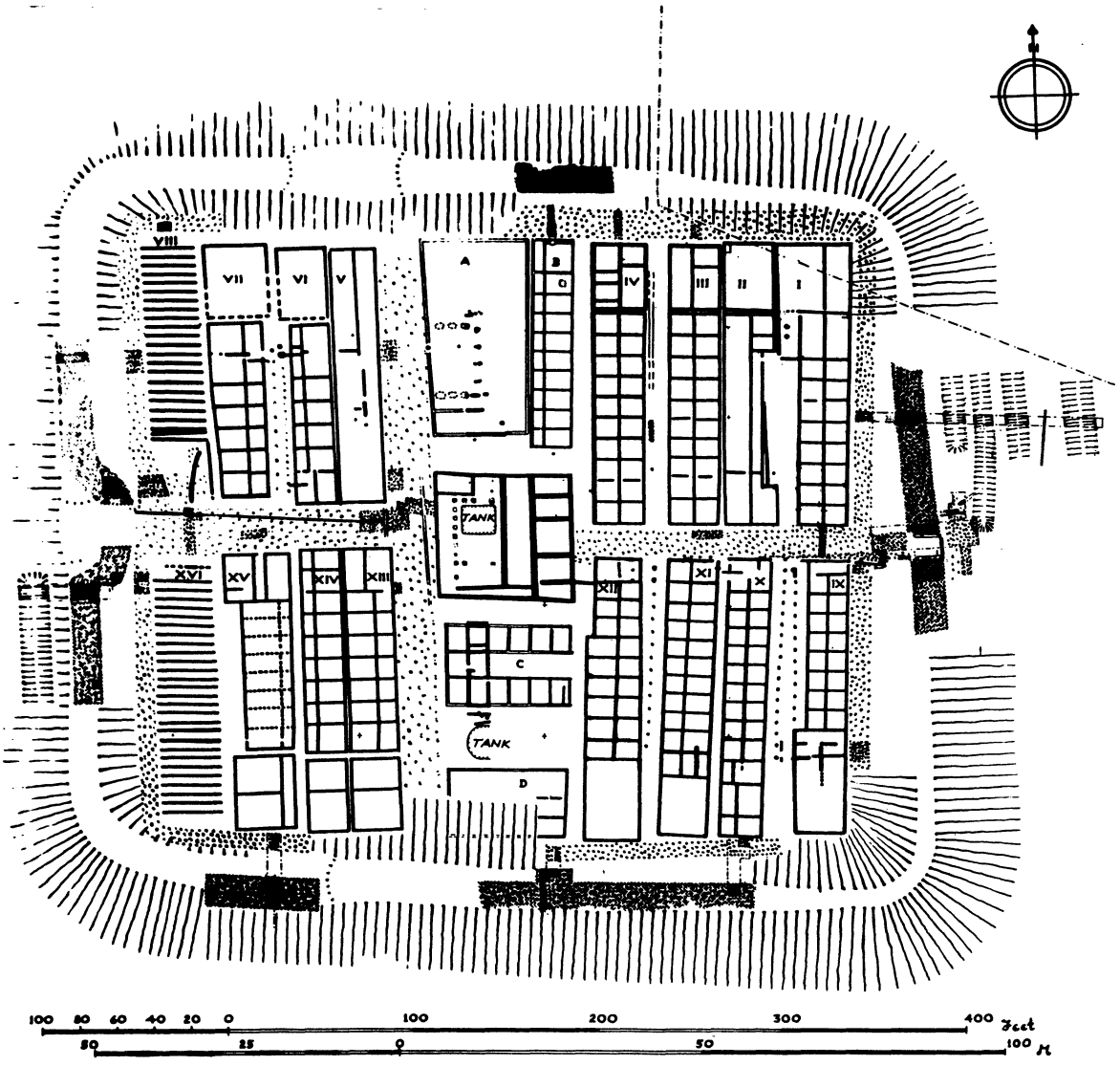
(After Reichmann, C. pers comm)



Plan 6 Fendoch

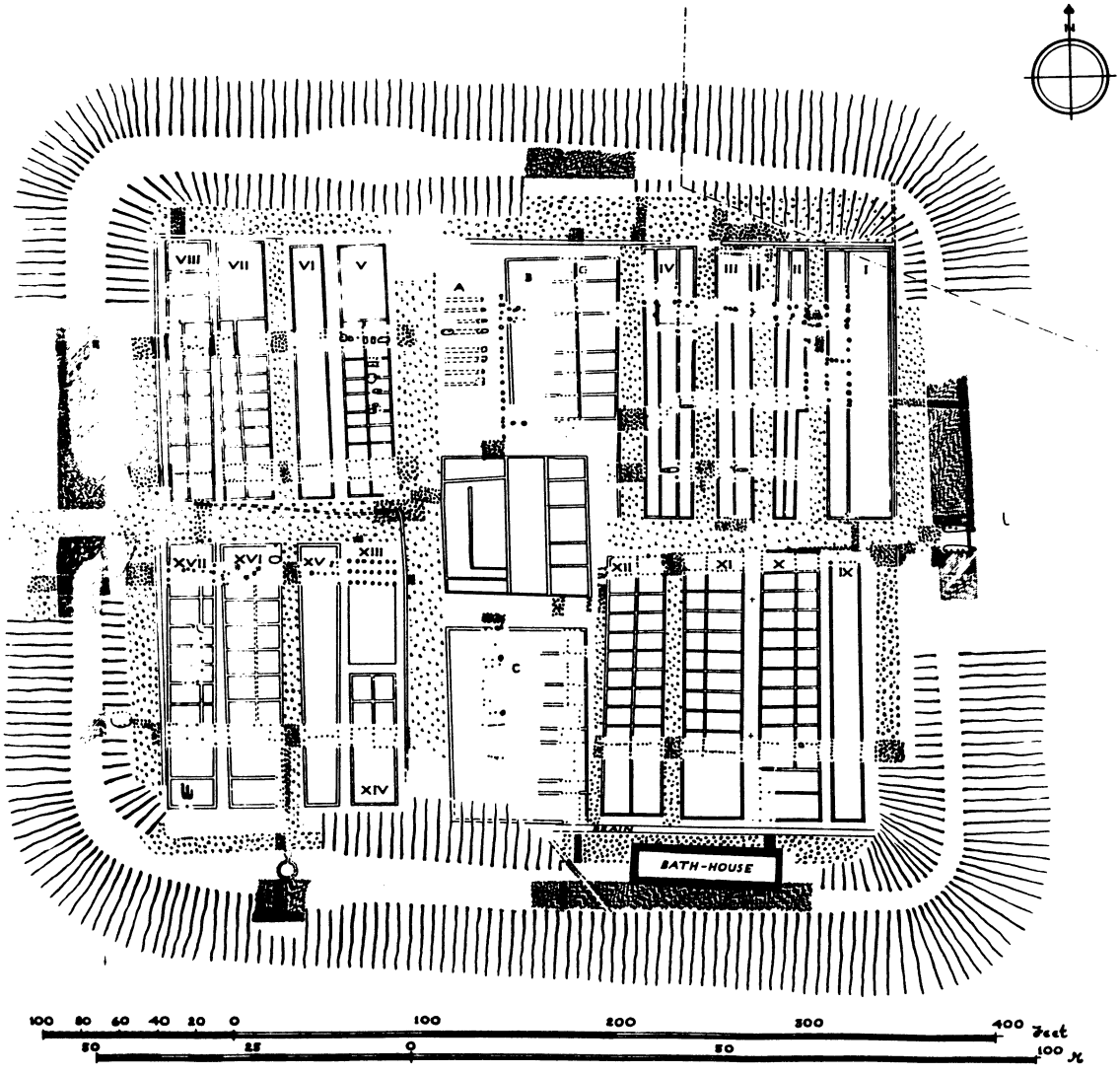
(After Richmond 1938-39, Fig 2)

STRAGEATH: FLAVIAN



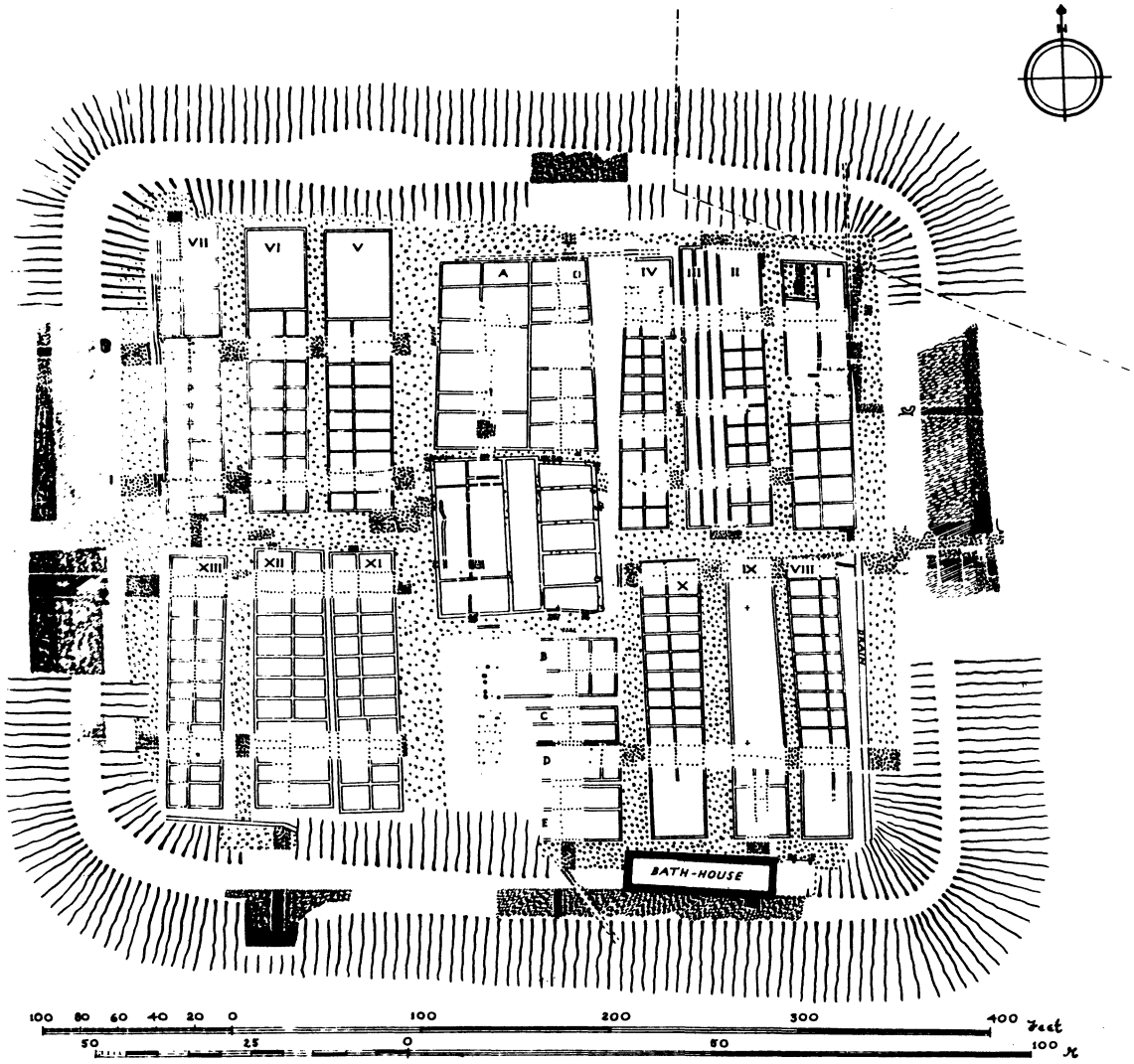
Plan 7 Strageath Flavian (After Frere forthcoming)

STRAGEATH ANTONINE I

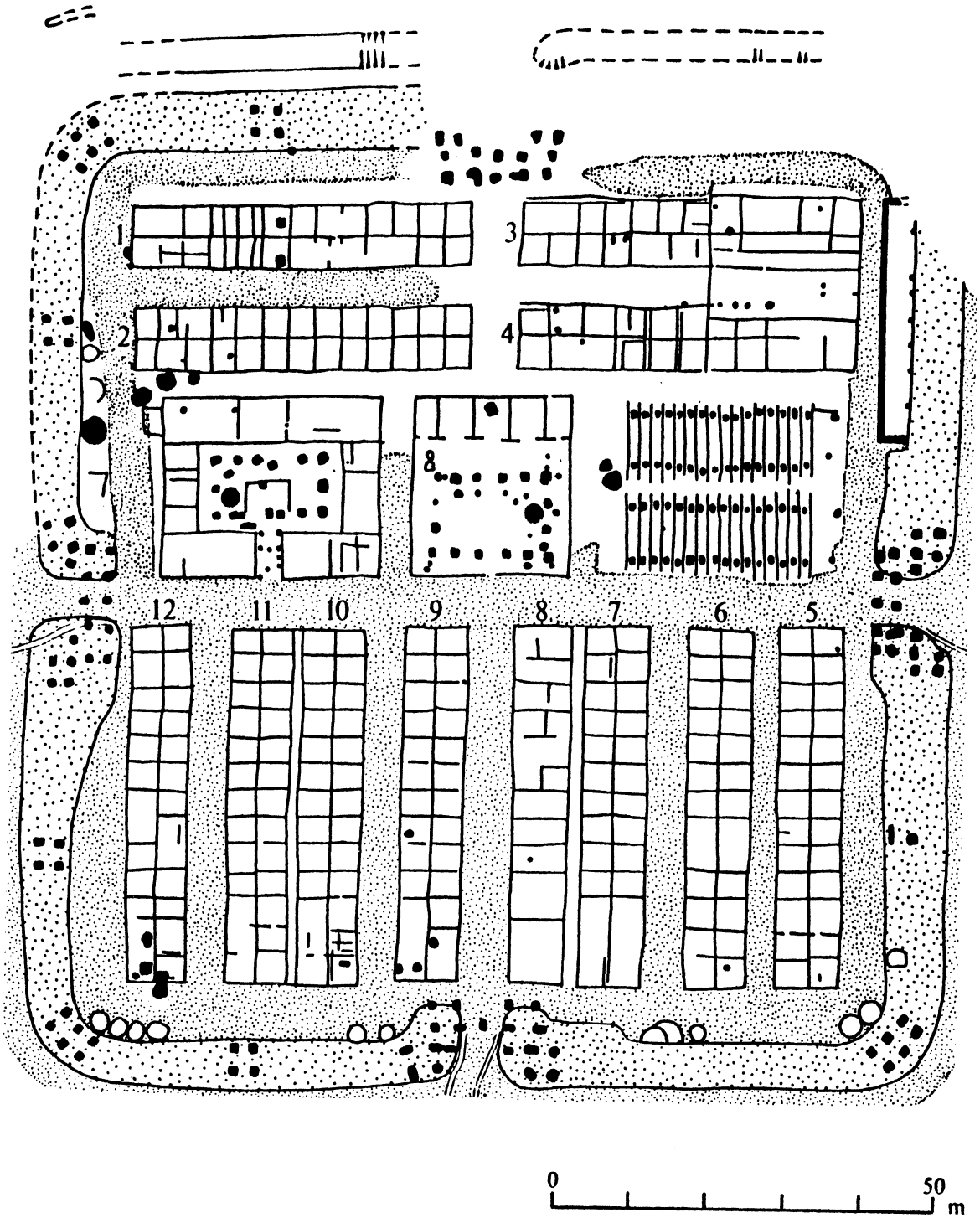


Plan 8 Strageath Antonine I (After Frere forthcoming)

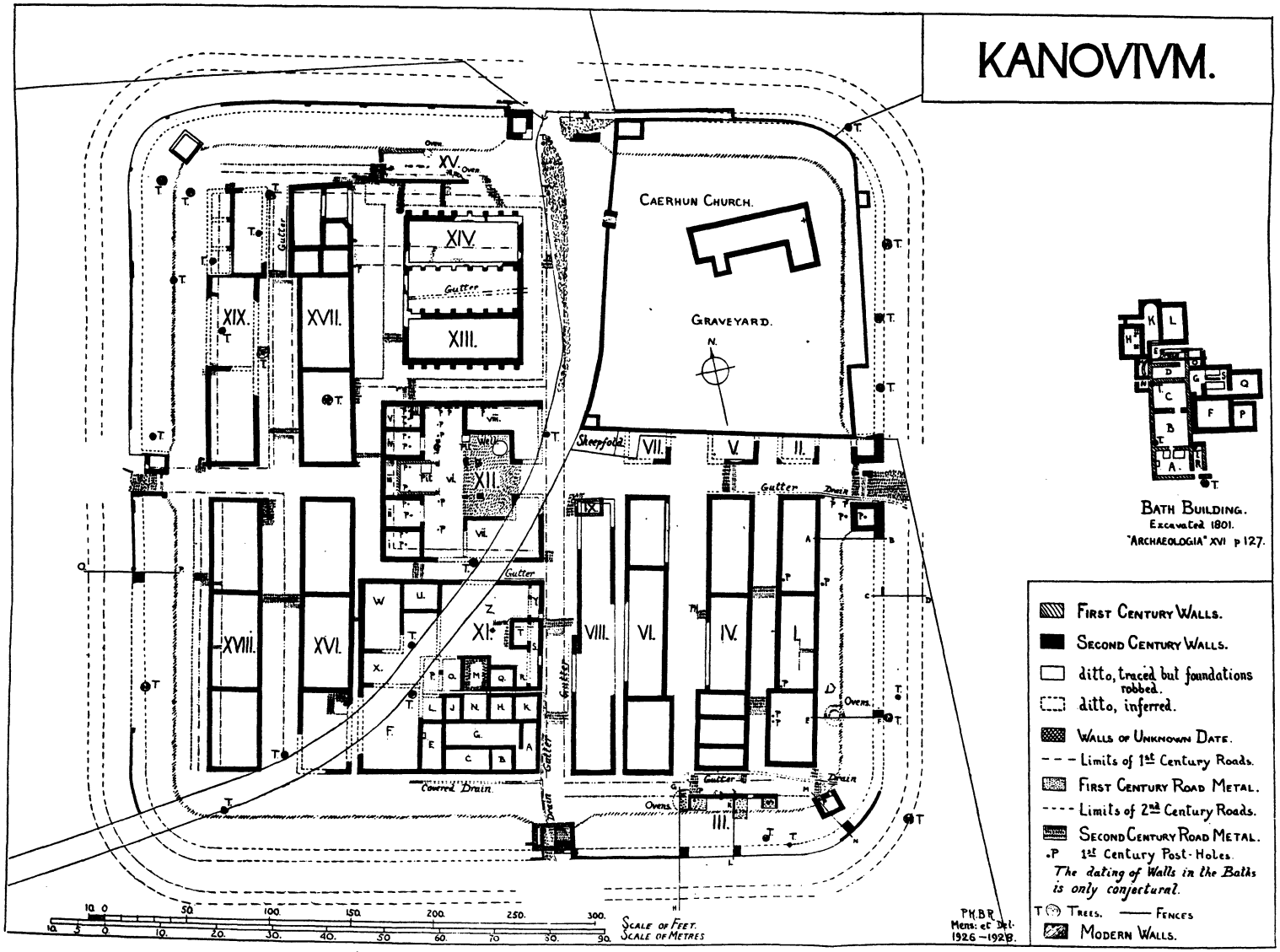
STRAGEATH ANTONINE II



Plan 9 Strageath Antonine II (After Frere forthcoming)

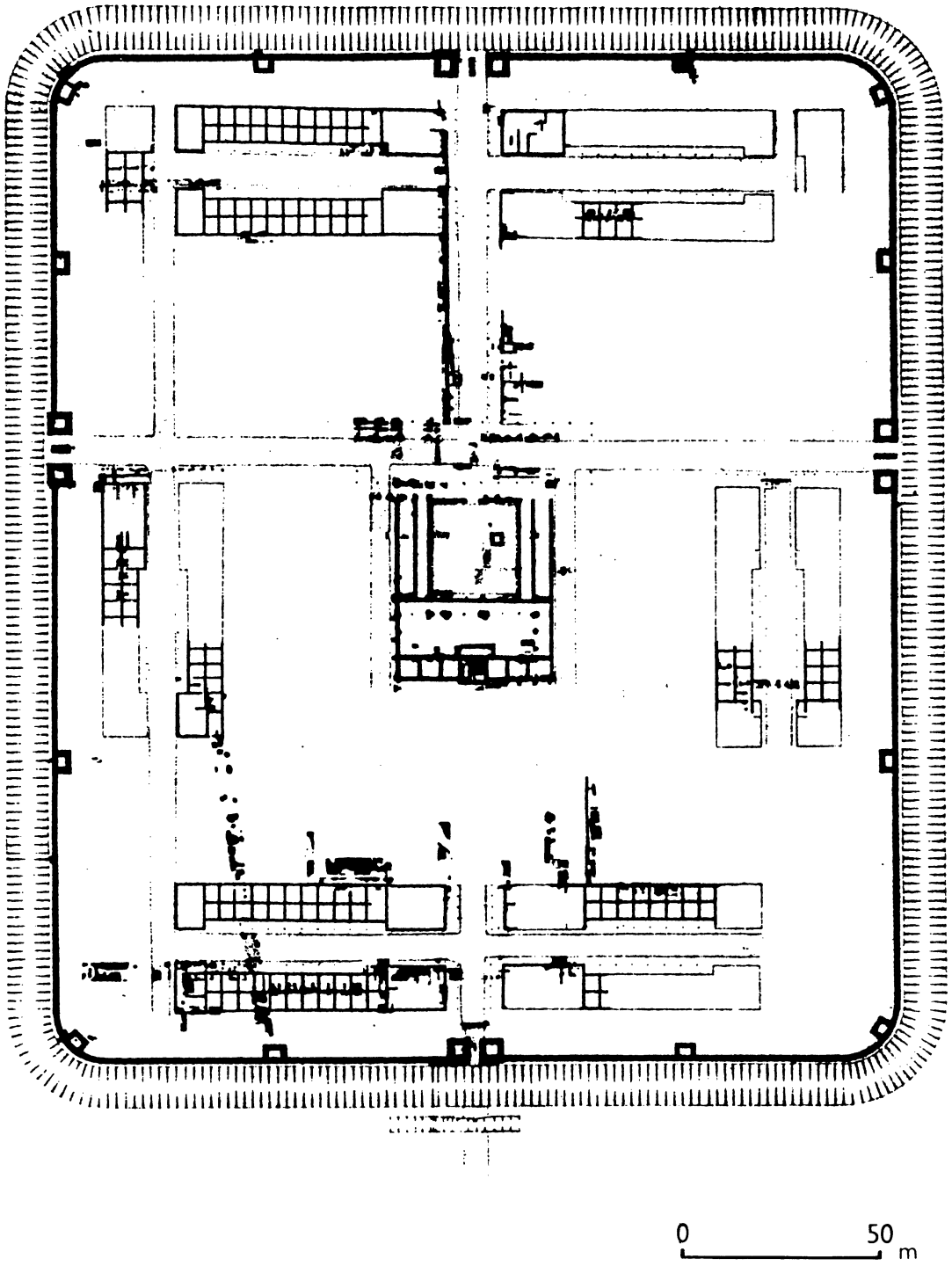


Plan 10 Elginhaugh (After Hanson 1987)

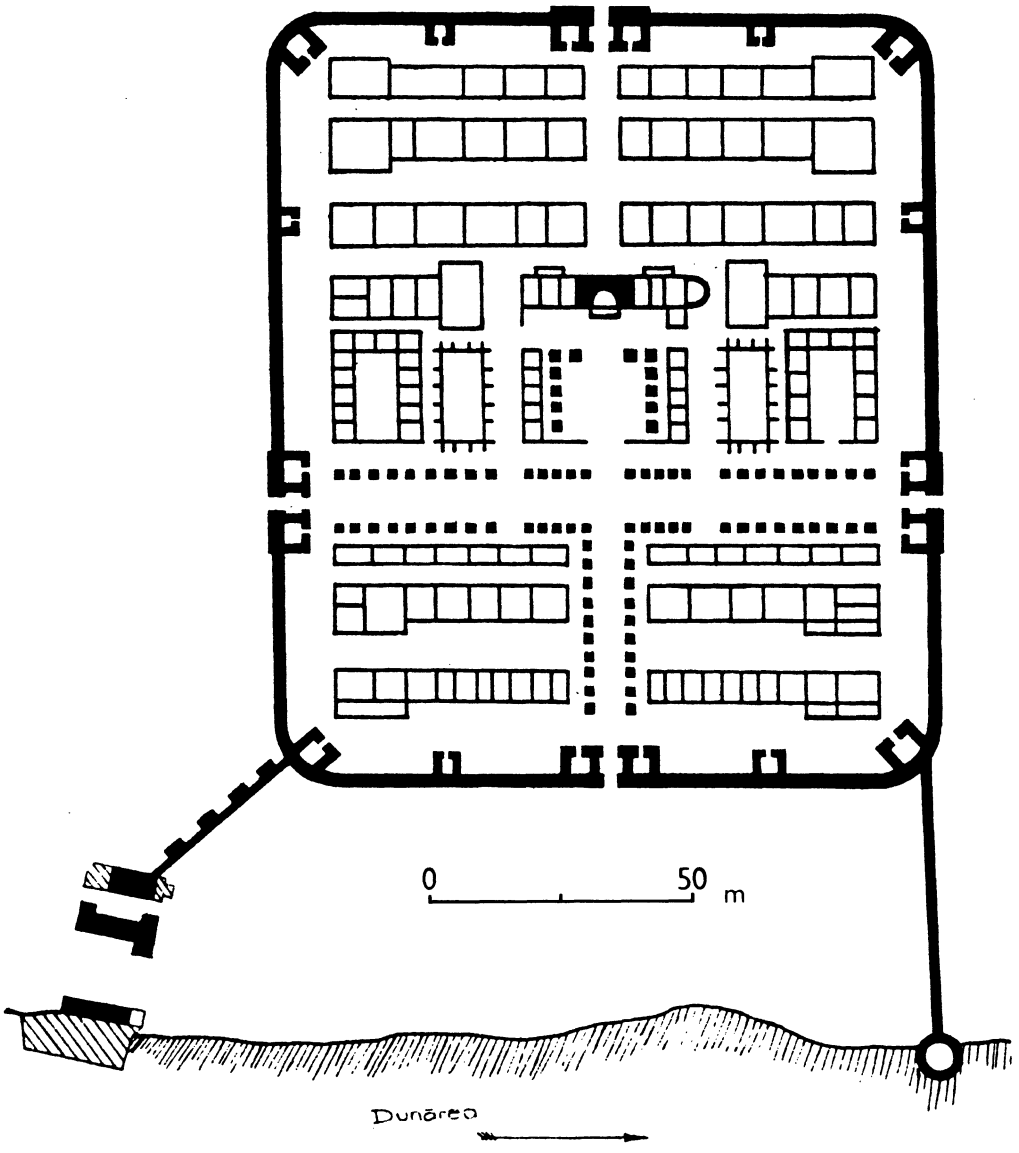


Plan 11 Caerhun

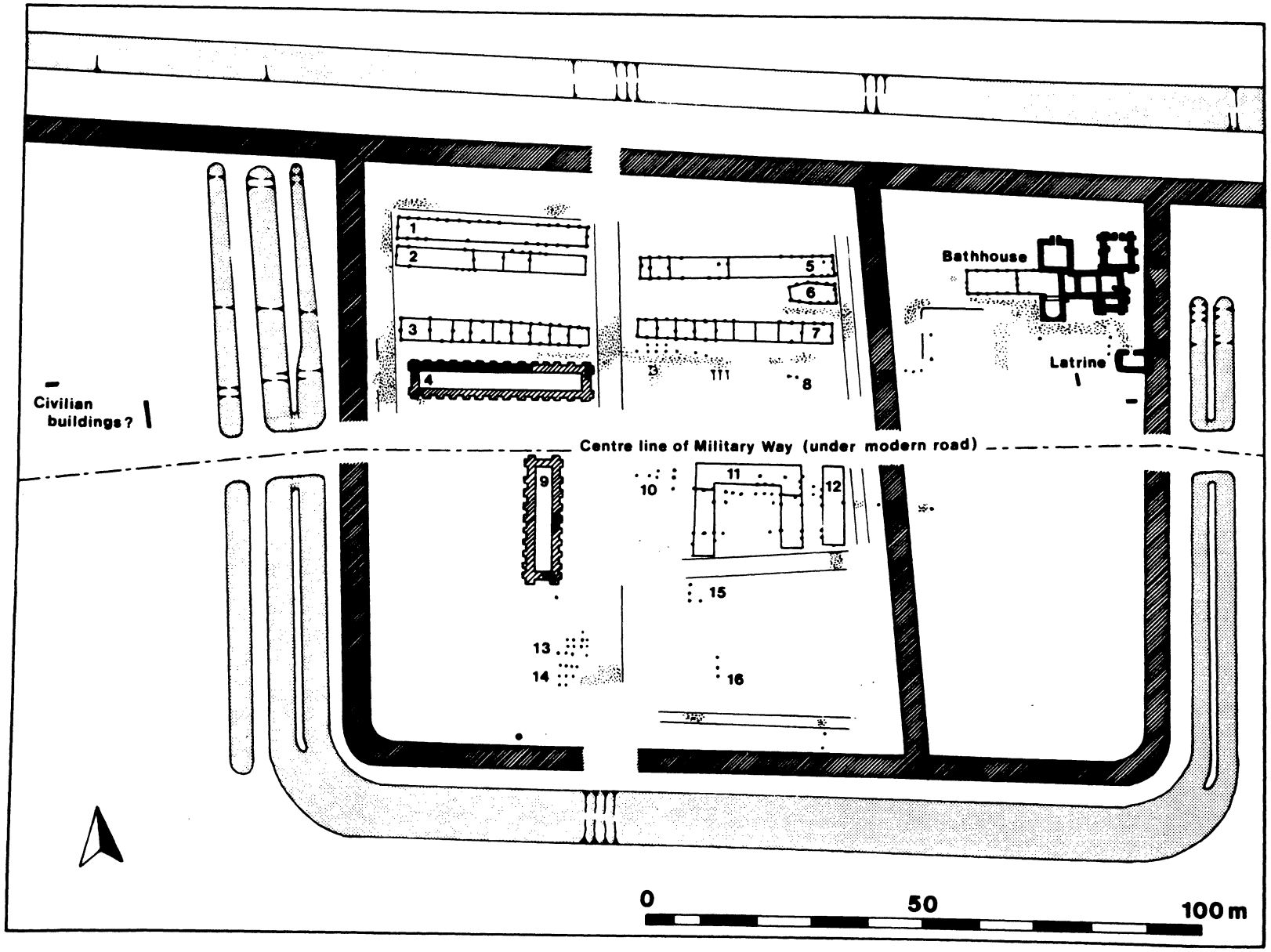
(After Baillie Reynolds 1938, Fig 20)



Plan 12 Echzell (After Baatz, D. pers comm)

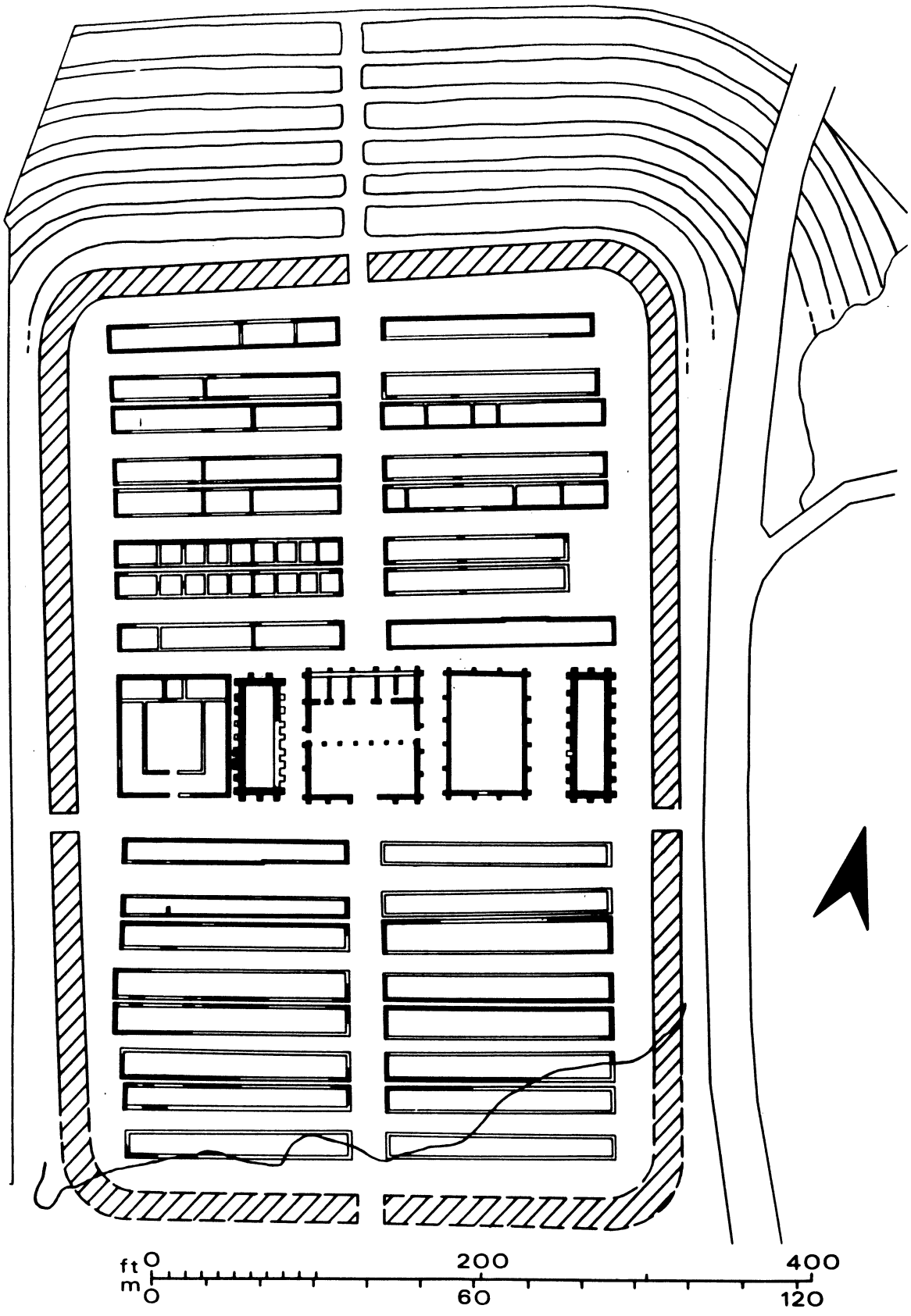


Plan 13 Drobeta (After Davidescu 1980, 74)

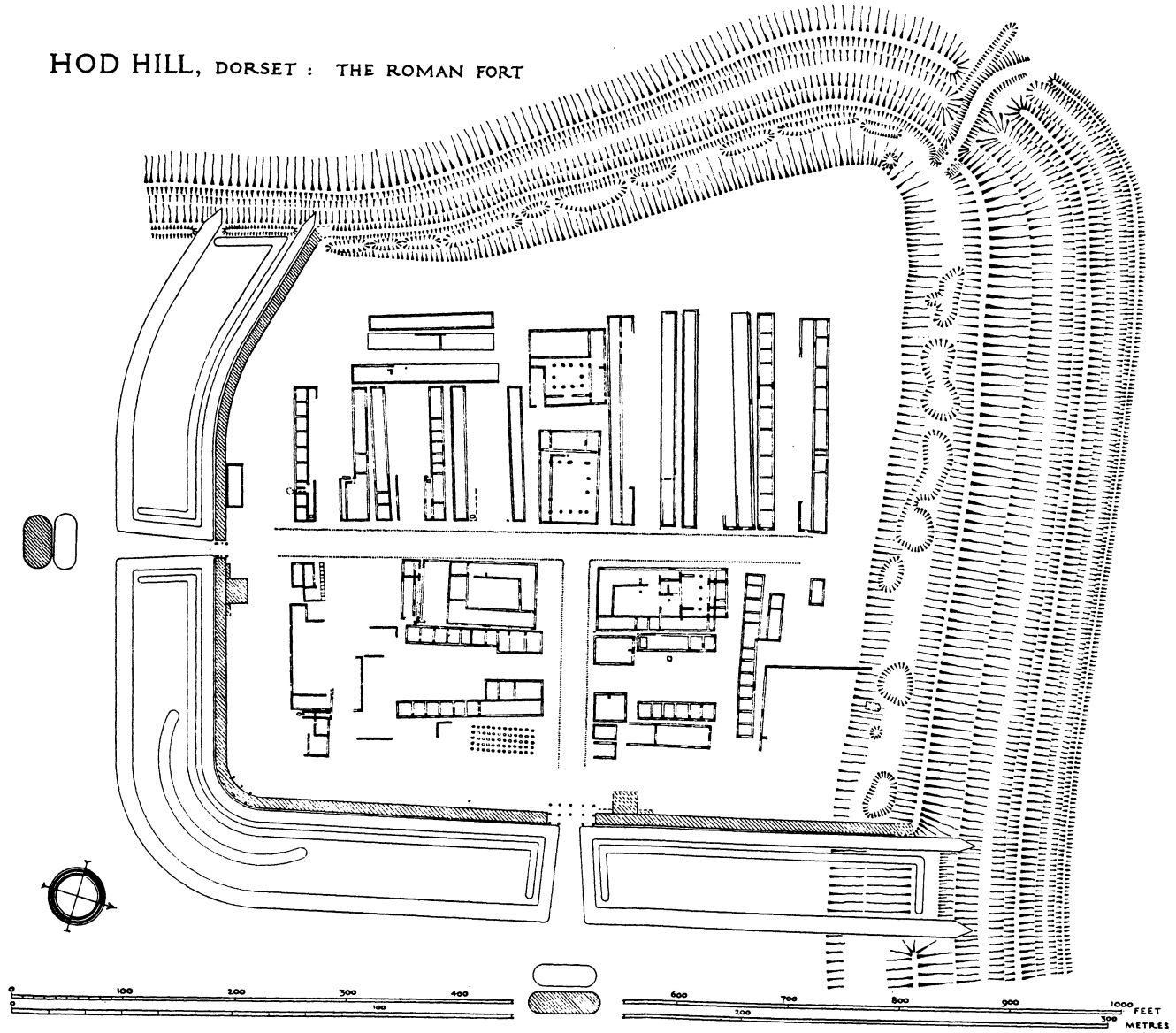


Plan 14 Bearsden

(After Breeze 1984b, 35, Fig 13)

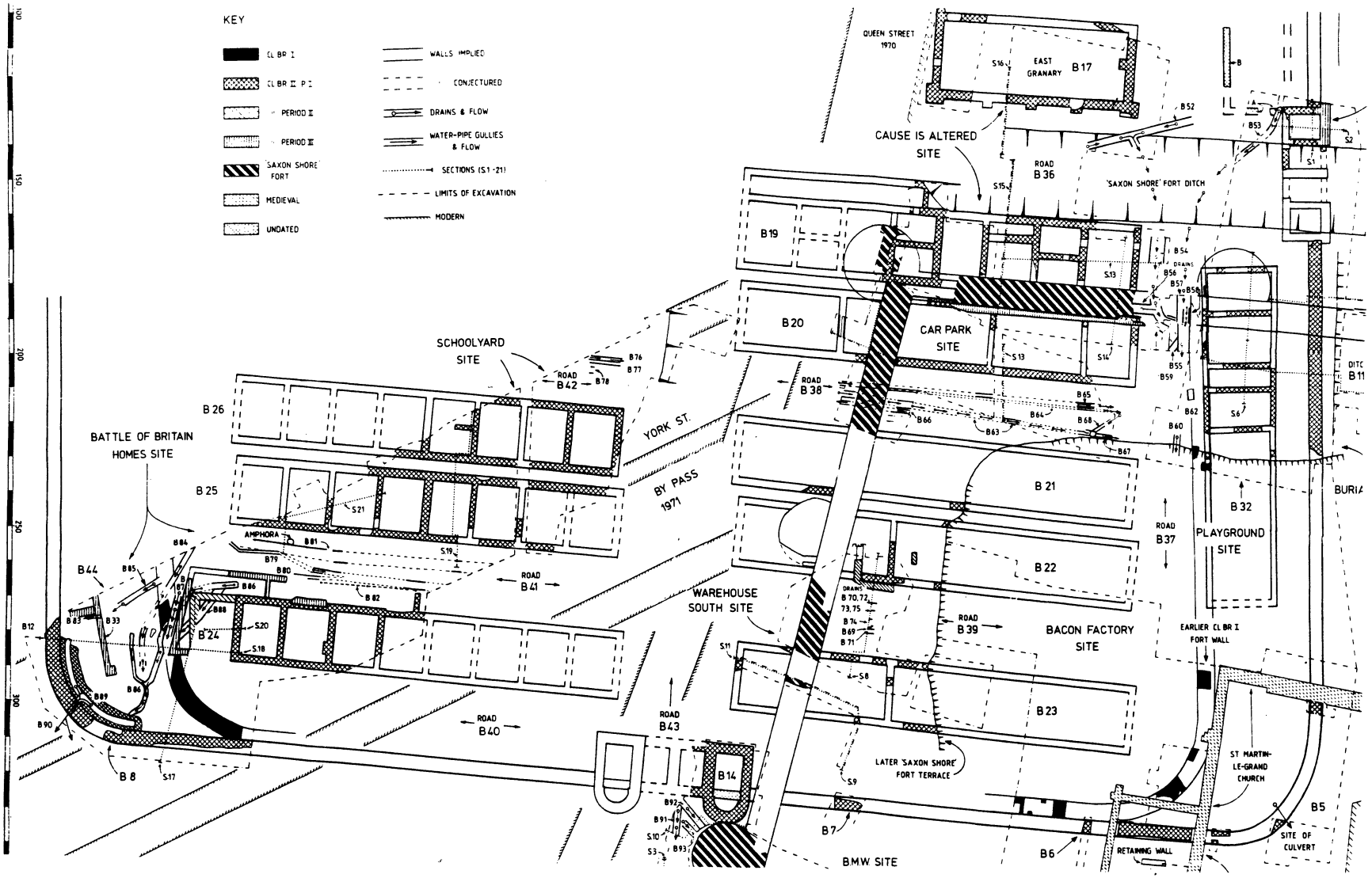


Plan 15 Birrens (After Breeze 1984b, 45, Fig 20)

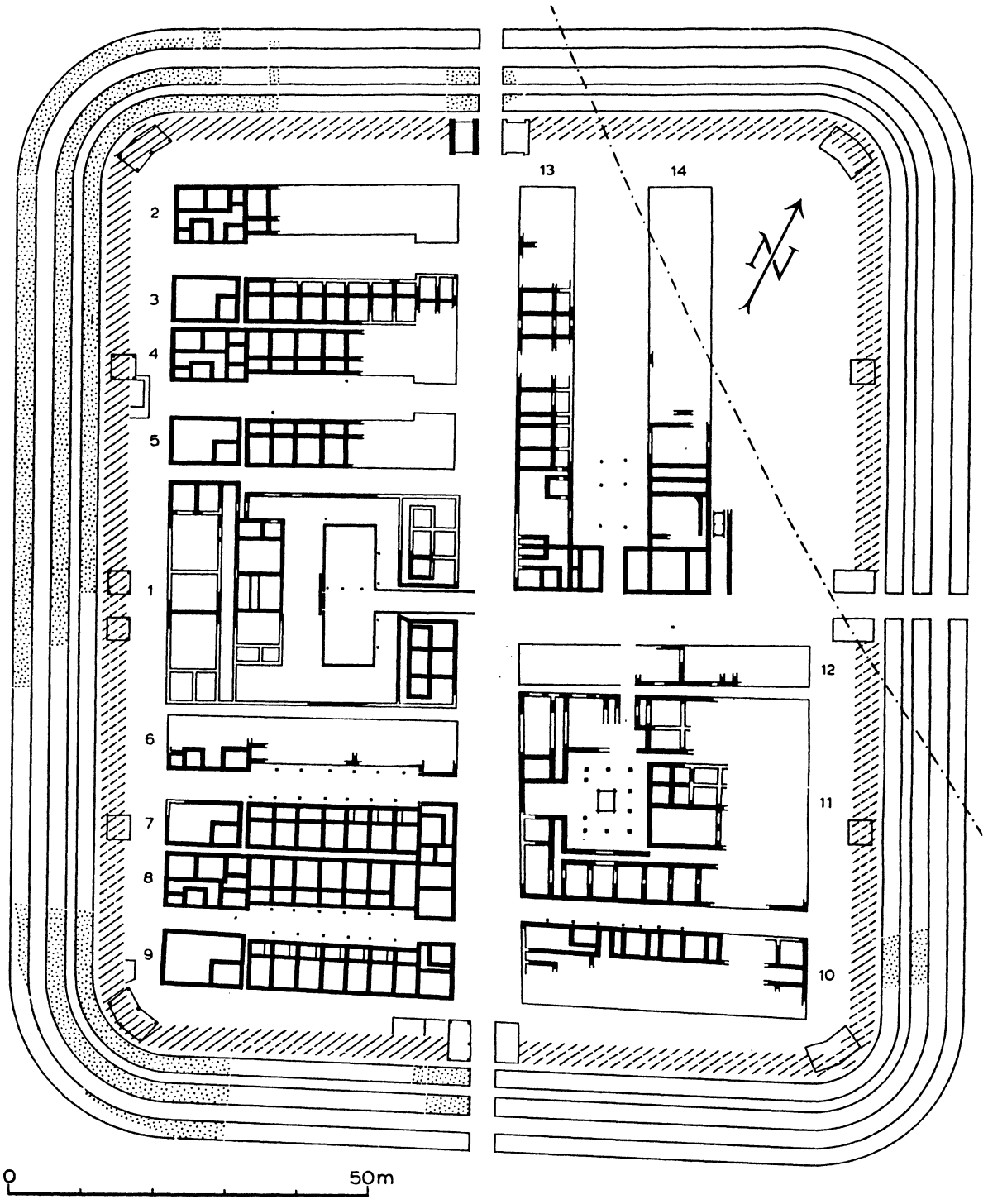


Plan 16 Hod Hill

(After Richmond 1968, Fig 62)

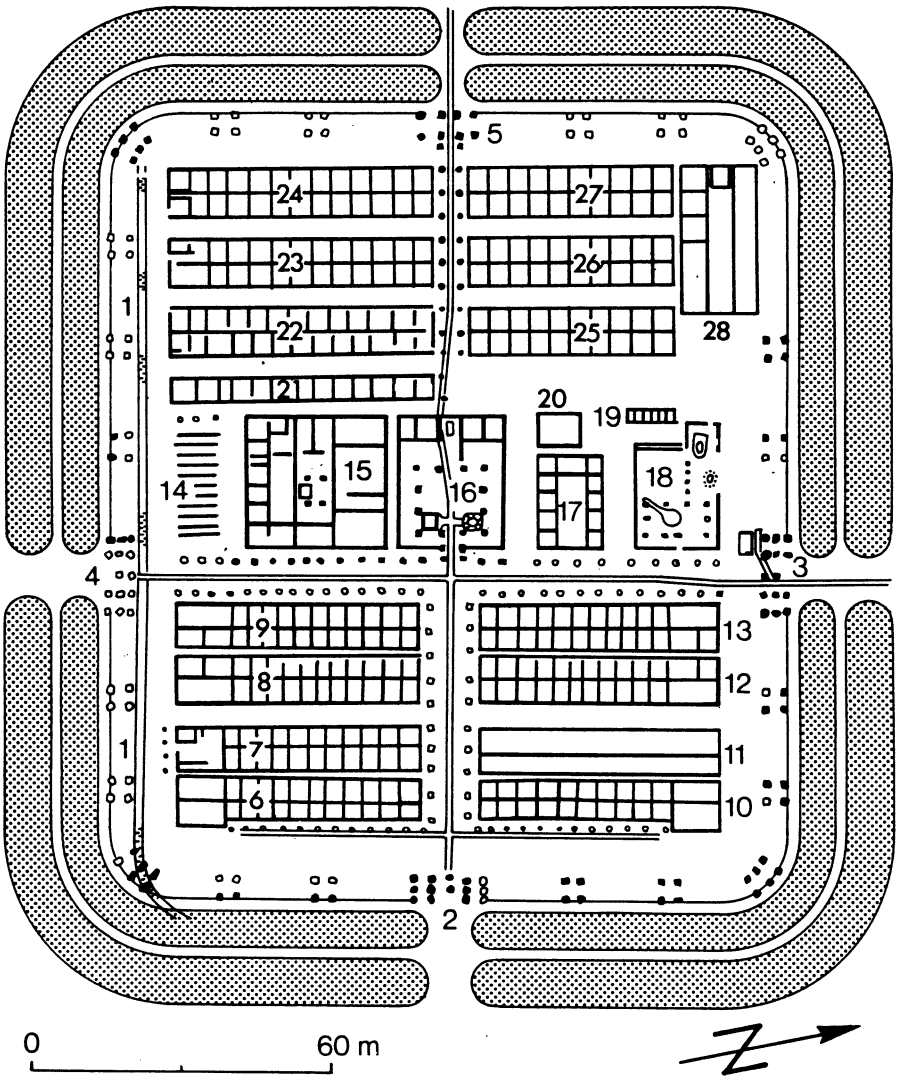


Plan 17 Dover *Classis Britannica* Fort II *praetentura* (After Philp 1981, Fig 5)

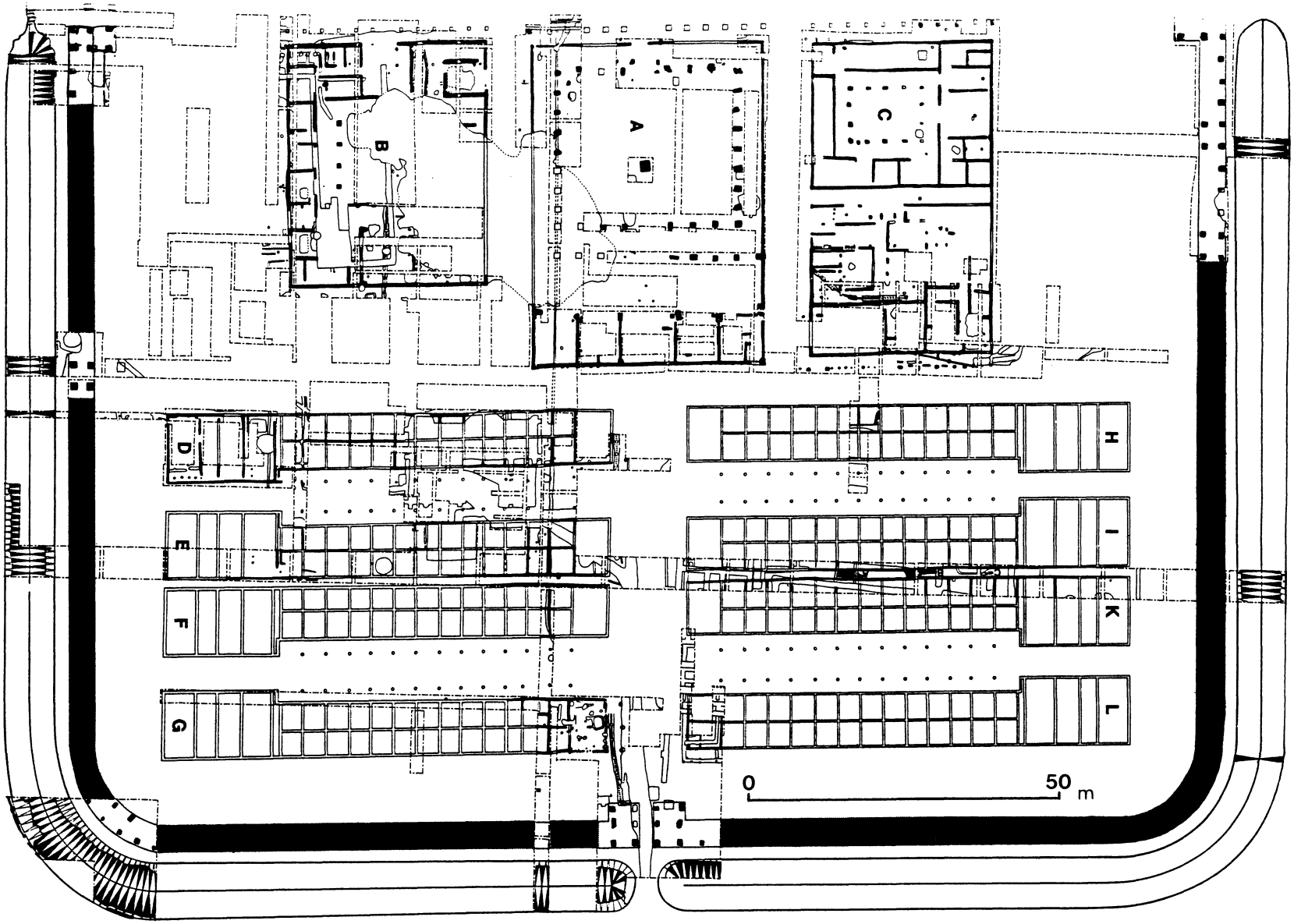


Plan 18 Valkenburg Castellum 1

(After Glasbergen and Groenmann-van Waateringe 1974, 7, Fig 2)

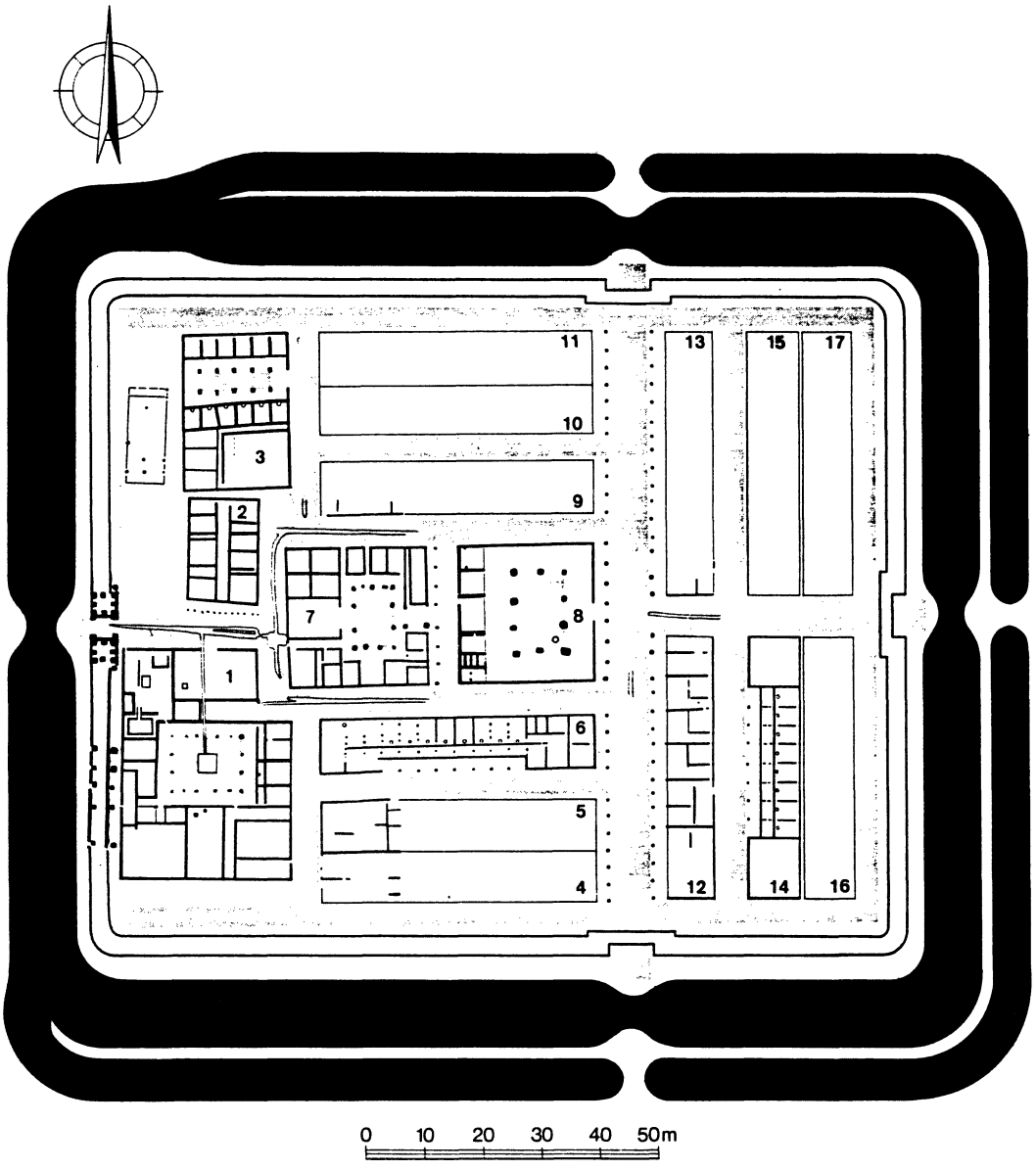


Plan 19 Hofheim Steinkastell Period I (After Nuber 1983)

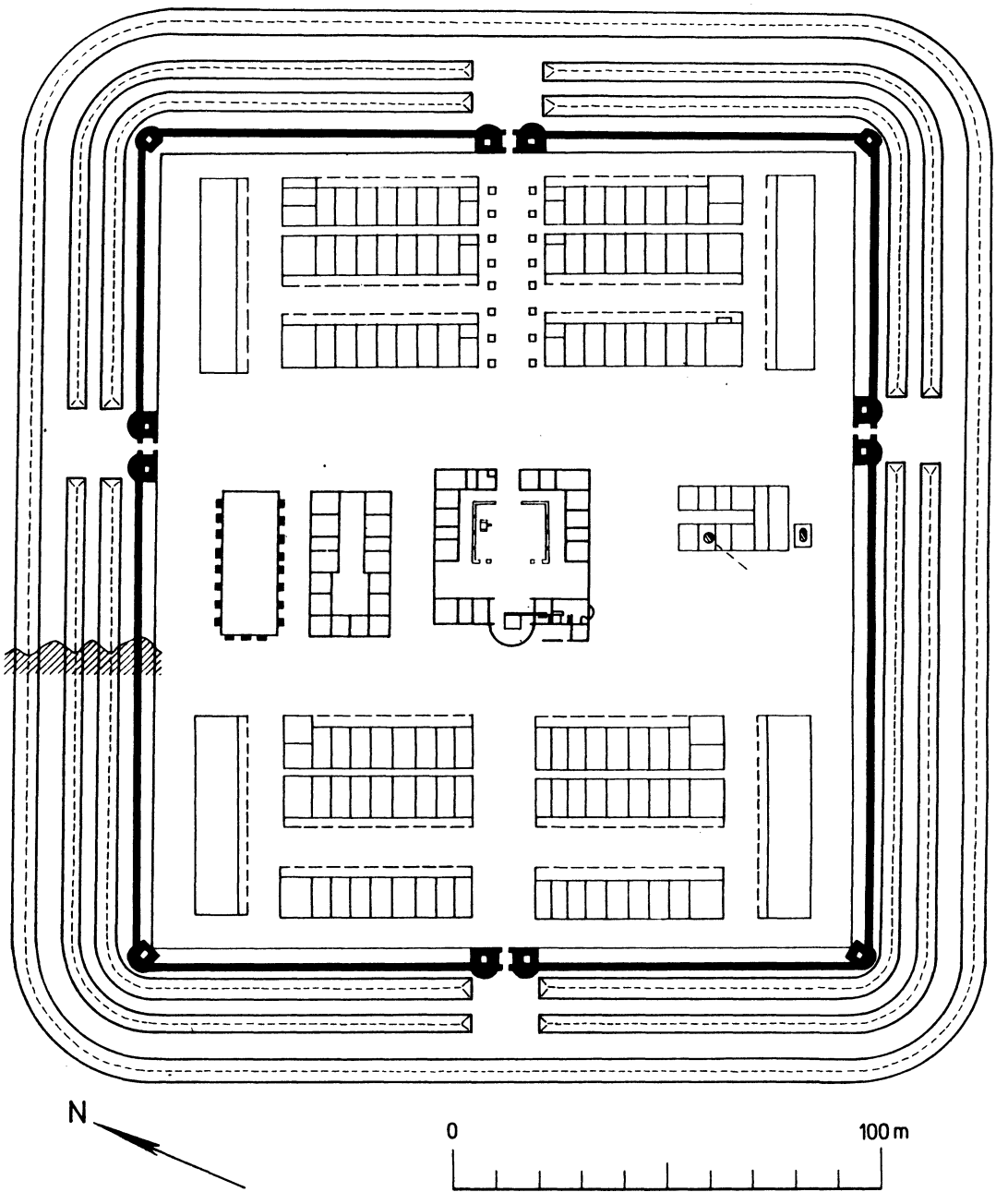


Plan 20 Rottweil Kastell III *retentura*

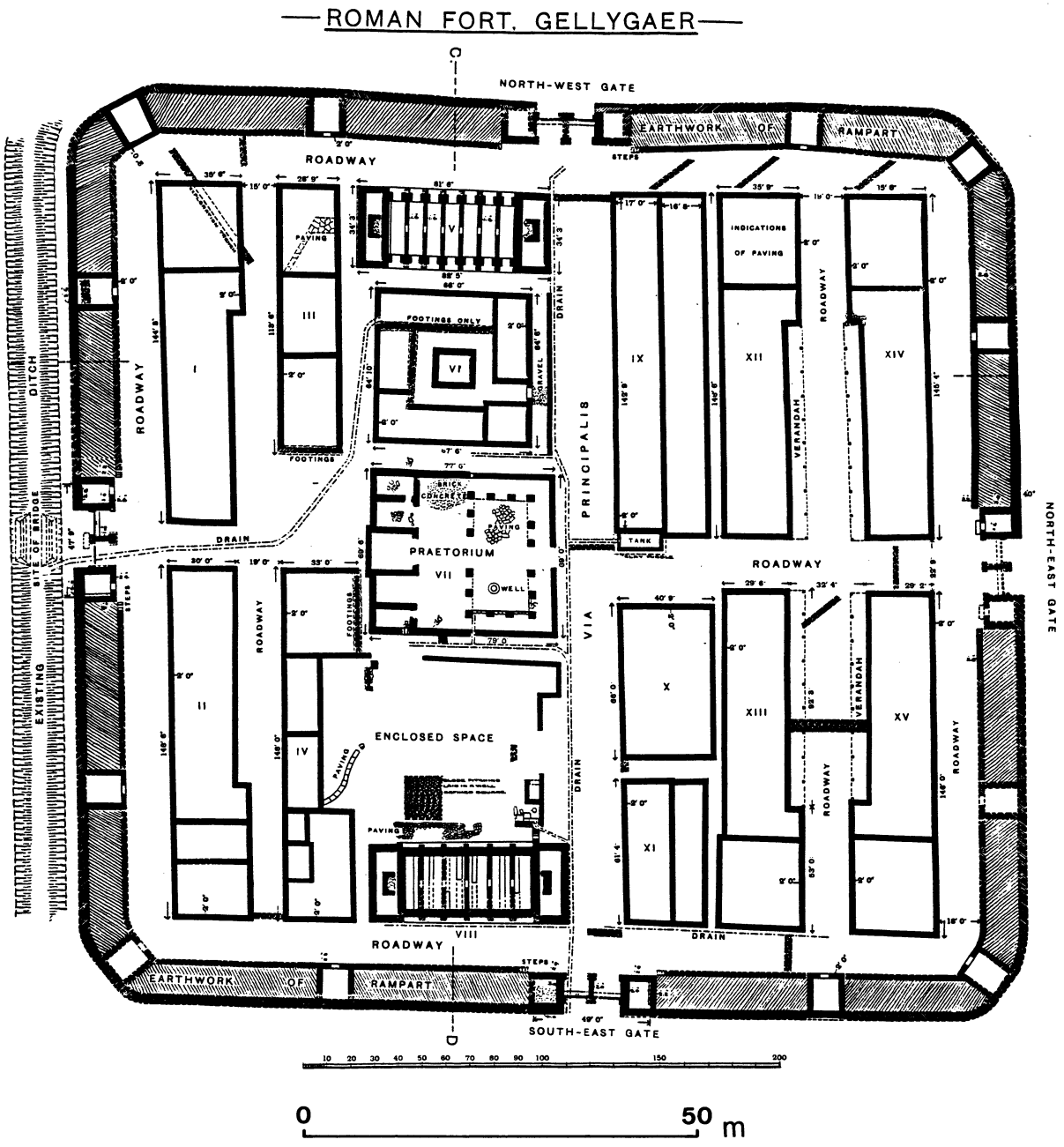
(After Planck 1975a, Beilage 4)



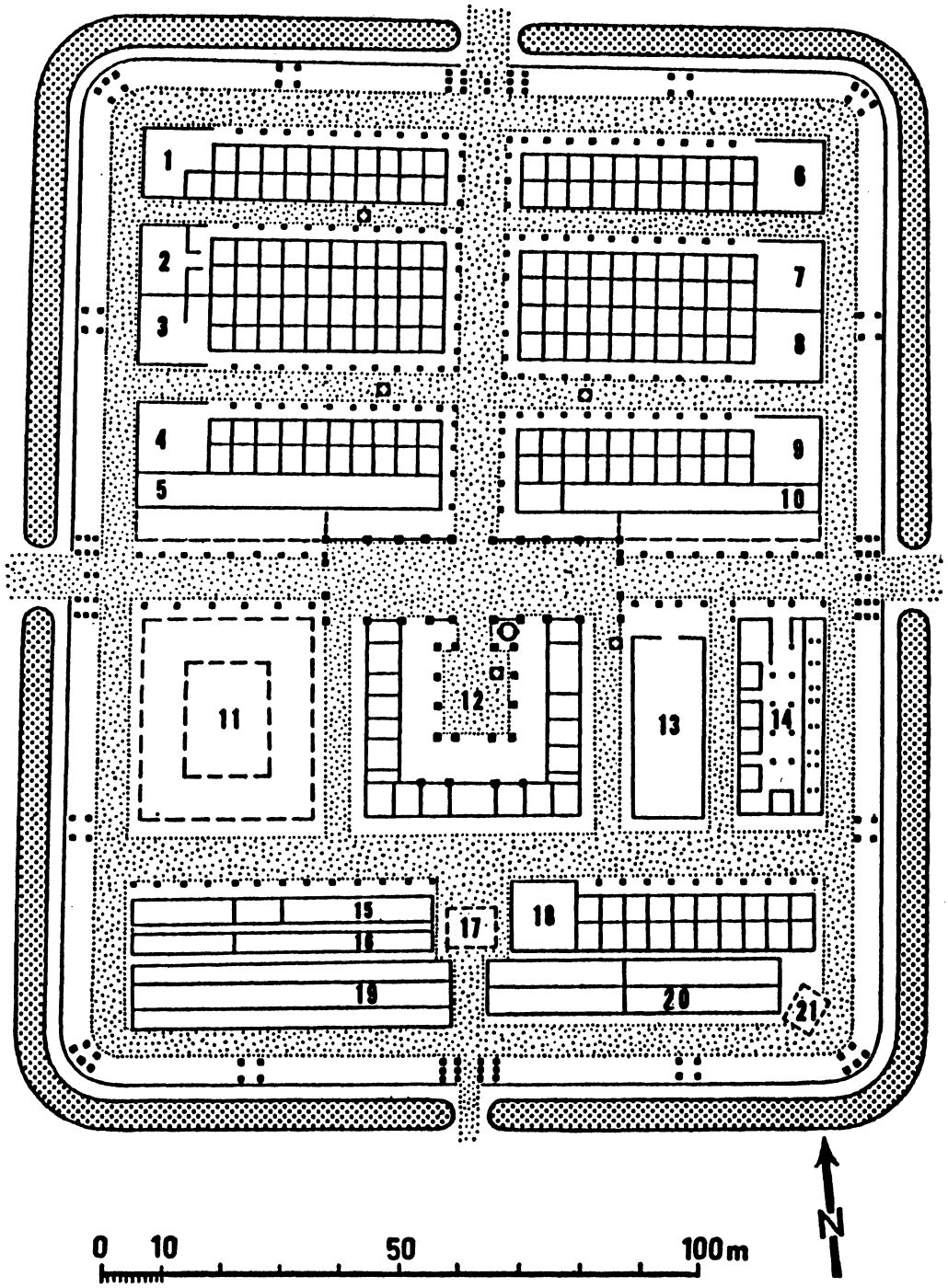
Plan 21 Oberstimm Phase 1b (After Schönberger 1978, 138, Fig 65)



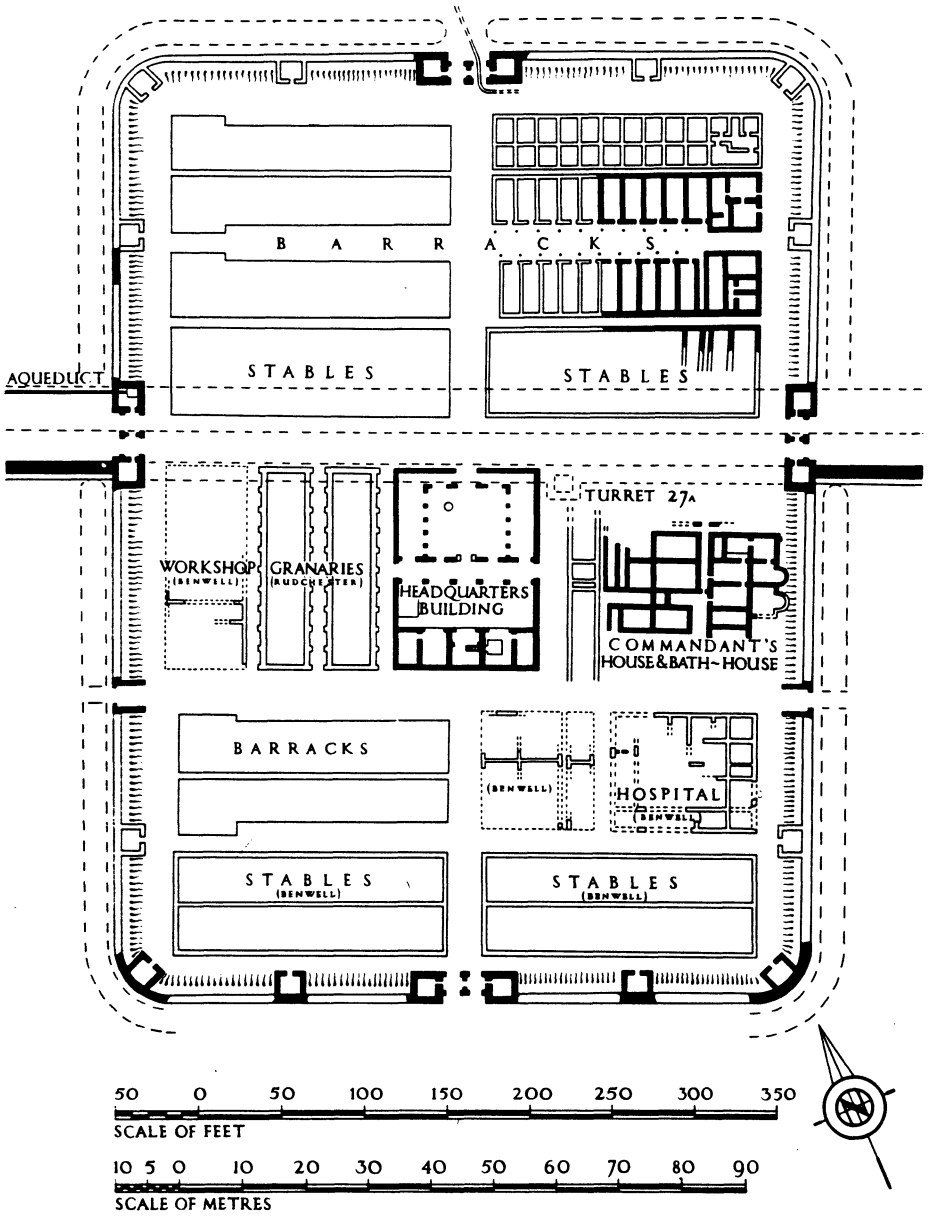
Plan 22 Slăveni (After Tudor 1977, 402, Fig 2)



Plan 23 Gelligaer II (After Ward 1903, facing 104)



Plan 24 Künzing (After Schönberger 1969, 163, Fig 17)



Plan 25 Chesters (After Birley 1982, 12)

TABLE A Barracks and Stables

A - Unit
B - *Centuriae*
C - *Turmae*
D - Barracks
E - Stables
F - Total

A	B	C	D	E	F
cohors quingenaria peditata	6	-	6	-	6
cohors quingenaria equitata	6	4	8	2	10
cohors milliaria peditata	10	-	10	-	10
cohors milliaria equitata	10	8	14	4	18
ala quingenaria	-	16	8	8	16
ala milliaria	-	24	12	12	24

(After Breeze and Dobson 1974, 13)

TABLE B Qualities of the good horse

Aelian		II 10
Columella		VI xxvii 1, xxix 1-4
Diodorus Siculus		XVII 6
Nemesianus		240
Oppian		I 166
Palladius		IV xiii
Theodosius		VI xxxi 1
Varro		II vii 4; vii 15
Virgil	Georgics	III 72
Xenephon	Cyropaedia	i; iii 12; ix 12

TABLE C **Distinctions between different breeds of horse**

Aelian		III 2; IV 52; XIII 9; XV 25; XVI 23; XVI 24
Ammianus		XVII 12 1; XXI 2 6
Appian		II viii 49; II xiv 96; VI xi 67; VIII vii 41; xiv 100
Arrian	Ars Tactica	XL 4-5
	Alex and Ind	VII xiii
	Cynegitica	XXIV 2-3
Caesar	African War	6; 14; 20; 34; 41; 48; 69; 40
	Alex War	17; 29
	Civil War	II 40
	Gallic War	II 17; IV 2, 24, 26, 32-33; VII 64, 68
Dio		LXXVII 12
Diodorus		XVII 110
Frontinus		I v 16
Grattius		497
Herodotus		III 106; V 9; VII 40; IX 20, 22
Horace	Odes	I; VII
Hadrian		IV
Livy		XXXV xi
Martial		I xlix 1-7; XIV cxcix
Nemesianus		240
Oppian		I 166; I 271; I 310; IV 44; IV 110
Pausanius		I xxi 6
Philostratus		II xii 54
Pliny		VIII lxiv 156; lxv 162, 165
Plutarch	Lucullus	XXVIII
	Crassus	XXV 4, 7-8
	Antony	XXXVII 3
Posidonius		F 243
Strabo		III iv 15, 18; IV iv 2; V i 4-6, 14; VII iv 8; XI xiii 7

Tacitus	Annals	III 5
	Germania	VI 3; XXXII 2
	Histories	I lxxvii, lxxix
Theodosius		XV x 1
Varro		II vii 14, viii 3
Virgil	Aeneid	IV 41; V 563-570
	Georgics	II 145
Xenephon	Anabasis	IV v 36

TABLE D **Characteristics of different barbarian cavalry traditions**

Ammianus		XVII xii 12; XXI ii 6
Appian	Roman History	IV i 3; VIII vii 41, xiv 100; XI vi 32
	Civil War	I x 89; II viii 49, xiv 96
Caesar	African War	6; 14; 15; 20; 29; 34; 41; 48; 69; 40
	Alex War	17; 29
	Civil War	II 40
	Gallic War	I 15, 23; IV 2, 24; VII 13, 31, 64, 65
Frontinus		I v 16
Herodotus		I 215; V 9
Livy		XXXV 11
Lucan		I 422-432
Martial		XII xiv 1-2
Pliny		VIII lxiv 156, lxv 165
Plutarch	Lucullus	XXVIII
	Crassus	XXV 4, 7-8
	Antony	XXXVII
Polybius		V 3; V 3, 9
Scr Hist A	Severus Alexander	LVI 5
Strabo		III iv 18; IV iv 2; V i 4
Tacitus	Annals	III 5
	Germania	VI 2, 3; XXXII 2
	Histories	I lxxvii; LXXIX
Vegetius		I xx; II ii
Virgil	Aeneid	IV 41
	Georgics	II 31
Xenephon	Anabasis	I viii 5-7

TABLE E Stables without internal subdivisions: internal widths

	For 2 rows of horses	For 1 row of horses
Longthorpe	6,10	
Bearsden		3,65
Wallsend	7,20	
Ilkley	5,15	
		5,46
		5,79
Maryport		4,50
Brough-on-Noe		3,96
Gelligaer		5,10
		5,18
Haltonchesters	7,64	
Niederbieber	9,20	
	9,60	
Saalburg	8,80	
Total	48,54 ÷ 6	38,79 ÷ 8
Average	8,09	4,85
Recommendations	8,40	5,50

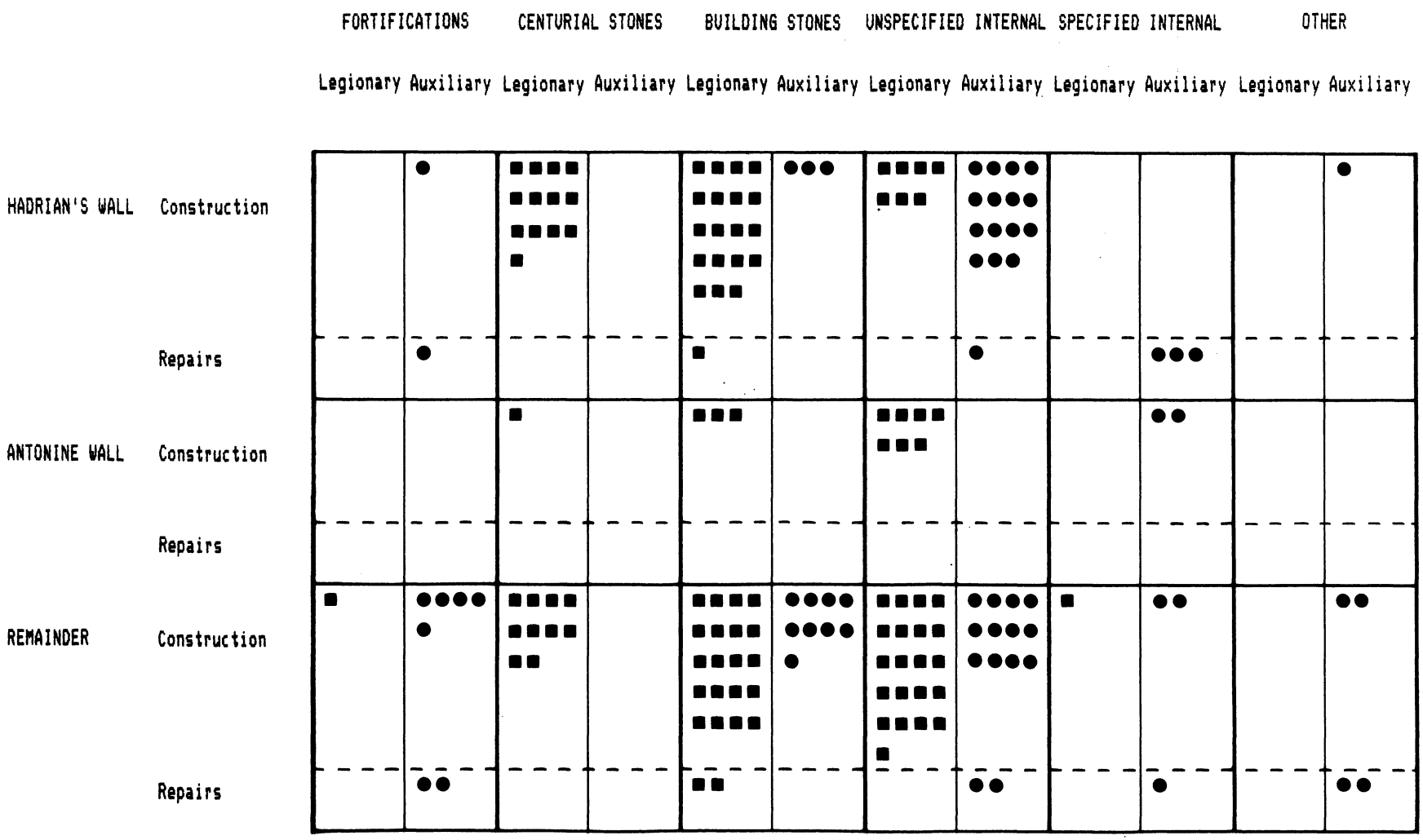
TABLE F Theoretical space allowance per horse

A - Fort / Stable
B - Building Type
C - Width per horse
D - Length per horse
E - Gangway allowance

A	B	C	D	E
Longthorpe VII	O	1,09	2,00	2,00
Bearsden	O	0,94	2,43	1,22
Wallsend	O	1,20	2,40	2,40
Ilkley III	O	1,08	2,58 (1,72)	2,58 (1,72)
		1,08	2,73 (1,82)	2,73 (1,82)
Maryport	O		2,25	2,25
Ilkley I	R	1,11	2,90 (1,93)	2,90 (1,93)
Brough-on-Noe	R		1,98	1,98
Gelligaer	R	1,44	2,58 (1,72)	2,58 (1,72)
Haltonchesters	T	1,03	2,55	2,55
Niederbieber	T		3,07	3,07
	T		3,20	3,20
Saalburg	T	1,28	2,93	2,93
Nanstallon	S		2,50	
Haltonchesters Hadr	H	1,09	1,83	1,83
3C	H	1,13	1,68	1,68
Benwell	H	1,23	1,83	1,83
Hod Hill	H	1,12	1,83	1,83
	H	1,12	1,84	1,84
Krefeld-Gellep III	H	1,00	1,75	1,75
IV	H	1,17	1,75	1,75
Valkenburg	G	1,25	2,75	2,75
Krefeld-Gellep II	J	1,10	1,85	1,85

A	B	C	D	E
Dormagen	J	1,13	1,65	1,65
	J	1,20	2,00	2,00
	J	1,07	2,00	2,00
	J	1,75		
Total		25,78 ÷ 22	58,86 ÷ 26 (55,26)	55,15 ÷ 25 (51,55)
Average		1,16	2,26 (2,13)	2,21 (2,06)

TABLE G Building Inscriptions – *Britannia*



BIBLIOGRAPHY

ANCIENT AUTHORS

Aelian: *On the Nature of Animals.* Trans Schofield, A.F. 1958 (London, Loeb Classical Library).

Ammianus Marcellinus. Trans Rolfe, J.C. 1971 (London, Loeb Classical Library).

Appian: *Roman History.* Trans White H. 1958 (London, Loeb Classical Library).

Aristides: *The Roman Oration.* Trans Oliver, J.H. (Trans American Philosophical Society, new series 43, part 4)

Aristotle: *Historia Animalium.* Trans Peck, A.L. 1965 (London, Loeb Classical Library).

Arrian: *Ars Tactica.* Kiechle, F. 1964, Die Taktik des Flavius Arrianus, Bericht der Römisch-Germanischen Kommission 45, 87-129.

Arrian: *History of Alexander and Indica.* Trans Brunt, P.A. 1976 (London, Loeb Classical Library).

Arrian: *The Joy of Hunting.* Trans Stadter, P.A. 1980, Arrian of Nicomedia (Chapel Hill, University of North Caarolina Press).

Caesar, G.J.: *African War.* Trans Way, A.G. 1964 (London, Loeb Classical Library).

Caesar, G.J.: *Alexandrine War.* Trans Way, A.G. 1964 (London, Loeb Classical Library).

Caesar, G.J.: *Civil War.* Trans Peskett, A.J. 1979 (London, Loeb Classical Library).

Caesar, G.J.: *Gallic War.* Trans Edwards, H.J. 1970 (London, Loeb Classical Library).

Cato: *De Agri Cultura.* Trans Hooper, W.D. 1936 (London, Loeb Classical Library).

Catullus: Trans Cornish F.W. 1950 (London, Loeb Classical Library).

Columella: *De Re Rustica.* Trans Ash, H.B. 1960 (London, Loeb Classical Library).

Dio, Cassius: *Roman History.* Trans Cary, E. (London, Loeb Classical Library).

Diodorus Siculus: *The Library of History.* Trans Geer, R.M. (London, Loeb Classical Library).

Faventinus: Trans Plommer H. 1973, Vitruvius and Later Roman Building Manuals (Cambridge).

Frontinus: *Stratagems and Aqueducts.* Trans Bennett, C.E. 1980 (London, Loeb Classical Library).

Fronto: *Correspondence.* Trans Haines, C.R. 1920 (London, Loeb Classical Library).

Grattius: *Cynegitica.* Trans Duff, J.W and Duff, A.M. 1934, Minor Latin Poets (London, Loeb Classical Library).

Hadrian: Trans Duff, J.W. and Duff, A.M. 1934, Minor Latin Poets (London, Loeb Clasical Library).

Hadrian: *Address at Lambaesis.* Trans Grant, M. 1974, The Army of the Caesars (London).

Herodian: Trans Whittaker, C.R. 1969 (London, Loeb Classical Library).

Herodotus: Trans Godley, A.D. 1921 (London, Loeb Classical Library).

Hesiod: *Works and Days.* Ed trans Mazon, P. 1947 (Paris, Les Belles Lettres edition)

Horace: *Odes and Epodes.* Tr Bennett, C.E. 1978 (London, Loeb Classical Library).

Hyginus a: *Liber de Munitionibus Castrorum.* Ed Domaszewski, A.von 1887 (Leipzig)

Hyginus b: *Des Fortifications du Camp.* Ed trans Lenoir, M. 1979 (Paris, Les Belles Lettres edition).

Josephus: *The Jewish War.* Trans Thackeray, H.StJ. 1927 (London, Loeb Classical Library).

Livy: *Historia Romanorum.* Ed trans Jal, P. 1976 (Paris, Les Belles Lettres edition).

Lucan: *The Civil War* . Trans Duff, J.D.? (London, Loeb Classical Library).

Martial: *Epigrams.* Trans Keir, W.C.A. 1957 (London, Loeb Classical Library).

Nemesianus: *Cynegitica.* Trans Duff, J.W. and Duff, A.M. 1934, Minor Latin Poets (London, Loeb Classical Library).

Onasander: *The General.* Trans Oldfather, W.A. 1923 (London, Loeb Classical Library).

Oppian: *Cynegitica.* Trans Mair, A.W. 1958 (London, Loeb Classical Library).

Palladius: *Traité d'agriculture.* Ed trans Martin, R. 1976 (Paris, Les Belles Lettres edition).

Pausanius: Description of Greece. Trans Jones, W.H.S. 1968 (London, Loeb Classical Library).

Philostratus: *Appolonius of Tyana.* Trans Phillimore, J.S. 1912 (Oxford).

Pliny: *Natural History.* Trans Rackham, H. (London, Loeb Classical Library).

Pliny the Younger: Panegyrique de Trajan. Ed trans Durry, M. 1959 (Paris, Les Belles Lettres edition)

Plutarch: *The Parallel Lives.* Trans Perrin, B. 1959 (London, Loeb Classical Library).

Pollux: *Onomasticon.* Ed Bethe, E. 1900 (Teubner).

Polybius: *The Histories.* Trans Paton, W.R. 1979 (London, Loeb Classical Library).

Posidonius: *The Fragments.* Trans Edelstein, L. and Kidd, I.G. 1972 (Cambridge).

Sallust: *Bellum Iugurthinum.* Ed Watkiss, L. (London, University Tutorial Press).

Scriptores Historiae Augustae. Tr. Magie, D. 1924 (London, Loeb Classical Library).

Strabo: *Geography.* Trans Jones, H.L. 1961 (London, Loeb Classical Library).

Suetonius: *The Lives of the Caesars.* Trans Rolfe, J.C. 1965 (London, Loeb Classical Library).

Tacitus: *Agricola*

Tacitus: *The Annals.* Trans Church, A.J. and Brodribb, W.J. 1895 (London, Macmillan).

Tacitus: *Germania.* Trans Hutton, M. (London, Loeb Classical Library).

Tacitus: *Histories and Annals.* Trans Moore, C.H. 1952 (London, Loeb Classical Library).

Theodosius II: *The Theodosian Code.* Pharr, C. 1952, The Theodosian Code and Novels and The Sirmondian Constitutions (New York, Greenwood Press).

Thucydides: Trans Forster Smith, C. (London, Loeb Classical Library).

Varro: *De Lingua Latina.* Trans Kent, R.G. 1977 (London, Loeb Classical Library).

Varro: *De Re Rustica.* Trans Hooper W.D (revised Ash, H.B.) 1936 (London, Loeb Classical Library).

Vegetius: *Epitoma rei militaris.* Trans Clarke, J. 1767 (London, Griffin, W.)

Vegetius: *Artis Veterinariae or Mulomedicinae.* Ed Schneider, J.O. 1797 (Leipzig).

Virgil: *Aeneid.* Trans Day Lewis, C. (Oxford).

Virgil: *The Georgics.* Trans Fairclough, H.R. 1974 (London, Loeb Classical Library).

Vitruvius: *De Architectura*. Trans Granger, F. 1962 (London, Loeb Classical Library).

Xenephon a: *L'Art Equestre*. Ed Delebecque, E. 1950 (Paris).

Xenephon b: *Cyropaedia*. Trans Miller, W. 1979 (London, Loeb Classical Library).

Xenephon: *The Anabasis of Cyrus*. Trans Brownson, C.L. 1980 (London, Loeb Classical Library).

MODERN LITERATURE

Adam, L.C. and Boone, E.J. (editors) 1940: *Notter and Firth's Hygiene*, (London, 10th edition).

Addyman, P.V. 1975: Keyhole Archaeology: Romans in Store (W.P. Brown's). *Interim* 3 (2), 30-33.

Albrecht, C. 1938: *Das Römerlager in Haltern und das Uferkastell in Beckinghausen an der Lippe* (Veröffentlichungen aus dem städt. Museum für Vor- und Frühgeschichte Dortmund, Band II, Heft I).

Albrecht, C. 1940: Neue Ausgrabungsergebnisse im Römerlager Oberaden. In *Bericht über den VI. Internationalen Kongress für Archäologie, Berlin, 21-26 August 1939*, 550-555.

Alcock, L. 1969: Excavations at South Cadbury Castle, 1968: A Summary Report. *Antiq Journ* 49, 30-40.

Alföldy, G. 1968: Die Hilfstruppen der römischen Provinz Germania Inferior. *Epigraphische Studien* 6.

Alföldy, G. 1974: *Noricum* (London).

Alföldy, G. 1986: Die Inschriften aus den Principia des Alenkastells Aalen (Vorbericht). In Unz, C. (editor) 1986, 69-73.

Ambros, C. and Müller, H.H. 1975: Zur Methode der Widerristhohenberechnung aus den Langenmassen der Extremitätknochen beim Pferd. In Clason A.T. (editor) 1975, 45-50.

Ambrose, T. and White, A. 1978: *A Guide to Roman Lincoln* (Lincolnshire County Council/Lincolnshire Museums).

Amschler, J.W. 1949: Ur- und frühgeschichtliche Haustierfunde aus Österreich. *Archaeologia Austriaca* 3, 3-100.

Amy, R., Duval, P.-M., Formigé, J., Hatt, J.-J., Piganiol, A., Picard C., Picard, G.C. 1962: *L'Arc d'Orange* (Gallia Supplement 15).

Anderson, J.K. 1961: *Ancient Greek Horsemanship* (Berkeley).

Anderson, J.K. 1974: *Xenephon* (London).

Anthes, E. 1912: Das Kastell Altenstadt. *Obergermanisch-rätische Limes* Abt B, Band II 2, Kastell Nr 20.

Applebaum, S. (editor) 1971: *Roman Frontier Studies 1967* (Tel Aviv).

Arias, P.E. 1950: Il Piatto Argenteo di Cesena. *Annuario della Scuola Archeologica di Atene e delle Missioni Italiane in Oriente* 24-26, 309-344.

Aschemeyer, H. 1959: Die Grabungen im Lager von Haltern seit 1953. *Germania* 37, 287-291.

Aschemeyer, H. 1963: Münster: Neue Untersuchungen im Römerlager Oberaden. *Praehistorische Zeitschrift* 41, 210-212.

Aschemeyer, H. 1964: Oberaden. *Neujahrsgrüss* 3.

Aschemeyer, H. and Günther, K. 1966: Forschungs und Literaturberichte Mitteilungen über Ausgrabungen und Funde 1960-1962. *Westfälishe Forschungen* 19, 127.

Aschemeyer, H. 1967: Mitteilungen über Ausgrabungen und Funde, Haltern. *Westfälische Forschungen* 20, 115-116.

Aschemeyer, H. 1968: Mitteilungen über Ausgrabungen und Funde, Haltern. *Wesfälische Forschungen* 21, 182-183.

Askew, S. 1961: Faunal Remains. In Webster, G. 1961, 107-108.

Askew, S. and Westley, B. 1964: Osteological Material. In Webster G. 1964, 142-144.

Austen, P.S. and Breeze, D.J. 1979: A new inscription from Chesters on Hadrian's Wall. *Archaeol Ael* 5th series 7, 115-126.

Axe, J. W. 1905: *The Horse, its Treatment in Health and Disease* (London).

Baatz, D. 1962a: *Lopodunum - Ladenburg a. N.: Die Grabungen im Frühjahr 1960* (Badische Fundberichte, Sonderheft 1).

Baatz, D. 1962b: *Mogontiacum: Neue Untersuchungen am römischen Legionslager in Mainz* (Berlin, Limesforschungen Band 4).

Baatz, D. 1963: Grabungen im Limeskastell Echzell. *Germania* 41, 338-344.

Baatz, D. 1963-64: Die Grabungen im Kastell Echzell 1962. *Saalburg Jahrbuch* 21, 32-58

Baatz, D. 1965: Limeskastell Echzell, Kurzbericht über die Grabungen 1963 und 1964. *Saalburg Jahrbuch* 22, 139-157.

Baatz, D. 1966: Zur Geschützwaffnung römische Auxiliartruppen in der frühen und mittleren Kaisezeit. *Bonner Jahrbücher* 166, 194-207.

Baatz, D. 1968a: Römische Wandmalereien aus dem Limeskastell Echzell, Kr. Büdingen (Hessen). *Germania* 46, 40-52.

Baatz, D. 1968b: *Limeskastell Saalburg: Ein Führer* (Bad Homburg).

Baatz, D. 1968c: Wandmalereien aus einem Limeskastell. *Gymnasium* 75, 262-269.

Baatz, D. 1969: Ausgrabungen im Limeskastell Echzell. *Wetterauer Geschichtsblätter* 18, 1-7.

Baatz, D. 1971: Das römische Kastell Hunneburg bei Butzbach und seine Umgebung. *Wetterauer Geschichtsblätter* 20, 1-16.

Baatz, D. 1972: Ausgrabungen im Kastell Munningen 1971. *Archäologisches Korrespondenzblatt* 2, 204-206.

Baatz, D. 1973a: *Kastell Hesselbach* (Berlin, Limesforschungen Band 12).

Baatz, D. 1973b: Review of Gudea, N. and Pop, I.I. 1971. *Germania* 51, 616-618.

Baatz, D. 1973c: Review of Chirila, E., Gudea, N., Lucacel, V. and Pop, C. 1972. *Germania* 51, 619-620.

Baatz, D. 1973d: Review of Glasbergen 1972. *Germania* 51, 619-620.

Baatz, D. 1974: *Der römische Limes, Archäologische Ausflüge zwischen Rhein und Donau* (Berlin).

Baatz, D. 1974-75: Das Kastell Munningen im Landkreis Donau Ries. *Jahresbericht der Bayerischen Bodendenkmalpflege* 15/16, 108-120.

Baatz, D. 1976: Das Kastell Munningen in Nordlinger Ries. *Saalburg Jahrbuch* 33, 11-62

Baatz, D. 1977: Review of Petrikovits, H. von 1975. *Germania* 55, 267-270.

Baatz, D. 1979a: Die Römerzeit in Ries. In *Führer zu vor- und frühgeschichtlichen Denkmälern, Band 40, Nordlinge-Bopfingen-Oettingen-Harburg - Teil I* (Mainz), 184-197.

Baatz, D. 1979b: Die römische Kastelle nördlich vom Ries. In *Führer zu vor- und frühgeschichtlichen Denkmälern, Band 41, Nordlingen-Bopfingen-Oettingen-Harburg - Teil II* (Mainz), 235-269.

Baatz, D. 1981: Review of Schönberger, H. 1978b. *Bayerische Vorgeschichtsblätter* 46, 270-272.

Baatz, D. 1984: Quellen zur Bauplanung römischer Militärlager: Bauplanung und Bautheorie der Antike. *Diskussion zur archäologischen Bauforschung* 4, 315-325.

Baatz, D. 1985: Hibernacula. *Germania* 63 (1), 147-154.

Baatz, D. and Herrmann, F.-R. 1982: *Die Römer in Hessen* (Stuttgart).

Baillie Reynolds, P.K. 1926: *The Vigiles of Imperial Rome* (London).

Ballu, M.A. 1897: *Le monastère byzantin de Tebessa* (Paris).

Ballu, M.A. 1903: *Les ruines de Timgad, nouvelles decouvertes* (Paris).

Ballu, M.A. 1905: Lambèse. In Rapport sur les travaux de fouilles opérés en 1904 par la service des monuments historiques en Algérie, 81-84. *Bulletin archéologique du Comité des Travaux Historiques et Scientifiques* 1905, 75-103.

Ballu, M.A. 1906: 5° Fouilles de Lambèse. In Fouilles archéologiques d'Algérie en 1905, 192-193. *Bulletin archéologique du Comité des Travaux historiques et scientifiques 1906*, 182-222.

Ballu, M.A. 1911: *Les ruines de Timgad* (Paris).

Bărbulescu, M. *et al* 1983: *Potaissa* 3, 13-20.

Bărcăcila, Al. 1932: *Drubeta, Azi T-Severin. Aşezarta Dacică Podui lui Traian Castrul şi Orasui Roman* (Turnu-Severin).

Barkóczi, L. 1951: *Brigetio* (Budapest, Dissertationes Pannonicae series 2, no 22).

Barkóczi, L. 1976a: Brigetio - Ószőny. In Fitz, J, (editor) 1976, 33-35.

Barkóczi, L. 1976b: Vetus Salina - Adony. In Fitz, J, (editor) 1976, 98-99.

Barkóczi, L. and Bónis, E. 1954: Das frührömische Lager und die Wohnsiedlung von Adony (Vetus Salina). *Acta Archaeol Acad Scient Hung* 4, 129-197.

Barthel, W. 1907: Das Kastell Cannstatt. *Obergermanisch-rätische Limes* Abt B, Band V 1, Kastell Nr 59.

Barton, R.M.S. 1937: *Elements of Stabling* (London).

Bayerische Landesamt für Denkmalpflege, 1985: *Die Römer in Schwaben: Jubiläumsaustellung 2000 Jahre Augsburg veranstaltet vom Bayerischen Landesamt für Denkmalpflege und der Stadt Augsburg, Zeughaus, 23. Mai - 3. Novemeber 1985* (München, Bayerische Landesamt für Denkmalpflege, Arbeitsheft 27).

Becatti, G. 1957: *Colonna di Marco Aurelio* (Milan).

Bechert, T. 1969: Zu einigen Bauinschriften aus römischen Legionslagern. *Epigraphische Studien* 8, 39-52.

Bechert, T. 1971: Römische Lagertore und ihre Bauinschriften. *Bonner Jahrbücher* 171, 201-287.

Bechert, T. 1972a: Der Stand der Asciburgium-Forschung. Vorbericht über die Grabung bis 1971. *Rheinische Ausgrabungen* 12, 147-197.

Bechert, T. 1972b: Grabungen in Asciburgium. *Das Rheinishe Landesmuseum Bonn* 6, 81-83.

Bechert, T. 1972c: Neue Grabungen im römischen Kastell Asciburgium. *Antike Welt* 3 (1), 33-52.

Bechert, T. 1973a: Neue Ausgrabungen im Kastell Asciburgium. *Archäol Korrespondenzblatt* 3, 39-45.

Bechert, T. 1973b: Zum Stand der Ausgrabungen in Asciburgium (Frühjahr 1973). In *Funde aus Asciburgium* Heft 1, 5-10 (Duisburg and Rheinhausen).

Bechert, T. 1974: *Asciburgium: Ausgrabungen in einem römischen Kastell am Niederrhein* (Duisburger Forschungen Band 20).

Bechert, T. 1975: Neue Untersuchungen im römischen Kastell Asciburgium in Moers Asberg. In *Rheinische Ausgrabungen* '75, 45-47.

Bechert, T. 1979: Ausgrabungen in Asciburgium - Vorbericht über die Grabungen 1975-7. *Bonner Jahrbücher* 179, 475-498.

Bechert, T. 1980: The Roman Military Settlement of Asciburgium: Topography and Chronology. In Hanson, W.S. and Keppie, L.J.F. (editors) 1980, 501-514.

Bechert, T. 1981: Die römische Militärsiedlung Ascibugium: Topographie und Chronologie. *Antike Welt* 12, 21-26.

Bechert, T. 1982: Die Römer in Asciburgium. In *Niederrheinisches Museum der Stadt Duisburg 1981-82*, 3-48.

Beck, W. and Planck, D. 1980: *Der Limes in Sudwestdeutschland* (Stuttgart).

Beckmann, B. 1975: Review of Fischer, U. 1973. *Fundber Hessen* 15, 699-702.

Beckmann, B. 1976-77: Neuere Ausgrabungen im römischen Limeskastell Miltenberg-Altstadt und in mittelalterlichen Walthusen: Ein Vorbericht. *Jahresber Bayer Bodendenkmalpflege* 17/18, 62-131.

Beckmann, B. 1977a: Neue Ausgrabungen im Kastell Miltenberg Altstadt (ORL Band 3, Nr 38). In Bogaers, J.E. (editor) 1977b, 83-85.

Beckmann, B. 1977b: Die Ergebnisse der Ausgrabungen im römischen Limeskastell Miltenberg-Altstadt (ORL Nr 38). In Fitz, J. (editor) 1977, 113-122.

Benario, H.W. 1972: Albano and the Second Parthian Legion. *Archaeology* 25, 257-263.

Benea, D., Medelet, Fl., Bona, P. and Petrovszki, R. 1980: Cercetările arheologice de la Tibiscum. *Materiale şi cercetări arheologice*, 283-303.

Benea, D. 1986: Das Römerlager von Tibiscum und seine Rolle im Verteidigungssystem von südwest Dakien. In Unz, C. (editor) 1986, 451-460.

Bennett, J. 1986: Fort Sizes as a Guide to Garrison Type: A Preliminary Study of Selected Forts in the European Provinces. In Unz, C. (editor) 1986, 707-711.

Bernard, M. 1906: Le cheval dans les mosaiques de l'Afrique du nord. *Bulletin Archeologique* 1906, 1-31.

Bersu, G. 1912: Das römische Kastell Burladingen. *Röm-germ Korrespondenzblatt* 5, 65-70.

Bersu, G. 1913: Rißtissen. *Fundber Schwaben* 21, 66-67.

Bersu, G. 1914-16: Rißtissen. *Fundber Schwaben* 22-24, 26-28.

Bersu, G. 1917: Kastell Burladingen. *Germania* 1, 111-118.

Bidwell, P.T. 1979: *The Legionary Bath-house and Basilica and Forum at Exeter* (Exeter Archaeological Reports: Vol 1).

Bidwell, P.T. 1980: *Roman Exeter: Fortress and Town* (Exeter).

Bidwell, P.T. 1982: Review of Dore, J.N and Gillam, J.P. 1979. *Britannia* 13, 429-430

Bidwell, P.T. 1985: *The Roman Fort of Vindolanda at Chesterholm, Northumberland* (London, Historic Buildings and Monuments Commission for England Archaeological Report No 1).

Bidwell, P.T. and Boon, G.C. 1976: An Antefix Type of the Second Augustan Legion from Exeter. *Britannia* 7, 278-280.

Birley, A.R. 1969: *The Ninth Pilgrimage of Hadrian's Wall* (Kendal).

Birley, E.B. 1930: Excavations on Hadrian's Wall West of Newcastle upon Tyne in 1929. *Archaeol Ael* 4th series, 143-174.

Birley, E.B. 1937-38: Excavations at Birrens, 1936-1937. *Proc Soc Antiq Scot* 72, 275-347.

Birley, E.B. 1952a: Roman Garrisons in Wales. *Archaeol Camb* 102, 9-19.

Birley, E.B, (editor) 1952b: *The Congress of Roman Frontier Studies 1949* (Durham).

Birley, E.B. 1956-57: Dalswinton and the Ala Petriana. *Trans Dumf Gall Nat Hist Archaeol Soc* 35, 9-13.

Birley, E.B. 1958: The Roman Fort at Ravenglass. *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 58, 14-30.

Birley, E.B. 1961: *Research on Hadrian's Wall* (Kendal).

Birley, E.B. 1963-64: Promotions and Transfers in the Roman Army II: The Centurionate. *Carnuntum Jahrbuch* 8, 21-33.

Birley, E.B. 1966: Alae and cohortes milliariae. In *Corolla memoriae Erich Swoboda dedicata* (Graz, Römische Forschungen in Niederösterreich 5) 55-67.

Birley, E.B. 1977: *Corbridge Roman Station* (London, HMSO).

Birley, E.B. 1981: Note: Hyginus and the First Cohort. *Britannia* 12, 287.

Birley, E.B. 1982: *Chesters Roman Fort* (London, HMSO)

Birley, E.B., Richmond, I.A. and Gutenbrunner, S. 1938: Excavations at Corbridge 1936-38. *Archaeol Ael* 4th series 15, 243-294.

Birley, E.B. and Richmond, I.A. 1938-40: The Roman Fort at Carzield. *Trans Dumfr Gall Nat Hist Archaeol Soc* 22, 156-163.

Birley, E.B., Dobson, B. and Jarrett, M.G. (editors) 1974: *Roman Frontier Studies 1969* (Cardiff).

Birley, R.E. 1970: Excavations at Chesterholm-Vindolanda 1967-9. *Archaeol Ael* 4th series 48, 97-155.

Bishop, M.C. 1986: The Distribution of Military Equipment within Roman Forts of the First Century AD. In Unz, C. (editor) 1986, 717-723.

Bloemers, J.H.F. 1974: Archeologisch Nieuws: Nijmegen. *Nieuwsbull Konink Ned Oud Bond* 73, 180-181.

Bloemers, J.H.F. 1975: Archeologisch Nieuws: Nijmegen. *Nieuwsbull Konink Ned Oud Bond* 74, 161-163.

Bloemers, J.H.F. 1977: Die augusteischen Lager und die flavisch-trajanischen Canabae Legionis in Nijmegen. In Bogaers, J.E. (editor) 1977b, 87-91.

Bloemers, J.H.F. 1978: Archeologisch Nieuws: Nijmegen. Nieuwsbull Konink Ned Oud Bond 77, 249-254.

Bloemers, J.H.F. 1980a: Archeologisch Nieuws: Nijmegen. *Nieuwsbull Konink Ned Oud Bond* 79, 32-36.

Bloemers, J.H.F. 1980b: Nijmegen: ROB excavations 1974-1979 in the Roman forts, cemeteries and canabae legionis. In Hanson, W.S. and Keppie, L.J.F. (editors) 1980, 471-474.

Bökönyi, S. 1968: Mecklenburg Collection Part I: Data on Iron Age Horse of Central and Eastern Europe. *Bulletin of the American School of Prehistoric Research, Peabody Museum, Harvard University* 25, 3-71.

Bökönyi, S. 1974: *History of Domestic Mammals in Central and Eastern Europe* (Budapest).

Boessneck, J. 1956: Die Tierknochenfunde aus dem Kastell Boiodurum. In Schönberger, H., Das Römerkastell Boiodurum-Beiderweis zu Passau-Innstadt, *Saalburg Jahrbuch* 15, 42-80 (79-80).

Boessneck, J. 1958: *Zur Entwicklung vor- und frühgeschichtlicher Haus- und Wildtiere Bayerns in Rahmen der gleichzeitigen Tierwelt Mitteleuropas* (München, Studien an vor- und frühgeschichtlichen Tierresten Bayerns 2).

Boessneck, J. 1971: *Die Tierknochenfunde aus dem Oppidum von Manching* (Wiesbaden).

Boessneck, J. and Driesch, A.v.d. 1974: Kritische Anmerkungen zur Widerristhohenberechnungen aus Längenmassen vor- und frühgeschichtlicher. *Saugetierkdl Mitt* 22 (4), 325-348.

Bogaers, J.E. 1964: Praetorium Agrippinae. *Bull Konink Ned Oud Bond* 6th series 17, 209-239.

Bogaers, J.E. 1965a: Exercitus Germanicus Inferior. *Numaga* 12, 98-106.

Bogaers, J.E. 1965b: Romeins Nijmegen: De Bezettingstroepen van de Nijmegse Legionsvesting in de 2de Eeuw na Chr. *Numaga* 12, 10-37.

Bogaers, J.E. 1967: Die Besatzungstruppen des Legionslagers von Nijmegen im 2 Jahrhundert nach Christus. In *Studien zu den Militärgrenzen Roms, Vorträge des 6. Internationalen Limeskongresses in Süddeutschland* (Beihefte der Bonner Jahrbücher Band 19) 54-76.

Bogaers, J.E. 1969: Cohortes Breucorum. *Ber Rijk Oud Bod* 19, 27-50.

Bogaers, J.E. 1974a: Thracische Hulptroepen in Germania Inferior. *Oud Med Rijk Oud Leiden* 55, 198-220.

Bogaers, J.E. 1974b: Troupes Auxiliaires Thraces dans la partie Néerlandaise de la Germania Inferior. In Pippidi, D.M. (editor) 1974, 445-463.

Bogaers, J.E. 1975-76: Review of Petrikovits, H, von 1975. *Bulletin Antieke Beschaving* 51, 127-129.

Bogaers, J.E. 1977a: Auxiliaria. In Fitz, J. (editor) 1977, 601-632.

Bogaers, J.E. (editor) 1977b: *Studien zu den Militärgrenzen Roms II: Vorträge des 10 Internationalen Limeskongresses in der Germania Inferior* (Beihefte der Bonner Jahrbücher Band 38).

Bogaers, J.E. and Rüger, C.B. 1974: *Der Niedergermanische Limes: Materialien zu seiner Geschichte* (Bonn).

Bogaers, J.E. and Haalebos, J.K. 1975a: Problemen rond het Kops Plateau. *Oud Med Rijk Oud Leiden* 56, 127-178.

Bogaers, J.E. and Haalebos, J.K. 1975b: Romeins Nijmegen: De Nijmeegse legionsvestingen vanaf 70 na Chr. *Numaga* 22, 1-20.

Bogaers, J.E. and Haalebos, J.K. 1976: Opgravingen in de romeinse Legionsvestingen te Nijmegen I (Berg en Dalseweg-Huygensweg 1973-1974). *Oud Med Rijk Oud Leiden* 57, 149-196.

Bogaers, J.E. and Haalebos, J.K. 1977a: Die Nijmegener Legionslager seit 70 nach Christus. In Bogaers, J.E. (editor) 1977b, 87-108

Bogaers, J.E. and Haalebos, J.K. 1977b: Opgravingen in de romeinse Legionsvestingen te Nijmegen II (ten oosten en noorden van de Praetoriumstraat, 1974-1975). *Oud Med Rijk Oud Leiden* 58, 73-157.

Bogaers, J.E. and Haalebos, J.K. 1980: Opgravingen in de romeinse Legionsvestingen te Nijmegen III (Canisiuscollege, Hoge Veld, 1975-1977). *Oud Med Rijk Oud Leiden* 61, 39-111.

Bogaers, J. E. and Haalebos, J.K. 1983: Archeologen op oon bouwterrein. *Hakoerier* 10-11.

Bogaers, J.E. and Haalebos J.K. 1987: Opgravingen te Alphen aan den Rijn in 1985 en 1986. *Westerheem* 36 (2), 40-52.

Bojović, D. 1975: Résultats des fouilles archéologiques de Singidunum et localisation du camp militaire. *Starinar* new series 26, 83-85.

Bona, P., Petrovszki, R and Rogozea, P. 1982: Tibiscum: cercetări arheologice (1) 1976-1979. *Acta Musei Napocensis* 19, 311-322.

Boon, G.C. 1963: *Segontium Roman Fort* (London, HMSO).

Boon, G.C. 1972: *Isca: The Roman Legionary Fortress at Caerleon, Monmouthshire* (Cardiff, National Museum of Wales).

Boon, G.C. 1974: *Caernarvon* (Bulletin of the National Museum of Wales 18).

Boon, G.C. 1977: Review of Petrikovits, H. von 1975. *Antiq Journ* 57, 113-115.

Bosanquet, R.C. 1904: Excavations on the Line of Roman Wall in Northumberland: the Roman Camp at Housesteads. *Archaeol Ael* 2nd series 25, 193-300.

Bošković, D. 1982-83: Recherches archaeologiques aux Portes de Fer 1956-1970. *Starinar* 33-34, 18-27.

Bowman, A.K. 1983: *The Roman Writing Tablets from Vindolanda* (London, British Museum).

Bowman, A.K. and Thomas, J.D. 1983: *Vindolanda: The Latin Writing Tablets* (Britannia Monograph Series No 4).

Braasch, O. 1983: *Luftbildarchäologie in Süddeutschland* (Stuttgart, Kleine Schriften zur Kenntnis der römischen Besetzungsgeschichte Sudwestdeutschlands Nr 30).

Brailsford, J.W. 1964: *Hod Hill* I: Antiquities from Hod Hill in the Durden Collection (London, Trustees of the British Museum).

Branigan, K. 1974: Vespasian and the South-West. *Proc Dorset Nat Hist Archaeol Soc* 95, 50-57.

Branigan, K. 1976: *The Roman Villa in South-West England* (Bradford-on-Avon).

Branigan, K. and Fowler, P.J. (editors) 1976: *The Roman West Country* (Newton Abbot).

Breeze, D.J. 1969: The Organisation of the Legion: The First Cohort and the equites legionis. *Journ Rom Stud* 59, 50-55.

Breeze, D.J. 1871: Pay Grades and Ranks below the Centurionate. *Journ Rom Stud* 61, 130-135.

Breeze, D.J. 1972: Excavations at the Roman Fort of Carrawburgh. *Archaeol Ael* 4th series 1, 81-144.

Breeze, D.J. 1974a: The Career Structure below the Centurionate during the Principate. In Temporini, H. (editor) 1974, 435-451.

Breeze, D.J. 1974b: The Organistion and career structure of the immunes and principales of the Roman Army. *Bonner Jahrbücher* 174, 245-292.

Breeze, D.J. 1974c: The Roman Fortlet at Barburgh Mill, Dumfriesshire. *Britannia* 5, 130-162.

Breeze, D.J. 1977a: Review of Robertson, A.S. 1975. *Britannia* 8, 451-60.

Breeze, D.J. 1977b: Review of Schönberger, H. 1975. *Britannia* 8, 451-60.

Breeze, D.J. 1977c: The Garrisoning of Roman Fortlets. In Bogaers, J.E. (editor) 1977b, 1-6.

Breeze, D.J. 1979a: *Roman Scotland: a guide to the visible remains* (Newcastle upon Tyne).

Breeze, D.J. (editor) 1979b: *Roman Scotland: some recent excavations* (Edinburgh).

Breeze, D.J. 1979c: The Roman Fort on the Antonine Wall at Bearsden. In Breeze, D.J. (editor) 1979b, 21-26.

Breeze, D.J. 1980: The Roman Forts at Ardoch. In Clarke, D.V. and O'Connor, A.C. (editors), *From the Stone Age to the Forty-Five* (Edinburgh), 224-236.

Breeze, D.J. 1982a: Bearsden. *Current Archaeology* 82, 343-347.

Breeze, D.J. 1982b: *The Northern Frontiers of Roman Britain* (London).

Breeze, D.J. 1983a: Review of Philp, B. 1981. *Britannia* 14, 372-375.

Breeze, D.J. 1983b: *Roman Forts in Britain* (Aylesbury).

Breeze, D.J. 1984a: Demand and Supply on the Northen Frontier. In Miket, R. and Burgess, C. (editors) 1984, 264-286.

Breeze, D.J. 1984b: The Roman Fort on the Antonine Wall at Bearsden. In Breeze, D.J. (editor) 1984, *Studies in Scottish Antiquities presented to Stewart Cruden* (Edinburgh), 32-68.

Breeze, D.J. 1986: The Frontier in Britain. In Unz, C. (editor) 1986, 21-34.

Breeze, D.J. and Dobson, B. 1969: Fort Types on Hadrian's Wall. *Archaeol Ael* 4th series 47, 15-32.

Breeze, D.J. and Dobson, B. 1974: Fort Types as a Guide to Garrisons: A Reconsideration. In Birley, E.B., Dobson, B. and Jarrett, M.G. (editors) 1974, 13-20.

Breeze, D.J. and Dobson, B. 1978: *Hadrian's Wall* (London).

Brunsting, H. 1951: Nijmegen. *Ber Rijk Oud Bod Ned* 2, 4-5.

Brunsting, H. 1952: Lagerplaats van Leg X Gem, Nijmegen (Prov Gelderland). *Ber Rijk Oud Bod Ned* 3, 8-9.

Brunsting, H. 1960: Romeins Nijmegen: Nieuwe Opgraving in de Nijmeegse Castra. *Numaga* 7, 6-40.

Brunsting, H. 1961: Romeins Nijmegen: De Nijmeege Castra, Resultaten de Opgraving in 1960. *Numaga* 8, 49-67.

Brunsting, H. 1962a: Archeologisch Nieuws Gelderland: Nijmegen. *Nieuwsbull Konink Ned Oud Bond* 15; 3-4, 40, 67, 78-79, 101, 187-88, 207-09.

Brunsting, H. 1962b: *Vierhonderd jaar romeinse bezetting: Noviomagus Batavorum* (Nijmegen, Leiden Rijksmuseum van Oudheiden 1961).

Brunsting, H. 1963: Archeologisch Nieuws: Nijmegen. *Nieuwsbull Konink Ned Oud Bond* 16; 179-80, 226-27.

Brunsting, H. 1964: Archeologisch Nieuws: Nijmegen. *Niewsbull Konink Ned Oud Bond* 17; 130-32, 302-08.

Brunsting, H. 1965: Archeologisch Nieuws: Nijmegen. *Nieuwsbull Konink Ned Oud Bond* 18; 62-64, 125-28.

Brunsting, H. 1966: Archeologisch Nieuws: Nijmegen. *Nieuwsbull Konink Ned Oud Bond* 19; 16-17, 84-87.

Brunsting, H. 1967: Archeologisch Nieuws: Nijmegen. *Nieuwsbull Konink Ned Oud Bond* 20, 7-8.

Brunsting, H, 1968: Archeologisch Nieuws: Nijmegen. *Nieuwsbull Konink Ned Oud Bond* 21, 22-25.

Brunsting, H, 1969: *400 Jahr romeinse Bezetting van Nijmegen* (Nijmegen).

Brunsting, H. 1977: Das Legionslager in Nijmegen: Ausgrabungen bis 1967. In Bogaers, J.E. (editor) 1977b, 118-20.

Bruton, F.A. 1909: *Excavations at Toothill and Melandra* (Manchester).

Buchanan, M. 1904-05: Report of the Society's Excavation of Rough Castle on the Antonine Vallum. *Proc Soc Antiq Scot* 39, 442-499.

Bult, E.J. and Hallewas, D.P. 1986: *Graven bij Valkenburg: het archeologisch onderzoek in 1985* (Delft).

Burford, J.E. 1960: Heavy Transport in Classical Antiquity. *Economic History Review* 13, 1-18.

Burkett, M.E. 1965: Recent Discoveries at Ambleside. *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 65, 86-101.

Butler, R.M. (editor) 1971: *Soldier and Civilian in Roman Yorkshire* (Leicester)

Cagnat, M.R. 1908: Les deux camps de la legion III^me^ Auguste à Lambèse d'après les fouilles recentes. *Mémoires de l'Académie des Inscriptions et Belles-Lettres* 38 (1).

Cagnat, R. 1913: *L'armée romaine d' Afrique et l'occupation militaire d'Afrique sous les empereurs* (Paris).

Callies, H. 1964: Die Fremdentruppen im römischen Heer des Princpats und die sogennanten nationalen Numerei. *Ber Röm-Germ Komm* 45, 130-227.

Caprino, C., Coloni, A.M., Gatti, G., Pallottino, M. and Romanelli, P. 1955: *La Colonna di Marco Aurelio* (Rome).

Carrington, P. 1977: The Planning and Date of the Roman Legionary Fortress at Chester. *Journ Chest Archaeol Soc* 60, 35-42.

Carlisle, 1981: Round-Up, Carlisle. *Current Archaeology* 75, 114-15.

Caruana, I. 1983: Carlisle. *Current Archaeology* 86, 77-81.

Casey, P.J. 1974: Excavations outside the North-East Gate of Segontium 1971. *Archaeol Camb* 54-77.

Cermanović-Kuzmanović, A. 1982-83: Tekija (Transdierna): certains aspects du problème du site. *Starinar* 33-34, 342-343.

Chantraine, H., Gechter, M., Horn, H.G., Knörzer, K.-H., Müller, G., Rüger, C.B. and Tauch, M. 1984: *Das römische Neuss* (Stuttgart).

Chaplin, R.E. 1971: *The Study of Bones from Archaeological Sites* (London).

Charlesworth, D. 1965: Excavations at Papcastle, 1961-2. *Trans Cumb Westm Antiq Archaeol Soc* series 2, 102-114.

Charlesworth, D. 1978: Roman Carlisle. *Archaeol Journ* 135, 115-137.

Charlesworth, D. 1980: The south gate of a Flavian fort at Carlisle. In Hanson, W.S. and Keppie, L.J.F. (editors) 1980, 201-210.

Cheesman, G.L. 1911: Numantia. *Journ Rom Stud* 1, 180-186.

Cheesman, G. L. 1928: *The Auxilia of the Roman Imperial Army* (Oxford).

Chirilă, E, Gudea, N. 1973: Sautierul archeologic Bologa, jud. Cluj (1967). *Materiale şi Cercetări Archeologice* 10, 115-123.

Chirilă, E., Gudea, N., Lucăcel, V., and Pop, C. 1980: *Das Römerlager von Buciumi: Beiträge zur Untersuchung des Limes der Dacia Porolissensis* (Zalău).

Chirilă, E., Gudea, N., Matei, A.V. and Lucăcel, V. 1980: Raport preliminar asupra cercetarilor archeologice de la Moigrad (Porolissum) din anii 1977-1979. *Acta Musei Porolissensis* 4, 80-103.

Christern J. 1976: *Das frühchristliche Pilgerheiligtum von Tebessa: Architektur und Ornamentik einer spätantiken Bauhütte in Nordafrika* (Wiesbaden).

Christison, D. 1896: Account of the Excavation of Birrens, a Roman Station in Annandale, undertaken by the Society of Antiquaries of Scotland in 1895. *Proc Soc Antiq Scot* 30, 81-199.

Christison, D. 1898: Account of the Excavation of the Roman station at Ardoch, Perthshire. *Proc Soc Antiq Scot* 32, 399-476.

Christison, D. 1900-01a: Account of the Excavation of the Roman Station of Camelon near Falkirk, Stirlingshire, undertaken by the Society in 1900. *Proc Soc Antiq Scot* 35, 329-417.

Christison, D. 1900-01b: Excavation of the Roman Camp at Lyne, Peebleshire. *Proc Soc Antiq Scot* 35, 154.

Čičikova, M. 1975: Ukrepitelna sistema i gradonstrojstvo na Novae. *Vekove* 2, 36-46.

Čičikova, M. 1977: La fortification et et l'urbanisation de Novae à la lumière des dernières fouilles archéologiques (1970-1974). In Bogaers, J.E. (editor) 1977b, 277-282.

Čičikova, M. 1980: Forschungen in Novae (Moesia Inferior). *Klio* 62 (1), 55-66.

Cichorius, C. 1896: *Die Reliefs der Traianssäule* (Berlin).

Cichy, B. 1967: Heidenheim: Fundschau. *Fundber Schwaben* new series 18 (2), 90-91

Cichy, B. 1971: *Das römische Heidenheim* (Heidenheim).

Cichy, B. 1972: In den Kasernen des Reiterkastells Aquileia - Heidenheim. *Denkmalpfl Baden-Württemberg* 1, 33-38.

Clarke, J. 1933: *The Roman Fort at Cadder* (Glasgow).

Clarke, J. 1938-40: Note on the Roman Site at Milton. *Trans Dumfr Gall Nat Hist Archaeol Soc* 22, 153-155.

Clarke, J. 1949-50: Excavations at Milton (Tassiesholm) in Season 1950. *Trans Dumfr Gall Nat Hist Archaeol Soc* 28, 199-221.

Clarke, J. 1952: Durisdeer. In Miller, S.N. (editor) 1952, 124-126.

Clason, A.T. 1960: Some Remarks on the Faunal Remains from the Roman Castellum at Valkenburg, Province of South Holland. *Palaeohistoria* 8, 139-147.

Clason, A.T. 1967: Animal and Man in Holland's Past. *Palaeohistoria* 13A.

Clason, A.T. 1975: *Archaeozoological studies: Papers of the Archaeozoological Conference 1974 held at the Biologisch-Archaeologisch Instituut of the State University of Groningen* (Amsterdam).

Clutton-Brock, J. 1981: *Domesticated Animals* (London).

Coleman, T.E. 1897: *Stable Sanitation and Construction* (London).

Collingwood, R.G. 1915: The Exploration of the Roman Fort at Ambleside: Report on the second year's work (1914). *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 15, 2-62.

Collingwood, R.G. 1916: The Exploration of the Roman Fort at Ambleside: Report on the third year's work (1915). *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 16, 57-90.

Collingwood, R.G. 1921: Explorations in the Roman Fort at Ambleside (fourth year 1920) and at other sites on the Tenth Iter. *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 21, 1-42.

Collingwood, R.G. 1928: Excavations at Brough-by-Bainbridge in 1926. *Proc Leeds Phil Soc* 1, 261-284.

Collingwood, R.G. 1936a: The Roman Fort and Settlement at Maryport. *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 36, 85-99.

Collingwood, R.G. 1936b: The Roman Fort at Beckfoot. *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 36, 76-84.

Collingwood, R.G. and Wright, R.P. 1965: *The Roman Inscriptions of Britain I: Inscriptions on Stone* (Oxford).

Collingwood, R.G. and Richmond, I.A. 1969: *The Archaeology of Roman Britain* (London).

Collingwood Bruce, J.C. 1889: Some Excavations at Chesters. *Archaeol Ael* 2nd series, 13, 374-77.

Collingwood Bruce, J. 1978: *Handbook to the Roman Wall* (Newcastle, 13th edition Daniels, C.M.).

Collyer, C. 1975: *Lincoln; the archaeology of an historic city* (Lincoln Archaeological Trust).

Conrady, W. 1910: Das Kastell Altstadt bei Miltenberg. *Obergermanisch-rätishce Limes* Abt B, Band III, Kastell Nr 38.

Conway, R.S. 1906: *Melandra Castle* (Manchester University Press).

Corder, P. and Romans, T. 1934-38: *Excavations at Brough-on-Humber: 1st - 5th interim reports, 1933-1937* (Hull).

Cornwall, I.W. 1956: *Bones for the Archaeologist* (London).

Cowley, L.F. 1929: Report on the Animal Bones from Jenkins's Field, Caerleon. In Nash-Williams, V.E. 1929, 304-305.

Cowley L.F. 1932: Report on Stratified Animal Remains found in the Prysg Field. In Nash-Williams, V.E. 1932, 341-349.

Cowley, L.F. 1970: Report on Animal Remains. In Birley, R.E. 1970, 147-155.

Čremošnik, I. 1984: Rimski Castrum kod Doboja. *Glasnik* new series 39, 23-84.

Crow, P. 1979: Forden Gaer, Montgomery. *Bull Bd Celtic Stud* 28, 730-142.

Crummy, P. 1977: Colchester fortress and colonia. *Britannia* 8, 65-106.

Crummmy, P. 1982: The Origins of some Major Romano-British Towns. *Britannia* 13, 125-134.

Crummy, P. 1983: How Roman Colchester began. *Catalogue* 13, 6-11.

Crummy, P. 1984: *Excavations at Lion Walk, Balkerne Lane and Middleborough, Colchester, Essex* (Colchester Archaeological Report 3, Colchester Archaeological Trust).

Cunliffe, B. 1971: *Excavations at Fishbourne 1961-9* (London, Society of Antiquaries Research Report No 26).

Curle, J. 1911: *A Roman Frontier Post and its People: the fort of Newstead in the parish of Melrose* (Glasgow).

Czysz, W. 1973-78: Archäologische Nachuntersuchung am Kleinkastell Neuwirtshaus bei Hanau. *Neues Magazin für Hanauische Geschichte* 6, 121-128.

Czysz, W. 1979: *Der römische Limes zwischen Kinzing und Main* (Wiesbaden, Archäologische Denkmäler in Hessen 3).

Dacre, J.A. 1985: An excavation on the Roman Fort at Stanwix, Carlisle. *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 85, 53-69.

Daniels, C. 1980: Excavations at Wallsend and the Fourth Century Barracks on Hadrian's Wall. In Hanson, W.F. and Keppie, L.J.F. (editors) 1980, 173-187.

Davey, P.J. 1973: *Chester Northgate Brewery Phase One: Interim Report* (Chester, Grosvenor Museum).

Davidescu, M. 1980: *Drobeta in secole I-VII e.u. (70-77)* (Craiova).

Davies, R.W. 1967a: A note on a recently discovered inscription from Carrawburgh. *Epigraphische Studien* 4, 108-111.

Davies, R.W. 1967b: A Note on P. Dura 64. *Latomus* 26, 68-69.

Davies, R.W. 1968a: Fronto, Hadrian and the Roman Army. *Latomus* 27, 73-95.

Davies, R.W. 1968b: Training Grounds for Roman Cavalry. *Archaeol Journ* 125, 73-100.

Davies, R.W. 1969: The Supply of Animals to the Roman Army and the Remount System. *Latomus* 28, 429-459.

Davies, R.W. 1971a: Cohortes Equitatae. *Historia* 20, 751-763.

Davies, R.W. 1971b: The Roman Military Diet. *Britannia* 2, 122-141.

Davies, R.W. 1974: The daily life of the Roman soldier under the Principate. In Temporini, H. (editor) 1974, 299-388.

Davies, R.W. 1977: Cohors I Hispanorum and the garrisons of Maryport. *Trans Cumb Westm Antiq Archaeol Soc* series 2 77, 7-16.

Davison, D.P. forthcoming: Excavations under York Minster: specialist report on the remains of the Roman barracks.

Dehn, R. and Fingerlin, G. 1976: Ausgrabungen der archäologischen Denkmalpflege Freiburg für das Jahr 1975. *Archäol Nachricht Baden* 16, 3-16.

Dehn, R. and Fingerlin, G. 1980: Ausgrabungen der archäologischen Denkmalpflege Freiburg im Jahr 1979. *Archäol Nachricht Baden* 24, 3-39.

Dembski, G. 1971: Zeiselmauer. *Fundber Österreich* 9 (5), 346.

Dent, A.A. and Goodall, D.M. 1962: *The Foals of Epona: A History of British ponies from the Bronze Age to yesterday* (London).

Dessau, H. (editor) 1944: *Inscriptiones Latinae Selectae* (Berlin, 2nd edition).

De Vogue, 1865: *Syrie Centrale* (Paris).

Dietz, K., Osterhaus, U., Rieckhoff-Pauli, S. and Spindler, K. 1979: *Regensburg zur Römerzeit* (Regensburg).

Dietz, K. 1980: Die Bauinscrift des Limeskastells Ellingen, Lankreis Weißenburg-Gunzenhausen, Mittelfranken. *Das archäologische Jahr in Bayern 1980*, 18-19.

Dietz, K.-H. 1983: Kastellum Sablonetum und der Ausbau des rätischen Limes unter Kaiser Commodus. *Chiron* 13, 497-536.

Dilke, O.A.W. 1971: *The Roman Land Surveyors* (Newton Abbot).

Dimitrov, D.P. et al 1974: Archeologičeski raskopki v istočnija sektor na Novae prez. *Izv Archaeol Inst Bulg Akad Nauk* 34, 138-76.

Dobson, B. 1965: The Praefectus Fabrum in the Early Principate. In Jarret, M.G. and Dobson, B. (editors) 1965, 61-84.

Dobson, B. 1974: The Significance of the Centurion and 'Primipilaris' in the Roman Army and Administration. In Temporini, H. (editor) 1974, 392-434.

Dodd, P.W. and Woodward, A.M. 1922: Excavations at Slack 1913-1915. *Yorks Archaeol Journ* 26, 1-93.

Domaszewski, A. von 1967: *Die Rangordnung des römischen Heeres* (Köln, 2nd edition Dobson, B.).

Dore, J.N. 1976: Excavations at South Shields 1975. *Archaeol Ael* 5th series 4, 185.

Dore, J.N. and Gillam, J.P. 1979: *The Roman Fort at South Shields: excations 1875-1975* (Newcastle, Societies of Antiquaries of Newcastle upon Tyne, monograph series 1).

Dore, J.N. 1980: The Fort at Red House and Flavian Coarse Pottery in Northern England. In Hanson, W.S. and Keppie, L.J.F. (editors) 1980, 113-17.

Dorow, W. 1827: *Römische Alterthümer in und um Neuwied am Rhein* (Berlin).

Drexel, F. 1910: Das Kastell Stockstadt. *Obergermanisch-rätische Limes* Abt B, Band III, Kastell Nr 33.

Driesch-Karpf, A.v.d. 1969: Ein Pferdeskelettfund der römischen Kaiserzeit aus Gielde, Kreis Goslar. In Jankuhn, H. *Neue Ausgrabungen und Forschungen in Niedersachsen* 4, 187-192.

Droop, J.P. 1932: Excavations at Brough-by-Bainbridge in 1931 and Remarks in the Bainbridge Finds 1928, 1929, 1931. *Proc Leeds Phil Soc* 3, 16-38.

Droop, J.P. and Newstead, R. 1931: Excavations in the Deanery Field Chester 1928. *Liverp Ann Archaeol Anthrop* 18, 6-18.

Dunbabin, K.M.D. 1978: *The mosaics of Roman north Africa: studies in iconography and patronage* (Oxford, Oxford monographs on classical archaeology).

Dunnett, B.R.K. 1967: Excavations on North Hill, Colchester. *Archaeol Journ* 123, 27-61.

Dunnett, B.R.K. 1971: Excavations in Colchester 1964-8. *Trans Essex Archaeol Soc* 3, 38-41.

Eadie, J.W. 1967: The Development of Roman mailed cavalry. *Journ Rom Stud* 57, 161-173.

Eckhart, L. 1969: Das römische Donaukastell Schlögen in Österreich: Die Ausgrabungen 1957-1959. *Der römische Limes in Österreich* Heft 25.

Eckinger, T. 1898: Bericht über die Ausgrabungen der antiquarischen Gesellschaft von Brugg und Umgebung im Herbst 1897. *Anz Schweiz Altertum* 31, 2-11.

Eckinger, T. 1910: Grabungen der Gesellschaft pro Vindonissa im Jahre 1909 (und seine aus dem Jahre 1907). *Anz Schweiz Altertum* new series 12, 103-130.

Edwards, B.J.N. 1972: *Ribchester, Lancashire* (National Trust).

Edwards, B.J.N. and Webster P.V. 1985: *Ribchester Excavations Part I: Excavations within the Roman Fort* (University of Cardiff, Department of Extra-Mural Studies).

Eidam, H. 1907: Das Kastell Gnotzheim. *Obergermanisch-rätische Limes* Abt B, Band VII, Kastell Nr 70.

Eidam, H. 1929: Das Kastell Munningen. *Obergermanisch-rätische Limes* Abt B, Band VI, Kastell Nr 68a.

Ésperandieu, E.1913: *Recueil géneral des bas-reliefs, statues et bustes de la Gaule romaine*, Vols 1-15 (Paris).

Ettlinger, E. 1961: Review of Baatz, D. 1962b. *Bonner Jahrbücher* 162, 603-606.

Esser, K.H.: Mogontiacum. *Bonner Jahrbücher* 172, 212-227.

Ewart, J.C. 1911: Animal Remains. In Curle, J. 1911, 362-377.

Ewart, J.C. 1904: The Multiple Origin of Horse and Ponies. *Nature* 69, 590-596 (Abridged from *Trans Highland and Agr Soc* 16).

Fabricius, E. 1899: Degenfeld bei Butzbach: Archäologischer Anzeiger 87-88. *Jahrbuch Kais Deutschen Archäol Inst* 14.

Fabricius, E. 1915: Die Erdschanzen auf dem Pohl bei Kemel. *Obergermanisch-rätische Limes* Abt A, Band I, Strecke 2, 78-82.

Fabricius, E. 1932: Some notes on Polybius' description of Roman Camps. *Journ Rom Stud* 22, 78-87.

Fabricius, E. 1936: Das Kastell Degenfeld. *Obergermanisch-rätische Limes* Abt A, Band II, Str 4-5, 87-89.

Fellmann, R. 1952-53: Die Sondiergrabung auf der Breite 1952/53 (Ein Vorbericht). *Jahresber Gesell Pro Vind* 1952/53, 19-22.

Fellmann, R. 1953-54: Die Grabungen im Legionslager Vindonissa im Jahre 1953. *Jahresber Gesell Pro Vind* 1953/54, 5-60.

Fellmann, R. 1955-56: Die Grabungen im Legionslager Vindonissa im Jahre 1955 und Nachlese aus den Grabungen der Jahre 1953-1955. *Jahresber Gesell Pro Vind* 1955/56, 5-34.

Fellmann, R. 1958: *Die Principia des Legionslagers Vindonissa und das Zentralgebäude der römischen Lager und Kastelle* (Brugg).

Fellmann, R. 1977: Neue Untersuchungen an den Principia des Legionslagers Vindonissa. In Bogaers, J.E. (editor) 1977b, 111-130.

Fellmann, R. 1983: *Principia - Stabsgebäude* (Aalen, Kleine Schriften zur Kenntnis der römischen Besetzungsgeschichte Südwestdeutschlands Nr 31).

Fels, C. 1909: Grabungen der Gesellscaft pro Vindonissa im Jahre 1908. *Anz Schweiz Altertum* new series 11, 31-56.

Fels, C. 1910: Grabungen der Gesellschaft pro Vindonissa im Jahre 1910. *Anz Schweiz Altertum* new series 12, 182-215.

Ferris, I.M. and Jones, R.F.J. 1980: Excavations at Binchester 1976-9. In Hanson, W.F. and Keppie, L.J.F. (editors) 1980, 233-254.

Février, P.A. 1976: Thevestis (Tebessa). In Sitwell, R. (editor) 1976, 913-914.

Field, N.H. 1967: Excavations on the Roman Military Site at Lake near Wimborne. *Proc Dorset Nat Hist Archaeol Soc* 89, 143.

Field, N.H. 1968: Excavations at Lake. *Proc Dorset Nat Hist Archaeol Soc* 90, 171.

Fifield, P. 1979: The Animal Bones: Watercrook Fort. In Potter, T.W. (editor) 1979, 299-311.

Filzinger, P. 1967: Wehranlagen am Donaulimes in Baden-Württemberg im Luftbild. *Fundber Schwaben* new series 18 (1), 106-112.

Filzinger, Ph., Planck, D. and Cämmerer B. (editors) 1976: *Die Römer in Baden-Württemberg* (Stuttgart).

Fingerlin, G. 1970-71: Dangstetten, ein augusteisches Legionslager am Hochrhein: Vorbericht über die Grabungen 1967-1969. *Ber Röm-Germ Komm* 51-52, 197-232.

Fingerlin, G. 1971: Rheinheim - Dangstetten: Ein Legionslager aus frührömischer Zeit am Hochrhein. *Archäol Nachricht Baden* 6, 11-20.

Fingerlin, G. 1977: Die Tore des frührömischen Lagers von Dangstetten (Hochrhein). *Fundber Baden-Württemberg* 3, 278-285.

Fink, R.O. 1958: Hunt's Pridianum: British Museum Papyrus 2851. *Journ Rom Stud* 48, 102-116.

Fink, R.O. 1971: *Roman Military Records on Papyrus* (Cleveland, Philological Monographs of the American Philological Association No 26).

Fischer, H.T. 1980: Neue Untersuchingen in Kastell und Vicus von Eining/Abusina Landkr. Kelheim, Niederbayern. *Bayerische Vorgeschichtsblätter* 45, 125-153.

Fischer, H.T. and Rieckhoff-Pauli, S. 1982: *Bavaria Antiqua, von den Römern zu den Bajuwaren: Stadtarchäologie in Regensburg* (München).

Fischer, T. 1986: Neues zum römischen Regensburg. in Unz, C. (editor) 1986, 146-151.

Fischer, U. 1960: Grabungen im Lager Heddernheim 1957-1959. *Germania* 38, 189-192.

Fischer, U. 1971: *Aus Frankfurts Vorgeschichte* (Frankfurt).

Fischer, U. 1973: *Grabungen im römischen Steinkastell von Heddernheim 1957-1959* (Frankfurt, Schriften des Frankfurter Museums für Vor- und Frühgeschichte 2).

Fischer, U. 1974: Heddernheim: Plangrabung. *Fundber Hessen* 4, 229-230.

Fischer, W. 1914: *Das römische Lager insbesondere nach Livius* (Leipzig and Berlin).

Fitz, J. 1972: Les Syriens à Intercisa. *Latomus* 22.

Fitz, J. (editor) 1976: *Der römische Limes in Hungarn: Taschenbuch für die Teilnehmer des XI. Internationalen Limeskongresses* (Székesfehérvár).

Fitz, J. (editor) 1977: *Limes: Akten des XI Internationalen Limeskongresses* (Budapest).

Fitzwygram, F. 1894: *Horses and Stables* (London, 4th edition).

Fleming, G. 1886: *The Practical Horse-Keeper* (London).

Florescu, F.B. 1965: *Das Siegesdenkmal von Adamklissi Tropaeum Traiani* (Bucharest and Bonn).

Florescu, F.B. 1961: *Monumentul de la Adamklissi Tropaeum Traiani* (Bucharest).

Florescu, 1979: *Die Trajansäule* (Bucharest and Bonn).

Florescu, Gr. 1933: *Castrul roman Drobeta (T. Severin). Cercetări şi săpături archeologice din 1931* (Bucarest, Extràs din revista istoricà românà 3 - Carteà Romaneascà).

Florescu, R. 1967: Les phases de construction du castrum Drobeta (Turnu Severin). In *Studien zu den Militärgrenzen Roms, Vorträge des 6 Internationalen Limeskongresses in Süddeutschland* (Beihefte der Bonner Jahrbücher Band 19) 144-151.

Förster, U. 1960: *Die Pferdephalangen aus dem keltischen Oppidum vom Manching* (München, Studien an vor- und frühgeschichtlichen Tierresten Bayerns 8).

Forrer, R. 1927: *Strasbourg - Argentorate, préhistorique, gallo-romain et mérovingien* (Strasbourg).

Fox, A. 1940: Excavations in Myrtle Cottage Orchard 1939. *Archaeol Camb* 95, 101-152.

Fox, A. 1966: Roman Exeter: Origins and Early Development. In Wacher, J.S. (editor) 1966, *The Civitas Capitals of Roman Britain*, 45-61.

Fox, A. and Ravenhill, W.L.D. 1965: Old Burrow and Martinhoe. *Antiquity* 39, 253-258.

Fox, A. and Ravenhill, W.L.D. 1966a: Early Roman Outposts on the North Devon Coast, Old Burrow and Martinhoe. *Devon Archaeol Explor Soc* 24, 3-39.

Fox, A and Ravenhill, W.L.D. 1966b: Excavation of the Roman Fort at Tregear, Nanstallon 1965: Interim Report. *Corn Archaeol* 5, 28-30.

Fox, A. and Ravenhill, W.L.D. 1967: Excavation of the Roman Fort at Tregear, Nanstallon: Second Interim Report. *Corn Archaeol* 6, 32-34.

Fox, A. and Ravenhill, W.L.D. 1968: Excavation of the Roman Fort at Tregear, Nanstallon: Third Interim Report. *Corn Archaeol* 7, 40-42.

Fox, A. and Ravehill, W.L.D. 1972: The Roman Fort at Nanstallon, Cornwall. *Britannia* 3, 56-111.

Frank, K.G. 1962: *Neue Funde des Pferdes aus dem keltischen Oppidum vom Manching* (München, Studien an vor- und frühgeschichtlichen Tierresten Bayerns 13).

Fraser, F.C. 1954: The Animal Bones. In Wheeler, R.E.M. 1954, *The Stanwick Fortifications* (London), 57-58

Fraser, F.C. 1968: Animal Bones from Hod Hill, I: Sites within the Roman Fort. In Richmond, I.A. 1968, 127.

Fremersdorf, F. 1927a: Ausgrabung auf der Alteburg bei Köln. *Germania* 11; 83, 160-161.

Fremersdorf, F. 1927b: Von der Flottenstation der römischen Rheinflotte bei Köln. *Forschungen und Fortschritte* 3, 209-210.

Fremersdorf, F. 1929: Neue Inscriften aus Köln. *Germania* 13, 132-138.

Fremersdorf, F. 1963: *Denkmäler des römischen Köln* (Köln).

Frend, W.H.C. 1980: Augustus' Egyptian Frontier: Q'asr Ibrim?. In Hanson, W.S. and Keppie, L.J.F. 1980, 927-930.

Frere, S.S. (editor) 1977: Roman Britain in 1976. *Britannia* 8, 355-425.

Frere, S.S. 1979: The Roman Fort at Strageath. In Breeze, D.J. (editor) 1979b, 37-41.

Frere, S.S. 1980: Hyginus and the First Cohort. *Britannia* 11, 51-61.

Frere, S.S. (editor) 1983: Roman Britain in 1982. *Britannia* 14, 280-335.

Frere, S.S. (editor) 1984: Roman Britain in 1983. *Britannia* 15, 265-332.

Frere, S.S. (editor) 1985: Roman Britain in 1984. *Britannia* 16, 252-316.

Frere, S.S. (editor) 1986a: Roman Britain in 1985. *Britannia* 17, 364-427.

Frere, S.S. 1986b: The Use of Iron Age Hill Forts by the Roman Army in Britain. In Unz, C. (editor) 1986, 42-46.

Frere, S.S. 1987: *Britannia* (London, 3rd edition).

Frere, S.S. forthcoming: Strageath: final report.

Frere, S.S. and St Joseph, J.K. 1974: The Roman fortress at Longthorpe. *Britannia* 5, 1-129.

Frere, S.S. and St Joseph, J.K. 1983: *Roman Britain from the Air* (Cambridge).

Fröhlich, E. 1906: Bericht über die Grabungen der Antiquarischen Gesellschaft von Brugg und Umgebung im Jahre 1904. *Anz Schweiz Altertum* new series 8, 13-22.

Gabler, D. 1967: Ács-Vaspuszta. *Archaeologiai Értesítő* 94, 221.

Gabler, D. 1968: Ács-Vaspuszta. *Archaeologiai Értesítő* 95, 130.

Gabler, D. 1971: Ács-Vaspuszta. *Archaeologiai Értesítő* 98, 269.

Gabler, D. 1972: Ács-Vaspuszta. *Archaeologiai Értesítő* 99, 255.

Gabler, D. 1973: Ács-Vaspuszta. Römische Auxiliarlager, urzeitliche und mittelalterliche Siedlung, 1971. *Mitt Archzeol Inst Ung Akad Wiss* 4, 182-185.

Gabler, D. 1977a: Untersuchungen am oberpannonischen Donaulimes. In Bogaers, J.E. (editor) 1977, 297-312.

Gabler, D. 1977b: In Fitz, T. (editor) 1977, 27.

Gale and Polden 1915: *Stable Management* (London).

Galsterer, B. 1983: Die Graffiti auf der römischen Gefäßkeramik aus Haltern. *Bodenaltertümer Westfalens* 20.

Galtrey, S. 1918: *The Horse and The War* (London).

Gardner, W. 1925: The Roman Fort at Caerhun co. Caernarvon. *Archaeol Camb* 80, 307-41.

Garlick, T. 1975: *Ambleside Roman Fort* (Whitehaven).

Garlick, T. 1982: *Romans in the Lake Counties* (Lancaster).

Garstang, J. 1904: Roman Brough - Anavio: Report of preliminary excavations. *Derb Archaeol Journ* 26, 177-204.

Gauer, W. 1981: Castra Regina und Rom: Zu Ursprung und Erneuerung der europäischen Stadt. *Bonner Jahrbücher* 181, 1-88.

Gavillet, E. 1945: *Les animaux domestiques de l'époque romaine de Vichy-Lausanne* (Lausanne).

Gechter, M. 1979a: Grabungen im Legionslager zu Bonn. *Ausgrabungen in Rheinland* '78, 73-75.

Gechter, M. 1979b: In der Nordwestecke: Grabungen im Legionslager von Bonn 1977/1978. *Das Landesmuseum Bonn, Berichte aus der Arbeit des Museums* 4/79, 49-51.

Gechter, M. 1983-84a: Ausgrabungen im Bereich des Neusser Legionslager in den Jahren 1983 und 1984. *Ausgrabungen in Rheinland* 1983/84, 115-120.

Gechter, M. 1983-84b: Ausgrabungen in Bonn in den Jahren 1983/84. *Ausgrabungen im Rheinland* 1983/84, 121-128.

Gechter, M. 1984: Neue Untersuchungen an der Nord- und Ostseite des Bonner Legionslagers. *Rheinische Ausgrabungen* 23, 85-90.

Gechter, M. 1986: Neue Untersuchungen in Bonner Legionslager. In Unz, C. (editor) 1986, 155-158.

Geddes, C. (editor) 1978: *The Complete Book of Horses and Horsemanship* (London).

Geilhausen, H.E. and Wille, K.-H. 1975: Tierknochenfunde aus den römischen Militärlager von Bad Nauheim. *Fundber Hessen* 15, 335-359.

Genser, K. 1986: Der Österreichische Donaulimes in der Römerzeit: Ein Forschungsbericht. *Der römische Limes in Österreich* Heft 33,

Georoceanu, P., Georoceanu, M. and Lisovschi, C. 1979: Fauna din castrele şi aşezările romanedin Transilvania. I Fauna din castrul Bologa - Jud. Cluj. *Acta Musei Porolissensis* 3, 427-447.

Gibson, J.P. and Simpson F. G. 1909: The Roman Fort on the Stanegate at Haltwhistle Burn. *Archaeol Ael* 3rd series 5, 213-285.

Gibson, J.P. and Simpson, F.G. 1911: The Milecastle on the Wall of Hadrian at the Poltross Burn. *Trans Cumb Westm Antiq Achaeol Soc* 2nd series 11, 390-461.

Giffen, A.E.van 1948: De Romeinse Castella in den 20 dorpsheuvel te Valkenburg aan den Rijn (Z.H.) (Praetorium Agrippinae), I De opgravingen in 1941. *25-28 Jaarverslag Ver Terpenonderzoek, 1940-1944.*

Giffen, A.E.van 1950: Inheemse in Romeinse terpen: opgravingen in de Dorpswierde te Ezinge en de Romeinse terpen en de Romeinse terpen van Utrecht, Valkenburg Z.H., en Vechten. *29-32 Jaarverslag Ver Terpenonderzoek, 1944-1948.*

Giffen, A.E.van 1952: Three Roman Frontier Forts in Holland at Utrecht, Valkenburg and Vechten. In Birley, E. (editor) 1952, 31-40.

Giffen, A.E.van 1955: De Romeinse Castella in de dorpsheuvel te Valkenburg aan de Rijn (Z.H.) Praetorium Agrippinae, II De opgravingen in 1942-1943 en 1946-1950. *33-37 Jaarverslag Ver Terpenonderzoek, 1949-1953.*

Giffen, A.E.van 1963: Ausgrabungsergebnisse in römischen Limeskastellen am Rhein in Holland, besonders zu Valkenburg Z.H. (Praetorium Agrippinae). In Novak, G. (editor), 133-143.

Giffen, A.E.van 1971: Neues zu dem Limeskastellen unterhalb Valkenburg am Rhein. In Applebaum S. (editor) 1971, 88-93.

Gilbey, W. 1899: *The Great Horse* (London).

Gilbey, W. 1900: *Small Horses in Warfare* (London).

Gillam, J.P. 1950: Recent Excavations at Birdoswald. *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 50, 63-69.

Gillam, J.P. 1953: Calpurnius Agricola and the Northen Frontier. *Trans Dur Northumb Arch Archaeol Soc* 10 (4), 359-375.

Gillam, J.P. 1977: The Roman Forts at Corbridge. *Archaeol Ael* 5th series 5, 47-74.

Gillam, J.P., Harrison, R.M. and Newman, T.G.: Interim Report on Excavations at the Roman Fort of Rudchester 1972. *Archaeol Ael* 5th series 1, 81-85.

Gilliam, J.F. 1950: Some Latin Military Papyri from Dura I: Texts relating to Cavalry Horses. *Yale Classical Studies* 11, 171-209.

Gilliam, J.F. 1962: The Moesian Pridianum. *Latomus* 55, 747-756.

Gilliam, J.F., Welles, C.B. and Fink, R.O. 1959: *The Excavations at Dura-Europos, Final Report V, Part I: The Parchments and Papyri* (New Haven).

Giraud, B. 1891: *Stable Building and Stable Fitting* (London).

Giuliano, A. 1955: *Arco di Constantino* (Milan).

Glasbergen, W. 1972: *De Romeinse Castella te Valkenburg Z.H.: de Opgravingen in de Dorpsheuvel in 1962* (Universitaat van Amsterdam, Instituut voor Prae- en Protohistorie, Cingula 1).

Glasbergen, W. and Groenmann-van Waateringe, W. 1974a: The Garrisons of Valkenburg Z.H. 1, 1a and 2/3. In Pippidi, D.M. (editor) 1974, 465.

Glasbergen, W. and Groenmann-van Waateringe, W. 1974b: *The Pre-Flavian Garrisons of Valkenburg Z.H.: fabriculae and bipartite barracks* (Amsterdam and London).

Glasbergen, W., Rutten, H.L.A. and Haalebos, J.K. 1968: *Nieuwsbull Konink Ned Oud Bond* 21,86-88.

Goguey, R. 1977: La forteresses de legionnaires de Mirebeau d'après les recherches aeriennes de 1964-1974. In Bogaers, J.E. (editor) 1977b, 139-140.

Goessler, P. 1913: Rottweil. *Fundber Schwaben* 21, 73-80.

Goessler, P. 1914-16: Rottweil. *Fundber Schwaben* 22-24, 28-29.

Goessler, P. 1925: Neues von den römischen Kastellen in Rottweil. *Germania* 9, 145-152.

Goessler, P. 1920: *Vor- und Frühgeschichte von Stuttgart-Cannstatt* (Stuttgart).

Goessler, P. and Knorr, R. 1920: *Cannstatt zur Römerzeit - Neue archäologische Forschungen und Funde* (Stuttgart).

Goessler, P., Hertlein, F. and Paret, O. 1932: *Die Römer in Württemberg* (Stuttgart).

Goodall, D.M. 1977: *A History of Horse-Breeding* (London).

Goodall, D.M. 1962: *British Native Ponies* (London).

Goodall, D.M. 1973: *Horses of the World* (Newton Abbot).

Goodburn, R. 1976: Roman Britain in 1975. *Britannia* 7, 290-377.

Goodburn, R. 1978: Roman Britain in 1977. *Britannia* 9, 403-472.

Goodburn, R. 1979: Roman Britain in 1978. *Britannia* 10, 267-338.

Goodchild, R.G. 1954: Oasis Forts of Legio III Augusta on the Routes to the Fezzan. *Pap Brit Sch Rome* 22, 56-68.

Goodchild R.G. and Forbes, R.J. 1956: Roads and Land Travel with a Section on Harbours, Docks and Lighthouses. In Singer, C., Holmyard, E.J., Hall, A.R. and Williams, T.I. 1956, Vol II, 493-536.

Gosselin, J.-Y., Seillier, C. and Leclerq, P. 1976: Boulogne antique: essai de topographie urbaine. *Septentrion* 6 (fasc 25), 5-15.

Gosselin, J.-Y., Seillier, C., Florin, B. and Ledne, M. 1978: Fouille de sauvetage du Camp de la Flotte de Bretagne à Boulogne-sur-Mer. *Septentrion* 8 (Fasc 33), 18-22.

Gosselin, J.-Y. and Seillier, C. 1981: Fouilles de Boulogne-sur-Mer, Campagnes 1980-1982. *Septentrion* 11 (Fasc 45-46), 19-20.

Grant, M. 1974a: *The Age of the Caesars* (New York).

Grant, M. 1974b: *The Army of the Caesars* (London).

Greene, K. 1984: Pots, People and Probability: A spatial analysis of pottery in the Neronian legionary fortress at Usk, Gwent. In Dannheimer, H. (editor), Studien zur römischen Keramik: Vorträge des 13. internationalen Kongresses der Rei Cretariae Romanae Fautores in München (Kataloge der prähistorischen Staatsammlung Beihelft 1). *Rei Cretariae Romanae Fautorum Acta* 23-24, 117-122.

Grew, F.O. (editor) 1980: Roman Britain in 1979. *Britannia* 11, 346-402.

Grew, F.O. (editor) 1981: Roman Britain in 1980. *Britannia* 12, 314-368.

Grimes, W.F. 1930: Holt, Denbighshire: The Works-Depôt of the Twentieth Legion at Castle Lyons. *Y Cymmrodor* 41.

Grimes, W.F. 1968: *The Excavation of Roman and Mediaeval London* (London).

Groenman-van Waateringe, W. 1967: *Romeins lederwerk uit Valkenburg Z.H.* (Instituut voor Prae- en Protohistorie, Universiteit van Amsterdam, Publicatie 108).

Groenman-van Waateringe, W. 1974: Römische Ledeerfunde aus Vindonissa und Valkenburg Z.H.; ein Vergleich. *Jahresber Gesell Pro Vind* 1974, 62-84.

Groenman-van Waateringe, W. 1977: Grain storage and supply in the Valkenburg castella and Praetorium Agrippinae. In Beck, B.L.van, Brandt, R.W. and Groenman-van Waateringe, W. (editors) 1977, *Ex Horreo* (Amsterdam), 226-240.

Groller, M.von 1900: Das Standlager von Carnuntum. *Der römische Limes in Österreich* Heft I, 11-64.

Groller, M.von 1901: Das Standlager von Carnuntum. *Der römische Limes in Österreich* Heft II.

Groller, M.von 1902: Das Standlager von Carnuntum. *Der römische Limes in Österreich* Heft III, 31-116.

Groller, M.von 1903: Grabungen im Lager Carnuntum. *Der römische Limes in Österreich* Heft IV, 53-112.

Groller, M.von 1904: Grabungen im Legionslager Carnuntum. *Der römische Limes in Österreich* Heft V, 33-92.

Groller, M.von 1905: Das Lager Carnuntum. *Der römische Limes in Österreich* Heft VI, 63-114.

Groller, M.von 1906a: *Der römische Limes in Österreich* Heft VII, 6-46.

Groller, M.von 1906b: Das Legionslager Carnuntum. *Der römische Limes in Österreich* Heft VII, 47-82.

Groller, M.von 1907: *Der römische Limes in Österreich* Heft VIII, 119-155.

Groller, M.von 1908a: Die Grabungen in Carnuntum. *Der römische Limes in Österreich* Heft IX, 1-44.

Groller, M.von 1908b: *Der römische Limes in Österreich* Heft IX, 89-115.

Groller, M.von 1909a: Die Grabungen in Carnuntum. *Der römische Limes in Österreich* Heft X, 1-64.

Groller, M.von 1909b: *Der römische Limes in Österreich* Heft X, 81-114.

Groller, M.von 1910: Die Grabungen im Lager Lauriacum und dessn nächster Umgebung im Jahre 1908. *Der römische Limes in Österreich* Heft XI, 1-60.

Groller, M.von 1919a: Grabung im Lager Lauraicum im Jahre 1911. *Der römische Limes in Österreich* Heft XIII, 1-32.

Groller, M.von 1919b: Die Grabungen im Lager Lauriacum in den Jahren 1912 und 1913. *Der römische Limes in Österreich* Heft XIII, 117-264.

Groller, M.von 1924a: Die Grabungen im Lager Lauriacum im Jahre 1914 und 1915. *Der römische Limes in Österreich* Heft XIV, 1-54.

Groller, M.von 1924b: Die Grabungen im Lager Lauriacum im Jahre 1916. *Der römische Limes in Österreich* Heft XIV, 121-164.

Groller, M.von 1925a: Die Grabungen im Lager Lauriacum im Jahre 1917. *Der römische Limes in Österreich* Heft XV, 1-58.

Groller, M.von 1925b: Die Grabungen im Lager Lauriacum im Jahre 1918. *Der römische Limes in Österreich* Heft XV, 99-136.

Groller, M.von 1925c: Die Grabungen im Lager Lauriacum im Jahre 1919. *Der römische Limes in Österreich* Heft XV, 175-200.

Grünewald, M. 1979: Die Gefäskeramik des Legionslagers von Carnuntum (Grabungen 1968-1974). *Der römische Limes in Österreich* Heft XXIX.

Grünewald, M. 1981: Die Kleinfunde des Legionslagers von Carnuntum mit Ausnahme der Gefäskeramik (Grabungen 1968-1974). *Der römische Limes in Österreich* Heft XV.

Gsell, S. 1901: *Les monuments antiques de l'Algérie* (Paris).

Gudea, N. 1972: Inscripţii şi ştampile tegulare din castrul roman de la Bologa. *Acta Musei Napocensis* 9, 421-422.

Gudea, N. 1973: Castrul roman de la Bologa. Săpăturile archeologice din anul 1969. *Crisia* 3, 109-136.

Gudea, N. 1977: Materiale archeologice din castrul roman de la Bologa. *Apulum* 15, 169-215.

Gudea, N. 1977: Das Römerlager von Bologa zur dakischen Tonware in den Militärlagern des römischen Dakien. In Bogaers, J.E. (editor) 1977b, 313-329.

Gudea, N. 1979: The Defensive System of Roman Dacia. *Britannia* 8, 63-87.

Gudea, N. 1980: Recent Research on the Limes of Roman Dacia. In Hanson, W.S. and Keppie, L.J.F. (editors) 1980, 799-809.

Gudea, N, 1986: Bericht über die zwischen 1979 bis 1982 am Limes der drei Dakien und der benachbarten Provinzen Moesia Superior und Moesia Inferior durchgeführeten archäologischen Forschungen. In Unz, C. (editor) 1986, 477-497.

Gudea, N. and Bozu, O. 1979: Raport preliminara asupra säpäturilor arheologice executate la castrul roman de la Pojejna în anii 1977-1978. *Banatica* 5, 181-185.

Haalebos, J.K. 1972: Romeins Nijmegen. Nieuws uit de Nijmeegse Castra. *Numaga* 19, 41-44.

Haalebos, J.K. 1976: Review of Schönberger 1976. *Bonner Jahrbücher* 183, 892-893.

Haalebos, J.K. 1977: *Zwammerdam - Nigrum Pullum. Ein Auxiliarkastell am Nidergermanischen Limes* (Universiteit van Amsterdam, Subfaculteit der Prae- en Protohistorie, Cingula 3).

Habermehl K.-H. 1962: Die Tierknochenfunde des augusteischen Lagers Rödgen, Kr. Friedberg/Hessen. *Saalburg Jahrbuch* 20, 46-53.

Habermehl, K.-H. and Badawi, H. 1967: Osteologische Untersuchungen an Tierknochenresten des Römerkastells Altenstadt. *Saalburg Jahrbuch* 24, 79-91.

Hänggi, R. 1986: Zurzach AC/Tenedo: Römische Kastelle und Vicus. *Archäologie der Schweiz* 9 (4), 149-159.

Hagen, J. 1931: *Römerstrassen der Rheinprovinz. Erläuterungen zum geschichtlichen Atlas der Rheinprovinz* (Bonn).

Haigh, D. and Savage, M. 1984: Sewingshields. *Archaeol Ael* 5th series 12, 33-147.

Hallewas, D.P. 1986: Valkenburg. Archeologische Kroniek Zuid-Holland. *Rijk Oud Bod* 271, Holland 18, 313-319.

Hancar, F. 1955: *Das Pferd in prähistorischer und früher historischer Zeit* (Wiener Beiträge zur Kulturgeschichte und Linguistik XI).

Hanson, W.S. 1974: Red House, Corbridge. *Current Archaeology* 46, 325-329.

Hanson, W.S. 1978: The Organisation of Roman military timber supply. *Britannia* 9, 293-307.

Hanson, W.S. 1982: Roman Military Timber Buildings: Construction and Reconstruction. In Mc Grail, S. (editor), *Woodworking Techniques before AD 1500. Papers presented to a Symposium at Greenwich in September 1980, together with edited discussion* (National Maritime Museum Greenwich Archaeological Series No 7) (Oxford, BAR Int Ser 129), 169-186.

Hanson, W.S. 1986: *Elginhaugh Project* (Elginhaugh Excavation Open Day pamphlet).

Hanson, W.S. 1987: *The Elginhaugh Project* (Glasgow).

Hanson, W.S. and Keppie, L.J.F. (editors) 1980: *Roman Frontier Studies 1979: Papers presented to the 12th International Congress of Roman Frontier Studies* (Oxford, BAR Int Ser 71 (i-iii)).

Hanson W.S. and Macinnes, L. 1981: Forests, Forts and Fields. In Kenworthy, J. (editor) 1981, 98-113.

Hanson, W.S. and Maxwell, G.S. 1983: *Rome's North-West Frontier: The Antonine Wall* (Edinburgh).

Hanson, W.S. and Breeze, D.J. 1986: Elginhaugh Project 1986: excavation strategy. *Scottish Archaeological Revue* 4 (1), 44-45.

Hanson, W.S., Daniels, C.M., Dore, J.N. and Gillam J.P. 1979: The Agricolan Supply Base at Red House Corbridge. *Archaeol Ael* 5th series 7, 1-99.

Harl, O. 1975: Nachgrabung in den römischen Ruinen unter dem Hohen Markt. *Pro Austria Romana* 25, 18-19.

Harl, O. 1976: 25 Jahre archäologische Forschung in Wien. *Mitt Österr Arbeitgem Ur- Frühgeschichte* 26, 1-10.

Harl, O. 1979: *Vindobona*: Das römische Wien (Wiener Geschichtsbücher Band 21/22).

Harl, O. 1984: Wien: Ausgrabungen im Legionslager von Vindobona. *Pro Austria Romana* 34 (3-4), 14-16.

Harl, O. 1986a: Kasernen und Sonderbauten der 1. Kohorte im Legionslager Vindobona. In Unz, C. (editor) 1986, 322-327.

Harl, O. 1986b: Wien/Innere Stadt - Vindobona. In Kandler, M. and Vetters, H. (editors) 1986, 177-187.

Hartley, B.R. 1960: The Roman fort at Bainbridge (Virosidum), Excavations of 1957-9. *Leeds Phil Lit Soc* 9 (3), 107-131.

Hartley, B.R. 1966: The Roman Fort at Ilkley: Excavations of 1962. *Leeds Phil Lit Soc* 12 (2), 23-72.

Hartley, B. 1971: Roman York and the Northern Military Command to the third century AD. In Butler, R.M. (editor) 1971, 55-69.

Hartley, B.R. 1982: The Roman Period AD 70-410. In Spratt, D.A. (editor) 1982, *Prehistoric and Roman Archaeology of North-East Yorkshire* (Oxford, BAR Brit Ser 104), 205-218.

Hartmann, M. 1973a: Der Gesamtplan der Holzbauten von Vindonissa. *Jahresber Gesell Pro Vind* 1973, 43.

Hartmann, M. 1973b: Windisch, Breite 1973. *Jahresber Gesell Pro Vind* 1973, 5-9.

Hartmann, M. 1979-80: Vindonissa. Stand der Erforschung. *Jahresber Gesell Pro Vind* 1979/80, 5-22.

Hartmann, M. 1983: *Das römische Legionslager von Vindonissa* (Archäologische Führer der Schweiz 18).

Hartmann, M. and Unz, C. 1975: *Das römische Legionslager von Vindonissa. Untersuchung der Kantonsarchäologie in den Jahren 1960-1975* (Brugg, Katalog zur Ausstellung).

Hartyani, B.P. 1976: Late Roman Floral Remains from the Retentura of the 2-3rd Century AD Legionary Camp of Aquincum. *Budapest Régiségei* 24, 133.

Hassall, M.W.C. 1974: Review of Glasbergen, W. 1972. *Britannia* 5, 491-492.

Hassall, M.W.C. 1977: Review of Glasbergen, W. and Groenman-van Waateringe, W. 1974. *Antiq Journ* 57, 115-147.

Hassall, M.W.C. 1983: The Internal Planning of Roman Auxiliary Forts. In Hartley, B. and Wacher, J. 1983, 96-131.

Hassall, M.W.C. and Rhodes, J. 1974: Excavations at the New Market Hall, Gloucester. *Bristol and Gloucester Archaeol Soc* 93, 15-100

Hassall, M.W.C. and Tomlin, R.O. 1978: Roman Britain in 1977 II: Inscriptions. *Britannia* 9, 473-485.

Hatt, J.-J. 1949a: Découverte de vestiges d'une caserne romaine dans l'angle du castrum d'Argentorate. Rapport provisoire sur les fouilles de l'église Saint Étienne à Strasbourg (été 1948). *Cah Archéol Hist Alsace* 130, 257-276.

Hatt, J.-J. 1949b: Le passé romaine de Strasbourg. *Gallia* 7, 161-194.

Hatt, J.-J. 1953a: Fouilles et découvertes romaines à Strasbourg de 1950 à 1952. *Cah Archéol Hist Alsace* 133, 73-96.

Hatt, J.-J. 1953b: Les fouilles de la rouelle Saint-Médard à Strasbourg. *Gallia* 11, 225-248.

Hatt, J.-J. 1953: *Strasbourg au temps des Romains* (Strasbourg and Paris).

Hatt, J.-J. 1958: Rapport provisoire sur les fouilles de 1956 sur l'église Saint-Étienne à Strasbourg. *Cahiers Alsaciens* 2, 27-46.

Hatt, J.-J. 1959: Zehn Jahre archäologischer Forshung im Elsaß 1946-1956. *Germania* 37, 223-237.

Hatt, J.-J. 1962: Informations Archéologiques, Circonscription de Strasbourg: Strasbourg. *Gallia* 20, 505-510.

Hatt, J.-J. 1969: Découvertes et observations nouvelles sur les enceintes de Strasbourg. *Cah Archéol Hist Alsace* 13, 73-98.

Hauser, A. 1886: Ausgrabungen in Carnuntum 1865. *Archäol Epig Mitt Österr* 10, 12-37.

Hauser, A. 1887: Ausgrabungen in Carnuntum. *Archäol Epig Mitt Österr* 11, 1-7.

Hauser, A. 1888: Ausgrabungen in Carnuntum. *Archäol Epig Mitt Österr* 12-162.

Hauser, O. 1904: Vindonissa: *Das Standquartier römische Legionen* (Zürich).

Haverfield, F. 1910: *Military Aspects of Roman Wales* (London).

Haverfield, F. and Collingwood, R.G. 1913: Report on the Exploration of the Roman Fort at Ambleside. *Trans Cumb and Westm Antiq Archaeol Soc* 2nd series 14, 433-465.

Hawkes, C.F.C. 1929: Review of Schulten, A. 1927-29. *Journ Rom Stud* 19, 99-102.

Hawkes, C.F.C. 1930: The Roman Legionary Fortress at Caerleon in Monmouthshire: Report on Excavations carried out in the Eastern Corner in 1929. *Archaeol Camb* 85, 144-196.

Hawkes, C.F.C. and Hull, M.R. 1947: *Camulodunum: first report on the excavations at Colchester, 1930-39* (Oxford, Research Report of the Society of Antiquaries of London 14).

Hayes, M.H. 1968: *Stable Management and Exercise* (London, 6th edition Horsburgh-Porter, A.).

Hayes, M.H. 1969: *Points of the Horse: A treatise on the conformation, movements, breeds and evolution of the horse* (London, 7th edition Hope, C.E.G.).

Hedges, J. 1984: *In Search of Roman Castleford* (West Yorkshire Metropolitan County Council, Archaeology Unit, Recreation and Arts Division).

Heiligmann, J. 1977: *Das römische Kastell bein Burladingen Hausen (Zollernalbkreis)* (Kulturdenkmale in Baden-Württemberg, Kleine Führer, Blatt 42).

Heiligmann, J. 1981: *Der Alblimes: Ein Beitrag zur römischen Besetzungsgeschichte Süddeutschlands* (Inaugural-Dissertation zur Erlangung der Doktowürde der Philosophischen Fakultät für Altertumskunde und Kulturwissenschaften an der Ludwig Maximilians-Universität München).

Heiligmann, J. 1986: Der Alblimes. In Unz, C. (editor) 1986, 175-181.

Heimberg, U. 1977: *Römische Landvermessung* (Aalen, Kleine Schriften zur Kenntnis der römischen Besetzungsgeschichte Suddwestdeutschlands Nr 17).

Hemmer, H. and Jaeger, R. 1969: Pferde zur Römerzeit in Mainz. *Mz Natur Archäol* 8, 347-362.

Henderson, C.G. (editor) 1984: *Archaeology in Exeter 1983/4* (Exeter Museums Archaeological Field Unit).

Herzog, E. 1897: Die Kastelle bei Öhringen. *Obergermanisch-rätische Limes* Abt B, Band IV Kastell Nr 42 und 42¹.

Hettner, F. 1898: Degenfeld bei Butzbach: Archäologischer Anzeiger 29. *Jahrb Kais Deutsch Archäol Inst* 13.

Hilzheimer, M. 1913: Die in Saalburgmuseum aufbewahrten Tierreste aus römischer Zeit. *Saalburg Jahrbuch* 5, 106-158.

Hilzheimer, M. 1920: Die Tierreste aus dem römischen Kastell Cannstatt bei Stuttgart und anderen römischen Niederlassungen in Württemberg. *Landwirtschaftlice Jahrbücher* 55.

Hinde, R. 1778: *The Discipline of the Light Horse* (London).

Hobley, B. 1966-67: A Neronian-Vespasianic Military Site at The Lunt, Baginton, Warwickshire: First Interim Report. *Trans Birm Warw Archaeol Soc* 83, 65-129.

Hobley, B. 1971: The Lunt. *Current Archaeology* 3 (1), 18-21.

Hobley, B. 1973: Excavations at The Lunt Military Site Baginton, Warwickshire 1968-71. *Trans Birm Warw Archaeol Soc* 85, 7-92.

Hobley, B. 1975: The Lunt Roman fort and training school for Roman cavalry, Baginton, Warwickshire: Final Report. *Trans Birm Warw Archaeol Soc* 87, 1-56.

Hodgkin, T. 1902: Excavations on the Line of the Roman Wall in Northumberland. *Archaeol Ael* 2nd series 24, 1-12.

Hodgson, G.W.I, 1970: Animal Remains. In Birley, R.E. 1970, 150-155.

Hodgson, G.W.I. 1971: Report on the animal remains recovered from the site of the Roman fort at South Shields Co. Durham. *Arch Ael* 4th series 49, 135-137.

Hodgson, G.W.I. 1972: Animal Remains. In Breeze, D.J. 1972, 144.

Hodgson, G.W.I. 1975: Report on the Animal Remain from Ebchester. In Maxfield, V.A. and Reed, A. 1975, 103-104.

Hodgson, G.W.I. 1976: *The Animals of Vindolanda* (Haltwhistle).

Hodgson, G.W.I. 1977: *The animal remains from the excavations of 1970-75* (Hexham, Vindolanda Trust).

Hogg, A.H.A. 1968: Pen Llystyn: A Roman Fort and Other Remains. *Archaeol Journ* 125, 101-192.

Hogg, R. 1964: Excavations at Tullie House, Carlisle. *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 64, 14-62.

Holder, P.A. 1980: *The Auxilia from Augustus to Trajan* (Oxford, BAR Int Ser 70).

Holder, P.A. 1982: *The Roman Army in Britain* (London).

Holmes, N. 1977: *Cramond Excavations: Summer 1977.*

Holwerda, J.H. 1909: Lugdunum Batavorum of Praetorium Agrippinae: Opgraving te Voorburg. *Oud Med Rijk Oud Leiden* 3, 53-70.

Holwerda, J.H. 1912a: Ausgrabung des Römerkastells Arentsburg in Vorburg beim Hang. *Röm-germ Korrepondenzblatt* 5, 71-75.

Holwerda, J.H. 1912b: Opgraving bij Arentsburg te Voorburg. *Oud Med Rijk Oud Leiden* 6, 17-47.

Holwerda, J.H. 1913: Opgraving bij Arentsburg te Voorburg. *Oud Med Rijk Oud Leiden* 7, 1-28.

Holwerda, J.H. and Evelein, M.A. 1911: Opgraving bij Arentsburg te Voorburg. *Oud Med Rijk Oud Leiden* 5, 23-63.

Holwerda, J.H. 1923: *Arentsburg: Eeen romeinsch militair Vlootstation bij Voorburg* (Leiden).

Hope-Taylor, B. 1971: *Under York Minster: Archaeological Discoveries 1968-1971* (The Dean and Chapter of York).

Hüssen, C.-M. 1986: Neue Ergebnisse der Grabungen im Holzkastell von Weißenburg i. Bay. *Das archäologische Jahr in Bayern* 1985, 108-109.

Huld-Zetsche, I. 1979: 150 Jahre Forschung in Nida-Heddernheim. *Nassauische Annalen* 90, 5-38.

Hull, M.R. 1960: The St Nichols Church Site, Colchester. *Trans Essex Archaeol Soc* 25 (3), 301-328.

Humphreys, G.A. 1911: *Caerhun Hall and the Roman Military Station Conovium* (Llandudno).

Hunter, J.K.T., Manby, T.J. and Spaul, J.E.H. 1967-70: Recent Excavations at the Slack Roman Fort near Huddersfield. *Yorks Archaeol Journ* 42, 74-97.

Hunter-Blair, P. 1934: Housesteads Milecastle. *Archaeol Ael* 4th series 11, 103-120

Hurst, H.R. 1972: Excavations at Gloucester 1968-71: First Interim Report. *Antiq Journ* 52, 24-69.

Hurst, H.R. 1974: Excavations at Gloucester 1971-1973: Second Interim Report. *Antiq Journ* 54, 8-52.

Hurst, H.R. 1975: Excavations at Gloucester Third Interim Report: Kingsholm 1966-75. *Antiq Journ* 267-294.

Hurst, H.R. 1985: *Kingsholm: Excavations at Kingsholm Close and other sites with a discussion on the archaeology of the area* (Gloucester Archaeological Reports Vol 1).

Hurst, H.R. 1986: *Gloucester: The Roman and Later Defences* (Gloucester Archaeological Reports Vol 2).

Isac, D. 1977: Terra Sigillata din castrul roman de la Buciumi. *Acta Musei Porolissensis* 1, 155-172.

Isac, D. 1979: Ala Siliana c. R. torquata et armillata în Dacia. *Acta Musei Napocensis* 16, 39-67.

Isac, D., Diaconescu, A. and Opreanu, C. 1980: Sapaturile în castrul roman de la Gilau: Campaniile 1976-1979. *Potaissa* 2, 29-54.

Jacobi, H. 1911: Die Ausgrabungen: I Kastell Saalburg. *Saalburg Jahrbuch* 2, 10-23.

Jacobi, H. 1912a: Die Ausgrabungen: I Kastell Saalburg. *Saalburg Jahrbuch* 3, 6-15.

Jacobi, H. 1912b: Römische Getreidemühlen. *Saalburg Jahrbuch* 3, 75-95.

Jacobi, H. 1913: Die Ausgraabungen: I Kastell Saalburg. *Saalburg Jahrbuch* 4, 7-108.

Jacobi, H. 1927a: Das Erdkastell der Saalburg. *Saalburg Jahrbuch* 6, 85-155.

Jacobi, H. 1927b: Die Ausgrabungen. *Saalburg Jahrbuch* 6, 22-44.

Jacobi, H. 1930: Die Backöfen an der Umfassungsmauer der zweiten Kastells. *Saalburg Jahrbuch* 7, 10-19.

Jacobi, H. 1937: Das Kastell Saalburg. *Obergermanisch-rätische Limes* Abt B, Band II, Kastell Nr 11.

Jacobi, L. 1906: Das Kastell Kapersburg. *Obergermanisch-rätische Limes* Abt B, Band II 2, Kastell Nr 8.

Jarrett, M.G. 1960: The Roman Fort at Ebchester, County Durham. *Archaeol Ael* 4th series 38, 193-229.

Jarrett, M.G. 1964: Excavations at Gelligaer, Glamorgan 1963. *Morgannwg* 8, 66-69.

Jarrett, M.G. 1965: Roman officers at Maryport. *Trans Cumb Westm Antiq Archaeol Soc* 65, 115-132.

Jarrett, M.G. 1966: The garrisons of Maryport and the Roman Army in Britain. In Jarrett, M.G. and Dobson, B. (editors) 1966, 27-40.

Jarrett, M.G. 1966-68: The Roman Fort at Brecon Gaer: Some Problems. *Bull Bd Celtic Studs* 22, 426-432.

Jarrett, M.G. 1976: *Maryport, Cumbria: a Roman fort and its garrison* (Kendal, Cumb Westm Antiq Archaeol Soc extra series 22).

Jarrett, M.G. 1980: Review of Potter, T.W. 1979. *Britannia* 11, 431-433.

Jarrett, M.G. and Dobson, B. (editors) 1965: *Britain and Rome* (Kendal).

Jobst, W. 1983: *Provinzhaupstadt Carnuntum: Österreichs gröste archäologische Landscaft* (Wien).

Jobst, W., Stiglitz, H. and Vetters, H. 1983a: Lehrgrabung im Auxiliarkastell von Carnuntum 1983. *Mitt Gesell Freunde Carn* 1/83, 16-19.

Jobst, W., Stiglitz, H. and Vetters, H. 1983b: Lehrgrabung im Auxiliarkastell von Carnuntum 1982. *Pro Austria Romana* 33 (1-3), 2-5.

Johnson, A. 1983: *Roman Forts of the 1st and 2nd centuries AD in Britain and the German Provinces* (London).

Johnson, J.S. 1977: An early Flavian fort at Hayton, near York. In Fitz, J. (editor) 1977, 43-46.

Johnson, S. 1978: Excavations at Hayton Roman Fort, 1975. *Britannia* 9, 57-114.

Jones, A.H.M. 1964: *The Later Roman Empire* (Oxford, Blackwell).

Jones, G.D.B. 1970: Roman Lancashire. *Archaeol Journ* 127, 237-245.

Jones, G.D.B. 1967: Manchester University Excavations at Brough-on-Noe 1967. *Derb Archaeol Journ* 87, 154-158.

Jones, G.B.D. and Thompson, F.H. 1965: Excavations at Brough-on-Noe 1965. *Derb Archaeol Journ* 85, 123-126.

Jones, G.B.D., Thompson, F.H. and Wild, J.P. 1966: Manchester University Excavations at Brough-on-Noe. *Derb Archaeol Journ* 86, 99-101.

Jones, G.B.D. and Wild, J.P. 1968: Excavations at Brough-on-Noe 1968. *Derb Archaeol Journ* 88, 89-93.

Jones, G.D.B. and Wild J.P. 1969: Manchester University Excavations at Brough-on-Noe (Navio). *Derb Archaeol Journ* 89, 99-107.

Jones, G.D.B. and Little, J.H. 1973: Excavations on the Roman Fort at Pumpsaint, Carmarthenshire: Interim Report 1972. *The Carmarthenshire Antiquary* 9, 3-27.

Jones, G.D.B. and Little, J.H. 1974: Excavations at Pumpsaint 1973: Interim Report. *The Carmarthenshire Antiquary* 10, 3-16.

Jones, M.J. 1975: *Roman Fort Defences to AD 117* (Oxford, BAR Brit Ser 21).

Jones, M.J. 1980: The early military occupation of the Lincoln area. In Hanson, W.S. and Keppie, L.J.F. (editors) 1980, 279-289.

Janon, M. 1973: Récherches à Lambèse. *Antiquités Africaines* 7, 193-254.

Jope, E.M. 1956: Vehicles and Harness. In Singer, C., Holmyard, E.J., Hall, A.R. and Williams, T.I. (editors) 1956, Vol II, 537-562.

Jope, M. 1968: Animals Remains. In Todd, M. 1968, 54-55.

Jorns, W. and Meier-Arendt, W. 1967: Das Kleinkastell Degerfeld in Butzbach, Kr. Friedberg (Hessen). *Saalburg Jahrbuch* 24, 12-32.

Kandler, M. 1969: Die Versuchgrab 1968 der Limeskommission im Legionslager Carnuntum. *Pro Austria Romana* 19, 4.

Kandler, M. 1970: Die Grabung 1970 im Legionslager Carnuntum. *Pro Austria Romana* 21, 8-10.

Kandler, M. 1971: Die Grabung 1971 im Legionslager Carnuntum. *Pro Austria Romana* 21, 28-30.

Kandler, M. 1973: Die Grabung 1972 im Legionslager Carnuntum. *Pro Austria Romana* 23, 2-3.

Kandler, M. 1974a: Die Ausgrabungen im Legionslager Carnuntum 1968-1973. Eine vorläufige Zusammenfassung. *Anz Österr Akad Wiss (Phil-Hist Klasse)* 111, 27-40.

Kandler, M. 1974b: Die Grabung 1973 im Legionslager Carnuntum. *Pro Austria Romana* 24, 16-18.

Kandler, M. 1976a: Die Ausgrabungen 1968-1972 im Legionslager Carnuntum. In Stiglitz, H. (editor) 1976, *Neue Forschungen in Carnuntum* (Wien, Kultur und Natur in Niederösterreich: Studien und Forschungen, Band I), 53-65.

Kandler, M. 1976b: Legionslager Carnuntum 1974. *Pro Austria Romana* 26, 14-15.

Kandler, M. 1977: Legionslager Carnuntum 1976. *Pro Austria Romana* 27, 10-12.

Kandler, M. 1977-78: Zu Innenbauten des Legionslagers. In *Vindobona: Die Römer im Wiener Raum* (Historisches Museum der Stadt Wien), 90-100.

Kandler, M. 1978a: Vorläufiger Bericht über den Grabungen im Legionslager Carnuntum in den Jahren 1974 bis 1978. *Anz Österr Akad Wiss (Phil-Hist Klasse)* 115, 335-351.

Kandler, M. 1978b: Legionslager Carnuntum. *Pro Austria Romana* 28, 11-13.

Kandler, M. 1979: Zu Innenbauten des Legionslagers Vindobona. *Veröff Verb Österr Geschichtsvereine* 22, 38-41.

Kandler, M. 1977: Legionslager und Canabae von Carnuntum. In Stiglitz, H., Kandler, M. and Jobst, W. 1977, 626-700.

Kandler, M. and Vetters, H. 1986: *Der römische Limes in Österreich: Ein Führer* (Wien, Österreichischer Akademie der Wissenschaften).

Kellner, H.-J. 1972: *Die Römer in Bayern* (München).

Kelly, D.B. 1965: Excavations at Watergate House. *Journ Chest Archaeol Soc* 52, 1-21.

Kenner, F. 1879: *Neue römische Funde in Wien* (Wien).

Kenner, F. 1897: *Geschichte der Stadt Wien I* (Wien).

Kenner, F. 1900: *Bericht über römische Funde in Wien: In den Jahren 1896 bis 1900* (Wien).

Kenner, F. 1904: Römische Funde in Wien aus den Jahren 1901 bis 1903. *Jarhb Zentr Komm Erforsch Kunst Hist Denkm* new series 2 (1), 103-170.

Kenner, F. 1905: Römische Funde in Wien aus den Jahren 1904 und 1905. *Jahrb Zentr Komm Erforsch Kunst Hist Denkm* new series 3, 137-230.

Kenner, F. 1909: Forschungen In Vindobona. *Jahrb Altertum* 3, 35-85.

Kenner, F. 1911: Forschungen in Wien. *Jahrb Altertum* 5, 107-162.

Kenworthy, J. (editor) 1981: *Agricola's Campaigns in Scotland* (Edinburgh, Scottish Archaeological Forum 12).

Keppie, L. 1984: *The Making of the Roman Army* (London).

Keppie, L. 1986a: *Scotland's Roman Remains: An Introduction and Handbook* (Edinburgh).

Keppie, L. 1986b: The Garrison of the Antonine Wall: Some New Evidence from Bar Hill. In Unz, C. (editor) 1986, 53-57.

Keppie, L.J.F. 1979: A Roman Fortlet on the Antonine Wall at Kinneil. In Breeze, D.J. (editor) 1979b, 17.

Keppie, L.J.F. and Walker, J.J. 1981: Fortlets on the Antonine Wall at Seabegs Wood, Kinneil and Cleddans. *Britannia* 12, 143-162.

Kérdö, K.H.: Preliminary Report of the Investigations conducted at the Southern Front of the 4th Century Fort in Aquincum. *Budapest Régiségei* 24 (1), 75.

Kinch, K.-F. 1890: *L'Arc de Triomphe de Salonique* (Paris).

King, A. 1978: A comparative survey of bone assemblages from Roman sites in Britain. *Bull Inst Arch* 15, 207-232.

King, J.E. 1968: Animal Bones from Hod Hill II: Sites outside the Roman Fort. In Richmond, I.A. 1968, 128-132.

Klee, M. 1984: Neue Ausgrabungen in Rottweil. *Archäol Ausgrab Bad-Württ* 1983, 129-134.

Klee, M. 1986: Das frührömische Kastell Unterkirchberg (Gemeinde Unterkirchberg, Alb-Donau Kreis). In Unz, C. (editor) 1986, 187-191.

Knörzer, K.-H. 1979: Verkohlte Reste von Viehfutter aus einem Stall des römischen Reiterlagers von Dormagen. In Müller, G. 1979a, 130-137.

Koenen, C. 1892: Miscellen Aufdeckung eines römisches Castells bei Werthausen am Niederrhein. *Bonner Jahrbücher* 93, 270-274.

Koenen, C. 1904: Beschreibung von Novaesium. In Nissen, H., Koenen, C., Lehner, H., Struck, M.L. and Hagen, J. 1904, Novaesium, *Bonner Jahrbücher* 111/112, 97-242.

Koepp, F. (editor) 1903: *Mitt Alt Komm Westf* 3.

Koepp, F. (editor) 1905: *Mitt Alt Komm Westf* 4.

Koepp, F. 1909a: Haltern i. W. Ausgrabungen im Sommer 1909. *Röm-germ Korrespondenzblatt* 2, 85-89.

Koepp, F. (editor) 1909b: *Mitt Alt Komm Westf* 5.

Koepp, F. 1912: Ausgrabungen bei Haltern: Bericht über die Ausgrabungen der Jahre 1908-1910. *Mitt Alt Komm Westf* 6.

Koepp, F. 1922: Ausgrabungen bei Haltern: Ergebnisse der Jahre 1912 und 1913. *Mitt Alt Komm Westf* 7.

Körber-Grohne, U., Kokabi, M., Piening U. and Planck, D. 1983: *Flore und Fauna im Ostkastell von Welzheim* (Stuttgart, Forschungen und Berichte zur Vor- und Frühgeschichte in Baden-Württemberg Band 14).

Kofler, F. 1894: Das Kastell Butzbach. *Obergermanisch-rätische Limes* Abt B, Band II 2, Kastell Nr 14.

Kofler, F. 1903a: Das Kastell Echzell. *Obergermanisch-rätische Limes* Abt B, Band II 2, Kastell Nr 19.

Kofler, F. 1903b: Das Kastell Ober-Florstadt. *Obergermanisch-rätische Limes* Abt B, Band II 2, Kastell Nr 19.

Kohl, W. 1927: Das Numerus Kastell Ellingen. *Obergermanisch-rätische Limes* Abt A, Band VII, Strecke 14, 81-82.

Kokabi, M. 1982a: Arae Flaviae II. Viehhaltung und Jagd im römischen Rottweil (Stuttgart, Forschungen und Berichte zur Vor- und Frühgeschichte in Baden-Württemberg Band 13).

Kokabi, M. 1982b: Ein Pferdeskelett aus dem römischen Reiterlager Dormagen. *Bonner Jahrbücher* 182, 389-392.

Kólnik, T. 1986: Neue Ergebnisse der Limesforschung in der ČSSR. In Unz, C. (editor) 1986, 335-361.

Kondić, V. 1974: Ergebnisse der neuen Forschungen auf dem obermoesischen Donaulimes. In Pippidi, D.M. (editor) 1974, 39-54.

Koschik, H. 1980a: Das Kastell Ellingen, Landkreis Weißenburg-Gunzenhausen. *Das archäologische Jahr in Bayern* 1980, 116-117.

Koschik, H. 1980b: Das römische Feldlager von Weißenburg i. Bay. *Jahresber Bay Bodendenkmalpflege* 21, 139-154.

Koschik, H. 1982: Ausgrabungen im Kastell von Ellingen Ldkr, Weißenburg-Gunzenhausen, Mfr. *Jahrbuch der Bayerischen Denkmalpflege* 34, Sonderdruck.

Koschik, H. 1983a: Kastell Ellingen: Sablonetum, Ldkr. Weißenburg-Gunzenhausen. *Heimatkundliche Beiträge* 2/83, 20-21.

Koschik, H. 1983b: Kastell Ellingen: Sablonetum: Flurbereiniging und Denkmalpflege. *Schriftenreihe des Bayerisches Staatsministerium für Ernährung, Landwirtschaft und Forsten* 20, 44-50.

Koschik, H. 1983c: Römisches Weißenburg. *Heimatkundliche Beiträge* 4/83, 38-45.

Koschik, H. 1983c: Streifzüge zu archäologischen Stätten im Landkreis Weißenburg-Gunzenhausen. *Bayernspiegel* Mai/Juni Nr 3, 3-7.

Koschik, H. 1984: Rekonstruktion am Kastell Ellingen-Sablonetum. *Das archäologische Jahr in Bayern* 1983, 188-190.

Krämer, H. 1900: Die Haustierfunde von Vindonissa. *Revue Suisse de Zoologie* 7.

Krause, R. 1984: Neue Untersuchungen am römischen Kohortenkastell in Murrhardt, Rems-Murr-Kreis. *Fundber Baden-Württemberg* 9, 289-358.

Kubitschek, W. and Frankfurter, S. 1923: *Führer durch Carnuntum* (Wien, Österreichisches Archäologisches Institut).

Kühlborn, J.-S. 1979: Oberaden. *Neujahrsgruss* 1979, 33-36.

Kühlborn, J.-S. 1980: Oberaden. *Neujahrsgruss* 1980, 33-34.

Kühlborn, J.-S. 1981: Oberaden. *Neujahrsgruss* 1981, 37-41.

Kühlborn, J.-S. 1982a: Die neuen Grabungen in der Nordwestecke des römischen Legionslagers Oberaden. *Germania* 60, 501-512.

Kühlborn, J.-S. 1982b: Oberaden. *Neujahrsgruss* 1982, 35-38.

Kühlborn, J.-S. 1983: Oberaden. *Neujahrsgruss* 1983, 22-23.

Landes, A. 1979: Propuneri pentru o reconstituire a castrului roman de la Buciumi: 1 Elementele incintei. *Acta Musei Porolissensis* 3, 411-425.

Lassus, J. 1969: *Visite à Timgad* (Algiers).

Lassus, J. 1981: *La forteresse byzantine de Thamugadi: fouilles à Timgad 1938-1956* (Paris, Éditions du Centre National de la Recherche Scientifique).

Laur-Belart, R. 1933: Grabungen der Gesellschaft Pro Vindonissa im Jahre 1932: An der Via Principalis. *Anz Schweiz Alt* 35, 1-16.

Laur-Belart, R. 1935: *Vindonissa, Lager und Vicus* (Berlin/Leipzig, Römisch-germanische Forschungen Band 10).

Laur-Belart, R. 1936-37: Grabungen. *Jahresber Gesell Pro Vind* 1936/37, 9-14.

Laur-Belart, R. 1937: Große Untersuchungen I: Vindonissa (Aargau). *Jahresber Schweiz Gesell Urg* 29, 22-29.

Laur-Belart, R. 1938-39: Ausgrabungen. Jahresber Gesell Pro Vind 1938/39.

Laur-Belart, R. 1940-41: Die Ausgrabungen. Jahresber Gesell Pro Vind 1940/41, 13-18.

Laur-Belart, R. 1942-43: Über die Schreibkunst beim römischen Militär. *Jahresber Gesell Pro Vind* 1942/43, 32-39.

Laur-Belart, R. 1944-45: Die Ausgrabungen. *Jahresber Gesell Pro Vind* 1944/45, 35-38.

Laur-Belart, R. (editor) 1959: *Limes-Studien: Vorträge des 3. Internationalen Limes-Kongresses in Rheinfelden-Basel 1957* (Basel, Schriften des Institutes für Ur- und Frühgeschichte der Schweiz).

Leach, J. D. and Wilkes, J.J. 1977: The Roman Military Base at Carpow, Perthshire, Scotland: Summary of Recent Excavations. In Fitz, J. (editor) 1977, 47-62.

Lefebvre des Noëttes, 1931: *L'attelage: Le cheval de selle à travers les ages* (Paris).

Le Glay, M. 1977: Les discours d'Hadrian à Lambèse (128 apr, J.C.). In Fitz, J. (editor) 1977, 545-558.

Lehner, H. 1901: Das Kastell Kemel. *Obergermanisch-rätische Limes* Abt B, Band I, Kastell Nr 7.

Lehner, H. 1906: Die Alteburg bei Cöln, I Ausgrabungsbericht. *Bonner Jahrbücher* 114/115, 244-266.

Lehner, H. 1912: Vetera: Ausgrabungen in den Jahren 1910, 1911, 1912. *Bonner Jahrbücher* 122, 311-362.

Lehner, H. 1917: Vetera Ausgrabungen in den Jahren 1913 und 1914. *Bonner Jahrbücher* 124, 133-151.

Lehner, H. 1924: Jahresbericht 1923. *Bonner Jahrbücher* 129, 260.

Lehner, H. 1927: Ausgrabungen in Vetera 1926. *Germania* 11, 17-21.

Lehner, H. 1930a: Ausgrabungen. *Bonner Jahrbücher* 135, 168-172.

Lehner, H. 1930b: *Vetera. Die Ergebnisse der Ausgrabungen des Bonner Provincialmuseums bis 1929* (Berlin/Leipzig, Römisch-germanisch

Kommission des Deutschen archäologischen Instituts zu Frankfurt A.M., Römisch-germanisch Forschungen Band IV).

Leman, P. and Seillier, C. 1978-79: Fouilles de Boulogne-sur-Mer. *Bulletin de la société nationale des antiquaires de France* 1978-1979, 138-148.

Lengyel, A. and Radau, G.T.B. (editors) 1980: *The Archaeology of Roman Pannonia* (Budapest).

Liddle, P. 1982: Great Casterton: Archaeological Report No 4 (Leicestershire Museums Publication No 31).

Liepe, H.U. 1958: *Die Pferde das Latène Oppidums Manching* (München, Studien Tierresten Bayerns IV).

Ling, R. and Ling, L.A. 1979: Excavations at Loughor, Glamorgan: Buildings in the western part of the Roman Fort. *Archaeol Camb* 127, 13-39.

Lith, S.M.E. 1978-79: Römisches Glas aus Valkenburg Z.H.. *Oud Med Rijk Oud Leiden* 59-60, 1-150.

Lőrincz, B. 1975: Zur Erbauung des Legionslagers von Brigetio. *Acta Archaeol Acad Sc Hung* 27, 343-352.

Lőrincz, B. 1978: Die Besatzunbgstruppen des Legionslagers von Aquincum am Ende des 1. - Anfang des 2. Jahrhunderts. *Acta Archaeol Acad Sc Hung* 30, 299-312.

Lőrincz, B. and Visy, Zs. 1980: Die Baugeschichte des Auxiliarkastells von Intercisa. In Hanson, W.S. and Keppie L.J.F. (editors) 1980, 681-701.

Lőrincz, B., Szabó, K. and Visy, Zs. 1986: Neue Forschungen im Auxiliarkastell von Intercisa. In Unz, C. (editor) 1986, 362-368.

Lüdin, O. 1960-61: Grabung Jaberg. *Jahresber Gesell Pro Vind* 1960/61, 5-20.

Lüdin, O. 1961-62: Nachträge zur Vindonissa-Forschung 1954-1960. *Jahresber Gesell Pro Vind* 1961/62, 47-56.

Lüdin, O. 1966: Ausgrabung Königsfelden-Breite 1966. *Jahresber Gesell Pro Vind* 1966, 15-31.

Lüdin, O. 1967: Die Ausgrabungen in Windisch 1967. *Jahresber Gesell Pro Vind* 1967, 31-50.

Luff, R.M. 1982: *A Zooarchaeological Study of the Roman North-Western Provinces* (Oxford, BAR Int Ser 137).

Lupton, J.I. 1896: *Mayhew's Illustrated Horse Doctor* (London, new edition).

Lugli, G. 1919: Castra Albana: un accampamento romana fortificato al XV miglio della via Appia. *Ausonia* 9, 211-215.

Maag, R. 1982: Ein Kalkbrennofen im Legionslager von Vindonissa. *Jahresber Gesell Pro Vind* 1982, 65-70.

Maaskant-Kleinbrink, M. 1968: A Glass Gem from the Castra at Nijmegen. *Bull Ver Bev Kenn Ant Besch Grav* 43, 70-74.

MacDonald, G. 1932-1933: Roman Forts at Rough Castle and Westerwood. *Proc Soc Antiq Scot* 67, 243-296.

MacDonald, G. 1934: *The Roman Wall in Scotland* (Oxford, 2nd edition).

MacDonald, G. 1939: A New Inscription at Mumrills. *Proc Soc Antiq Scot* 73, 244-245.

MacDonald, G. and Park, A. 1906: *The Roman Forts on the Bar Hill* (Glasgow).

MacDonald, G. and Curle A.C. 1928-29: The Roman Fort at Mumrills near Falkirk. *Proc Soc Antiq Scot* 63, 396-576.

Macgregor-Morris, P. 1980: *The Complete Book of the Horse* (London).

MacIvor, I. Thomas, M.C. and Breeze, D.J. 1978-80: Excavations on the Antonine Wall fort of Rough Castle, Stirlingshire, 1957-61. *Proc Soc Antiq Scot* 110, 230-285

Mackendrick, P. 1975: *The Dacian Stones Speak* (Chapel Hill).

Mackensen, M. 1984: Das frühkaiserzeitliche Kleinkastell bei Nersingen. *Das archäologische Jahr in Bayern* 1983, 92-96.

Mackensen, M. 1985: Das frühkaiserzeitliche Kastell Aislingen und die neu entdeckten Kleinkastelle bei Burlafingen und Nersingen an der Donau. In Bayerische Landesamt für Denkmalpflege, 1975, 37-41.

Mackensen, M. 1987: *Frühkaisezeitliche Kleinkastelle bei Nersingen und Burlafingen an der oberen Donau* (Münchener Beiträge zur Vor- und Frühgeschichte Band 41).

Majewski, K. 1979: Novae - Sektor Zachodni, 1971: Sprawozdine tymczasowe z wykopalisk okspedygi archeologicznej universitetu warsawskiego. *Archeologia* 32, 165-250.

Majewski, K. 1981: Novae - Sektor Zachodni, 1979: Sprawozdine tymczasowe z wykopalisk okspedygi archeologicznej universitetu warsawskiego. *Archeologia* 32, 85-163.

Maltby, M. 1979: *The animal Bones from Exeter 1971-1975* (Exeter Archaeological Reports Vol 2).

Manning, W.H. 1981: *Usk: the fortress Excavations 1968-71* (Cardiff).

Manning, W.H. 1976: The Conquest of the West Country. In Branigan, K. and Fowler, P.J. (editors) 1976, 15-41.

Marichal, R. 1979: Les ostraca de Bu Ngem. *Acad Inscr et Belles-Lettres* 1979, 436-452.

Marples, B.J. 1974: Animal Bones from the Roman Fort at Longthorpe near Peterborough. In Frere, S.S. and St Joseph, J.K. 1974, 122-129.

Marsden, P., 1980: *Roman London* (London).

Mattingly, D.J. 1984: *Tripolitania: a comparative study of a Roman frontier province* (Manchester, unpublished Ph.D thesis).

Maxfield, V.A. 1979: Camelon 'South Camp': Excavations 1975-1979. In Breeze, D.J. (editor) 1979b, 28-32.

Maxfield, V.A. 1980a: The Flavian Fort at Camelon. In Kenworthy, J. (editor) 1980, 69-78.

Maxfield, V.A. 1980b: The Roman military occupation of south-west England: further light and fresh problems. In Hanson, W.S. and Keppie, L.J.F. (editors) 1980, 297-309.

Maxfield, V.A. 1981: *Camelon 1981, Interim Report.*

Maxfield, V.A. 1986: Pre-Flavian Forts and their Garrisons. *Britannia* 17, 59-72.

Maxfield, V.A. and Reed, A. 1975: Excavations at Ebchester Roman Fort, 1972-3. *Archaeol Ael* 5th series 3, 43-104.

Maxwell, G. 1971-72: Excavations at the Roman Fort of Crawford, Lanarkshire. *Proc Soc Antiq Scot* 104, 147-200.

Maxwell, G. 1981: Agricola's Campaigns: The Evidence of the Temporary Camps. In Kenworthy, J. (editor) 1981, 25-54.

Maxwell, G.S. 1982: Roman temporary camps at Inchtuthil: an examination of the aerial photographic evidence. *Scottish Archaeological Review* 1 (2), 105-113.

Maxwell, G.S. 1983: Recent aerial discoveries in Roman Scotland: Drumquhassle, Elginhaugh and Woodhead. *Britannia* 14, 167-181.

May, T. 1922: *The Roman Forts of Templeborough near Rotheram* (Rotherham).

Mc Carthy, M.R. 1979: Carlisle. *Current Archaeology* 68, 268-272.

Mc Carthy, M.R. 1986: Note: Woodland and Roman Forts. *Britannia* 17, 339-272.

Mc Carthy, M.R., Padley, T.G. and Henig, M. 1982: Excavations and Finds from The Lanes, Carlisle. *Britannia* 13, 79-89.

Mc Intyre, J. and Richmond, I.A. 1934: Tents of the Roman Army and Leather from Birdoswald. *Trans Cumb Westm Antiq Archaeol Soc* 2nd series, 34, 62-90.

Mc Peake, J.C. 1974: Chester Goss Street. *Chesh Archaeol Bull* 2, 15-16.

Mc Peake, J.C. 1978: The First Cnetury. In Strickland, T.J. and Davey, P.J. (editors) 1978, 9-17.

Mc Peake, J.C., Bulmer, M. and Rutter, J.A. 1980: Excavations in the Garden of No 1 Abbey Green, Chester, 1975-77: Interim Report. *Journ Chest Archaeol Soc* 63, 15-37.

Meek, A. and Gray, R.A. 1911: Animal Remains. In Foster, R.H. and Knowles, W.H., Corstopitum: report on the excavations of 1910, *Archaeol Ael* 3rd series 7, 143-267 (220-267).

Mertens, J. 1980: Recherches recentes sur le Limes en Gaule Belgique. In Hanson W.S. and Keppie L.J.F. (editors) 1980, 423-470.

Metcalf, V.M. 1979-80: Roman Gates, Caerleon: The Legionary Barracks. *Glam-Gwent Archaeol Trust Ann Rpt* 1979-80, 1-9.

Metcalf Dickinson, V.M. 1980-81: Roman Gates, Caerleon, 1980-81: Prelminary Summary of Results. *Glam-Gwent Archaeol Trust Ann Rpt* 1980-81, 6-11.

Metcalf-Dickinson, V.M. 1982-83: Salvage work at Caerleon, Gwent. *Glam-Gwent Archaeol Trust Ann Rpt* 1982-83, 64-65.

Mettler, A. 1907: Das Kastell Köngen. *Obergermanisch-rätische Limes* Abt B, Band V 1, Kastell Nr 60.

Miket, R. 1983: *The Roman Fort at South Shields: Excavation of the Defences 1977-1981* (Tyne and Wear County Council).

Miket, R. and Burgess, C. (editors) 1984: *Between and Beyond the Walls: Essays on the Prehistory and History of North Britain in Honour of George Jobey* (Edinburgh).

Mildenberger, G. 1961: Untersuchungen im Kastell Rißtissen: Ein Vorbericht. *Germania* 39, 69-87.

Mildenberger, G. 1962: Neue Grabungen im Kastell Rißtissen. *Fundber Schwaben* new series 16, 106-119.

Miles, W. 1860: *General Remarks on Stables and Examples of Stable Fittings* (London).

Miller, S.N. 1925: Roman York: Excavations of 1925. *Journ Rom Stud* 15, 176-194.

Miller, S.N. 1922: *The Roman Fort at Balmuildy* (Glasgow).

Miller, S.N. 1928: *The Roman Fort at Old Kilpatrick* (Glasgow).

Miller, S.N. (editor) 1952: *The Roman Occupation of South-West Scotland* (Glasgow).

Millett, M. 1982: Distinguishing between the Pes Monetalis and the Pes Drusianus: some problems. *Britannia* 13, 315-320.

Mocsy, A. 1974: *Pannonia and Upper Moesia* (London).

Mocsy, A. and Lorincz, B. 1977: Pannonia Forschung 1973-1976. *Acta Archaeol Acad Sc Hung* 29, 373-401.

Moosbrugger-Leu, R. 1959-60: Grabungen 1959: Areal Oelhafen. *Jahresber Gesell Pro Vind* 1959/60, 5-23.

Morren, C.G.A. 1955: Romeins Nijmegen: Tweede Periode (70-105). *Numaga* 11, 7-15.

Müller, G. 1962: *Untersuchungen am Kastell Butzbach* (Berlin, Limesforschungen Band 2).

Müller, G. 1966: Dormagen Kr. Grevenbroich, Jahresbericht 1964: römische Zeit. *Bonner Jahrbücher* 166, 564-565.

Müller, G. 1979a: Aussgrabungen in Dormagen 1963-1977. *Rheinische Ausgrabungen* 20.

Müller, G. 1979b: *Durnomagus: Das römische Dormagen* (Köln).

Müller, G., Heimberg, G. and Wentscher, J. 1978: Gabungen in Legionslager Novaesium. *Ausgrabungen in Rheinland* '78, 65-73.

Müller, H.H. 1955: Bestimmung der Hohe im Widerrist bei Pferden. *Jahreschrift für Mitteldeutsche Vorgeschichte* 39, 240-244.

Müller, H.H. 1980: *Haustiere* (Berlin).

Nagy, T. 1974: Drei Jahre Limesforschungen in Ungarn. In Pippidi, D.M. (editor) 1974, 27-37.

Nagy, T. 1977a: Albertfalva. In Fitz, J. (editor) 1977, 91.

Nagy, T. 1977b: Das zweite Lager der Legio II Adiutrix in Aquincum (Óbuda). In Bogaers, J.Æ. 1977b, 359-366.

Nash-Williams, V.E. 1929a: The Roman Legionary Fortress at Carleon Monmouth: Report on the 1926 Excavations. *Archaeol Camb* 84, 237-307.

Nash-Williams, V.E. 1929b: Miscellanea: Caerleon Excavations 1928, School Field. *Archaeol Camb* 84, 142-145.

Nash-Williams, V.E. 1931: Report on the excavations carried out in the Prysg Field 1927-9. *Archaeol Camb* 86, 99-157.

Nash-Williams, V.E. 1932: Excavations at Caerleon. *Bull Bd Celt Stud* 6, 289.

Nash-Williams, V.E. 1933: Further Excavations within the Roman Legionary Fortress at Caerleon Mon. 1932-3. *Archaeol Camb* 88, 111-114.

Nash-Williams, V.E. 1936: Caerleon Excavations 1936, Vine Cottage Site. *Archael Camb* 91, 318-320.

Nash-Williams, V.E. 1946: *The Roman Legionary Fortress at Caerleon Monmouthshire* (Cardiff, 2nd edition).

Nash-Williams, V.E. 1969: *The Roman Frontier in Wales* (Cardiff, 2nd edition Jarrett, M.G.)

Naß, K. 1934. Kastell Holzhausen: Grabung vom 15 Juli bis 30 Novemeber 1932. *Nassauische Annalen* 54, 233-269.

Negev, A. 1977: The Nabateans and the Provincia Arabia. In Temporini, H. and Haase, W. (editors) 1977, 520-686.

Németh, M. 1976: Aquincum: Archaeological Observations near the North-Eastern Corner of the Camp (Preliminary Report). *Budapest Régiségei* 24 (1), 67.

Németh, M. and Kérdó, K. 1986: Zur Frage der Besatzung von Aquincum im 1. Jahrhundert. In Unz, C. (editor), 384-388.

Newall, F. 1976: The Roman Signal Fortlet at Outerwards, Ayrshire. *Glasg Archaeol Journ* 4, 111-123.

Newstead, R. 1924: Report on the Excavations on the Site of the Roman Camp at the Deanery Field Chester. *Liverp Ann Archaeol Anthrop* 11, 59-86.

Newstead, R. 1926: Records of Archaeological Finds in Chester, Hunter Street Site, Site IX. *Journ Chest Nth Wales Architect Archaeol Hist Soc* new series 27, 61-79.

Newstead, R. 1928: Report on the Excavations on the Site of the Roman Fortress at the Deanery Field Chester. *Liverp Ann Archaeol Anthrop* 15, 3-32.

Newstead, R. 1936: Excavations in the Deanery Field and Abbey Green 1935. *Liverp Ann Archaeol Anthrop* 23, 3-50.

Newstead, R. 1939: Hunter Street: Site of the Odeon Theatre. *Journ Chest Nth Wales Architect Archaeol Hist Soc* new series 23, 3-50.

Neumann, A. 1967: Forschung in Vindobona 1948 bis 1967. *Der römische Limes in Österreich* Heft XXIII, Teil I.

Neumann, A. 1972a: Sichtbares Vindobona. *Antike Welt* 3 (2), 31-37.

Neumann, A. 1972b: *Vindobona: Die römische Vergangenheit Wiens* (Wien, Köln and Graz).

Neumann, A. 1980: Vindobona: *Die römische Vergangenheit Wiens* (Wien, Köln and Graz, 2nd edition).

Nobis, G. 1973: Zur Frage römerzeitliche Hauspferde in Zentraleuropa. *Zeitschrift für Saugtierkunde* 38, 224-252.

Noddle, B.A. 1974: The Animal Bones. In Casey, P.J. 1974, 75-77.

Nolan, L.E. 1853: *Cavalry; Its History and Tactics* (London).

Noll, R. 1958: Lauriacum. *Der römische Limes in Österreich* Heft XXI, 46-50.

North, O.H. and Hidyard, E.J.W. 1945: Excavations at Watercrook 1944. *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 45, 148-162.

Novak, G. (editor) 1963: *Quintus Congressus internationalis limitis Romani studiosorum* (Zagreb).

Nowotny, E. 1914: Die Grabungen im Standlager zu Carnuntum (1908-1911). *Der Römische Limes in Österreich* Heft XII, 1-222.

Nowotny, E. 1923: Das römische Wien und sein Forleben. *Mitt Ver Gesch Stadt Wien* 4, 5-22.

Nowotny, E. 1923-24: Römische Forschung in Österreich 1912-1924: *Ber Röm-Germ Komm* 15, 121-178.

Nowotny, E. 1925-25: Nactrag zum Bericht über römische Forschung in Österreich in XV Bericht der Röm.-Germ. Kommission 1923/24. *Ber Röm-Germ Komm* 16, 164.

Nuber, H.-U. 1967: Neue Beobachtungen zur Umwehrung des Kastells Böbingen an der Rems (Kr. Schwäbisch-Gmund). *Fundber Schwaben* new series 18 (1), 283-287.

Nuber, H.-U. 1972: Zwei bronzene Besitzermarken aus Frankfurt/M - Heddernheim. Zur Kennzeichnung von Ausrüstungsstücken des römischen Heeres. *Chiron* 2, 483-503.

Nuber, H.-U. 1974: Römisches Steinkastell Hofheim, Main-Taunus-Kreis: Vorbericht über die Grabungen 1969-1970. *Fundber Hessen* 14, 227-250.

Nuber, H.-U. 1976: Ausgrabungen im römischen Kleinkastell Haselburg (Walldürn-Reinhardsachsen, Neckar-Odenwald Kreis). *Denkmalpfl Baden-Württemberg* 5, 64-67.

Nuber, H.-U. 1979a: *Das Kleinkastell Haselburg bei Walldürn-Reinhardsachsen, Neckar-Odenwald Kreis* (Stuttgart, Kulturdenkmäle in Baden-Württemberg, Kleine Führer Blatt 47).

Nuber, H.-U. 1979b: Das römische Kastell Haselburg, Gemeinde Walldürn-Reinhardsachsen, Neckar-Odenwald Kreis. *Freiburg Universitätsblätter* 65, (Jahrgang 18), 63-71.

Nuber, H.-U. 1983: *Die römischen Kastelle bei Hofheim am Taunus, Main-Taunus-Kreis. Neue Ausgrabungen 1969-1981 im römischen Steinkastell Hofheim* (Wiesbaden, Archäologische Denkmäler in Hessen 29).

Nuber, H.-U. 1986: Das Steinkastell Hofheim (Main-Taunus-Kreis). In Unz, C. (editor) 1986, 226-234.

Oates, D. 1968: *Studies in the Ancient History of Northen Iraq* (London, British Academy).

Oates, D and Oates, J. 1959: Ain Sinu: A Roman Frontier Post in Northen Iraq. *Iraq* 21 (2), 207-242.

Oelmann, F. 1920: Das Standlager der ala Vocontiorum bei Soissons. *Germania* 4, 7-12.

Oelmann, F. 1931: Ausgrabungen in Vetera 1930. *Germania* 15, 221-229.

Oelmann, F. 1934: Ausgrabungen in Vetera 1932-1934. *Germania* 18, 263-271.

Österreichische Archäologisches Institut 1934: Lauriacum: Fundberichte 1933. *Fundber Österreich* 1, 244.

Österreiche Archäologisches Institut 1935: Lauriacum: Fundberichte 1934. *Fundber Österreich* 2, 37-38.

Oettinger, K. 1951: *Das Werden Wiens* (Wien).

Offenberger, J. 1977: Archäologische Untersuchungen in der Stadtpfarrkirche von Traismauer. *Fundber Österreich* 16, 215-232.

Offenberger, J. 1983: Das römische Lager Augustianis - Traismauer. *Fundber Österreich* 22, 133-162.

Oldenstein, J. 1967: Zur Ausrüstung römischer Auxiliareinheiten. *Ber Röm-Germ Komm* 57, 49-284.

Oldenstein-Pferdehirt, B. 1983: Die römischen Hifstruppen nördlich des Mains. *Jahrb Röm-Germ Zentralmus* 30, 303-348.

O'Neil, H. 1965: Excavations in the King's School Gardens, Gloucester 1964. *Trans Brist Glouc Archaeol Soc* 84, 15-27.

O'Neil, H. 1968: The Roman Settlement on the Fosse Way at Bourton Bridge, Bourton-on-the-Water, Gloucestershire. *Trans Brist Glouc Archaeol Soc* 87, 29-55.

Osterhaus, U. 1972: Beobachtungen zum römischen und frühmittelalterlichen Regensburg. *Verhandl Histor Ver Oberpf Regensb* 112, 7-17

Osterhaus, U. 1974: Beobachtungen an der Via Principalis im Legionslager von Regensburg. *Bayerische Vorgeschichtsblätter* 39, 110-180.

Osterhaus, U. 1975: Neuere Grabungen in römischen Regensburg. *Verhandl Histor Ver Oberpf Regensb* 115, 193-201.

Owen-John, H.S. 1981-82: Loughor, West Glamorgan: An Interim Report on Current Excavations. *Glamorgan-Gwent Archaeol Trust Ann Rpt* 1981-1982, 21-30.

Owen-John, H.S. and Marvell, A.G. 1982-83: Interim Report on Current Excavations at Loughor, West Glamorgan. *Glamorgan-Gwent Archaeol Trust Ann Rpt* 1982-83, 31-63.

Oxé, A. 1909: Die älteste Truppenverteilung im Neusser Legionslager. *Bonner Jahrbücher* 118, 75-99.

Paar, I. 1972: Römische Besiedlung in Krefeld-Gellep. Neue Ausgrabungen im Kastell Gelduba 1970/71. *Archäol Korrespondenzblatt* 2, 313-317.

Paar, I 1980: Zur Datierung der Holzbauperioden des niedergermanisches Auxiliarkastells Gelduba (Krefeld-Gellep). Ausgrabungen 1970-1976. In Hanson, W.S. and Keppie, L.J.F. (editors) 1980, 515-528.

Paar, I. and Rüger, C.B. 1971: Kastell Gelduba: Forschungs- und Grabungsberichte bis 1969. *Rheinische Ausgrabungen* 10.

Pallat, L. 1904: Das Kastell Holzhausen. *Obergermanisch-rätische Limes* Abt B, Band I, Kastell Nr 5a.

Paret, O. 1961: *Württemberg in vor- und frühgeschichtlicher Zeit* (Stuttgart, Veroffentlichungen der Kommission fr geschichtliche Landeskunde in Baden-Württemberg, Reihe B, Band 17).

Parker, H.M.D. 1928: *The Roman Legions* (Oxford).

Parker, S.J. 1986: Research on the Central Limes Arabicus, 1980-1982. In Unz, C. 1986, 641-648.

Paulovics, S. 1941: Funde und Forschungen in Brigetio (Szóny). In *Laureae Aquincenses: Memoriae Valentini Kvsinszky dedicatae II* (Dissertationes Pannonicae Series 2, No 11), 118-164.

Pearson, N. 1986a: The Purey Cust; Nuffield Hospital. *Interim* 11 (2), 15-18.

Pearson, N. 1986b: The Purey Cust. *Interim* 11 (3), 17-18.

Petch, D.F. 1971: Excavations on the Site of the Old Market Hall. *Journ Chest Archaeol Soc* 57, 3-26.

Petch, D.F. 1978: The Major Buildings of the Fortress. In Strickland, T.J. and Davey, P.J. (editors) 1978, 17-25.

Petch, J.A. 1927: Excavations at Benwell (Condercum), First Interim Report (1926). *Archaeol Ael* 4th series 4, 135-192.

Petch, J.A. 1928: Excavations at Benwell (Condercum), Second Interim Report (1927 and 1928). *Archaeol Ael* 4th series 5, 46-74.

Petch, J.A. 1943: Recent Work on Melandra Castle, Preliminary Report. *Derb Archaeol Journ* 64, 49-63.

Petch, J.A. 1958: Melandra Castle Excavations. *Derb Archaeol Journ* 78, 1-8.

Petch, J.A. 1959: Melandra Castle Excavations 1959. *Derb Archaeol Journ* 79, 122-124.

Petch, J.A. 1960: Melandra Castle Excavations 1960. *Derb Archaeol Journ* 80, 105-109.

Petch, J.A. 1961: Melandra Castle Excavations 1961. *Derb Archaeol Journ* 81, 146.

Petch, J.A. and Thomson, F.H. 1959: Excavations at Commonhall St Chester 1954-6: The Granaries of the Legionary Fortress of Deva. *Journ Chest Archaeol Soc* 46, 33-60.

Peters, W.J.T. 1965-66: Mural Painting Fragments found in the Roman Castra at Nijmegen. *Ber Rijk Oud Bod* 15-16, 113-144.

Peters, W.J.T. 1969: Mural Painting Fragments Found in the Legionary Fortress and the Canabae Legionis at Nijmegen. *Ber Rijk Oud Bod* 19, 51-71.

Peters, W.J.T. 1979: Mural Painting Fragments Found in the Legionary Fortress and the Canabae Legionis at Nijmegen. *Ber Rijk Oud Bod* 29, 373-402.

Petö, M. 1976: Excavations in the Retentura of the 2-3rd Century AD Legionary Camp of Aquincum. *Budapest Régiségei* 24, 121.

Petrikovits, H. von 1955: Forschungen und Beobachtungen am Limes. Beobachtungen am nidergermanischen Limes seit dem zweiten Weltkrieg. Rheinhausen-Werthausen. *Saalburg Jahrbuch* 14, 7-11.

Petrikovits, H.von 1960: *Das römische Rheinland: Archäologische Forschungen seit 1945* (Köln, Arbeitsgemeinschaft für Forschung des Landes Nordrhein-Westfalen Geistewissenschaften 68).

Petrikovits, H.von 1960: *Das römische Rheinland* (Köln and Opladen).

Petrikovits, H.von 1961: Die Ausgrabungen in Neuss: Stand der Ausgrabungen Ende 1961. *Bonner Jahrbücher* 161, 449-485.

Petrikovits, H.von 1970: Die Spezialgebäude römischer Legionslager. In *Legio VII Gemina* (Léon, Instituto Léones de Estudios Romano-Visigothicos), 229-252.

Petrikovits, H.von 1971: Fortifications in the North-Western Roman Empire. *Journ Rom Stud* 61, 178-218.

Petrikovits, H.von 1974: Militärischer Fabricae der Römer. In Pippidi, D.M. (editor) 1974, 399-407.

Petrikovits, H.von 1975: *Die Innenbauten römischer Legionslager während der Prinzipatszeit* (Opladen, Abhandlungen der rheinisch-westfälischen Akademie der Wissenscaften 56).

Petrikovits, H.von 1976: *Die Spezialgebäude römischer Legionslager. Beiträge zur römischen Geschichte und Archäologie, 1931 bis 1974* (Beihefte der Bonner Jahrbücher Band 86).

Petrikovits, H.von 1977: Verpflegungsbauten der Legion. In Fitz, J. (editor) 1977, 633-641.

Petrikovits, H.von 1982: Review of Schönberger, H. 1978b. Bonner Jahrbücher 182, 706-713.

Pétry, F. 1974: Informations archéologiques: Alsace, Bas-Rhin, Strasbourg. *Gallia* 32, 381-384.

Pétry, F. 1976: Informations archéologiques: Alsace, Bas-Rhin, Strasbourg. *Gallia* 34, 390-399.

Pétry, F. 1978: Informations archéologiques: Alsace, Bas-Rhin, Strasbourg. *Gallia* 36, 360-363.

Pferdehirt, B. 1976: *Die Keramik des Kastells Holzhausen* (Berlin, Limesforschungen Band 16).

Philippi, F. (editor) 1901: Haltern und die Altertumsforschung an der Lippe. *Mitt Alt Komm Westfalen* 2.

Philp, B. 1981: *The Excavations of the Roman Forts of the Classis Britannica at Dover 1970-1977* (Dover, Kent Archaeological Rescue Unit).

Piepers, W. and Haupt, D. 1968: Gelduba: Die Ausgrabungen der Jahre 1954/55. *Rheinische Ausgrabungen* 3, 213-315.

Pippidi, D.M. (editor) 1974: *Actes du IXe Congrès international d'études sur les frontières romaines* (Bucharest).

Pirling, R. 1971: Ein Bestattungsplatz gefallener Römer in Krefeld-Gellep. *Archäol Korrespondenzblatt* 1, 45-46.

Pitts, L.F. 1982: *Inchtuthil Roman Fortress* (Oxford, unpublished D.Phil thesis).

Pitts, L.F. and St Joseph, J.K. 1985: *Inchtuthil: The Roman Legionary Fortress* (London, Britannia Monograph Series No 6)

Planck, D. 1974a: Ausgrabungen im römischen Limeskastell Unterböbingen Ostalbkreis. *Denkmalpfl Baden-Württemberg* 3, 32-37.

Planck, D. 1974b: Das Kleinkastell Rötelsee nördlich von Welzheim, Rems-Mur-Kreis. *Archäologische Ausgrabungen* 1974, 40-43.

Planck, D. 1975a: *Arae Flaviae I: Neue Untersuchung zur Geschichte des römischen Rottweil* (Stuttgart, Forschungen und Berichte zur Vor- und Frühgeschichte in Baden-Württemberg Band 6, I und II).

Planck, D. 1975b: Die Entdeckung eines Kleinkastell am Limes in Mainhardt Kreis Schwäbisch Hall. *Archäologische Ausgrabungen* 1975, 52-55.

Planck, D. 1975c: *Neue Ausgrabungen am Limes* (Stuttgart, Kleine Schriften zur Kenntnis der römischen Besetzungsgeschichte Südwestdeutschlands Nr 12).

Planck, D. 1975d: Neue römische Ausgrabungen am obergermanischen Limes bei Welzheim. *Zeitschrift an Rems und Murr* Juni 1975, 55-61.

Planck, D. 1976a: Erste Teiluntersuchung im Ostkastell von Welzheim, Rems-Murr-Kreis. *Archäologische Ausgrabungen* 1976, 50-55.

Planck, D. 1976b: Neue Forschungen zum obergermanischen und rätischen Limes. In Temporini, H. (editor) 1976, 404-456.

Planck, D. 1977a: Eine Flächegrabung im Limeskastell Murrhardt, Rems-Murr-Kreis. *Archäologische Ausgrabungen* 1977, 59-61.

Planck, D. 1977b: Untersuchungen im Ostkastell von Welzheim, Rems-Murr-Kreis. *Archäologische Ausgrabungen* 1977, 61-?.

Planck, D. 1978a: Ausgrabungen im Kastell Aalen, Ostalbkreis. *Archäologische Ausgrabungen* 1978, 49-52.

Planck, D. 1978b: Die Südwestecke des Kohortenkastells in Mainhardt, Kreis Schwäbisch-Hall. *Archäologische Ausgrabungen* 1978, 46-49.

Planck, D. 1979: Ausgrabungen im Ostkastell von Welzheimm Rems-Murr-Kreis (Baden-Württemberg). *Archäol Korrespondenzblatt* 9, 411-417.

Planck, D. 1981: Ausgrabungen in Stabsgebäude des Kastells Aalen, Ostalbkreis. *Archäol Ausgrab Bad-Württ* 1981, 175-179.

Planck, D. 1982: Die Principia im Kastell Aalen: Vorbericht über die Grabungen 1980 und 1981. *Aalener Jahrbuch* 1982, 13-40.

Planck, D. 1983: Kastellgrabung Aalen 1983. *Archäol Ausgrab Bad-Württ* 1983, 158-161.

Planck, D. 1986: Untersuchungen in Alenkastell Aalen, Ostalbkreis. In Unz, C. (editor) 1986, 247-255.

Plesničar-Gee, L. 1978: Najstarejši urbanistični koncept Emone: Naseljavanje i naselja u antici. *Materijali* 15, Prilep 1976, 103-110.

Póczy, K. 1976a: Aquincum. In Fitz, J. (editor) 1976, 82-85.

Póczy, K. 1976b: The Excavation of the Porta Praetoria in the Aquincum Legionary Camp. *Budapest Régiségei* 24 (1), 87.

Póczy, K. 1976c: Investigation of the Aquincum Legionary Camp and the restoration of its Ruins. *Budapest Régiségei* 24 (1), 27-28.

Póczy, K. 1977: Beiträge zur Baugeschichte des 3. und 4. Jahrhunderts im Legionslager Aquincum: Vorbericht über die Grabungen 1973-1974. In Bogaers, J.E. (editor) 1977b, 373-378.

Póczy, K., Németh, M. Szirmai, K. and Kocsis, L. 1986: Das Legionslager von Aquincum. In Unz, C. (editor) 1986, 398-403.

Polaschek, E. 1935: Die römische Vergangenheits Wiens. *Mitt Ver Gesch Stadt Wien* 15, 1-14.

Pop, I.I. and Gudea, N. 1974-75: Castrul roman de la Feldioara (Făgăras). *Cumidava* 8, 39-54.

Popović, V. 1982-83: Donji Milanovac - Veliki Gradac (Taliata): forteresse romano-byzantine. *Starinar* 33-34, 265-282.

Potter, T.W. 1975: Excavations at Bowness-on-Solway 1973. *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 75, 29-57.

Potter, T.W. 1978: Review of Jarrett, M.G. 1976. *Britannia* 9, 493-495.

Potter, T.W. (editor) 1979a: *Romans in North-West England*: Excavations at the Roman Forts of Ravenglass, Watercrook and Bowness-on-Solway (Kendal, Cumberland and Westmorland Antiquarian and Archaeological Society Research Series Vol 1).

Potter, T.W. 1979b: The Roman Fort at Bowness-on-Solway. In Potter, T.W. (editor) 1979a, 321-350.

Potter, T.W. 1980: The Roman Frontier in Cumbria. In Hanson, W.S. and Keppie, L.J.F. (editors) 1980, 195-200.

Prammer, J. 1976: Das Kastell von Sorviodurum: Die Ausgrabungen 1976 im Bereich des Nordtores. *Jahresber Hist Ver Straub Umgeb* 79, 77-111.

Prammer, J. 1983-84: Ein neues römisches Kastell in Straubing. *Ausgrab Funde Altbay* 1983/1984, 42-43.

Prammer, J. 1984b: Ein neues römisches Kastell in Straubing. *Das archäologisches Jahr in Bayern* 1984, 103-105.

Prescher, 1900: Das Kastell Heidenheim. *Obergermanisch-rätische Limes* Abt B, Band V, Kastell Nr 66b.

Press, L. 1981: Les travaux de l'expédition archéologique polonaise à Novae, secteur Ouest, dans les années 1975 et 1977. *Archaeologia Polona* 20, 255-270.

Press, L. 1983: Travaux de l'expédition archéologique polonaise à Novae: secteur Zachodni, 1981. *Archeologia* 34, 129-169.

Press, L. 1985: Travaux de l'expédition archéologique polonaise à Novae: secteur ouest 1981. *Archaeologia Polona* 24, 123-133.

Press, L. 1986: Valetudinarium at Novae. In Unz, C. (editor) 1986, 529-535.

Protase, D. 1977a: Das Römerlager von Brîncoveneşti und seine Bedeutung für die Verteidigung der Nordostgrenze Dakiens. In Bogaers, J.E. (editor) 1977b, 379-386.

Protase, D. 1977b: Römische Lager mit doppelten Umfassungsmauern in Dakien. In Fitz, J. (editor) 1977, 303-320.

Prummel, W. 1975: Some reflections on the faunal remains of the Roman castellum Valkenburg, excavation 19962. In Clason, A.T. (editor) 1975, 225-229.

Pryce, F.N. and Pryce, T.D. 1927: Excavations of the Powysland Club at the Forden Gaer. *Archaeol Camb* 82, 333-354.

Pryce, F.N. and Pryce, T.D. 1929: The Forden Gaer, Second Interim Report (excavations of 1928). *Archaeol Camb* 84, 100-139.

Pryce, F.N. and Pryce, T.D. 1930: The Forden Gaer, Third Interim Report (excavations of 1929). *Archaeol Camb* 85, 115-130.

Rae, A and V. 1974: The Roman Fort at Cramond, Edinburgh: excavations 1956-66. *Britannia* 5, 163-224.

Rakob, F. and Strorz, S. 1974: Die Principia des römischen Legionslagers in Lambaesis. *Mitt Deutsch Archäol Inst (Röm Abt)* 81 (2), 253-280.

Rankov, N.B. 1982: Roman Britain in 1981. *Britannia* 13, 328-395.

Rebuffat, R., Deneuve, J. and Hallier, G. 1966-67: Bu Njem 1967. *Libya Antiqua* 3-4, 49-137.

Rebuffat, R., Gassend, J.M., Guery, R. and Hallier, G. 1969-70: Bu Ngem 1968. *Libya Antiqua* 6-7, 9-165.

Rebuffat, R. 1969-70: Bu Njem 1970. *Libya Antiqua* 6-7, 107-165.

Reddé, J. 1984: Le camp d'Arlaines en Picardie. *Histoire et Archéologie* 86, 54-57.

Redő, F, 1979: Römische Forschungen in Zalalövő 1977. *Acta Archaeol Acad Scient Hung* 31 (3-4), 357-390.

Redö, F., Gabler, D., Péterfi, Zs., Zsákovice R., Szabó, K. and Katona-Guór, Zs. 1981: Römische Forschungen in Zalalövó 1978-1979. *Acts Archaeol Acad Scient Hung* 33 (1-4), 273-346.

Reed, A. Harper, R. and Dodds, W. 1964: Excavations at Ebchester in 1962-3. *Archaeol Ael* 4th series 42, 173-185.

Reichmann, C. 1983-84: Neue Grabungen im Kastell Gelduba (Krefeld-Gellep). *Ausgrabungen in Rheinland* 1983/84, 129-131.

Reinecke, P. 1927: Römische und frühmittelalterliche Denkmäler vom Weinberg bei Eining a.d. Donau. In *Festschrift zu Feier des fünfundsiebzigjahrigen Bestehens des Römisch-Germanischen Central-Museums zu Mainz 1927*, 5, 157-169.

Reinecke, P. 1957: Das römische Grenzkastell Abusina bei Eining/Donau. *Verhandl Hist Ver Niederbay* 83, 7-10.

Reim, H. 1974: Ausgrabungen im römischen Kastell bei Burladingen Hausen, Zollernalbkreis. *Archäologische Ausgrabungen* 1974, 30-33.

Revellio, P. 1926: Kastell Hüfingen: ein vorläufiger Bericht. *Germania* 10, 16-25.

Revellio, P. 1928: Kastell Hüfingen: zweiter vorläufiger Bericht (Grabung 1926) mit einem Nachtrag über die Grabungen von 1927. *Germania* 11, 118-121.

Revellio, P. 1929: Kastell Hüfingen: dritter vorläufiger Bericht (Grabung 1928). *Germania* 13, 35-47.

Revellio, P. 1930: Kastell Hüfingen: vierter vorläufiger Bericht. *Germania* 14, 58-64.

Revellio, P. 1932: Kastell Hüfingen: fünfter vorläufiger Bericht. *Germania* 16, 196-201.

Revellio, P. 1933: Kastell Hüfingen: sechster vorläufiger Bericht. *Germania* 17, 260-262.

Revellio, P. 1937: Das Kastell Hüfingen. *Obergermanisch-rätische Limes* Abt B, Band V 2, Kastell Nr 62a.

Reynolds, P.K.B. 1938: *Excavations on the site of the Roman fort of Kanovium at Caerhun Caernarvonshire* (Cardiff).

Richmond, I.A. 1925: *Huddersfield in Roman Times* (Huddersfield, The Tolson Memorial Museum Publications, Handbook IV, edited Woodhead, T.W.).

Richmond, I.A. 1928: Review of Schulten, A. 1927-29. *Antiquity* 2, 489-491.

Richmond, I.A. 1929a: Excavations on Hadrian's Wall in the Gilsland-Birdoswald-Pike Hill Sector 1928. *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 29, 303-315.

Richmond, I.A. 1929b: Review of Schulten, A. 1927-29. *Antiquity* 3, 367-370.

Richmond, I.A. 1931: Excavations on Hadrian's Wall in the Birdoswald-Pike Hill Sector 1930. *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 31, 122-134.

Richmond, I.A. 1934: The Roman Fort at South Shields. *Archaeol Ael* 4th series 11, 83-102.

Richmond, I.A. 1935: Trajan's Army on Trajan's Column. *Pap Brit Sch Rome* 13, 1-40.

Richmond, I.A. 1938: Interim Report on the excavations at the Roman fort at Brough-on-Noe. *Derb Archaeol Journ* 53, 53-65.

Richmond, I.A. 1938-39: The Agricolan Fort at Fendoch. *Proc Soc Antiq Scot* 73, 110-154.

Richmond, I.A. 1945: The Sarmatae, Bremetennacum Veteranorum and the Regio Bremetannacensis. *Journ Rom Stud* 35, 15-29.

Richmond, I.A. 1949-50: Excavations at the Roman Fort of Newstead 1947. *Proc Soc Antiq Scot* 84, 1-38.

Richmond, I.A. 1950-51: The Roman Fort of Cappuck Roxburghshire. *Proc Soc Antiq Scot* 85, 138-145.

Richmond, I.A. 1952: Review of Giffen, A.E.van 1948. *Journ Rom Stud* 42, 129-131.

Richmond, I.A. 1955: Roman Britain and Roman Military Antiquities (Albert Reckitt Archaeological Lecture). *Proc Brit Acad* 41, 297-315.

Richmond, I.A. 1959: The Agricolan legionary fortress at Inchtuthil. In Laur-Belart, R. (editor) 1959, 152-155.

Richmond, I.A. 1961: Roman Timber Building. In Jope, E.M. (editor) 1961, *Studies in Building History: Essays in Recognition of the work of B. H. St J. O'Neil* (London), 15-27.

Richmond, I.A. 1962: The Roman siege-works of Masada, Israel. *Journ Rom Stud* 52, 142-155.

Richmond, I.A. 1965: Roman Wales. In Foster, I.Ll. and Daniel, G. (editors), *Prehistoric and Early Wales* (London), 151-175.

Richmond, I.A. 1967: Adamklissi. *Pap Brit Sch Rome* 35, 29-39.

Richmond, I.A. 1968: *Hod Hill II: Excavations carried out between 1951 and 1958 for the Trustees of the British Museum* (London).

Richmond, I.A. 1970: Roman military engineering. In Salway, P. (editor), *Roman Archaeology and Art* (London), 194-198.

Richmond, I.A. (edited Hanson, W.S) 1978-80: A Roman fort at Inveresk, Midlothian. *Proc Soc Antiq Scot* 110, 286-304.

Richmond, I.A. and Birley, E. 1930: Excavations on Hadrian's Wall in the Birdoswald-Pike Hill Sector. *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 30, 169-205.

Richmond, I.A., Hodgson, K.S. and St Joseph, K. 1938: Report of the Cumberland Excavation Committee directed by F. G. Simpson: The Roman Fort at Bewcastle. *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 38, 195-237.

Richmond, I.A. and Webster, G. 1951: Excavations in Goss Street Chester. *Journ Chest Nth Wales Architect Archaeol Hist Soc* 38, 1-38.

Richmond, I.A., St Joseph, J.K. and Gillam J.P. 1951-52: The Roman Fort at Glenlochar, Kirkudbrightshire. *Trans Dumfr Gall Nat Hist Archaeol Soc* 30, 1-16.

Richmond, I.A and Gillam J.P. 1955: Some Excavations at Corbridge 1952-4. *Archaeol Ael* 4th series 33, 218-253.

Richmond, I.A. and St Joseph, J.K. 1955-56: The Roman Fort at Dalswinton. *Trans Dumfr Gall Nat Hist Archaeol Soc* 34, 1-21.

Ridgeway, W. 1905: *The Origin and Influence of the Thoroughbred Horse* (Cambridge).

Rijksmuseum G. M. Kam 1979: *Noviomagus: Auf den Spuren der Römer in Nijmegen* (Nijmegen).

Rimington, M.F. 1897: *Hints on Stable Management* (Aldershot).

Ritterling, E. 1904: Das frührömische Lager bei Hofheim i.T.: Ausgrabungs und Fundbericht. *Nassauische Annalen* 34, 1-110.

Ritterling, E. 1909: Das Kastell Wiesbaden. *Obergermanisch-rätische Limes* Abt B, Band II 3, Kastell Nr 31.

Ritterling, E. 1911: Das Kastell Niederbieber. *Bonner Jahrbücher* 120, 259-285.

Ritterling, E. 1913: Das frührömische Lager bei Hofheim in Taunus. *Nassauische Annalen* 40.

Ritterling, E. 1936: Das Kastell Nieder-Bieber. *Obergermanisch-rätische Limes* Abt B, Band I, Kastell Nr 1a.

Robertson, A.S. 1957: *An Antonine Fort: Golden Hill, Duntocher* (Glasgow).

Robertson, A.S. 1960-61: Excavations at Raeburnfoot, Eskdalemuir, 1959-1960. *Trans Dumf Gall Nat Hist Archaeol Soc* 39, 24-49.

Robertson, A.S. 1964: *The Roman Fort at Castledykes* (Edinburgh/London).

Robertson, A.S. 1975: *Birrens (Blatobulgium)* (Edinburgh).

Robertson, A.S. 1977: Excavations at Cardean and Stracathro, Angus. In Bogaers, J.E. (editor) 1977b, 65-74.

Robertson, A.S. 1979a: *The Antonine Wall* (Glasgow, 5th edition).

Robertson, A.S. 1979b: The Roman Fort at Cardean. In Breeze, D.J. (editor) 1979b, 42-44.

Robertson, A., Scott, M. and Keppie, L. 1975: *Bar Hill: A Roman Fort and its Finds* (Oxford, BAR Brit Ser 16).

Rocester 1986-86: *Rocester Archaeology 1985-86, Excavations 1985-86: Interim Report.*

Rogers, H.C.B. 1959: *The Mounted Troops of the British Army 1066-1945* (London, Imperial Services Library 3).

Romanelli, P. 1942: *La colonna Traiana: relievi fotografici esequiti in occasione dei lavori di protezione antiaerea* (Roma).

Roxan, M.M. 1978: *Roman Military Diplomas 1984-1977* (London, Institute of Archaeology Occasional Publication No 2).

Roxan, M.M. 1985: *Roman Military Diplomas 1978-1984* (London, Institute of Archaeology Occasional Publication No 9).

Roy, W. 1793: *The Military Antiquities of the Romans in Britain* (London, Society of Antiquaries).

Royal Commission on Ancient and Historical Monuments in Wales and Monmouthshire, 1964: *Caernarvon* Vol III (Cardiff, HMSO).

Royal Commission on Ancient and Historical Monuments in Wales and Monmouthshire, 1976: An Inventory of the Ancient Monuments in Glamorgan Vol I ii (Cardiff, HMSO).

Royal Commission on Historical Monuments, England, 1936: *An Inventory of the Historical Monuments in Westmorland (London, HMSO).*

Royal Commission on Historical Monuments, England, 1962: *The City of York Vol I, Eburacum: Roman York* (London, HMSO).

Royal Commission on Historical Monuments, England, 1970: *County of Dorset* (London, HMSO).

Royal Commission on the Ancient and Historical Monunments of Scotland, 1963: *Stirlingshire: an Inventory of the Ancient Monuments* (Edinburgh, HMSO).

Royal Commission on the Ancient and Historical Monuments of Scotland, 1967: *Peebleshire* (Edinburgh, HMSO).

Royal Commission on the Ancient and Historical Monuments of Scotland, 1978: *Lanarkshire* (Edinburgh, HMSO).

Royal Commission on the Ancient and Historical Monuments of Scotland, 1956: *Roxburghshire* (Edinburgh, HMSO).

Rubin, B. 1955: Die Entstehung der Kataphractenreiterei im Lichte der chorezmischen Ausgrabungen. *Historia* 4, 264-283.

Rüger, C. 1980: Research on the Limes of Germania Inferior (German Part), 1974-1979. In Hanson, W.S. and Keppie L.J.F. (editors) 1980, 495-500.

Rüsch, A. 1976: Arae Flaviae: Die Militärlager und die Zivilsiedlung in Rottweil am Neckar. In Temporini, H. (editor) 1976, 560-600.

Rüsch, A. 1977: Ausgrabungen in Rottweil: Vorbericht über die Untersuchungen von 1968 bis 1975. *Fundber Baden-Württemberg* 3, 443-462.

Rüsch, A. 1981: *Das römische Rottweil* (Stuttgart, Führer zu archäologischen Denkmälern in Baden-Württemberg Band 7).

Rüsch, A. 1982: Die Ausgrabungen im römischen Rottweil. *Archäol Ausgrab Bad-Württ* 1982, 83-88.

Rüsch, A. 1983: Die römischen Kastelle von Rottweil - Arae Flaviae. In Landesdenkmalamt Baden-Württemberg 1983, *Führer zu römischen Militäranlagen in Süddeutschland* (Stuttgart), 32-35.

Ruggiero, E.de 1982: *Dizionario epigrafico di anticita romane* (Roma).

Ruprechtsberger, E.M. 1986: Lorch/Enns - Lauriacum. In Kandler, M. and Vetters, H. (editors) 1986, 92-101.

Rusu, M. 1979: Castrul roman de la Gilău. *Studii şi Comunicări de Istorie* 1979, 153-191

Sadée, E. 1925: *Das römische Bonn* (Bonn).

Saddington, D.B. 1975: The development of the Roman auxiliary forces from Augustus to Trajan. In Temporini, H. (editor) 1975, 176-201.

Saddington, D.B. 1986: The Stationing of Auxiliary Regiments in Germania Superior in the Julio-Claudian Period. In Unz, C. (editor) 1986, 779-781.

St Joseph, J.K. 1951: Air Reconnaissance of North Britain. *Journ Rom Stud* 59, 104-128.

St Joseph, J.K. 1961: The Roman fort at Great Casteron: Discovery and Situation. In Corder P. *The Roman Town and Villa at Great Casteron, Rutland. Third Report for the Years 1954-1958* (University of Nottingham), 13-15.

St Joseph, J.K. 1969: Air Reconnaissance in Britain 1965-68. *Journ Rom Stud* 59, 104-128.

St Joseph, J.K. 1973: Air Reconnaissance in Britain 1969-72. *Journ Rom Stud* 63, 214-246.

St Joseph, J.K. 1976: Air Reconaissance of Roman Scotland, 1939-75: *Glasgow Archaeol Journ* 4, 1-28.

St Joseph, J.K. 1977: Air Reconnaissance in Roman Britain 1973-76. *Journ Rom Stud* 67, 125-161.

St Joseph, J.K. 1979: Aerial Reonnaissance: Recent Results. *Antiquity* 53, 51-55

St Joseph, J.K. 1983: The Roman Fortlet at Gatehouse of Fleet, Kirkcudbright. In Hartley, B. and Wacher, J. (editors) 1983, 222-234.

Salomonson, J.W. 1965: *La mosaique aux chevaux de l'antiquarium de Carthage* (The Hague, Archeologische Studien van het Nederlands Historisch Institute te Rom deel I).

Sander, E. 1962: Der praefectus fabrum und die Legionsfabriken. *Bonner Jahrbücher* 162, 139-161.

Sarnowski, T. 1976: Novae Siedziba Pierwszego Legionu Italskigo. *Archeologia* 27, 50-65.

Sarnowski, T. 1977: Fortress of the legio I Italica at Novae. In Fitz, E. (editor) 1977, 409-426.

Sarnowski, T. 1981: The Legionary Defences of Novae: Report on Latest Sections. *Archeologia* 32, 29-46.

Sarnowski, T. 1987: Zur Truppensgeschichte der Dakerkrieges Traians: Die Bonner legio I Minervia und das Legionslager Novae. *Germania* 65 (1), 107-122.

Schallmayer, E. 1979: *Das römische Seligenstadt, Kreis Offendach* (Wiesbaden, Archäologische Denkmäler in Hessen 9).

Schallmayer, E. 1982a: Das Wagbachkastell: ein römisches Erdkastell in der Gemarkung Waghäusel-Wiesental, Kreis Karlsruhe. *Denkmalpfl Baden-Württemberg* 9 (2), 51-54.

Schallmayer, E. 1984: *Der Odenwaldlimes: Vom Main bis an den Neckar* (Stuttgart).

Schick, S. 1974: Das römische Kastell bei Unterkirchberg (Gemeinde Illerkirchberg), Alb-Donau-Kreis. *Archäologische Ausgrabungen* 1974, 26-30.

Schicker, J. 1932: Lauriacum Fundberichte 1930-1931. *Fundber Oesterreich* 1, 127-128.

Schicker, J. 1938: Lauriacum Fundberichte 1937. *Fundber Oesterreich* 2, 269.

Schleiermacher, W. 1936: Das grosse Lager und die Kastelle von Rottweil. *Obergermanisch-rätische Limes* Abt B, Band V 2, Kastell Nr 62.

Schleiermacher, W. 1949: Principia. *Trierer Zeitschrift* 18, 243-248.

Schmid, W.M. 1910: *Das römische Kastell Abusina* (München).

Schnurbein, S.von 1971: Ein Bleibarren der 19, Legion aus dem Hauptlager von Haltern. *Germania* 49, 132-136.

Schnurbein, S.von 1974: Die römische Militäranlagen bei Haltern: Bericht über die Forschungen seit 1899. *Bodenaltümer Westfalens* 14.

Schnurbein, S.von 1977: Die Stand der Erforschung der römischen Militäranlagen bei Haltern. In Bogaers, J.E. (editor) 1977b, 169-174.

Schnurbein, S.von 1979: *Die Römer in Haltern* (Münster, Einführung in die Vor- und Frühgeschichte Westfalens Heft 2).

Schnurbein, S.von 1981: Untersuchungen zur Geschichte der römischen Militärlsger an der Lippe. *Ber Röm-Germ Komm* 62, 5-101.

Schnurbein, S.von 1982: Die neuen römischen Kastelle bei Friedberg, Landkreis Aichach-Friedberg, Schwaben. *Das archäologische Jahr in Bayern* 1982, 99-101.

Schnurbein, S.von 1982: Die unverzierte Terra Sigillata aus Haltern. *Bodenaltertümer Westfalens* 19 (1).

Schnurbein, S.von 1983: Neu entdeckte frühkaiserzeitliche Militäranlagen bei Friedberg in Bayern. *Germania* 61 (2), 529-550.

Schnurbein, S.von 1985: Die Kastelle von Friedberg-Rederzhausen. In Bayerisches Landesamt für Denkmalpflege 1985, 30-31.

Schönberger, H. 1957: Das Kastell Altenstadt. Zum äußeren obergermanischen Limes. *Germania* 35, 54-80.

Schönberger, H. 1959: Eine Grabung im Rendelkastell zu Öhringen. *Fundber Schwaben* new series 15, 46-64.

Schönberger, H. 1959-60: Die römischen Kastellanlagen in Echzell. *Saalburg Jahrbuch* 18, 35-51.

Schönberger, H. 1961: Ein augusteisches Lager in Rödgen bei Bad Nauheim. *Saalburg Jahrbuch* 19, 37-58.

Schönberger, H. 1963-64: Augusteisches Lager Rödgen, Grabung 1963. *Saalburg Jahrbuch* 21, 95-108.

Schönberger, H. 1965: Zur Gröste des Erdkastells in Butzbach. *Saalburg Jahrbuch* 222, 17-27.

Schönberger, H. 1967a: Das augusteische Römerlager in Rödgen: Vorbericht über die Grabungen in den Jahren 1961 bis 1966. *Germania* 45, 84-95.

Schönberger, H. 1967b: Die Kastelle in Miltenberg. In *Führer zu vor- und frühgeschichtlichen Denkmälern Band 8, Miltenberg-Amorbach-Obernburg-Aschaffenburg-Seligenstadt* (Mainz), 75-84.

Schönberger, H. 1969: The Roman frontier in Germany: an archaeological survey. *Journ Rom Stud* 59, 144-197.

Schönberger, H. 1972a: Das Römerkastell Oberstimm: Bericht über die Grabungen von 1968 bis 1971. *Bayerische Vorgeschichtsblätter* 37, 31-39.

Schönberger, H. 1972: Das Römerkastell Öhringen-West (Burgkastell). *Ber Röm-Germ Komm* 53, 233-282.

Schönberger, H. 1972: Neue Ausgrabungen in Römerkastell Oberstimm an der oberen Donau. In Birley, E., Dobson, B. and Jarrett, M.G. (editors) 1972, 409-414.

Schönberger, H. 1973: Das römische Öhringen. In *Führer zu vor- und frühgeschichtlichen Denkmälern, Band 24, Hohenloher Land-Öhringen-Jagsthausen-Künzelsau-Langenburg* (Mainz), 119-127.

Schönberger, H. 1974: Review of Fischer, U. 1973. *Germania* 52, 550-553.

Schönberger, H. 1975: *Kastell Künzing-Quintana: Die Grabungen von 1958-1966* (Berlin, Limesforschungen Band 13).

Schönberger, H. 1978a: Das Römerkastell Okarben. *Wetterauer Geschichtsblätter* 27, 1-9.

Schönberger, H. 1978b: *Kastell Oberstimm* (Berlin, Limesforschungen Band 18).

Schönberger, H. 1979: Valkenburg Z.H.: Praetorium oder Fabrica? *Germania* 57, 135-141.

Schönberger, H. 1980a: Recent Research on the Limes in Germania Superior und Raetia. In Hanson, W.S. and Keppie, L.J.F. (editors) 1980, 541-552.

Schönberger, H. 1980b: Römerkastell Moos, Landkreis Deggendorf, Niederbayern. *Das archäologische Jahr in Bayern* 1980, 114-115.

Schönberger, H. 1981: Das römische Kastell Altenstadt. *Wetterauer Geschichtsblätter* 30, 23-30.

Schönberger, H. 1982: Moos-Burgkastell: Ein Neues Römerkastell. *Ber Röm-Germ Komm* 63, 179-279.

Schönberger, H. 1985: Die römischen Truppenlager der frühen und mittleren Kaisezeit zwischen Nordsee und Inn. *Ber Röm-Germ Komm* 66, 321-497.

Schönberger, H. and Simon, H.-G. 1976: *Römerlager Rödgen. Das augusteische Römerlager Rödgen. Die Funde aus den frühkaiserzeitlichen Lagern Rödgen, Friedberg und Bad Nauheim* (Berlin, Limesforschungen Band 22).

Schönberger, H. and Simon, H.-G. 1980: *Das Kastell Okarben und die Besetzung der Wetterau seit Vespasian* (Berlin, Limesforschungen Band 19).

Schönberger, H. and Simon, H.-G. 1983: *Die Kastelle in Altenstadt* (Berlin, Limesforschungen Band 22).

Scholfield, K.L. 1983: *Roman Military Stabling* (Exeter University, unpublished BA dissertation).

Schoppa, H. 1974: *Aquae Mattiacae: Wiesbadens römische und alamannisch-merowingische Vergangenheit* (Wiesbaden).

Schoppa, H. 1975: Review of Fischer, U. 1973. *Nassauische Annalen* 86, 301-302.

Schröder, O. 1979: Bodenchemische Untersuchung von Reduktionsverfärbungen. In Müller, G. 1979a, 129.

Schulten, A. 1927-29: *Numantia: die Ergebnisse der Ausgrabungen 1905-12*, Vols 3-4.

Schulten, A. 1933: *Masada, die Burg des Herodes und die römischen Lager* (Leipzig).

Schultz, P. 1904: Die Kastelle bei Welzheim. *Obergermanisch-rätische Limes* Abt B, Band IV Kastell Nr 45 und 45a.

Schulze, R. 1934: Legionary Hospitals. *Bonner Jahrbücher* 139, 54-63.

Schwarz, K. 1971: *Die Ausgrabungen im Niedermünster zu Regensburg* (Kallmünz/Opf., Führer zu archäologischen Denkmälern in Bayern Heft 1, Bayerisches Landesamt für Denkmalpflege).

Schwarz, K. 1972-73: *Die Ausgrabungen im Niedermünster zu Regensburg. Ansprachen anlässlich der Eröffnung des archäologischen Untergeschosses und wissenschaftlicher Bericht* (Fortdruck aus den Jahresbericht der Bayerischen Bodendenkmalpflege 13/14, 1972/73).

Schweizer, R. 1975: Eine Notgrabung im Kohortenkastell Murrhardt, Rems-Murr-Kreis. *Archäologische Ausgrabungen* 1975, 39-42.

Scott, K. 1978: The Fort at Mancetter. *West Midlands Archaeological News Sheet* (CBA Group 8) 21, 39-42.

Scott, K. 1980: Mancetter. *West Midlands Archaeological News Sheet* (CBA Group 8) 23, 104.

Seillier, C. 1980: Les travaux militaires d'époque romaine dans le Nord de la France. *Septentrion* numero spéciale 10, 25-29.

Seillier, C. 1984: La flotte de Bretagne. *Histoire et Archéologie* 86, 71-75.

Seillier, C. and Gosselin, J.Y. 1969: Novelles estampilles de la flotte de Bretagne en provenance de Boulogne-sur-Mer. *Revue du Nord* 51, 363-372, No 202.

Shimmin, D. 1985: Century barracked at the Gilberd. *Catalogue* 17, 3-5.

Simon, H.-G. 1968: Das Kleinkastell Degerfeld in Butzbach, Kr. Feldberg (Hessen): Datierung und Funde. *Saalburg Jahrbuch* 25, 5-64.

Simon, H.-G. 1968: Spuren der Ala Moesica Torquata aus Obergermanien. *Saalburg Jahrbuch* 25, 193-201.

Simonett, C. 1934: Grabungen der Gesellschaft Pro Vindonissa im Jahre 1933. *Anz Schweiz Alt* 36, 73-104.

Simonett, C. 1936: Grabungen der Gesellscaft Pro Vindonissa in den Jahren 1934 und 1935 auf der Breite. *Anz Schweiz Alt* 38, 161-176.

Simonett, C. 1937: Grabungen der Gesellscaft Pro Vindonissa in den Jahren 1935 und 1936 auf der Breite (K-P 1446). *Anz Schweiz Alt* 39; 81-92, 201-217.

Simonett, C. 1938: Grabungen der Gesellscaft Pro Vindonissa im Jahre 1937. *Anz Schweiz Alt* 40, 81-108.

Simonett, C. 1939: Grabungen der Gesellscaft Pro Vindonissa im Jahre 1938. *Zeitschr Schweiz Archaeol Kunstgesch* 1, 106-113.

Simonett, C. 1941: Grabungen der Gesellscaft Pro Vindonissa im Jahre 1940. *Zeitschr Schweiz Archaeol Kunstgesch* 3, 170-175.

Simonett, C. 1941-42: Die Ausgrabungen. *Jahresber Gesell Pro Vind* 1941/42, 4-10.

Simonett, C. 1943-44: Die Ausgrabungen. *Jahresber Gesell Pro Vind* 1943/44, 21-29

Simonett, C. 1945-46: Frühe Terra Sigillata aus Vindonissa. Ein Beitrag zur Frage der Gründung des Lagers. *Jahresber Gesell Pro Vind* 1945/46, 5-25.

Simpson, F.G. 1913: High House Milecastle. In Excavations on the Line of the Roman Wall in Cumberland during the years 1909-1912, *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 13, 297-397 (312-314).

Simpson, F.G. and Richmond, I.A. 1933: Birdoswald. In Excavations on Hadrian's Wall: Report of the Cumberland Excavation Committee for 1932, *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 33, 246-277 (246-262).

Simpson, F.G. and Richmond, I.A. 1934: Birdoswald. In Excavations on Hadrian's Wall: Report of the Cumberland Excavation Committee for 1933, *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 34, 120-158 (120-130).

Simpson, F.G. and Richmond, I.A. 1935a: Bankshead Milescastle 52. In Report of the Cumberland Excavation Committee for 1934, *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 35, 213-258 (247-256).

Simpson, F.G. and Richmond, I.A. 1935b: Randylands Milecastle 54. In Report of the Cumberland Excation Committee for 1934, *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 35, 213-258 (236-244).

Simpson, F.G. and Richmond, I.A. 1936: The Roman Fort on the Stanegate, and other remains, at Old Church, Brampton. *Trans Cumb Westm Antiq Archaeol Soc* 2nd series 36, 172-182.

Simpson, F.G. and Richmond, I.A. 1937: The Fort on Hadrian's Wall at Halton. *Archaeol Ael* 4th series 14, 151-171.

Simpson, F.G. and Richmond, I.A. 1940-41: Petriana and the Tactical Arrangement of Hadrian's Wall in Cumberland. *Durham University Journal* new series 33 (2), 102-110.

Simpson, F.G. and Richmond, I.A. 1941: The Roman Fort on Hadrian's Wall at Benwell. *Archaeol Ael* 4th series 19, 1-43.

Simpson, F.G., Richmond, I.A. and Mc Intyre J. 1934: Milecastles on the Line of the Turf Wall. *Trans Cumb West Antiq Archaeol Soc* 2nd series 24, 144-148.

Simpson, F.G., Richmond, I.A. and St Joseph, K. 1935: The Turf-Wall Milecastle at High House. In Report of the Cumberland Excavation Committee for 1934, *Trans Cumb Westm Antiq Archaeol Soc* 35, 213-258 (220-229).

Simpson, G. 1962: Caerleon and the Roman Forts in Wales in the second century AD (Part 1). *Archaeol Camb* 111, 103-166.

Simpson, G. 1963: Caerleon and the Roman Forts in Wales in the second century AD (Part 2). *Archaeol Camb* 112, 49-66.

Simpson, G. 1973: Roman Manchester and Templebrough: The Forts and Dates Revised. In Hawkes, C. and Hawkes, S. (editors), *Greeks, Celts and Romans* (London, Studies in Venture and Resistance, Archaeology into History I), 61-93.

Singer, C., Holmyard, E.J., Hall, A.R. and Williams, T.I. (editors) 1956: *A History of Technology,* Vols I-III (Oxford).

Sites Review 1975a: City Garage, Blake Street. *Interim* 3 (2), 13-25.

Sites Review 1975b: City Garage, Blake Street. *Interim* 3 (3), 15-25.

Sitwell, R. (editor) 1976: *The Princeton Encyclopaedia of Classical Sites* (Princeton).

Smith, N.A. 1982: Culver Street. *Catalogue* 11, 2-4.

Söllner, M. 1968: Neue römische Funde aus Butzbach. *Wetterauer Geschichtsblätter* 17, 9-19.

Sölter, W. 1971: Die Bonner Ausgrabung 1971. *Das Rheinische Landesmuseum Bonn* '71 (6), 81-84.

Sölter, W. 1972a: Am Rande einer Ausgrabung. *Das Rheinische Landesmuseum Bonn* '72 (2), 17-18.

Sölter, W. 1972b: Vögel und Männer: Funde der Bonner Grabung 1972. *Das Rheinische Landesmuseum Bonn* '72 (6), 84-85.

Sölter, W. 1975: Die Ausgrabungen 1975 im römischen Legionslager Bonn. *Rheinische Ausgrabungen* '75.

Sölter, W. 1977: Das Ende einer Ausgrabung: Die Ausgrabungen 1976 im römischen Legionslager Bonn. *Rheinische Ausgrabungen* '76.

Sölter, W. (editor) 1981: *Das römische Germanien aus der Luft* (Bergisch-Gladbach).

Sommer, C.S. 1984: *The Military Vici in Roman Britain: Aspects of their Origins, their Location and Layout, Administration, Function and End* (Oxford, BAR Brit Ser 129).

Speidel, M. 1965: *Die Equites Singulares Augusti: Begleittruppe der römischen Kaiser des zweiten und dritten Jahrhunderts* (Bonn).

Speidel, M. 1973: The pay of the auxilia. *Journ Rom Stud* 63, 141-147.

Speidel, M.P. 1978: *Guards of the Roman Armies: An essay on the singulares of the provinces* (Bonn).

Spratt, D.A. (editor) 1982: *Prehistoric and Roman Archaeology of North-East Yorkshire* (Oxford, BAR Brit Ser 104).

Stanford, S.C. 1960: The Roman Fort at Buckton Herefordshire: excavations 1959. *Trans Woolhope Nat Field Club* 36, 87-99.

Stanford, S.C. 1967-69: The Roman Forts at Leintwardine and Buckton. *Trans Woolhope Nat Field Club* 39, 222-326.

Starr, C.G. 1960: *Roman Imperial Navy 31 BC - AD 324* (Cambridge, 2nd edition)

Steer, K.A. 1948-49: The Roman Fort at Whitemoss, Renfrewshire. *Proc Soc Antiq Scot* 83, 28-32.

Steer, K.A. 1960-61: Excavations at Mumrills Fort 1958-60. *Proc Soc Antiq Scot* 94, 86-133.

Steer, K.A. and Feachem, R.W. 1961-62: The Excavations at Lyne, Peebleshire 1959-63. *Proc Soc Antiq Scot* 95, 208-218.

Steimle, Z.D. 1894: Das Kastell Unterböbingen. *Obergermanisch-rätische Limes* Abt B, Band VI, Kastell Nr 65.

Steger, U. 1982: Zu den Tierknochenfunde der Grabung Moos-Burgstall. In Schönberger H. 1982, 269-273.

Stevens, C.E. 1942: Notes on Roman Chester. *Journ Chest Archaeol Soc* 35, 49-52.

Stevenson, G.H. and Miller, S.N. 1911-12: Report on the Excavations at the Roman Fort of Cappuck, Roxburghshire. *Proc Soc Antiq Scot* 46, 446-483.

Stieren, A. 1925-28: Der Bericht: Reg-Bezirk Münster, Kr. Coesfeld, Haltern. *Bodenaltertümer Wesfalens* 1, 13-22.

Stieren, A. 1928: Die neuen Grabungen in Haltern, I Teil, Gesamtübersicht. *Germania* 12, 70-76.

Stieren, A. 1932: Grabungen in Haltern 1929-1931: *Germania* 16, 36-45.

Stieren, A. 1943: Die Funde von Haltern seit 1925. *Bodenaltertümer Westfalens* 6, 7-14.

Stiglitz, H. 1975: Das römische Donaukastell Zwentendorf in Niederösterreich: Die Grabungen 1953-1962. *Der römische Limes in Österreich* Heft XXVI.

Stiglitz, H. 1978: Grabungen im Bereich von Petronell. *Pro Austria Romana* 28, 10-11.

Stiglitz, H. 1978-80: Carnuntum - Zivilstadt und Auxiliarlager: Grabungen 1975-77. *Jahresh Österr Archäol Inst Wien* 52, (Beiblatt - Grabungen) 26.

Stiglitz, H. 1980: *Petronell. Fundber Österreich* 19, 532-537.

Stiglitz, H. 1982a: Petronell. *Fundber Österreich* 21, 289-290.

Stiglitz, H. 1982b: Niederösterreich: Carnuntum Auxiliarkastell. *Jahresh Österr Archäol Inst Wien* 53, (Beiblatt - Grabungen) 32-33.

Stiglitz, H. 1983a: Untersuchungen im Auxiliarkastell. *Mitt Gesell Freud Carn* 83 (1), 9-15.

Stiglitz, H. 1986a: Das Auxiliarkastell von Carnuntum. In Unz, C. (editor) 1986, 416-420.

Stiglitz, H. 1986b: Zwentendorf - Asturis. In Kandler, M. and Vetters, H. 1986, 148-153.

Stiglitz, H., Kandler, M. and Jobst, W. 1977: Carnuntum. In Temporini, H. and Haase, W. 1977, 583-730.

Stoia, A. 1980: Les fouilles archéologiques en Roumanie (1979). *Dacia* new series 24, 335-370.

Stoia, A. 1981: Les fouilles archéologiques en Roumanie (1980). *Dacia* new series 25, 363-379.

Strickland, T.J. 1974: Chester: Crook Street. *Chesh Archaeol Bull* 2, 16-17.

Strickland, T.J. 1975: Chester: Crook Street. *Chesh Archaeol Bull* 3, 38.

Strickland, T.J. 1978: The fortress in the second and third centuries. In Strickland, T.J. and Davey, P.J. 1978, 25-28.

Strickland, T.J. 1980: First Century Chester: Some Evidence reconsidered in the light of Recent Archaeological Discoveries. *Journ Chest Archaeol Soc* 63, 5-12.

Strickland, T.J. 1982a: Chester: Excavations in the Princess Street/Hunter Street Area 1978-82. A First Report on Discoveries of the Roman Period. *Journ Chest Archaeol Soc* 65, 5-24.

Strickland, T.J. 1982b: *Summary Report on Excavations in the Princess Street Area 1979-82* (Grosvenor Museum Excavations: Newsletter).

Strickland, T.J. and Davey, P.J. (editors) 1978: *New Evidence for Roman Chester: Material from the Chester Conference of November 1977* (University of Liverpool, Institute of Extension Studies).

Stroh, A. 1958: Untersuchung an der Südostecke des Lagers der Legio III It. in Regensburg. *Germania* 36, 78-89.

Studien zu den Militärgrenzen Roms 1967: Vorträge des 6. Internationalen Limeskongresses in Süddeutschland (Köln, Beihefte der Bonner Jahrbücher Band 19).

Summerhays, R.S. 1978: *The Observer's Book of Horses and Ponies* (London, revised Goodall, D.M.).

Svoboda, B. 1962: Zur Geschichte des Römerkastell in Leányvar bei Iža, Bezirk Komárno. *Slovenská Archeológica* 10 (2), 422-423.

Swoboda, E. 1937: Lauriacum: Grabungen in Enns im Jahre 1936. *Jahresh Österr Archäol Inst Wien* 30, 253-308.

Swoboda, E. (editor) 1956: *Carnuntia: Vorträge beim Internationalen Kongress der Altertumforscher, Carnuntum 1955* (Köln and Graz, Römische Forschungen in Niederösterreich Band 3).

Swoboda-Milenović, R.M. 1957: Grabung 1958. *Carnuntum Jahrbuch* 1957, 21-47.

Szilágyi, M. 1986: Zur Rangordnung der rheinischen Legionen im 1. Jahrhundert n. Chr. In Unz, C. (editor) 1986, 787-791.

Szirmai, K. 1976: Prelimiary Report on the Excavations conducted at the Principia of the Obuda Legionary Camp and its immediate vicinity. *Budapest Régiségei* 24 (1), 109.

Szirmai, K. 1980: Kutatások az aquincumi II-III. századi legióstábor praetentúrájának északi részéu 1973-1977-ben. *Archaeologiai Értesitó* 107, 187-200.

Szirmai, K. 1986: Das Straßennetz des Legionlagers von Aquincum im 2. und 3. Jahrhundert. In Unz, C. (editor) 1986, 426-428.

Szönyi, E.T. 1981: Forschungen im Auxiliarkastell von Arrabona. *Alba Regia* 19, 135-139.

Tarn, W.W. 1930: *Hellenistic Military and Naval Developments* (Cambridge).

Tattersall, G. 1941: *Sporting Architecture* (London).

Temporini, H. (editor) 1974: *Aufstieg und Niedergang der römischen Welt* II Band 1 (Berlin).

Temporini, H. (editor) 1975: *Aufstieg und Niedergang der römischen Welt* II Band 3 (Berlin).

Temporini, H. (editor) 1976: *Aufstieg und Niedergang der römischen Welt* II Band 5 (1) (Berlin).

Temporini, H. (editor) 1977: *Aufstieg und Niedergang der römischen Welt* II Band 6 (Berlin).

Temporini, H.and Haase, W. (editors) 1977: *Aufstief und Nidergang der römischen Welt* II Band 8 (Berlin).

Thijssen, J.R.A.M. 1976: Zoologica. In Bogaers J.E. and Haalebos, J.K. 1976, 189.

Thijssen, J.R.A.M. 1977: Zoologica. In Bogaers, J.E. and Haalebos, J.K. 1977, 145-146.

Thomas, J.D. and Davies, R.W. 1977: A New Military Strength Report on Papyrus. *Journ Rom Stud* 67, 50-61.

Thompson, F.H. 1959: Excavations at 62-66 Foregate Street 1956. *Journ Chest Archaeol Soc* 46, 63-72.

Thompson, F.H. 1963: Review of Baatz, D. 1962. *Journ Rom Stud* 53, 236-237.

Thompson, F.H. 1967: Excavations at Bolland's Court, Chester, 1954 and 1959. *Journ Chest Archaeol Soc* 54, 1-3.

Thompson, F.H. 1967: The Roman Fort at Castleshaw: Excvations 1957-64. *Trans Lancs Chesh Antiq Soc* 77, 1-18.

Threipland, L.M. 1967: Excavations at Caerleon 1966: Barracks in the North Corner. *Archaeol Camb* 116, 23-??.

Tischler, F. 1952: Die Rheinnnuferlage von Asberg und Werthausen, Krs. Moers. *Rheinische Vierteljahrsblätter* 17, 427-435.

Tocilesco, Gr.G 1910: Fouilles et recherches archéologiques en Roumanie. In *Communications faites à l'Académie des Inscriptions et Belles-Letters de Paris 1892-1899*, 140-141.

Todd, M. (editor) 1968: *The Roman Fort at Great Casterton, Rutland: Excavations of 1960 and 1962, directed by the late Sir Ian Richmond and the late Dr Philip Corder. A report compiled and edited by Malcolm Todd* (University of Nottingham).

Todd, M. 1985: The Roman Fort at Bury Barton, Devonshire. *Britannia* XVI, 49-55

Todd, M. 1986: Die Ausgrabungen in Hembury (Devon) und die römische Eroberung Sudwest-Englands. In Unz, C. (editor) 1986, 64-68

Tomasević, T. 1962: Bericht über die Untersuchung der Steinbauperioden in Widemer, H.R. 1962b, 33-47.

Tomasević, T. 1963: Ausgrabung Königsfelden 1963. *Jahresber Gesell Pro Vind* 1963, 15-24.

Tortorici, E. 1975: *Castra Albana* (Rome, Forma Italiae, Regio I, Vol II).

Tóth-Kurucz, J. 1914: *Római mjomek a Pannoniai Duna-Limes balpartján* (Kemárem).

Toynbee, J.M.C. 1973: *Animals in Roman Life and Art* (London).

Tragau, 1897: Ausgrabungen in Carnuntum. *Archäol-Epig Mitt* 20, 173-224.

Trousset, P. 1977: Le Camp de Gemellae sur les Limes de Numidie d'après les fouilles du colonel Baradez (1947-1950). In Fitz, J. (editor) 1977, 559-576.

Tudor, D. 1977: Le rôle defensiv du camp romain de Slăveni sue le Limes Alutanus en Dacie Inferieure. In Bogaers, J.E. (editor) 1977b, 399-403.

Ubl, H.-J. 1969: Zeiselmauer. *Fundber Österreich* 9 (4), 204.

Ubl, H.-J. 1970: Zeiselmauer. *Fundber Österreich* 9 (5), 289-290.

Ubl, H.-J. 1974-75: Österreichische Limesforschung seit 1945. *Mitt Österr Arbeitssgem Ur- Frühgesch* 25, 145-194.

Ubl, H.-J. 1974: Traismauer. *Fundber Österreich* 13, 119-120.

Ubl, H.-J. 1975a: Grabungen im Bereich der Principia von Augustiana-Traismauer. *Pro Austria Romana* 25, 7.

Ubl, H,-J. 1975b: Die Lagerbauinschrift von Traismauer-Augustiana. *Pro Austria Romana* 25, 17-18.

Ubl, H.-J. 1975c: Kirchengrabung Traismauer 1975. *Pro Austria Romana* 25, 32-34.

Ubl, H.-J. 1976a: Eine Weihung der Cohors II Thracum equ.p.f. in Zeiselmauer. *Pro Austria Romana* 26, 11-12.

Ubl, H.-J. 1976b: Die restaurierten Ausgrabungen unter der Pfarrkirche Traismauer. *Pro Austria Romana* 26, 26-27.

Ubl, H.-J. 1977a: *Archäologische Untersuchungen unter der Stadtpfarrkirche Traismauer* (Traismauer, Kirchenführer, 3-7).

Ubl, H.-J. 1977b: Der spätrömische Burgus von Zeilselmauer: Grabung und Restaurierung. In Bogaers, J.E. (editor) 1977b, 251-262.

Ubl, H.-J. 1977-78: Die Cohors II Thracum Eq.P.F., eine bisher am norischen Limes Unbekannte Truppe. *Römisches Österreich* 5/6, 231-246.

Ubl, H.-J. 1980: Der Österreichisches Abschnitt des Donaulimes: Ein Forschungsbericht (1970-1979). In Hanson, W.S. and Keppie, L.J.F. (editors) 1980, 587-611.

Ubl, H.-J. 1986: Traismauer - Augustianis. In Kandler, M. and Vetters, H. 1986, 142-146.

Uerpmann, H.-P. 1980: Die Tierknochenfunde. In Koschik, H. 1980b, 153-154.

Uerpmann, M. 1973: Pferdeskelettfunde aus dem römischen Lager Dangstetten. *Archäol Nachricht Baden* 11, 12-16.

Uerpmann, M. 1980: Dangstetten. *Fundber Baden-Württemberg* 5, 186-187.

Ulbert, G. 1965: *Der Lorenzburg bei Epfach: Die frührömische Militärstation* (München, Veröffentlichungen der Kommission zur archäologischen

Erforschung des spätrömischen Raetien der bayerischen Akademie der Wissenschafte Band 3, Epfach III)

Ulbert, G. 1969: *Das frührömische Kastell Rheingönheim: Die Funde aus den Jahren 1912 und 1913* (Berlin, Limesforschungen Band 9).

Ulbert, G. 1970: *Das römische Donau-Kastell Rißtissen. Teil I: Die Funde aus Metall, Horn und Knochen* (Stuttgart, Urkunden zur Vor- und Frühgeschichte aus Südwürttemberg-Hohenzollen Heft 4).

Ulbert, G. and Fischer, T. 1983: *Der Limes in Bayern* (Stuttgart).

Unz, C. 1975: Vindonissa: Bibliographie. *Jahresber Gesell Pro Vind* 1975, 23-46.

Unz, C. (editor) 1986: *Studien zu den Militärgrenzen Roms III: 13 Internationaler Limeskongreß Aalen 1983 Vorträge, Stuttgart* (Stuttgart, Forschungen und Berichte zur Vor- und Frühgeschichte in Baden-Württemberg Band 20).

Utley, R.M. 1973: *Frontier Regulars: the United States Army and the Indian 1866-1891* (New York and London).

Utley, R.M. 1975: *Bluecoats and Redskins* (London).

Vágó, E.B. 1971: Ausgrabungen in Intercisa (1957-1969). *Alba Regia* 11, 109-119

Van Mensch, P.J. 1974: A Roman soup-kitchen at Zwammerdam? *Ber Rijk Oud Bod* 24, 159-165.

Vasić, M. 1982-83: Čezava - Castrum Novae. *Starinar* new series 33-34, 121-122.

Vasić, M. and Kondić, V. 1986: Le limes romain et paleobyzantin des Portes de Fer. In Unz, C. (editor) 1986, 542-559.

Veeck, W. and Knorr, R. 1929: Das Donau-Iller Kastell Unterkirchberg. *Germania* 13, 1-19.

Veith, D.C.von 1888: *Das roemische Lager in Bonn: Festschrift zu Winckelmann's Geburtstag am 9 Dezember 1888* (Bonn, Herausgegeben vom Vorstande des Vereins von Altertumsfreunden in Rheinlande).

Vetters, H. 1969: Die Grabungen der Limeskommission im Legionslager von Carnuntum. *Anz Österr Akad Wiss (Phil-Hist Klasse)* 106, 369-371.

Vetters, H. 1977: Lauriacum. In Temporini, H. (editor) 1977, 355-379.

Vigneron, P. 1968: *Le cheval dans l'antiquité gréco-romaine* (Nancy).

Visy, Zs. 1973: Vorläufiger Bericht über die Ausgrabungen von Intercisa in den Jahren 1970-1972. *Alba Regia* 13, 258-263.

Visy, Zs. 1977: *Intercisa* (István Király Múzeum Kőxleménges).

Visy, Zs. 1977: Intercisa. In Fitz, J. (editor) 1977, 103.

Vogue, M.de 1867: *Syrie centrale: architecture civile et religieuse di I^er au VII^er siècle* (Paris).

Wacher, J.S. 1969: *Excavations at Brough-on-Humber 1958-9* (London, Society of Antiquaries Research Report 13).

Wacher, J.S. and Mc Whirr, A. 1982: *Early Roman Occupation at Cirencester* (Cirencester Excavation Committee, Cirencester Excavations I).

Wade, W.V. 1952: The Roman Fort at Bainbridge, Wesleydale. *Proc Leeds Phil Soc* 7 (1), 1-19.

Wade, W.V. 1953: The Roman Fort at Bainbridge: Excavations of 1952 and 1953. *Proc Leeds Phil Soc* 7, (3), 153-166.

Wahl, J., Schallmayer, E. and Wahl J. 1975: Untersuchungen an Wp. 4/5 - Steinturm. *Fundber Hessen* 15, 253-302.

Walbank, F.W. 1957: *A Commentary on Polybius*, I (Oxford).

Waldmann, K. 1967: Die Knochenfunde aus der Colonia Ulpia Traiana, ein römischen Staadt bei Xanten am Niederrhein. *Archaeo-Physika* 3.

Waley, A. 1955: The Heavenly Horses of Fergana: A New View. *History Today* 5 (2), 95-103.

Walsh, J.H. 1899: *The Horse in the Stable and in the Field* (London, revised edition Leeney, H.).

Walthew, C.V. 1978: Property Boundaries and the Sizes of Building Plots in Roman Times. *Britannia* 9, 335-350.

Walthew, C,V. 1981: Possible Standard Units of Measurement in Roman Military Planning. *Britannia* 12, 15-35.

Wamser, L. 1976: Biricianus - Weißenburg, Iciniacum - Theilenhofen: Römisches an Altmühl und Rezat. *Ausgrabungsnotizen aus Bayern* 1976/1.

Ward, J. 1903: *The Roman Fort of Gellygaer* (London).

Ward, J. 1911a: *Romano-British Buildings and Earthworks* (London).

Ward, J. 1911b: The Roman Fort at Gellygaer: The annexe. *Trans Cardiff Natur Soc* 44, 65-91.

Ward, J. 1913: The Roman Fort at Gellygaer. Discoveries made in 1913. *Trans Cardiff Natur Soc* 46, 1-20.

Ward, J. 1941: The Iron Age Horseshoe and its Derivatives. *Antiq Journ* 21, 9-27.

Ward, S. and Strickland, T.J. 1978: *Excavations on the Site of the Northgate Brewery Chester 1974-5: A Roman Centurion's Quarters and Barrack* (Chester, Grosvenor Museum).

Ward-Perkins, J.B. 1941: The Iron Age Horseshoe. *Antiq Journ* 21, 144-149.

War Office, 1904: *Manual of Horse and Stable Management* (London, HMSO).

War Office 1937: *Manual of Horsemastership, Equitation and Animal Transport* (London, HMSO).

Watson, G.R. 1958: The Pay of the Roman Army. *Historia* 7, 113-120.

Watson, G.R. 1959: The Pay of the Roman Army. *Historia* 8, 372-378.

Watson, G.R. 1969: *The Roman Soldier* (London).

Watson, G.R. 1974: Documentation in the Roman Army. In Temporini, H. (editor) 1974, 493-507.

Webster, G. 1951: Roman Walling under Northgate Brewery. *Journ Chest Archaeol Soc* 38, 174-175.

Webster, G. 1956a: Excavation of the Roman remains East of Trinity Street. *Journ Chest Archaeol Soc* 43, 27-33.

Webster, G. 1956b: Further excavations at the Roman Fort at Metchley, Birmingham, 1954. *Trans Birm Archaeol Soc* 72, 1-4.

Webster, G. 1958: The Military Advance under Ostorius Scapula. *Archaeol Journ* 115, 94.

Webster, G. 1960a: Excavations at Little Chester, Derby, 1960. *Derb Archaeol Journ* 81, 85-110.

Webster, G. 1960b: The discovery of a Roman Fort at Waddon Hill, Stoke Abbot, 1959. *Dorset Nat Hist Archaeol Soc* 82, 88.

Webster, G. 1961: Excavations at Little Chester, Derby. *Derb Archaeol Journ* 81, 85-110.

Webster, G. 1964: Further Excavations on the Site of the Roman Fort at Waddon Hill, Stoke Abbott, 1960-62. *Dorset Nat Hist Archaeol Soc* 86, 135-149.

Webster, G. 1969a: *The Roman Imperial Army* (London, 1st edition).

Webster, G. 1969b: Waddon Hill Roman Fort 1969. *Dorset Nat Hist Archaeol Soc* 91, 180.

Webster, G. 1970: The Military Situations in Britain between AD 43 and 71. *Britannia* 1, 179-198.

Webster, G. 1979a: *Boudica* (London).

Webster, G. 1979b: Final Report on the Excavations of the Roman Fort at Waddon Hill, Stoke Abbot, 1963-69. *Dorset Nat Hist Archaeol Soc* 101, 51-90.

Webster, G. 1980a: *The Roman Imperial Army* (London, 2nd edition).

Webster, G. 1980b: *The Roman Invasion of Britain* (London).

Webster, G. 1981: *Rome against Caratacus* (London).

Weerd, M.D.de 1977: The date of Valkenburg I reconsidered: the reduction of a multiple choice question. In Beck, B.L.van, Brandt, R.W. and Groenman-van Waateringe, W. (editors), *Ex Horreo*, 255-259.

Wegeleben, T. 1913: Die Rangordnung der römischen Centurionen (Berlin).

Weinstein, M.E. and Rurner, E.G. 1976: Greek and Latin Papyri from Qasr Ibrîm. *Journ Egypt Archaeol* 62, 115-130.

Weiss, J. and Holliger, C. 1979-80: Windisch. Grabung Dätwiler 1979/80: Gruben und Schachte. *Jahresber Gesell Pro Vind* 1979/80, 23-59.

Wells, C.M. 1972: The German Policy of Augustus (Oxford).

Wells, C.M. 1977a: Review of Schnurbein, S.von 1974. *Britannia* 8, 463-466.

Wells, C.M. 1977b: Where did they put the horses? In Fitz, J. (editor) 1977, 659-665.

Wenham, P. 1959-62: Excavations and Discoveries within the Legionary Fortress in Davygate, York 1955-8. *Yorks Archaeol Journ* 40, 507-587.

Wenham, P. 1972: Excavations in Low Petergate, York 1957-8. *Yorks Archaeol Journ* 44, 65-113.

Wheeler, R.E.M. 1923: Segontium and the Roman occupation of Wales. *Y Cymmrodor*, 33.

Wheeler, R.E.M. 1926: *The Roman fort near Brecon* (London, Honourable Society of Cymmrodorion).

White, K.D. 1970: *Roman Farming* (London and Southampton).

Wiedemer, H.R. 1961-62: Ausgrabung Königsfelden 1961. *Jahresber Gesell Pro Vind* 1961/62, 19-46.

Wiedemer, H.R. 1962a: Hauptergebnisse der Ausgrabungen in Königsfelden 1961/62. *Jahresber Gesell Pro Vind* 1962, 15-30.

Wiedemer. H.R. 1962b: Ausgrabung Königsfelden 1962. *Jahresber Gesell Pro Vind* 1962, 31-54.

Wiedemer, H.R. 1966-67: Der Stand der Erforschung des römischen Legionslager von Vindonissa. *Jahrbuch Schweiz Gesell Ur- Frühgesch* 53, 63-77.

Wijngaarden-Bakker, L.H. 1970: Dierenresten uit het castellum te Zwammerdam: Voorbericht over de opgravingscampagnes 1968 en 1969. *Helinium* 10, 274-278.

Wilkes, J.J. 1960: Excavations at Housesteads in 1959. *Archaeol Ael* 4th series 38, 61-71.

Wilkes, J.J. 1961: Excavations in Housesteads Fort 1960. *Archaeol Ael* 39, 279-331.

Wilkes, J.J. 1969: *Dalmatia* (London).

Wilkes, J.J. 1974: The Antonine Wall Fortlet at Wilderness Plantation. *Glasgow Archaeol Journ* 3, 51-65.

Wilson, D.R. (editor) 1970: Roman Britain in 1969. *Britannia* 1, 269-315.

Wilson, D.R. (editor) 1971: Roman Britain in 1970. *Britannia* 2, 243-288.

Wilson, D.R. (editor) 1973: Roman Britain in 1972. *Britannia* 4, 271-323.

Wilson, D.R. (editor) 1974: Roman Britain in 1973. *Britannia* 5, 396-460.

Wilson, D.R. (editor) 1975: Roman Britain in 1974. *Britannia* 6, 220-283.

Wilson, D.R. 1977: A First-Century Fort near Gosbecks, Essex. *Britannia* 8, 185-187.

Wilson, R.J.A. 1980: *Roman Forts* (London).

Winkelmann, F. 1901: Das Kastell Pfünz. *Obergermanisch-rätische Limes* Abt B, Band VII, Kastell Nr 73.

Winkelmann, F. 1917: Der römische Burgus in der Harlach bei Weißenburg i.B. *Germania* 1, 45-54.

Winkelmann, F. 1918: Die römischen Burgi in der Harlach bei Weißenburg i.B. bei Heglohe und Steindorf. *Germania* 2, 54-59.

Wolf, F. 1889: *Kastell Alteburg bei Köln* (Köln).

Wolff, G. 1897: Das Kastell Hofheim. *Obergermanisch-rätische Limes* Abt B, Band II 3, Kastell Nr 25.

Wolff, G. 1902: Das Kastell Okarben. *Obergermanisch-rätische Limes* Abt B, Band II 3, Kastell Nr 25a.

Wolff, G. 1915: Das Kastell und die Erdlager von Heddernheim. *Obergermanisch-rätische Limes* Abt B, Band II 3, Kastell Nr 27.

Woodward, A.M. 1925: *The Roman Fort at Ilkley* (Leeds).

Woodward, A.M. 1926: The Roman Fort at Ilkley. *Yorks Archaeol Journ* 28, 137-321.

Wortmann, D. 1968: Untersuchungen an der Sudostecke des römischen Lagers in Bonn. *Rheinische Ausgrabungen* 3, 323-329.

Wright, R.P. 1968: Roman Britain in 1968 II: Inscriptions. *Journ Rom Stud* 58, 206-214.

Wright, R.P. 1977: A Roman Veterinary Physician from the Thames Valley. *Britannia* 8, 279-282.

Yadin, Y. 1966: *Masada: Herod's fortress and the Zealots' Last stand* (London).

Youatt, W. 1866: *The Horse* (London, revised edition Watson W.).

Zeuner, F.E. 1963: *A History of Domesticated Animals* (London).

Zotović, L. 1982-83: Boljetin (Smorna), camp romain et paléobyzantin. *Starinar* new series 33-34, 211-226.

Zotović L. and Kondić, V. 1971: Roman and Early Byzantine Fortresses in Djerdap. *Materijali* 6 (VIII Kongres Archeologa Jugoslavije, Bor 1969), 46-54.

CONTENTS

VOLUME III

Introduction to the Tables 563

Abbreviations 564

Tables I - XII Fortresses

I	History	565
II	Fortress Dimensions	570
III	Barracks and Ancillary Buildings	574
IV	Description	582
V	Lengths	592
VI	Widths	599
VII	*Contubernia* / Rooms	608
VIII	Special *Contubernia*	616
IX	Areas	619
X	Proportions	627
XI	Cohort-Blocks	635
XII	Roads and Gates	639

Tables XIII - XXIV Forts

XIII	History	643
XIV	Fort Dimensions	666
XV	Barracks and Ancillary Buildings	683
XVI	Description	709
XVII	Lengths	738
XVIII	Widths	758
XIX	*Contubernia* / Rooms	783
XX	Special *Contubernia*	802
XXI	Areas	806
XXII	Proportions	830
XXIII	Barrack Distribution	847
XXIV	Roads and Gates	860

Tables XXV - XXXVI Fortlets

XXV	History	873
XXVI	Fortlet Dimensions	877
XXVII	Barracks and Ancillary Buildings	881
XXVIII	Description	885
XXIX	Lengths	890
XXX	Widths	894
XXXI	*Contubernia* / Rooms	898
XXXII	Special *Contubernia*	901
XXXIII	Areas	903
XXXIV	Proportions	907

XXXV Barrack Distribution 910
XXXVI Roads and Gates 912

TABLES I - XXXVI INTRODUCTION

I - XII Legionary Fortresses
XIII - XXIV Auxiliary Forts
XXV - XXXVI Fortlets

1 - Tables I - XXXVI constitute an analysis of the size and composition of the barracks, stables, stores and workshops

2 - Order of analysis:

Fortresses: The buildings have been considered in a clockwise direction beginning with the first cohort.

Forts: The buildings have been considered in the order: left praetentura, right *praetentura*, left *retentura*, right *retentura*, from the front to the rear.

Fortlets: The buildings on the left side of the fortlet (where it is possible to judge) have been considered before those on the right.

3 - All the buildings of single fort periods have usually been analysed together; sometimes it has been more appropriate to take single buildings and to analyse their different periods individually.

4 - The nomenclature employed in the excavation reports has been retained.

5 - All measurements are metric.

6 - Two different figures are given for the dimensions of the buildings: thefirst gives the overall measurement and the second the measurement to the centre point of the walls.

7 - Theoretical or very uncertain entries are given in italics.

8 - For definitions of Building Types, Special First and End *Contubernium* Types, Fort Layout Types and Barrack Group Configuration Types see Figures A-E.

ABBREVIATIONS

Ft	-	Fort	Bk	-	Barrack
K	-	Kastell	Stab	-	Stable
C	-	Castellum	Bdg	-	Building
SK	-	Steinkastell	FC	-	First *contubernium*
EL	-	Erdlager	EC	-	End *contubernium*
SL	-	Steinlager	RIB	-	Roman Inscripts Britain
H-EL	-	Holz-Erde Lager	ND	-	*Notitia Dignitatum*
H-EK	-	Holz-Erde Kastell	AP	-	Aerial Photograph
LP	-	Left *praetentura*			
RP	-	Right *praetentura*			
LR	-	Left *retentura*			
RR	-	Right *retentura*			
LatP	-	*Latus praetorii*			
PP	-	*Primus Pilus*			
FC	-	First cohort			
Coh	-	Cohort			
Pd	-	Period			
Ph	-	Phase			
Fl	-	Fläche			
Fm	-	Form			
N	-	North			
S	-	South			
E	-	East			
W	-	West			
L	-	Left			
R	-	Right			

A - Periods of Occupation
B - Garrison
C - Province
D - Site Number (see Location Maps and List of Sites)

A	B	C	D
INCHTUTHIL			
83 - 86/87	*XX Valeria Victrix*	*Britannia*	3
CARPOW			
Severan	*VI BPF*	*Britannia*	7
RED HOUSE			
c 79 - 87		*Britannia*	48
YORK			
71/74 - 122	*IX Hispana*	*Britannia*	77
122 - end 4 C	*VI Victrix*		
LINCOLN			
61 - 70	*IX Hispana*	*Britannia*	88
MANCETTER			
c 45 - 71		*Britannia*	92
LONGTHORPE			
c 44/8 - 62	*IX* + auxs	*Britannia*	96
CHESTER			
74/79 - *c* 87	*II Adiutrix*	*Britannia*	98
c 87 - late 4 C	*XX Valeria Victrix*		

A	B	C	D
RHYN PARK			
Flavian		*Britannia*	104
WROXETER			
52/56 - 66	*XIV*	*Britannia*	105
66/67	*XX*		
CAERLEON			
c 75 - end 3 C	*II Augusta*	*Britannia*	115
GLOUCESTER			
67 - *c* 78	*XX Valeria Victrix*	*Britannia*	116
COLCHESTER			
c 44 - 49	*XX*	*Britannia*	118
LAKE FARM			
Claudian	*Vex II Augusta*	*Britannia*	122
EXETER			
55/6 - *c* 75	*II Augusta*	*Britannia*	127
MIREBEAU			
1 C		*Belgica*	133
NIJMEGEN			
Pd 1 Augustan		*Germania Inferior*	141
Pd 2 *c* 70/71	*II Adiutrix*		
Pd 3 Early Flavian	*X Gemina*		
Pd x			
Pd 4 Flavian	*X Gemina*		
Pd 5 *c* 89 - 175	*X Gemina*		
104 - 121	*Vex Brit*		
121 - 131	*IX Hispana*		
130 - 175	*Vex XXX Ulpia Victrix*		

A	B	C	D
VETERA I			
Pd 1 BC		*Germania Inferior*	143
Pd 2 10 -	*V Alaudae* + *XXI Rapax*		
Pd 3 46 - 69	*V Alaudae* + *XV Primigenia*		
HALTERN			
c 8 BC - AD 9	*XIX* ? + auxs	*Germania Inferior*	144
OBERADEN			
11 - 8/7 BC	Legs + auxs	*Germania Inferior*	145
BECKINGHAUSEN			
Augustan	Legs + auxs	*Germania Inferior*	146
NEUSS			
34 - 43	*XX Val Vic*	*Germania Inferior*	150
- 70	*XVI*		
79 - *c* 95	*VI Victrix*		
BONN			
c 30 - 70	*I Minervia*	*Germania Inferior*	*155*
70 - 83	*XXI Rapax*		
83 - 295	*I Minervia*		
RÖDGEN			
c 10 BC - 8 BC	*Legs + auxs ?*	*Germania Superior*	166
MAINZ			
c 12 BC - AD 43	*XIV Gemina* + *XVI*	*Germania Superior*	176
43 - 70/71	*IIII Macedonica* + *XXII Prim*		
70/71 - *c* 86	*I Adiutrix* + *XIV Gemina MV*		
c 86 - *c* 90	*XXI Rapax* + *XIV Gemina MV*		
c 90 - 92	*XIV Martia Victrix* + auxs		
92 - *c* 370	*XXII Primigenia PF*		
STRASBOURG			
17 - 43	*II Augusta*	*Germania Superior*	194
43 - *c* 45	*XXI Rapax*		

A	B	C	D
45 - 70	Civilian Occupation		
71 -	*VIII Augusta*		
DANGSTETTEN			
c 15 - 8 BC	Legs (*XIX* ?) + auxs	*Germania Superior*	201
VINDONISSA			
c 15 - 45	*XIII Gemina*	*Germania Superior*	203
45 - 71	*XXI Rapax*		
71 - 101	*XI Claudia*		
REGENSBURG			
179 - *c* 400	*III Italica*	*Raetia*	221
LAURIACUM			
191/205 - 451	*II Italica*	*Noricum*	226
EMONA			
Augustan	*XV Apollinaris*	*Italia*	229
VINDOBONA			
98 - 107	*XIII Gemina*	*Pannonia*	231
107 - 114	*XIV Gemina Martia Victrix*		
114 - late R	*X Gemina*		
CARNUNTUM			
Mid 1 C	*XV Apollinaris*	*Pannonia*	233
62 - 71			
71 - *c* 115	*XV Apollinaris*		
c 115 - late R	*XIV Gemina Martia Victrix*		
AQUINCUM			
c 89	*II Adiutrix* (*IV Flavia* ?)	*Pannonia*	239
92 - 114	*IIII Flavia* + ?		
114 - late R	*II Adiutrix*		

A	B	C	D
SINGIDUNUM			
- 89	*IIII Flavia*	*Moesia Superior*	243
c 106 - late R	*IIII Flavia*		
POTAISSA			
168 - 271	*V Macedonica*	*Dacia*	251
NOVAE			
45/46 - 69	*VIII Augusta*	*Moesia Inferior*	260
late 1 C - late R	*I Italica*		
ALBANO			
c 197 - 4 C	*II Parthica*	*Italia*	261
LAMBAESIS			
c 129 - Tetrarchy	*III Augusta*	*Numidia*	264

TABLE II FORTRESS DIMENSIONS

A - Date
B - Inside Rampart (length × width)
C - Area
D - Over Rampart (length × width)
E - Area
F - Over Defences (length × width)
G - Area
H - Proportions (length divided by width)

A	B	C	D	E	F	G	H
INCHTUTHIL							
83	460x443	20,38	474x463	21,95	498x482	24,00	1,02
CARPOW							
Severan	344x277	9,53	358x297	10,63			
RED HOUSE							
c 78				8,50 ?			
YORK							
71/74			484x418	20,23			1,16
LINCOLN							
61	426x365	15,55	445x375	16,69	475x400	19,00	1,19
MANCETTER							
c 45				9,00 ?			
LONGTHORPE							
43/8	288x343	9,88	298x353	10,52	306x361	11,05	0,84
60	207x191	3,95	220x200	4,40	229x205	4,69	1,10
CHESTER							
74/79	585x405	23,69	596x420	25,03	610x435	26,54	1,42

A	B	C	D	E	F	G	H
RHYN PARK							
Flav				17,50			
WROXETER							
52/56			480x390	18,72			1,23
CAERLEON							
c 75	484x410	19,84	496x418	20,73	514x442	22,72	1,19
GLOUCESTER							
69/70	449x360	16,16	464x380	17,63	487x400	19,48	1,22
COLCHESTER							
c 44	488x420	20,50	495x425	21,04	512x445	22,78	1,16
LAKE FARM							
Claudian				16,80 ?			
EXETER							
55/56	435x342	15,49	465x353	16,40	472x360	16,99	1,32
MIREBEAU							
1 C				22,00			
NIJMEGEN							
Pd 1				42,00 ?			
Pd 2				28,00 + ?			
Pd 3			675x435	29,36 + ?			1,55
Pd 4			435x345	15,00			1,26
Pd 5			475x350	16,50			1,36
VETERA I							
Pd 2			796x567	45,13 + ?			
Pd 3	894x616	55,07	900x620	55,80	924x644	59,51	1,45

A	B	C	D	E	F	G	H
HALTERN							
c 8 BC	355x473	16,79	366x484	17,71	391x508	19,86	0,76
AD ?	355x528	18,74	366x539	19,73	391x560	21,90	0,68
OBERADEN							
11 BC				56,00 ?			
BECKINGHAUSEN							
BC				1,60			
NEUSS							
35	547x410	22,43	568x463	24,59	696x468	28,36	1,31
BONN							
30	516x501	25,85	538x523	28,14	553x537	29,70	1,03
RÖDGEN							
c 10 BC				3,30			
MAINZ							
				35,00 ?			
STRASBOURG							
17				20,00			
DANGSTETTEN							
c 16 BC			300x420	12,60			0,71
VINDONISSA							
c 15				14,00 ?			
25/30			400x440	22,17			c 0,74
REGENSBURG							
179	530x436	23,12	538x442	23,78	598x502	30,02	1,22

A	B	C	D	E	F	G	H
LAURIACUM							
191/205	525x395	20,74	535x400	21,40			1,34
VINDOBONA							
98	480x420	16,00	500x450	18,00	580x550	25,52	1,11
CARNUNTUM							
c 50	465x375	17,44	478x390	18,64	513x425	21,80	1,23
AQUINCUM							
92			460x430	19,78			1,07
114	520x465	24,18	538x483	25,99	600x550	33,00	1,11
NOVAE							
45/46	495x360	17,82	505x370	18,69			1,36
ALBANO							
c 197	388x218	8,46	408x240	9,79			1,70
LAMBAESIS							
3 C	508x443	22,50	514x453	23,28			1,13

TABLE III BARRACKS AND ANCILLARY BUILDINGS FORTRESSES

A - Subject of entry
B - Period of occupation
C - Identity of the builders
D - Original interpretation of the building
E - Date of excavation

A	B	C	D	E
INCHTUTHIL				
R *Principia*	84 - 86/7	*XX Val Vic*		
A, B	84 - 86/7		Cav Bks	1952-65
FC PP-V + 52-43	84 - 86/7		First Cohort	
1-64	84 - 86/7		Bks	
135-136	84 - 86/7		Stables ?	
INCHTUTHIL (Temporary Compound)				
Bk	Ph I 83	*XX Val Vic*	Bk	1952-65
Bks	Ph II 84		Bks	
Offices	83-84		Offices	
CARPOW				
LP	Severan	*VI Vic BPF* ?	Bks ?	1969-79
RED HOUSE				
Bdg 16	79-87		Bk	1972-74
Bdgs	79-87		Stab/Stores	
YORK				
FC Bdgs 1 2 3	mid 2 C	*VI Vic*	Bks	1970s
Purey Cust	Ph 1 *c* 71	*IX Hisp*	Bks ?	1986
	Ph 2 *c* 100-125	*IX Hisp*	Bks ?	1986
W P Brown			Bk	1974
Davygate	Flav-4C	*IX Hisp/VI Vic*?	Bks	1955-58
Blake Street		*VI Vic* ?	Bk	1975
Public Libry		*IX Hisp*	Bk	1925
LINCOLN				
Westgate Sch	61-70	*IX Hisp*	Bk	1973

A	B	C	D	E
MANCETTER				
Site II	*c* 45		Bk wall	1977
Quarry Lane S III	*c* 45		Bk walls	
Site VI	*c* 45		Offs' Qs	
LONGTHORPE				
Bdg I	44/8-62	*IX Hisp*	Offs' Qs	1967-73
Bdg II	44/8-62		Bk ends	
Bdg III	44/8-62		Stable ?	
Bdg IV	44/8-62		Bk ?	
Bdg VII	44/8-62		Stable	
Bdg VIII	44/8-62		Bk	
Bdg XIV Bk I	44/8-62		Bk	
Ext Bdg XIV	44/8-62		Stab/Store	
Bk II	44/8-62		Bk	
CHESTER				
Goss Street	Ph 1 50/60-100/120			1948-49/69
	Ph 2 100/120	*XX Val Vic*	Stable	
	Ph 3 late 2C-222+	*XX Val Vic*	Admin/Qs	
Crook Street	Ph 1 1C	*XX Val Vic*	Bk	1970s
	Ph 2 100/120	*XX Val Vic*	Bk	
Trinity St	Ph 1 1C ?		Bk ?	1950-53
	Ph 2 2C	*XX Val Vic*	Bk ?	
Old Market Hall	1C-early 2C		Bk ?	1968-70
Hunter St / Princess St	Pd 1 1C	*II Adiutrix*	Bks	1909-14/25 35-6/64/82
	Pd 2 early 2C	*XX Val Vic*	Bks	
	Pd 3 early 3C	*XX Val Vic*	Bks	
Bdg K	Pd 1 late 1C-early 2C		Store(Stab)	1981-82
	Pd 2 early 2C-late 4C	*XX Val Vic*	Store(Stab)	
Northgate Brewy	Timb Ph 1 *c* 80-100	*II Adiutrix*	Cn's Qs	1974-75
	Timb Ph 2 *c* 100-120	*XX Val Vic*	Cn's Qs	
	Timb Ph 3 *c* 120	*XX Val Vic*	Cn's Qs	
	Early Stone *c* 120-160	*XX Val Vic*		
	Main Stone *c* 160-3C	*XX Val Vic*	Cn's Qs	
	Late Stone 3C-270/85	*XX Val Vic*	Cn's Qs	
Folliot Hse	Pd 1 early 2C	*XX Val Vic*	Bk	1955
	Pd 2 late 2C	*XX Val Vic*	Bk	
Abbey Green	Timb Ph 1 pre Flav	*II Adiutrix*	Cns' Qs	1975-77
	Timb Ph 2/3 Flavian	*II Adiutrix*	Cns' Qs	
	Stone Ph 1 c 100-100	*XX Val Vic*	Cns' Qs	
	Stone Ph 2 *c* 160	*XX Val Vic*	Cns' Qs	
Deanery Fld A-F	*c* 100	*XX Val Vic*	Bks	1924-35
Eastgate St	early 2C	*XX Val Vic*	Bk	1959
LP	2 C	*XX Val Vic*	Bk	
Bollond's Ct	Agr ?	*II Adiutrix*	Bk	1954/59
Weaver St	as Goss St	*XX Val Vic*	Bk	1956

A	B	C	D	E
RHYN PARK				
	c 60		Bk	1977
WROXETER				
RP 1,2,3,4	52/56-66/7	*XIV*	Bks	1982
CAERLEON				
FC V-I,IIa + x-i	Timber *c* 75-120/30	*II Aug*	Bks	1928/57
(Golledge's Fd)	Stone 120/30		Bks	
Prysg Field	Timber Ph *c* 75		Bks	1927-29
1,3,4,7,8,11	Stone Ph *c* 150		Bks	
2	Stone Ph *c* 130		Bk	
6,10	Stone Ph *c* 140		Bks	
9	Stone Ph Flav/Traj		Bk	
The Croft	Pd 1 75-early 2C		Bks	1966
	Pd 2 early 2C-mid 2C		Bks	
	Pd 3 mid 2C-end 2C		Bks	
	Pd 4 end 2C-early 3C		Bks	
Vine Cottage	Ph 1 75-100		Hutments	1936
	Ph 2 100-110		Bk	
	Ph 3 110-3C		Bks	
Roman Gates	Ph A Bks 1-3 74/5-80		Bks	1979-81
	Ph B Bks 2 3 80-100		Bks	
	Ph C Bks 1-3 100-120		Bks	
	Ph D Bk 2 130-140		Bk	
	Ph E Bks 1-3 220-296		Bks	
Myrtle Cottage	Pd I Bks I-VII *c* 75-100		Slight	1929/39
Orchard	Pd II Bk I 130 +		Bk	
	Bks IV-VII 130/40		Bks	
	Bk VIII 150 +		Bk	
	Pd III Bks I-VIII 200/20-4C		Bks	
Priory Meadow	Pd I/II *c* 200		Rect bdgs	1909/38
GLOUCESTER				
Eastgate St	67-78	*XX Val Vic*	Bks	1971-73
New Mkt Hall	67-68		Bks	
Berkeley St	67-68		Bks	1966-67
COLCHESTER				
Culver St	*c* 44-48/9	*XX*	Bks	1981-82
RR	*c* 44-48/9		Bks	
Gilberd School	*c* 44-48/9		Men's Qs	1984-85
North Hill	*c* 44-48/9		Cn's Qs	1966-67
Lion Walk	*c* 44-48/9		Bks	1971-78

A	B	C	D	E
LAKE FARM				
	Claudian		Bk	1966-67/74
EXETER				
Next *fabrica*	Ph 1-3 *c* 60-75	*II Aug*	Bks	1972
Offs' Qs	*c* 60-75		Off's Qs	1972
Goldsmith St	N,S Ph 1-3 *c* 60-75		Bks	1971
Store-B	*c* 60-75		Store	1972
St Nich Priory	*c* 55		Bks	1983-84
Bartholomew St	*c* 55		Bks	1983-84
MIREBEAU				
	1C		Bks	AP
NIJMEGEN				
	Pd 1 Augustan			1951-67
FC *PP*-V + 1-10	Pd 4 Flavian	*X Gemina*	Bks	1951-67
	Pd 5 *c* 89-175		Bks	
Cohs A B	Pd 4 Flavian		Bks	1951-67
	Pd 5 *c* 89-175		Bks	
S-W Corner	Bdgs 1-3 Pds 3 and 4		Bks	1973-74
(Dalseweg-Huygensweg)	Bdgs 9,10 Pd 5		Bk	
Coh C	Pd 4 Flavian		Bks	1974-75
(Praetoriumst)	Pd 5 *c* 89-175		Bks	
N *primus pilus*	Pd 5 *c* 89-175		Bk	1951-67
Coh D	Pd 4 Flavian		Bks	1951-67
	Pd 5 *c* 89-175		Bks	
E *via decumana*	Pd 5 *c* 89-175		Store	1972-78
VETERA I				
Y S,N	Pd 3 46-69	*V Alaudae*	Bks	1930-31
N	Pd 3 46-69	*V Alaudae*	Bk	1926
O S,N	Pd 3 46-69	*V Alaudae*	Bks	1926
W N,S	Pd 3 46-69	*XV Prim*	Bks	1929
V	Pd 3 46-69	*XV Prim*	Bk	1929
Bdg S *Praet*	Pd 3 46-69	*V Alaudae*	Guards/Stab	1913
HALTERN				
7 a-f	*c* 8 BC - AD 9			1912-13
11g 1-6			Bks	1967-68
11f 1-6			Bks	1912-13
11e			Bks	1962-63/65
11d			Bks	1962-63/65
11c			Bks	up to 1939

A	B	C	D	E
10 1-5			Bks	up to 1939
11b			Bks	1925-28
11a			Bks	1925-28
8a			Stable	up to 1928
8b			Stable	1909
8c			Cavalry Bk	1909
8d			Cavalry Bk	up to 1928
N of 3				after 1939
OBERADEN				
Albrecht's Bk	11-8/7 BC		Bk	1937
N-W Corner 1-9	11-8/7 BC		Cns' Qs	1908/63/ 77-81
BECKINGHAUSEN				
N-W Side	Augustan		Bks	1937-38
NEUSS				
Cohort Bks	*c* 80 - 92/105	*VI Victrix*	Bks	1887-1900
15-17,23-25,32-42,46-52			Aux Cav Bks	
91,198,106,124			Cav Bks	
BONN				
Casernen 9-12	70 +	*XXI Rap/I Min*	Bks	1876-88
S-W Corner	Pd 1 *c* 50	*I Minervia*	Bks	1971-76
(Loëkaserne) Pd 2-6	70 +	*XXI Rap/I Min*	Bks	
Coh A	70 +	*XXI Rap/I Min*	Bks	up to 1960
Schule an der Rheindorferstr	70 +	*XXI Rap/I Min*	Bks	1900-02
Graurheindorferstr	Pd 1 Claudian	*I Minervia*	Bks	1900-02/77-
	Pd 2 70 +	*XXI Rap/I Min*	Bks	78
Koenen Bke	70 +	*XXI Rap/I Min*	Bk	1900-02
Augustusring	70 +		Bks	1900-02
Coh B	70 +		Bks	1960 +
Coh C	70 +		Bks	1960 +
Casernen 3-6	70 +		Bks	1876
RÖDGEN				
Bdgs E 'A'	*c* 10 BC - 8 AD		Bks	1961-66
Bdgs S 'A' N,S			Bks	
Sq bdgs S 'A'				
Bdgs S Stabsgeb			Bks	

A	B	C	D	E
MAINZ				
SE side	Aug/Tib		Tents	1957-58
	Aug/Tib		Bk ?	
	Mid 1C		Bk ?	
	End 1C		Bk ?	
STRASBOURG				
St-Étienne	Pd 1 70	*VIII Augusta*	Bk	1948/56
	Pd 2 97-120		Bk	
	Pd 3 120-early 3C		Unoccupied	
	Pd 4 early 3C-235		Bk	
St Médard	Severan		Bks	1951-52
des Charpentiers/Brulée	2C/3C		Bk	1977
rue Thomann			Bk	1977
rue des Pierres	Hadrianic - end 2C		Bk	1968
rue du 22 Nov	2C		Bk	1961
DANGSTETTEN				
W Str I	Pd 1 *c* 15 BC		Tents	1967-69/75
	Pd 2 *c* 15-8 BC		Bks	
N Str IV	*c* 15-8 BC		Cavalry Bk	
E Str II/N III	*c* 15-8 BC		Bks	
E Str II/S III	*c* 15-8 BC		Bks	
VINDONISSA				
Dätwiler	Pd 1 Aug/Tib	*XIII Gemina*	Bks	1979-80
	Pd 2 Claud/Neronian	*XXI Rapax*	Bks	
Immunes Kaserne	1C	*XXI Rapax*	Bk	1976
Hispan Kohorte	Flavian		Bk	1908/53-55
Köngisfelden	Pd 1 early 1C	*XIII Gemina*	Tents	1961-63
(West Gate)	Pd 2 Schräge early 1C	*XIII Gemina*	Bks	
	Pd 3/4 Gerade Tib/Claud	*XIII Gemina*	Bks	
b,c,d	Pd 5 Ält Stein Claud/Ner	*XXI Rapax*	Bks	
b,c,d	Pd 6/7 Jüng Stein Flav	*XI Claudia*	Bks	
Köngisf Island	45	*XXI Rap/XI Cl*	Bk	1905
Königsf 1976	45	*XXI Rap/XI Cl*	Cn's Qs	1975-76
Breite VII-I	Pd a	*XIII Gemina*	Tents	1905/53/73
	Pd 1 Schräge 15-17 (2 Ph)	*XIII Gemina*	Bks	
	Pd 2 Gerade *c* 24-41	*XIII Gemina*	Bks	
	Pd 3 *c* 45-71	*XXI Rapax*	Bks	
	Pd 4 *c* 71	*XI Claudia*	Bks	
Gemüsegarten Kön	*c* 24	*XIII Gemina*	Bks	1976
Breite N Gate	Pd 1 *c* 24	*XIII Gemina*	Bks	1904/35/41-
5-2				42/66
	Pd 2 45 +	*XXI Rap/XI Cl*	Bks	
Breite N-E Corner	Pd III early Tib	*XIII Gemina*	Bks	1897/36-7/38
R1,U1/K1,U2/K2,R2				
O1/O2,U1/K1	Pds V/VI *c* 45-end 1C	*XXI Rap/XI Cl*	Bks	

A	B	C	D	E
O1/O2,U1/K1 U2/K2,K3,U3/K4,U4/K5,U5/K6	Pd VII end 1C	*XI Claudia*	Bks	
Breite *valetud*	Pd 1 *c* 12	*XIII Gemina*	Bks	1935-36
	Pd 2 *c* 15	*XIII Gemina*	Bks	
	Pd 3 *c* 15/25	*XIII Gemina*	Bks/*val*	
	Pd 4 *c* 40	*XIII Gemina*	Bks	
	Pd 5 *c* 47	*XXI Rapax*	Bks	
	Pd 6 *c* 70	*XI Claudia*	Bks	
Breite Schwimmbecken	Pd 4 46-69	*XXI Rapax*	Cn's Qs	1933
Oelhafen Bdg B	*c* 46-69	*XXI Rapax*	Bk	1959
Scheuergasse	*c* 45	*XXIRap/XI Cl*	Cav Bk	1953
Breite N-E Corn	Pd VII Bdg B end 1C			1897/36-7/38
REGENSBURG				
Niedermünster	Pd 1 179-244	*III Italica*	Bks	1964-68
	Pd 2 244-end 3C		Bks	
	Pd 3 4C		Bks	
Grasgasse	179		Bks	1979
LAURIACUM				
Cohort Bks	Pds 1-3 *c* 193-270	*II Italica*	Bks	1904-14/23/
	Pd 4 270-284/305		Bks	29-33/36
	Pd 5 284/5-Const		Bks	
	Pd 6 Const-Val		Bks	
	Pd 7 Val-451		Bks	
EMONA				
N Side	Augustan	*XV Apollinaris*	Bks	1970s
VINDOBONA				
FC A-F,H	Ph 1 *c* 100	*XIII*	Bks	1896-1900/
	Ph 2			01-03/04-05/84
	Ph 3 - 5C			
HeidenschuB/Am Hof			Bks	1909/13-14/ 48
Judengasse			Bks	1949/51
CARNUNTUM				
Cohs A-E,G,H	Pd 1 mid 1C-late Traj	*XV Apollinaris*	Bks	1886-88/87
	Pd 2 late Traj-200	*XIV Gemina MV*	Bks	1907/08-11
	Pd 3 *c* 200-300			
	Pd 4 *c* 300-364/75			
	Pd 5 364/75-Val			
Coh F	Pds 1-7		Bks	1877-78/83
RP Kas 7,8 E,W	Pd 1 Mid 1C	*XV Apollinaris*	Men's Qs	1968-77

A	B	C	D	E
	Pd 2 Trjanic Pd 3 *c* 200-*300* Pd 4 *c* 300 - Val Pd 5 Val	*XIV Gemina MV*		
AQUINCUM				
LatP L,R	Early 3C	*II Adiutrix*	Bks	1980s
P and R	Early 3C	*II Adiutrix*	Bks	1973-77/80s
SINGIDUNUM				
RR	Trajanic	*IV Flavia*	Bks	1983-84
POTAISSA				
LatP / LR	168-271	*V Macedonica*	Bks	1984
NOVAE				
LatP / RR	Pd 1	*I Italica*	*contubl*shops	1970-74
Secteur II	Pd 2 end 2C/early 3C			
LP Secteur IV	Early 2C	*I Italica*	Bks	1979
ALBANO				
R	197 +	*II Parthica*	Bks	1817/1919
In front R	197 +		Bks	
Rampart	197 +		Bks	
LAMBAESIS				
FC PP-VI + 1-6	253-Tetrarchy	*III Augusta*	Bks	19C/1910/68/
Coh B,C,D,E				71-73
Bdg Z			Stable	

TABLE IV DESCRIPTION

A - Subject of entry
B - Number of examples to which the description refers
C - Building Type
D - Officers' Quarters (integral + / detached -)
E - Porticus (with + / without -)
F - Rear wall configuration: 1 - separate walls
2 - party wall
3 - officers' party wall / men's separate
4 - men's party wall / officers' separate
5 - single end barrack of cohort-block
6 - party wall with building not a barrack
G - First *contubernium* Types
H - End *contubernium* Types
I - Construction methods: T - timber (precise method unknown)
SB - sill beam
PP - post-pit
PT - post-trench
SS - stone sill wall
S - stone wall
J - Orientation (sc - *per scamna* / str - *per strigas*)
K - Regularity of pairing within the cohort:
A - regular barrack pairing
B - barracks all facing the same direction
C - irregular

A	B	C	D	E	F	G	H	I	J	K
INCHTUTHIL										
Bdg R *Principia*	1	H		+				PT	str	
A	1	A		+	1		a	PT	str	
B	1	J		+	1			PT	str	
FC PP-V + 52-43	5	Y	-	+	1	a	a	PT	str	A
42-37	6	A	-	+	1			PT	sc	A
36-31	6	A	-	+	1			PT	str	A
30-25	6	A	-		1			PT	str	A
24-19	6	A	-	+	1			PT	sc	A
18,17	2	A	-	+	1	a	a	PT	sc	A
12-7	6	A	-	+	1			PT	sc	A
6-1	6	A	-	+	1			PT	str	A
64-59	6	A	-		1			PT	str	A
58-53	6	A	-	+	1			PT	sc	A
INCHTUTHIL (Temporary Compound)										
Phase I	1	J		-	1	a	a	PT		
Phase II	2	J		+	1	a	a	PT		
Offices	2	U						PT		

A	B	C	D	E	F	G	H	I	J	K
CARPOW										
LP	6	0						PT	sc	
RED HOUSE										
Bdg 16	1	Jx		-				PT	str?	
Other bdgs	14	S		-				PT	str?	
YORK										
FC Bdgs 1,2,3	3	A	+		1	h?	o	SS	str	A
Purey Cust Ph 1	1							SB		
Ph 2	1							SS		
W P Brown	1	A						SS	str	A
Davygate S,P,Q,R	4	A			1			T	str	A
	4	A			1			SS	str	A
Blake Street	2							SS	str	
Public Library								SB	str?	
LINCOLN										
Westgate School	1	A						T	str	
MANCETTER										
Sites II, III, VI	3							PT		
LONGTHORPE										
I	1	0			1			PT	str	
II	2?	0						PT	str	
III	1	0			1			PT	str	
IV	1	J		-?	1			PT	str	
VII	1	0			1			PT	str	
VIII	1	A	+	-	1			PT	str	
XIV (Bk I)	1	A	+	+	6	G(2)	A	PT	str	A
Ext XIV	1	0			6			PT	str	
Bk II	1	A?	+?	+	1			PT	str	A
CHESTER										
Goss St Ph 1,1	1	G						PP		
1,2	1	G						PT?		
1,3	1	G?						SB	str	B
Ph 2	1	G?	-	+	1	a	a	SS	str	A
Ph 3	1	G?	-	+	1	a		S	str	A
Crook St Ph 1	2	A	-	+	1	a	n	PT	str	A
Ph 2	2	A	-	+	1	a	n	SS	str	A

A		B	C	D	E	F	G	H	I	J	K
Trinity St	Ph 1								T	str	
	Ph 2								SS	str	
Old Market Hall		1	J	+				b	PT	sc	
Hunter St /	Pd 1	5	A	-?	+	1		n	PT	sc	A
Princes St	Pd 2	5	A	-?	+	1		n	SS	sc	A
	Pd 3	5	A	-?	+	1		n	SS	sc	A
Bdg K	Pd 1	1	H						PT		
	Pd 2	1	H						SS		
Northgate B	Tbr Ph 1	1	A	-	+	2			PT/PP	str	A
	Tbr Ph 2	1	A			2			PT/PP	str	A
	Tbr Ph 3	1	A			2			PT/PP	str	A
	Early Stone	1	A			1			SS		A
	Main stone	1	A	-	+	1			SS	str	A
	Late Stone	1	A		+	1			SS	str	A
Folliot House	Ph 1	2			+	1		a	SS	str	A
	Ph 2	2			+	1			S	str	A
Abbey Green	Tbr Phs	3	A			1			PT?	str	A
	St Phs	3	A			1			SS	str	A
Deanery Field		5	A	-	+	1	a	a	SS	str	A
Eastgate Street		1.	Jx						SS	str	A
LP		3	A	-		1	a		SS	str	A
Bollond's Court		2				1			T	sc	
Weaver Street									SS	str	
RHYN PARK											
				+					PP		
WROXETER											
RP 1		1	A	+?		2			PT	str	A
2		1	A	-		2	a		PT	str	A
3		1	A	-		1			PT	str	A
4		1				1			PT	str	A
CAERLEON											
FC	V-II + x-i	4	Y	+		1			SS	str	A
	IIa	1	O			1			SS	str	
	I	1	Y	-		1			SS	str	A
Prysg Field	Tbr Ph	11		+		1			PT	str	
	1-4 Stone Ph	4	A	+		1	a	n	SS	str	A
	6-9 Stone Ph	4	A	+		1	a	a	SS	str	A
	10-11 Stone Ph	2	A	+		1	a		SS	str	A
The Croft	Pds 1-4	6	Jx		+	1		a	SS	str	A
Vine Cottage	Ph 1								T	str	
	Ph 2 IV,VI	2	Jx			1	a	a	SS	str	A
	V	1	Jx	+		1	a	a	SS	str	B
	Ph 3 IV,VI	2	Jx			1	a	a	SS	str	A
	V	1	Jx	+		1	a	a	SS	str	A
Roman Gates	Ph A 1,3	2	Jx			1			PT	str	A
	2	1	Jx			1			PT	str	B

A	B	C	D	E	F	G	H	I	J	K
Ph B 2	1	Jx			1			SB	str	B?
3	1	Jx			1			SB	str	A
Ph C 1,3	2	Jx			1			SS	str	A
2	1	Jx			1			SS	str	B
Pd D 2	1	Jx			1			SS	str	A
Ph E 1	1	Hx			1			SS	str	A
2,3	1	Jx			1			SS	str	A
Myrtle Cott Pd I/II	3	0						SS	str	
Orchard Pds II,III	9	A	+	+?	1	a		SS	str	A
GLOUCESTER										
Eastgate Street	3	A		+	1		a	PT/SS	sc	A
New Market Hall	1	A	+		1	a?		PT	sc	A
Berkeley Street	5	A	-	+	1	e		PT/SS	sc	A
RP	3	0								
COLCHESTER										
Culver Street	2	A	+					SS	str	A
RR	1	0						SS	str	
Gilberd School	2	G		+	1		a	SS	str	
North Hill	1	A	+			h		SS	str	
Lion Walk	6	A	+		2	h		SS	str	A
LAKE FARM										
	1							T		
EXETER										
Next *fabrica*	1	Jx		+	1		a	PT	sc	A
Off's Qs next *fabrica*	1	0		-	1			PT	sc	
Goldsmith St Phs 1,2	2	A	+		1	a	a	PT	sc	A
Ph 3	2	A	+		1	a	a	PT	sc	A
Store-building	1	J			1			PT	str	
St Nicholas Priory	2	Jx		+	1		a?	PT	sc	A
Bartholomew St E	2	Jx		+	1		a	PT	str	A
NIJMEGEN										
Period 1	1	U						PT		
FC PP-V + 1-10 Pd 4	5	Y	-		2		j	PT	sc	A
Pd 5	5	Y?	-		1	e	e/j	SS	sc	A
Cohs A,B Pd 4	12	A	+	2		a/o	PT	sc	A	
Pd 5	12	A	+	1	e	a/o	SS	sc	A	
S-W Corn Pd 3/4 1-3	3	A?	+		2	a		PT	sc	A
Pd 5 9,10	2	A?					a/o	SS	sc	A
Coh C Pd 4	4	A	+		2	a?		PT	sc	A
Pd 5	4	A	+		2	e	b/o	SS	sc	A

A	B	C	D	E	F	G	H	I	J	K
N *Primus Pilus* Pd 5	1	A	+	+	1	a	a	SS	sc	
Coh D Pd 4	6	A	+	+	2		a	PT	str	A
Pd 5	6	A	+		2	e	b/o	SS	str	A
E *via decumana* Pd 5	1	F			1			SS	str	
VETERA I										
Y S,N	2	Z?		+	1		a	SS	Sc	A
N	1	Zb	+	+		d	k	SS	Sc	A
O	2	Zb	+		2	d		SS	Sc	A
W	2	Zb	+	+	2		k?	SS	Sc	A
V	1	Za	+	+	5	a	e	SS	Sc	A
Bdg S *Praet*	1	O			1			SS	Sc	
HALTERN										
7 a-f	6	Q						PT		
11g 1	1	G	-		1			PT	Str	B
2,3,5	3	A	+		1			PT	Str	B
6	1	A	-		1			PT	Str	B
11f	3	A?	+		1			PT	Str	A
11e	4?	A?	+		1			PT	Str	A
11d	5	A	+		1			PT	Str	A
11c	5	J?	+	-	2			PT	Sc	A
10 1,2	2	A	+	+	1			PT	Str	A
3	1	U						PT		
4,5	2	G	+		1			PT	Str	A
11b 1	1	A								
2-6	5	G	-		1	a?	a?	PT	Sc	A
11a		G?	-		1			PT	Sc	A
8a	1	J				a	a	PT	Str	
8b	1	J					a	PT	Sc	
8c	1	R						PT	Sc	
8d	1	H						PT	Str	
Bdg N 3	1	H						PT	Str	
OBERADEN										
Albrecht's Bk	1	D	+	-	1			PT		
N-W Corner 1,6,7	3	U	+?		1			PT		B
2,3	2	U	-?		1			PT		B
4,5,8,9	4	U	-?		3			PT		B
BECKINGHAUSEN										
								SB		

A	B	C	D	E	F	G	H	I	J	K
NEUSS										
93-98	6	A		+	3?		j	SS	Str	A
110-115	6	A	+	+	3	a	a	SS	Sc	A
131	1	A		+	1	a	a	SS	Sc	
155-150	6	A	+	+	3	i	n	SS	Str	A
149,146-144	4	A	+	+	3	h	o	SS	Str	A
148,147	2	A	+	+	1	h	o	SS	Str	A
143-142	2	A	+	+	1	h	a	SS	Str	A
140-135	6	A	+	+	3	h	n	SS	Str	A
122-119	4	A	+	+	3	h	a	SS	Sc	A
104-99	6	A	+	+	3	h	a	SS	Sc	A
84-87	4	A	+	+	3	h	n	SS	Str	A
7-12	6	A	+	+	3	d	o	SS	Str	A
26-31	6	A	+	+	3			SS	Str	A
15,16	2	J		+	1			SS	Str	
17	1	U			1			SS	Str	
23,24	2	J			2			SS	Str	
25	1	U			1			SS	Str	
32	1	J		-	1			SS	Str	
33	1	P		-	1			SS	Str	
34-42	9	J		-	1			SS	Str	
46-51	6	B	+	-	2			SS	Str	
52	1	J		-	2			SS	Str	
91,108,106,124	4	K		+	1			SS	Str	
BONN										
Casernen 9-11	3	A	+		2	a		SS	Str	A
12	1	Za	+	+	5		a	SS	Str	A
Loëkaserne Pd 1	1	Zb	+	+	2	a	k	PT	Str	A
Pd 2	1	Zb	+	+	2	a	k	SS	Str	A
Coh A	6	Z?	+		2		n	SS	Str	A
Graurhein'str Pd 2	1	Za								
	1	Zb	+	+	2	a	k	SS	Str	A
Koenen Baracke	1	Za	+	+	5	a	n	SS	Str	A
Augustusring	6?				2			SS	Sc	A
Coh B	2	Z?	+?		2			SS	Str	A
Coh C	2	Z?	+		2	a		SS	Str	A
Caserne 3	1	Za	+		5	a	a	SS	Str	A
Casernen 4,5	2	Zb	+		2	a	k	SS	Str	A
RÖDGEN										
E of 'A'	2	J	+?	+	1			PP	Str	A
S of 'A'	4	H/B?		-?	2			PP	Sc	C
S of Stabsgebäude	8?	H/B?	+	-?	2	a	a	PP	Str	C

A			B	C	D	E	F	G	H	I	J	K
MAINZ												
S-E Front	Aug/Tib		2?	0		+?				SB/PH		
	Mid 1C		1							SS		
	End 1C		1							S		
STRASBOURG												
St Étienne	Pd 1		1							PP?		
	Pd 2		1	Jx						SS		
	Pd 4		1							T		
St Médard										T		
des Charpentiers/Brulée									T			
rue Thomann			1									
rue des Pierres			1							SS		
rue du 22 Novembre										T		
DANGSTETTEN												
W Str I	Pd 2		6?	B?						PP	Sc	
N Str IV			1	0	+?					PT	Sc	
E Str II/N III			6?	0						PP	Sc	
E Str II/S III			6	B	+	-	4	a		PP/PT	Sc	C
VINDONISSA												
Dätwiler	Pd 1									PT?	Str	
	Pd 2		3	G?	+?		1	a	a	SS	Str	
Immunes Kaserne			1	Jx		+?				SS	Sc	
Hisp Kohorte			1	Jx		-				SS	Sc	
Königsfelden	Pd 2		3	Jx		+?				T	Sc	A
West Gate	Pd 3/4									PT?	Sc	
Pd 5	b,c		2	A	+	+	2	d		SS	Sc	A
	d		1	A	+	+	1	d	a	SS	Sc	A
Pd 6/7	b,c		2	A	+		2	d		SS	Sc	A
	d		1	A	+	+	1	d	a	SS	Sc	A
Königsf Island			1	Jx			1		a	SS	Str	
Königsf 1976			1	U			1			SS	Str	
Breite	Pd 1	VII-I	7	A		+	2		a	SB	Str	A
	Pd 2	VII-I	7	A	+	+	2	a?	a	SB	Str	A
Pds 3/4		VII	1	A	+	+	2	a	a	SS	Str	A
		VI	1	A	+	+	2	c	a	SS	Str	A
		V	1	A	+	+	1	a	n	SS	Str	A
		IV	1	A	+	+	1	b	a	SS	Str	A
		III,II	2	A	+	+	2	d	n	SS	Str	A
		I	1	A	+	+	5	d	j	SS	Str	A
Gemüsegarten Königsf			2	Jx		+	1			PT	Sc	
Breite N Gate		5	1	Jx			1		j	SB	Str	A
Pd 1		4	1	A	+		1	i		SB	Str	A
		3	1	A	+		1	b		SB	Str	A
		2	1	A	+		2	i	n	SB	Str	A
Pd 2		7	1	A	+	+	2	a		SS	Str	A

A		B	C	D	E	F	G	H	I	J	K
	6	1	A	+	+	2			SS	Str	A
	5	1	A	+	+	2			SS	Str	A
	4	1	A	+	+	2	d	b/n	SS	Str	A
	3	1	A	+	+	2	d	b?	SS	Str	A
	2	1	A	+	+	2	c	a	SS	Str	A
	1	1	A	+	+	2			SS	Str	A
Breite N-E Corn	R1	1	M	+		2			PT		B
Pd III	U1/K1	1	A	+	+	2	f		PT	Str	A
	U2/K2	1	A	+	+	3	f	a	PT	Str	A
	R2	1	H	+?		1		a	PT	Str	A
Pds V/VI	O1/O2	1	O	+		2			SS	Str	B
	U1/K1	1	A	+	+	2	d	a	SS	Str	A
Pd VII	O1/O2	1	O	+		2			SS	Str	B
	U1/K1	1	A	+	+	2	d	a	SS	Str	A
	U2/K2	1	A	+	+	2	d/e	a	SS	Str	A
	K3	1	J	+	-	1	a	a	SS	Str	A
U4/K5,U3/K4		2	A	-	-	4	a	a	SS	Str	A
	K6/U6	1	A	+		1	a	a	SS	Str	A
Breite *val* Pd 1	I-V	5	A	+?	+	1	a?		PT	Str	A
Pd 2	A1/B1	1	G	+?	+	1	a?	a	PT	Str	A
	A2/B2	1	G	+?		1			PT	Str	A
Pd 3	III,IV,V,VI	4	H/J		-	1			PT	Str	
	VII,VIII	2	Jx		-	2			PT	Str	
Pd 4		2	Jx						PT	Str	A
Pd 5/6	1	1	A	+?	+	5	h	a	SS	Str	A
	2,3	2	A	+	+	2	h	a	SS	Str	A
Breite Schwimmb	Pd 4	1	U			1?			SS	Sc	
Oelhafen Bdg B		1	A	+					SS	Str	
Scheuergasse		2	Jx		+			a	SS	Str	A
N-E Corner B	Pd VII	1	O						SS	Str	
REGENSBURG											
Niedermünster	Pd 1	5	J						PT	Str	A
	Pd 2	5	J		+	2			SS	Str	A
	Pd 3	5	A	+	+	4	b(2)		SS	Str	A
Grasgasse		2	A			1			T+SS	Str	
LAURIACUM											
FC		6	A?	-	+	1			SS	Str	A
Remaining Cohs		33	J?		+	2			SS	Str	A
EMONA											
N Side		2							SS		
VINDOBONA											
FC Ph 1	A	1	Jx		+	1			SS/S	Str	B
	B	1	O		-	1			SS/S	Str	

A		B	C	D	E	F	G	H	I	J	K
	C	1	0						SS/S	Str	
	E	1	Jx		+	1			SS/S	Str	
	F,H	2								Str	
Ph 2	A	1	Jx		+	1			SS/S	Str	
	B	1	0			1			SS/S	Str	
	C	1							SS/S	Str	
Ph 3	A	1	H			1			SS/S	Str	
	C	1							SS/S	Str	
Heidenschuß/Am Hof									SS/S		
Judengasse									SS/S		
CARNUNTUM											
Cohs A-F	Pd 1	36	A?						PT		
	Pds 2-4	36	A	+		2			SS	Str	A
Cohs G-H	Pd 1	12	A?						PT	Str	
	Pds 2-4	12	A	+?	+	2		M	SS	Str	A
RP	Pd 1								SB/PT	Str	
	Pd 2	3	Jx		+	2			SS	Str	A
	Pd 3/4	4	Jx		+	2			SS	Str	A
AQUINCUM											
P and R		4	A	+	+	1	a?		SS	Str	
LatP R		2	A	+		1		j?	SS	Str	C
L		2	0			1			S	Str	
SINGIDUNUM											
RR					+	1?			SS	Str	
POTAISSA											
LatP / LR		4	G	-		1	a?	h	SS	Sc	A
NOVAE											
Secteur II	Pd 1	1	Jx?						PT		
	Pd 2	1	Jx						SS	Str	
Secteur IV		3	A?	+		2?			SS	Str	A
ALBANO											
R									SS	Sc	
In front R		4		+	-	1	a	a	SS	Sc	
Rampart									SS		

A		B	C	D	E	F	G	H	I	J	K
LAMBAESIS											
FC	PP + 1	1	A	+	-	5		j	SS	Str	A
	II/III + 2-3	2	A	+	-	2	i		SS	Str	A
	IV + 4	1	A	+	-	2			SS	Str	A
	V + 5	1	A	+	-	2			SS	Str	A
	VI + 6	1	A	+	+	5			SS	Str	A
Coh	B	3	Jx			2		j	SS	Str	A
Coh	C	5	Jx			2		j	SS	Str	A
Coh	D	6	A	+	+	2	b	j	SS	Str	A
Coh	E	6	A	+	+	2	b	j	SS	Str	A
Bdg	Z	1							SS	Str	

A - Subject of entry
B - Overall
C - Centurions' / Officers' Quarters
D - Men's Quarters
E - Width of space (when present) between Centurions' and Men's Quarters
F - Total number of *contubernia* (details of special *contubernia*)

A	B		C		D		E		F
INCHTUTHIL									
R *Principia*	71,63	71,23			71,63	71,23			12
B	59,44	59,04			59,44	59,04			13
A	62,46	62,06	21,03	20,63	39,93	39,53	1,50	1,90	9
FC PP-V + 52	82,39	81,99	21,34	20,94	58,00	57,60	3,95	3,45	
51	83,94	83,54	21,34	20,94	58,00	57,60	4,60	5,00	
50	83,24	82,84	21,34	20,94	60,40	60,00	1,50	1,90	
49	83,82	83,42	21,34	20,94	62,48	62,08	1,83	2,23	
48	83,82	83,42	21,34	20,94	62,48	62,08	1,83	2,23	
47	83,82	83,42	21,34	20,94	62,48	62,08	2,74	3,14	
46	83,82	83,42	21,34	20,94	62,48	62,08	2,74	3,14	
45	83,82	83,42	21,34	20,94	62,48	62,08	1,83	2,23	
44	85,04	84,64	22,56	22,16	61,30	60,90	1,83	2,23	
43			22,56	22,16			2,74	3,14	
38	81,40	81,00	21,00	20,60	60,40	60,00	2,00	2,40	
25	83,62	83,22	21,70	21,30	60,40	60,00	1,52	1,92	
22	84,23	83,83	21,40	21,00	61,00	60,60	1,83	2,23	
18	84,18	83,78	20,74	20,34	61,00	60,60	2,44	2,84	14
17	83,64	83,24	21,40	21,00	59,80	59,40	2,44	2,84	14
16	82,98	82,58	20,74	20,34	59,80	59,40	2,44	2,84	
12	83,93	83,53	21,40	21,00	60,40	60,00	2,13	2,53	
4	84,14	83,74	20,74	20,34	60,40	60,00	3,00	3,40	14
53	84,82	84,42	22,30	21,10	61,30	60,90	1,22	1,62	15
135-156	63,40	63,00							11
INCHTUTHIL (Temporary Compound)									
Phase I	63,25	62,85			63,25	62,85			15
Phase II	63,40	63,00			63,40	63,00			15
Offices	20,73	20,33							
CARPOW									
	76,00	75,60							
RED HOUSE									
Stabs/Stores	17,09								

A	B		C		D		E		F
YORK									
FC 1,2,3	75,59	74,99	28,50	27,90	47,09				
Davygate			25,91	25,51					
LONGTHORPE									
VII	45,00	44,50							
VIII	57,61	57,00	15,20	14,59	42,41				
XIV Bk I	105,20	104,50	35,00	34,30	70,20				16 (2FC)
Ext XIV	61,00	60,00							
CHESTER									
Goss St Ph 2,3	*84,00*	*83,30*	*25,78*	*25,08*	57,00	56,30	1,22	1,92	12
Crook St Ph 1,2	84,00	83,30	25,78	25,08	55,32	54,62	2,90	3,60	12
H/P St Pd 2,3	88,50	87,80	26,00	25,30	62,50	61,80	2,00	2,70	12
Bdg K	85,00	84,30							
Ngte Bwy T 1,2	76,00	75,60	26,00	25,60					
Main Stone	76,00	75,30	25,00	24,30	49,00	48,30	2,00	2,70	11
Deanery Field	76,50	75,80	25,90	25,20	50,60	49,90	1,50	2,20	11
LP	86,00	85,30	27,00	26,30	57,00	56,30	2,00	2,70	12
WROXETER									
RP 1			19,00	18,60					
2,3			18,00	17,60					
CAERLEON									
FC V-II + x-i	77,00	76,25	25,00	24,25	52,00				12
IIa	20,00	19,25							
I 77,00	76,25		22,25	21,50	52,75	52,00	2,00	2,75	12
Prysg Field	73,76	73,01	24,00	23,25	49,76				12
Vine C/R Gates	77,00	76,25	24,00	23,25	53,00				13
Myrtle Cottage	75,00	74,25	26,00	25,25	49,00				12
GLOUCESTER									
Egt St/NMH	100,00	99,60	20,00	19,60	80,00				19
Berkeley St 4,5	72,50	72,10	18,75	18,40	52,00	51,60	1,75	2,10	12 (FC)
COLCHESTER									
Culver St	88,50	87,80	21,00	20,30	67,50				
RR	*85,84*	*85,14*							
Gilberd School					52,75				14
North Hill			22,00	21,30					
Lion Walk 5,2	85,84	85,14	18,00	17,30	67,84				

A	B		C		D		E		F
EXETER									
Next *fabrica*	60,00	59,60							
Offs' Qs	14,00	13,60	14,00	13,60					
Goldsm St S	62,00	61,60	19,50	19,10	42,50				12
N	62,00	61,60	18,00	17,60	44,00				12
NIJMEGEN									
Augustan	3,70	3,20	3,70	3,20					
FC Pd 4 PP			22,75	22,05					10 (EC)
II-V + 3-10			21,25	20,75					
Pd 5 PP + 1-2	70,00	69,30	23,75	23,05	45,00	44,30	1,25	1,95	8 (EC)
II-V + 3-10	77,50	76,80	22,50	21,80	48,75	48,05	6,25	6,95	11 (EC)
Cohs A,B Pd 4	65,00	64,50							10/11/12
Pd 5	71,25	70,55	22,50	21,80	48,75				12 (FC)
S-WC Pd 3/4 1-3			15,00	14,50					
Pd 5 9	67,50	66,80							
Coh C Pd 4			16,00	15,50					
Pd 5	67,50	66,80	20,75	20,05	46,75				
N *Primus Pilus*	70,00	69,30	26,25	25,55	43,75				11
Coh D Pd 4	65,75	65,25	23,50	23,00	42,25				10
Pd 5	67,50	66,80	22,50	21,80	45,00				10 (EC)
E *via dec*	50,00	49,30							
VETERA I									
Y	85,00	84,30							
N	82,00	81,30	15,00	14,30	52,00	52,70			12
			15,00	14,30					
O	82,00	81,30	15,00	14,30	52,00	52,70			(FC)
			15,00	14,30					
W	85,00	84,30	15,00	14,30	55,00	55,70			11
			15,00	14,30					
V	85,00	84,30	29,50	28,80	55,00				12 (EC)
Bdg S *Praet*	57,50	56,80							
HALTERN									
7 a-f	30,00	29,50	30,00	29,50					
11g	60,00	59,50	7,50	7,00	51,50	51,00	1,00	1,50	
11f	71,00	70,50							
11e	71,00	70,50							
11d	71,00	70,50	24,00	23,50	47,00				14
11c	67,00	66,50							
10 1	72,00	71,50	6,00	5,50	66,00				
2	40,00	39,50	13,50	13,00	26,50				8
3	40,00	39,50							
4	44,50	44,00	19,50	19,00	25,00				5
5	45,00	44,50	10,00	9,50	35,00				
11b	68,00	67,50	9,00	8,50	55,50	55,00	3,50	4,00	10/12
11a	68,00	67,50							

A	B		C		D		E	F
8a	40,50	39,50						
8b	45,00	44,50						
8c	47,00	46,50						
8d	53,00	54,50						11
Bdg N 3	30,00	29,50						10
OBERADEN								
Albrecht's Bk	70,00	69,50	8,24	7,74	61,76			15
N-W Corn 1			8,25	7,75				
2,3	*71,00*	*70,50*	9,25	8,75	*61,75*			
4,5	*71,00*	*70,50*	8,00	7,50	*63,00*			
6	*71,00*	*70,50*	8,25	7,75	*62,75*			
7	*71,00*	*70,50*	9,10	8,60	*61,90*			
8,9	*71,00*	*70,50*	13,25	12,75	*57,75*			
NEUSS								
93-98	74,50	69,50						12 (FC)
110-115	74,00	73,50	21,00	20,50	53,00			12
131	74,00	73,50						13
133-134	74,00	73,50						12
155-150	81,00	80,50	28,00	27,50	53,00			13 (FC)
149-144	81,00	80,50	28,00	27,50	53,00			13 (FC)
143-142	77,50	77,00	25,00	24,50	52,50			13 (FC)
140-135	78,00	77,50	25,00	24,50	53,00			13 (FC)
122-119	78,00	77,50	28,00	27,50	50,00			12 (FC)
104-99	77,00	76,50	25,00	24,50	52,00			12 (FC)
84-87	75,00	74,50	24,50	24,00	50,50			12 (FC)
7-12	77,00	76,50	25,00	24,50	52,00			13
26-31	78,00	77,50						13
15-17	32,50	32,00						8
23,24	41,00	40,50						
25	35,00	34,50						9
46-51	33,75	33,25	*14,00*	*13,50*	*19,75*			*5*
52	36,50	36,00						8
91	73,00	72,50						15
108	88,00	87,50						17
106	88,00	87,50						
124	137,00	136,50						18
BONN								
Cas 9,10,11	55,00	54,50	11,50	11,00	43,50			11
12	82,00	81,50	31,00	30,50	51,00			13
Loëkaserne Pd 2	82,00	81,50	15,00	14,50	52,00	52,50		12
			15,00	14,50				
Coh A	82,00	81,50						
Graurhdstrasse	81,00	80,50	15,50	15,00	50,00	50,50		
			15,50	15,00				
Koenen Bke	81,00	80,50	30,00	29,50	51,00			13
Coh C	78,00	77,50						

A	B		C		D		E	F
Caserne 3	78,00	77,50	28,50	28,00	49,50			12
Casernen 4,5	78,00	77,50	14,50	14,00	49,00	49,50		
			14,50	14,00				
RÖDGEN								
E of 'A'	31,00	30,50						
S of 'A' N	63,50	63,00						16
S	43,00	42,50						11
Square bdgs N	7,13	6,63						
S	5,75	5,25						
S Stabsgeb	50,00	49,50	8,50	8,00	41,50			11
DANGSTETTEN								
W Str I	*80,00*	*77,70*						
E Str II/N III	68,00	67,70						
E Str III/S III	81,25	80,95	21,88	21,58	59,37			11
VINDONISSA								
Dätwiler Pd 2 E					45,00			
W					42,30			7
Königsf Pd 5 b,c			23,45	22,85				
W Gate d	67,50	66,90	25,00	24,40	42,50			11 (FC)
Pd 6/7 b,c			22,50	21,90				
d	67,50	66,90	24,00	23,40	43,50			11 (FC)
Königsf Island					40,00			10
Breite VII	68,40	67,80	27,00	26,40	41,40			10
Pd 3/4 VI	68,50	67,90	24,80	24,20	43,70			11 (FC)
V	69,00	68,40	27,50	26,90	41,50			10
IV	68,75	68,15	24,00	23,60	44,75			11 (FC)
III	68,60	68,00	23,25	22,65	45,35			11 (FC)
II	68,60	68,00	23,25	22,65	45,35			11 (FC)
I	68,60	68,00	26,00	25,40	42,60			12 (FC,EC)
Pd 2 III			22,50	22,10				
II			22,50	22,10				
Breite Pd I 5	90,00	89,60	43,50	43,10	46,50			
N Gate 4	85,00	84,60	28,50	28,10	56,50			15
3	85,00	84,60	28,00	27,60	57,00			
2	83,25	82,65	37,00	36,60	46,25			12
Pd 2 7,6	96,00	95,40	32,25	31,65	63,75			
5	94,00	93,40	42,75	42,15	51,25			11
4	94,00	93,40	41,70	41,10	52,30			13 (FC)
3	91,50	90,90	34,75	34,15	56,75			12 (FC)
2	90,80	90,20	32,35	31,65	58,55			
1	88,25	87,65	32,50	31,90	55,75			12
Breite Pd III R1	84,75	84,35						
N-E Corner	38,50	38,20	6,50	6,10	32,00			8
	45,75	45,45	10,50	10,10	35,25			8
U1/K1	84,00	83,60	36,50	36,10	47,50			13 (FC)
U2/K2	89,00	88,60	31,60	31,20	57,40			16 (FC)

A	B		C		D		E		F
R2	89,00	88,60	31,60	31,20	57,40				10
Pd V/VI O1/O2	85,00	84,40	37,50	36,90	47,50				
U1/K1	85,00	84,40	37,50	36,90	47,50				11 (FC)
Pd VII O1/O2	85,00	84,40	37,50	36,90	47,50				
U1/K1	85,00	84,40	37,50	36,90	47,50				11 (FC)
U2/K2	84,00	83,40	33,25	32,65	50,75				12 (2FC)
K3					50,75				11
U3/K4,U4/K5	65,40	64,80	15,50	14,90	46,50	35,90	3,40	4,00	10
U5/K6	50,00	49,40	22,40	21,80	27,60				6
Breite *val* Pd 1									13
Pd 2 A1/B1	64,00	63,60	10,25	9,85	53,75				13
Pd 5/6 1	82,10	81,50	23,00	22,40	59,10				13 (FC)
2,3	83,00	82,40	24,45	23,85	58,55				13 (FC)
Oelhafen	29,00	28,40	4,70	4,10	24,30				
Breite N-EC B	53,00	52,40							
REGENSBURG									
Niederm Pd 2					66,25				
Pd 3	86,25	85,65	20,70	20,10	65,55				
LAURIACUM									
FC	87,50	86,90	16,25	15,65	70,00	69,40	1,25		
Cohs B-I	*87,50*	*86,90*	*17,50*	*16,90*	70,00				12
Coh J					47,50				
VINDOBONA									
FC Ph 1 A,E									12
CARNUNTUM									
Coh A Pd 4	85,00	84,40							
Coh B,C Pd 4	89,50	88,90	26,25	25,65	63,25				
Coh D Pd 4	90,00	89,40	28,40	27,80	61,60				12
Coh E Pd 4	92,00	91,40	28,40	28,20	63,20				
Coh F	73,75	73,15	26,25	25,25	47,50				
Coh G Pd 4	75,00	74,40							
Coh H Pd 4	75,00	74,40	27,50	26,90	47,50				11 (EC)
AQUINCUM									
LatP R	72,50	71,80							
L	72,50	71,80	23,75	23,05	48,75				
R	72,50	71,80	23,75	23,05	48,75				12
L	75,00	74,30	23,75	23,05	51,25				13

A	B		C		D		E	F
POTAISSA								
LatP / LR					65,20	64,50		11 (10+EC)
NOVAE								
LP Sect IV	68,00	67,30	18,00	17,30	50,00			12
ALBANO								
R a	38,00	37,30						8
b	40,00	39,30						9
In front R	94,00	93,30	*14,00*	*13,70*	*66,00*	*65,90*		14
			14,00	*13,70*				
LAMBAESIS								
FC PP + 1	97,00	96,30	38,00	37,30	59,00			
II/III + 2,3	97,00	96,30	35,00	34,30	62,00			
IV + 4	97,00	96,30	38,50	37,80	58,50			
V,VI + 5,6	97,00	96,30	40,00	39,30	57,00			
Cohs B,C	*90,00*	*89,30*						
Cohs D,E	96,00	95,30	25,50	24,80	70,50			14 (FC,EC)
Bdg Z	65,00	64,30						

A - Subject of entry
B - Overall
C - Centurions' / Officers' Quarters
D - Men's Quarters
E - Veranda (internal) (Where the veranda is not verified the equivalent measurement is shown in brackets)
F - Building proportions (length of building divided by width)

A	B		C		D		E	F	
INCHTUTHIL									
R *Principia*	11,28	10,88			7,62	7,22	3,26	6,35	6,56
B	10,67	10,27			7,60	7,20	2,67	5,57	5,75
A	10,36	9,96	10,36	9,96	8,23	7,83	1,73	6,03	6,23
FC PP-V + 52-51	35,05	34,65	35,05	34,65	8,84	8,44	1,58		
					7,92	7,52	1,58		
50-49	25,30	24,90	25,30	24,90	7,92	7,52	1,58		
					7,50	7,10	1,58		
48-47	25,91	25,51	25,91	25,51	7,92	7,52			
					7,92	7,52			
46-45	25,91	25,51	25,91	25,51	7,92	7,52	1,60		
					7,92	7,52			
44-43	27,43	27,03	27,43	27,03	7,92	7,52			
					7,92	7,52			
38	10,60	10,20	10,60	10,20	8,20	7,80	2,00	7,68	7,94
25	10,98	10,58	10,98	10,58	8,20	7,80	(2,38)	7,62	7,87
22	11,59	11,19	11,59	11,19	8,50	8,10	2,69	7,27	7,49
18	11,59	11,19	11,59	11,19	8,50	8,10	2,69	7,27	7,49
17	10,98	10,58	10,98	10,58	8,50	8,10	2,08	7,62	7,87
16	10,36	9,96	10,36	9,96	8,50	8,10	1,46	8,01	8,29
12	11,59	11,19	11,59	11,19	8,50	8,10	2,69	7,24	7,46
4	11,28	10,88	11,28	10,88	8,50	8,10	2,38	7,46	7,70
53	10,98	10,58	10,98	10,58	8,85	8,45	1,73	7,72	7,98
135-156	12,50	12,10			9,45	9,05	2,65	5,07	5,21
INCHTUTHIL (Temporary Compound)									
Ph I	9,45	9,05			9,45	9,05		6,69	6,94
Ph II N	11,28	10,88			8,38	7,98	2,50	5,62	5,79
S	11,58	11,18			9,14	8,74	2,04	5,67	5,64
Offices	12,80	12,40							
RED HOUSE									
Bdg 16			12,60	12,20					
Other Bdgs	6,00	5,60							

A	B		C		D		E	F	
YORK									
FC 1,2,3	19,81	19,21	19,81	19,21				3,82	3,90
Davygate	12,04	11,64	12,04	11,64					
LONGTHORPE									
I	9,45	9,00	9,45	9,00					
II	17,07	16,50							
IV	9,25	9,00			9,25	9,00			
VII	6,50	6,00						6,92	7,42
VIII	11,75	11,50	11,75	11,50	9,25	9,00		4,90	4,96
XIV Bk I	16,60	16,20	16,60	16,20	10,25	10,00	2,50	6,34	6,51
Ext XIV	7,90/3,00		7,00/2,50						
Bk II	11,35	11,00	11,25	11,00	8,50	8,00	2,00		
CHESTER									
Goss St Ph 1	4,40	4,00			4,40	4,00			
Phs 2,3	12,04	11,34	*12,04*	*11,34*	8,38	7,68	2,96	6,98	7,35
Crook St Ph 1,2	10,80	10,10	10,80	10,10	7,85	7,15	2,25	7,78	8,09
Old Mkt Hall	9,50	9,10			7,50	7,10	1,60		
H St/Pr St Pds 1-3	11,75	11,05	11,75	11,05	8,60	7,90	2,45	7,53	7,95
Bdg K	8,60	7,90							
Northg B T 1,2	11,00	10,60	11,00	10,60				6,91	7,13
Main/Late St	11,70	11,00	11,70	11,00	8,50	7,80	2,50	6,50	6,85
Folliot House Pd 2					8,51	7,81			
Abbey Green T	10,00	9,60	10,00	9,60					
St	11,25	10,55	11,25	10,55					
Deanery Field	11,27	10,57	11,27	10,57	8,53	7,83	2,04	6,92	7,31
LP	10,50	9,80	10,50	9,80	8,00	7,30	(1,90)	8,19	8,70
Bollond's Court	9,14	8,44							
RHYN PARK									
	9,10	8,70			7,20	6,80	(1,50)		
WROXETER									
RP 2	11,00	10,60	11,00	10,60	7,90	7,50	(2,70)		
3	10,35	9,95	10,35	9,95	7,50	7,10	(2,45)		
CAERLEON									
FC III	22,00	21,25	22,00	21,25					
II	17,50	16,75	17,50	16,75					
IIa	9,50	8,75							
x					9,00	8,25			
ix,viii,i					10,00	9,25			
iii					8,00	7,25			

A	B		C		D		E	F	
ii					10,00	9,25			
Prysg Field	11,50	10,75	11,50	10,75	9,00	8,25	(2,00)	6,41	6,79
The Croft Pd 2					9,00	8,25	1,75		
Vine Cottage					9,00	8,25			
R Gates Ph A 1					7,25	6,75			
2					9,00	8,50			
Ph C 1,2					9,50	9,00			
Ph D 2					9,50	8,75			
Ph E 1					8,70	8,00			
Myrtle Cottage	10,97	10,22	10,97	10,22	8,84	8,09	(1,38)	6,84	7,27
2					9,50	8,75			
GLOUCESTER									
Eastgate St/NMH	10,00	9,80	10,00	9,80	8,00	7,80	1,80	10,00	10,16
Berkeley St	10,00	9,80	10,00	9,80	8,15	8,00	1,50	7,25	7,36
COLCHESTER									
Culver St	13,00	12,30	13,00	12,30				6,81	7,14
Gilberd School	9,70	9,00			7,15	6,45	1,85		
Lion Walk	10,00	9,30	10,00	9,30					
LAKE FARM									
					3,66	3,26			
EXETER									
Next *fabrica*	11,00	10,60	11,00	10,60	7,50	7,10	2,90	5,45	5,62
Offs' Qs next *fab*	11,00	10,60	11,00	10,60					
Goldsmith St	11,00	10,60	11,00	10,60	7,50	7,10	2,90	5,64	5,81
Store-Bdg	6,20	5,80			6,20	5,80			
St Nich Priory	10,20	9,80	*10,20*	*9,80*	7,45	7,05	2,35		
Bartholomew St	11,00	10,60	*11,00*	*10,60*	8,00	7,60	2,60		
NIJMEGEN									
Augustan	3,20	2,70							
FC Pd 4 II+3-4	21,25	20,75	21,25	20,75	8,25	7,75	(2,50)		
II+5,6 III+7-8	20,50	20,00	20,50	20,00	8,25	7,75	(2,50)		
IV+9-10	21,00	19,50	21,00	19,50	8,25	7,75	(2,50)		
Pd 5 PP+1-2	30,00	29,30	30,00	29,30	9,00	8,30	1,55		
II,III,IV+3-8/9	21,25	20,56	21,25	20,55	8,75	8,05	(1,80)		
					6,25	5,55	(4,30)		
V+8/9-10	23,75	23,05	23,75	23,05	6,25	5,55	(4,30)		
					8,75	8,05	(1,80)		
Cohs A,B Pd 4	9,50	9,00	9,50	9,00	7,25	6,75	1,75	6,84	7,17
Pd 5	11,25	10,55	11,25	10,55	8,75	8,25	(1,80)	6,33	6,69
SWC Pd 3/4 1-3	8,50	8,00	8,50	8,00	6,75	6,25	(1,25)		

A		B		C		D		E	F	
	4	10,00	9,50							
Pd 5	9					9,00	8,30			
Coh C Pd 4		10,00	9,50	10,00	9,50	7,50	7,00	2,00		
Pd 5		11,50	10,80	11,50	10,80	8,50	7,80	(2,30)	5,87	6,19
N *Primus Pilus*		11,25	10,55	11,25	10,55	10,00	9,30	1,00	6,22	6,57
Coh D Pd 4		11,25	10,75	11,25	10,75	9,25	8,75	1,50	5,84	6,07
Pd 5		11,25	10,75	11,25	10,75	9,25	8,75	(1,50)	6,00	6,20
E *via decumana*		13,75	13,05						3,64	3,78
VETERA I										
Y		11,50	10,80			8,00	7,30	2,00	7,39	7,81
N,O		22,00	21,30	22,00	21,30	8,00	7,30	2,80	7,13	7,53
W		23,50	22,80	23,50	22,80	8,40	7,70	2,00	6,80	7,14
V		12,50	11,80	12,50	11,80	8,60	7,90	3,00	6,80	7,14
Bdg S *Praet*		8,60	7,90						6,69	7,19
HALTERN										
7a-f		16,00	15,50	16,00	15,50				1,88	1,90
11g		10,50	10,00	10,50	10,00	6,00	5,50	(4,00)	5,71	5,95
11f		11,00	10,50	11,00	10,50	6,50	6,00	(4,00)	6,45	6,71
11e		9,00	8,50	9,00	8,50				7,89	8,29
11d		9,50	9,00	9,50	9,00	6,50	6,00	(2,50)	7,47	7,83
11c		7,50	7,00	7,50	7,00	7,50	7,00		8,93	9,50
10 1		8,50	8,00	8,50	8,00	6,50	6,00	1,50	8,47	8,94
2		8,50	8,00	8,50	8,00	6,50	6,00	1,50	4,71	4,94
3				12,00	11,50	12,00	11,50		3,33	3,43
4		8,00	7,50	8,00	7,50	7,00	6,50	(0,50)	5,56	5,87
5		8,50	8,00	8,50	8,00	5,50	5,00	(2,50)	5,29	5,56
11b,11a		9,50	9,00	9,50	9,00	6,50	6,00	(2,50)	7,16	7,50
8a				14,50	14,00	14,50	14,00		2,79	2,82
8b				14,50	14,00	14,50	14,00		3,10	3,18
8c				6,00	5,50	6,00	5,50		7,83	8,45
8d				7,50	7,00	7,50	7,00		7,07	7,79
Bdg N 3		6,50	6,00			6,50	6,00		6,77	7,25
OBERADEN										
Albrecht's Bk		14,49	13,99	14,49	13,99	11,03	10,53	(2,96)	4,83	4,97
N-W Corner	1,2	9,25	8,75	9,25	8,75					
	3	8,00	7,50	8,00	7,50					
	4	9,50	9,00	9,50	9,00					
	5	11,60	11,10	11,60	11,10					
	6	9,25	8,75	9,25	8,75	*9,25*	*8,75*			
	7	8,60	8,10	8,60	8,10	*8,60*	*8,20*			
	8	10,00	9,50	10,00	9,50					
	9	10,50	10,00	10,50	10,00					

A	B		C		D		E	F	
NEUSS									
93-98	12,00	11,50			8,75	8,25	2,50	6,21	6,43
110-115	12,50	12,00	12,50	12,00	9,50	9,00	2,50	5,92	6,13
131	12,00	11,50			9,00	8,50	2,00	6,17	6,39
133-134	13,00	12,50			9,50	9,00	2,50	5,69	5,88
155-150	13,00	12,50	13,00	12,50	8,50	8,00	2,50	6,23	6,44
149,147-144	12,00	11,50	12,00	11,50	9,00	8,50	2,50	6,75	7,00
148	13,00	12,50	13,00	12,50	10,25	9,75	2,00	6,75	7,00
143-142	12,00	11,50	12,00	11,50	9,00	8,50	2,00	6,46	6,70
140-135	13,00	12,50	13,00	12,50	8,50	8,00	2,50	6,00	6,20
122-119	12,00	11,50	12,00	11,50	9,00	8,50	2,00	6,50	6,74
104-99	12,00	11,50	12,00	11,50	8,50	8,00	2,50	6,42	6,65
84-87	12,00	11,50	12,00	11,50	9,00	8,50	2,25	6,25	6,48
7-12	12,00	11,50	12,00	11,50	9,00	8,50	2,50	6,42	6,65
26-31	11,50	11,00			8,50	8,00	2,50	6,78	7,05
15	10,00	9,50	10,00	9,50	10,00	9,50		3,25	3,37
16	9,50	9,00	9,50	9,00	9,50	9,00		3,42	3,56
17	18,50	18,00	18,50	18,00	18,50	18,00		1,76	1,78
23	10,00	9,50	10,00	9,50	10,00	9,50		4,10	4,26
24	9,00	8,50	9,00	8,50	9,00	8,50		4,56	4,76
25	18,50	18,00	18,50	18,00	18,50	18,00		1,89	1,92
32-36,38,40-42	10,00	9,50			10,00	9,50		3,38	3,50
37	12,00	11,50	12,00	11,50	12,00	11,50		2,81	2,89
39	10,50	10,00	10,50	10,00	10,00	9,50		3,21	3,33
46-51	10,50	10,00	*10,50*	*10,00*	9,50	9,00		3,21	3,33
52	9,75	9,25	9,75	9,25	9,75	9,25		3,74	3,89
91	14,00	13,50			9,50	9,00	(3,50)	5,21	5,37
108	13,50	13,00			9,50	9,00	(3,00)	6,52	6,73
106	14,50	14,00			10,00	9,50	(3,50)	6,07	6,25
124	13,00	12,50			9,00	8,50	3,00	10,54	10,92
BONN									
Cas 9,10 1	18,00	17,50	18,00	17,50	8,50	8,00	(9,00)	3,06	3,11
10 2	7,50	7,00			5,00	4,50	(2,00)	7,33	7,79
11	16,00	15,50	16,00	15,50				3,44	3,52
12	11,00	10,50	11,00	10,50	8,50	8,00	(2,00)	7,45	7,76
Loëkaserne	22,50	22,00	22,50	22,00	8,50	8,00	2,25	7,29	7,41
Coh A	12,00	11,50	12,00	11,50	8,50	8,00	(3,00)	6,83	7,09
Graurheindorferstr	11,00	10,50	11,00	10,50	8,00	7,50	2,50	7,36	7,67
Koenen Bke	11,50	11,00	11,50	11,00	8,00	7,50	3,00	7,04	7,32
Coh C	10,50	10,00	10,50	10,00	8,00	7,50	(2,00)	7,43	7,75
Caserne 3	11,00	10,50	11,00	10,50	8,00	7,50	(2,50)	7,09	7,38
Casernen 4,5	21,00	20,50	21,00	20,50	8,00	7,50	(2,00)	7,43	7,56
Coh D					8,50				
RÖDGEN									
Bdgs E of 'A'	9,50	9,00	7,25	6,75	7,25	6,75	1,75	3,26	3,39
Bdgs S of 'A' N	6,75	6,25	6,75	6,25	6,75	6,25		9,41	10,08
Sq bdgs N	6,50	6,00						1,10	1,11

A		B		C		D		E	F	
S		6,25	5,75						0,92	0,91
Bdg S Stabsgebäude		6,75	6,25	6,75	6,25	6,75	6,25		7,41	7,92
STRASBOURG										
St Étienne Pd 2		9,90	9,40			8,50	8,00	1,20		
Pd 4						3,00				
DANGSTETTEN										
W Str I		*12,00*	*11,70*	*12,00*	*11,70*	*12,00*	*11,70*		*6,61*	*6,81*
N Str IV		13,53	13,23	13,53	13,23					
E Str II/N III		8,75	8,45	8,75	8,45	8,75	8,45		7,77	8,01
E Str II/S III		8,75	8,45	8,75	8,45	8,75	8,45		9,29	9,58
VINDONISSA										
Dätwiler Pd 2	E					9,00	8,25			
	W					12,00	11,25	2,70		
Immunes Kaserne		13,40	12,80			10,80	10,20	2,00		
Königsfelden Pd 2	d	7,65	7,35			7,65	7,35			
West Gate	c	12,75	12,45			9,30	9,00	2,85		
	b	12,30	12,00			9,08	8,78	2,70		
	a							2,70		
Pd 5	b,c	11,55	10,95	11,55	10,95	8,40	7,80	2,45	2,45	
	d	10,60	10,00	10,60	10,00	8,00	7,40	2,00	6,37	6,69
Pd 6/7	b	10,75	10,15	10,75	10,15	8,00	7,40	2,25		
	c	10,75	10,15	10,75	10,15	7,25	6,65	3,00		
	d	11,00	10,40	11,00	10,40	7,75	7,15	2,00	6,14	6,43
Königsf Island		11,25	10,65			8,75	8,15	1,88		
Breite Pd 1	III-I	10,60	10,20			7,60	7,20	2,00		
	IV	10,00	9,60			7,40	7,00	2,00		
Pd 2	IV	10,25	9,85	10,25	9,85	7,40	7,00	2,20		
	III	11,40	11,00	12,25	10,85	8,25	7,85	2,60		
	II	12,40	12,00	11,75	11,35	8,50	8,10	(3,40)		
Pds 3/4	VII	10,80	10,20	10,80	10,20	9,00	8,40	2,25	6,33	6,65
	VI	13,50	12,90	13,50	12,90	8,10	7,50	3,25	5,07	5,26
	V	11,25	10,65	11,25	10,65	8,60	8,00	2,10	6,13	6,42
	IV	10,50	9,90	10,50	9,90	8,40	7,80	2,25	6,55	6,88
	III	11,50	10,90	11,50	10,90	8,80	8,20	2,00	5,97	6,24
	II	10,45	9,85	10,45	9,85	8,75	8,15	1,30	6,56	6,90
	I	11,75	11,15	11,75	11,15	8,60	8,00	2,80	5,84	6,10
Pd 4	IV	11,30	10,70			8,40	7,80	2,40	6,08	6,37
	II	11,80	11,20			8,80	8,20	2,40	5,81	6,07
Gemüsegarten	K	10,20	9,80			7,50	7,10	2,40		
Breite N Gt Pd 1	5	10,50	10,10	10,50	10,10	8,00	7,60	(2,00)	8,57	8,87
	3,4	10,50	10,10	10,50	10,10	7,50	7,10	(2,60)	8,09	8,38
	2	10,50	10,10	10,50	10,10	7,50	7,10	(2,60)	7,93	8,18
Pd 2	7	11,25	10,65	11,25	10,65	8,25	7,65	2,50	8,53	8,96
	6	11,00	10,40	11,00	10,40	7,75	7,15	2,75	8,73	9,17
	5	13,00	12,40	13,00	12,40	8,75	8,15	2,00	7,23	7,53
	4	12,00	11,40	11,10	10,50	9,00	8,40	2,00	7,83	8,19

A		B		C		D		E	F	
	3	12,50	11,90	12,50	11,90	9,00	8,40	2,00	7,32	7,64
	2	11,25	10,65	11,25	10,65	9,00	8,40	1,75	8,07	8,47
	1	10,00	9,40	10,00	9,40	8,50	7,90	2,50	8,83	9,32
Breite Pd III R1		14,20	13,80			6,45	6,05		5,97	6,11
N-E Corner		13,25	12,85			6,45	6,05		2,91	2,97
		14,20	13,80			6,45	6,05		3,22	2,97
	U1/K1	14,00	13,60	14,00	13,609	8,75	8,45	2,90	6,00	6,15
	U2/K2	14,00	13,60	14,00	13,60	8,00	7,60	2,00	6,36	6,51
Pd V/VI	O1/O2	12,50	11,90	12,50	11,90	12,50	11,90		6,80	7,09
Pd V	U1/K1					8,20	7,60	2,80		
Pd VI	U1/K1	13,25	12,65	13,25	12,15	9,10	8,50	2,25	6,42	6,67
Pd VII	O1/O2	12,50	11,90	8,65	8,05	12,50	11,90		6,80	7,09
	U1/K1	16,50	15,90	16,50	15,90	9,10	8,50	2,25	5,15	5,31
	U2/K2	18,00	17,40	18,00	17,40	8,20	7,60	2,00	4,67	4,79
	K3					7,25	6,65			
	U3/K4			7,75	7,15	7,40	6,80		8,44	9,06
	U4/K5			7,75	7,15	7,10	6,50		8,44	9,06
	U5/K6	10,60	10,00	10,60	10,00	8,00	7,40		4,72	4,94
Breite *val* Pd 1		10,50	10,10	10,50	10,10	7,50	7,10	2,60		
Pd 2	A1/B1	10,00	9,60	10,00	9,60	8,00	7,60	2,00	6,40	6,63
Pd 3	II-VI					9,50	9,20			
	VII-VIII					11,90	11,60			
Pd 4						8,00	7,60			
Pd 5/6	1	11,50	10,90	11,50	10,90	8,80	8,20	1,90	7,14	7,48
	2,3	11,50	10,90	11,50	10,90	9,00	8,40	2,00	7,22	7,56
Breite Schwimm Pd 4		12,50	11,90	12,50	11,90					
Oelhafen Bdg B		9,90	9,30	9,90	9,30	8,25	7,65	(1,05)	2,93	3,05
Scheuergasse		10,33	9,73			8,80	8,20	1,05		
Breite N-EC Pd VII B		21,50	20,90						2,47	2,51
REGENSBURG										
Niedermünster	Pd 1					9,90	9,50			
	Pd 2					9,90	9,30	1,80		
	Pd 3	12,75	12,15	11,70	11,10	10,20	9,60	1,50	6,76	7,05
Grasgasse		12,20	11,40	12,20	11,40					
LAURIACUM										
FC 1		13,75	13,15	13,75	13,15	10,50	9,90	2,65		
2,3,4						13,75	13,15	2,65		
5						12,50	11,90	2,65		
6		13,75	13,15	13,75	13,15	11,00	10,40	2,15		
Remaining Cohs		*11,60*	*11,00*			10,00	9,40	1,20	7,54	7,90
VINDOBONA										
FC Ph 1	A,E	12,40	11,70			9,80	9,10	1,80		
	B	6,75	6,05			6,75	6,05			
Phs 2,3	A	12,15	11,55			9,40	8,80	2,25		
Heidenschuß/Am Hof						7,80	7,60			

A			B		C		D		E	F	
CARNUNTUM											
FC Coh A		1					18,50	17,90			
Pd 4		2					15,00	14,40			
		3					16,00	15,40			
		4					17,00	16,40			
		5					10,50	9,90			
Coh B Pd 4			11,00	10,40	11,00	10,40				8,14	8,55
Coh C Pd 4			11,00	10,40	11,00	10,40	8,75	8,15	(1,55)	8,14	8,55
Coh D Pd 4			10,40	9,80	10,40	9,80	8,00	7,40	(1,80)	8,65	9,12
Coh E Pd 4			10,00	9,40	10,00	9,40	8,00	7,40	(1,30)	9,20	9,72
Coh F Pd 4			12,50	11,90	12,50	11,90	9,38	9,78	(2,42)	5,90	6,15
Coh G Pd 4							8,25	7,65			
Coh H Pd 4			10,50	9,90	10,50	9,90	8,50	7,90	1,40	7,14	7,52
RP Pd 2	7	E					7,75	7,25			
		W					8,10	7,60	(1,50)		
	8	E					8,20	7,70	(1,70)		
Pd 3/4	7	E					7,35	6,95			
		W					6,90	6,50			
	8	E					7,40	7,00			
		W					7,70	7,30			
AQUINCUM											
LatP R			13,33	12,63	13,33	12,63	10,69	9,99	1,94	5,44	5,68
P			12,33	11,63	12,33	11,63	9,05	8,35	2,50	5,88	6,17
R			12,33	11,63	12,33	11,63	9,05	8,35	2,50	6,08	6,40
SINGIDUNUM											
RR			9,00	8,40			7,00	6,40	1,60		
POTAISSA											
LatP / LR			11,80	11,40			8,40	7,70	(2,70)		
NOVAE											
Secteur II							8,20	7,60			
Secteur IV			10,50	9,80	10,50	9,80	7,60	6,90	(2,20)		
ALBANO											
R a			6,00	5,30	6,00	5,30	6,00	5,30		6,33	6,54
b			6,00	5,30	6,00	5,30	6,00	5,30		6,66	6,89
In front R			*32,00*	*31,30*	*32,00*	*31,30*	*10,50*	*9,80*			

A	B		C		D		E	F	
LAMBAESIS									
FC PP + 1	26,00	25,30	26,00	25,30	18,00	17,30			
II/III + 2	52,00	51,30	42,00	51,30	16,50	15,80			
3					14,00	13,30			
IV + 4	15,50	14,80	15,50	14,80	16,50	15,80			
V + 5	20,00	19,30	20,00	19,30	13,00	12,30	2,00		
VI + 6	29,00	28,30	29,00	28,30	18,00	17,30	2,00		
Cohs B,C	17,50	16,80			11,50	10,80		5,14	5,32
Cohs D,E	15,75	15,05	15,75	15,05	11,25	10,55	2,25	6,10	6,33
Bdg Z	28,00	27,30						2,32	2,36

A - Subject of entry
B - Breadth × depth of *papilio* or rear room
C - Breadth × depth of *arma* or front room
D - Breadth × depth of *contubernium* or whole room
E - Area of *papilio*
F - Area of *arma*
G - Area of *contubernium*
H - Interval spacing of side walls

Note: All measurements are internal

A	B	C	D	E	F	G	H
INCHTUTHIL							
B	3,96x3,96	3,96x1,83	3,96x6,71	15,68	7,25	26,57	4,36
A	3,66x4,42	3,66x1,83	3,66x7,01	16,18	6,70	25,66	4,06
52	3,66x4,57	3,60x2,29	3,66x7,77	16,73	8,38	28,44	4,10
18	4,28x4,88	4,28x2,44	4,28x7,62	20,89	10,44	32,61	4,68
17	4,28x4,28	4,28x2,44	4,28x7,32	18,32	10,44	31,33	4,68
53	3,66x5,18	3,66x2,74	3,66x7,92	18,96	10,03	28,99	4,06
INCHTUTHIL (Temporary Compound)							
Phase I	3,85x5,83	3,85x2,13	3,85x7,92	20,52	8,20	30,49	4,25
Phase II N	3,66x4,72	3,66x2,29	3,66x7,32	17,28	8,38	26,79	4,60
S	3,66x4,57	3,66x2,90	3,66x7,92	16,73	10,61	28,99	4,06
RED HOUSE							
Bdg 16	6,90x5,60	6,90x5,60	6,90x11,30	38,64	38,64	77,97	7,30
YORK							
FC 3	x4,72						
W P Brown	4,30x	4,30x	4,30x				
LONGTHORPE							
IV	4,00x5,00	4,00x3,25	4,00x8,50	20,00	13,00	34,00	4,25
XIV Bk I	3,25x4,50	3,25x4,00	3,25x9,00	14,63	13,00	34,00	4,00
Bk II	4,50x4,90	4,50x2,50	4,50x7,90	22,05	11,25	35,55	5,40

A	B	C	D	E	F	G	H
CHESTER							
Goss St Phs 2,3			4,00x4,00			16,00	
Crook St Phs 1,2	4,00x3,00	4,00x2,50	4,00x6,50	12,00	10,00	26,00	4,70
Old Mkt Hall	3,30x4,05	3,30x2,50	3,30x6,80	13,37	8,25	22,44	3,70
Hunt St/Pr St	4,60x4,20	4,60x2,45	4,60x7,35	19,32	11,27	33,81	5,30
Bdg K			4,80x6,80			32,64	5,50
Folliot House	3,51x3,51	3,51x2,13	3,51x6,43	12,32	7,48	22,57	4,21
Deanery Field	4,25x4,50	4,25x2,75	4,25x8,00	19,13	11,69	34,00	4,95
Eastgate St	4,57x	4,57x2,44	4,57x		11,15		5,27
LP	4,50x5,00	4,50x3,50	4,50x9,00	22,50	15,75	40,50	5,20
RHYN PARK							
	x2,60	x2,60					
WROXETER							
RP 1	3,10x4,00	3,10x	3,10x	12,40			3,50
2	3,20x4,50	3,20x1,75	3,20x6,80	14,40	5,60	21,76	3,60
3	x4,10	x1,60	x6,50				
CAERLEON							
FC ix	6,50x4,50	6,50x3,00	6,50x8,00	29,25	19,50	52,00	6,70
viii	3,30x4,50	3,30x4,00	3,30x9,00	14,85	13,20	29,70	3,80
ii			3,50x9,00			31,50	4,90
i	3,30x4,50	3,30x4,00	3,30x9,00	14,85	13,20	29,70	3,80
Prysg Field	3,50x3,75	3,50x2,80	3,50x7,75	13,13	9,80	27,13	4,10
Croft Pd 2/3	3,60x3,75	3,60x2,65	3,60x7,25	13,50	9,54	26,10	4,10
Vine Cottage	3,50x3,75	3,50x2,80	3,50x7,75	13,13	9,80	27,13	4,10
R Gates PhA 1	3,50x3,40	3,50x2,60	3,50x6,60	11,90	9,10	23,10	4,00
2	3,40x5,40	3,40x2,60	3,40x8,00	18,36	8,84	27,20	3,80
Ph B 2	2,80x	2,80x2,50	2,80		7,00		3,25
3	2,60	2,60	2,60				3,00
Ph C 1	3,00x4,60	3,00x2,00	3,00x8,25	13,80	8,70	24,75	4,00
2	3,50x3,55	3,50x3,5	3,50x7,80	12,43	12,43	27,30	4,00
3	3,25x3,60	3,25x	3,25x	11,70			4,00
Ph D 2	3,50x3,90	3,50x3,90	3,50x8,10	13,65	13,65	28,35	4,00
Ph E 1			3,00x7,50			22,50	4,10
Myrtle Cott	3,51x3,96	3,51x2,74	3,51x7,32	13,90	9,62	25,69	3,96
GLOUCESTER							
Eastg St/NMH	3,70x4,50	3,70x2,50	3,70x7,50	16,65	9,25	27,75	4,10
Berkeley St	3,65x4,00	3,65x2,60	3,65x6,80	14,60	9,49	24,82	4,05
COLCHESTER							
Gilberd School			3,40x5,85			19,89	3,60

A	B	C	D	E	F	G	H
EXETER							
Next *fabrica*	4,00x4,00	4,00x3,00	4,00x7,30	16,00	12,00	29,20	4,30
Goldsm St Ph 1	2,80x4,40	2,80x2,20	2,80x6,75	12,32	6,16	18,90	3,25
Phs 2,3	2,80x3,60	2,80x2,75	2,80x6,75	10,08	7,70	18,90	3,25
Store-B Phs 1,2	3,00x3,40	3,00x1,20	3,00x5,30	10,20	3,60	15,90	3,50
St Nich Pr a	3,40x3,40	3,40x3,00	3,40x6,70	11,56	10,20	22,78	3,60
b	3,40x2,70	3,40x3,60	3,40x6,70	9,18	12,24	22,78	3,60
Barth St a	3,40x4,50	3,40x2,50	3,40x7,50	15,30	8,50	25,50	3,80
b	3,40x4,00	3,40x3,00	3,40x7,50	13,60	10,20	25,50	3,80
NIJMEGEN							
FC Pd 4	3,00x5,00	3,00x2,00	3,00x7,50	15,00	6,00	22,50	3,50
Pd 5 1-3,6,7,10	3,13x4,38	3,13x2,50	3,13x8,13	13,71	7,83	25,45	3,83
4/5,8/9			3,13x4,75				
Cohs A,B Pd 4	3,13x4,25	3,13x2,00	3,13x6,63	13,30	6,26	20,75	3,38
Pd 5	3,38x4,75	3,38x2,06	3,38x7,38	16,06	6,96	24,94	4,00
S-W Corn Pds 3,4	3,00x3,50	3,00x2,00	3,00x6,25	10,50	6,00	18,75	3,50
Bdg 9 Pd 5	3,25x4,25	3,25x3,00	3,25x7,75	13,81	9,75	25,19	4,00
Coh C Pd 4	3,25x4,50	3,25x2,00	3,25x7,00	14,63	6,50	22,75	3,75
Pd 5	3,25x4,50	3,25x2,25	3,25x7,25	14,63	7,31	23,56	4,25
N *Primus Pilus*	3,13x5,00	3,13x3,13	3,13x8,75	15,65	9,80	27,39	3,83
Coh D Pd 4	3,25x4,00	3,25x2,13	3,25x6,50	13,00	6,92	21,13	3,75
Pd 5	3,13x5,00	3,13x2,50	3,13x8,75	15,65	7,83	27,39	3,83
E *via dec* Pd 5			2,50x2,50			6,25	3,00
			3,75x5,00			18,75	4,45
VETERA I							
Y S,N	3,50x3,80	3,50x2,00	3,50x6,80	14,00	7,00	23,80	4,20
N	3,50x3,80	3,50x2,00	3,50x6,50x13,30		7,00	22,75	4,20
O S,N	5,00x3,80	5,00x2,00	5,00x6,50	19,00	10,00	32,50	5,70
W N,S	3,10x4,50	3,10x1,50	3,10x7,00	13,95	4,65	21,70	3,80
V	3,30x4,80	3,30x1,60	3,30x7,00	15,84	5,28	23,10	4,00
HALTERN							
11g 1			3,00x4,25			12,75	3,50
2	3,00x3,50	3,00x1,10	3,00x5,25	10,50	3,30	15,75	3,50
11f	3,00x4,00	3,00x1,10	3,00x5,50	12,00	3,30	16,50	3,50
11d	3,00x4,25	3,00x0,75	3,00x5,50	12,75	2,25	16,50	3,50
11c 1	2,50x4,00	2,50x2,50	2,50x7,00	10,00	6,25	17,50	3,00
2	3,75x2,25	3,75x2,25	3,75x5,50	8,44	8,44	20,63	4,25
3	3,75x2,25	3,75x3,50	3,75x6,25	8,44	13,13	23,44	4,25
4,5,6 a	5,00x	5,00x	5,00x5,00			25,00	5,50
b	3,50x	3,50x	3,50x5,00			17,00	4,00
10 1	3,00x3,50	3,00x1,50	3,00x5,50	10,50	4,50	16,50	3,50
2	3,25x4,25	3,25x1,25	3,25x5,50	13,81	4,06	17,86	3,75
4	3,50	3,50	3,50x6,00			21,00	4,00
5			7,50x4,50			33,75	8,00
11b	4,50	4,50	4,50x5,50			24,75	5,00

A	B	C	D	E	F	G	H
11a			4,50x5,50			24,74	5,00
8a	4,50x7,00	4,50x7,00	4,50x14,50	31,50	31,50	65,25	5,00
8b	4,00x6,50	4,00x6,50	4,00x13,50	26,00	26,00	54,00	4,50
8c			x5,50				
8d	4,00x	4,00x4,00x6,00				24,00	4,50
N of 3	3,00x1,00	3,00x4,00	3,00x5,50	3,00	12,00	16,50	3,50
OBERADEN							
Albrecht's Bk			3,62x6,30			22,81	4,02
NEUSS							
93-98	3,50x4,40	3,50x2,20	3,50x7,25	15,40	7,70	25,38	4,00
110-115	3,50x4,50	3,50x2,40	3,50x7,40	15,75	8,40	25,90	4,00
131	3,50x4,40	3,50x2,25	3,50x7,25	15,40	7,88	25,38	4,00
133,134	3,25x4,50	3,25x2,50	3,25x8,00	14,63	8,13	26,00	3,75
155-150	3,50x4,00	3,50x2,00	3,50x7,00	14,00	7,00	24,50	4,00
149,147-144	3,50x4,50	3,50x2,00	3,50x7,00	15,75	7,00	24,50	4,00
148	3,50x5,00	3,50x3,50	3,50x9,00	17,50	12,25	31,50	4,00
143,142	3,00x4,50	3,50x2,00	3,00x7,00	13,50	7,00	21,00	3,50
122-119	3,00x4,25	3,00x2,00	3,00x6,75	12,75	6,00	20,25	3,50
104-99	3,50x4,50	3,50x2,00	3,50x7,00	15,75	7,00	24,50	4,00
84-87	3,00x4,00	3,00x2,50	3,00x7,00	12,00	7,50	21,00	3,50
7-12	3,00x4,50	3,00x2,00	3,00x7,00	13,50	6,00	21,00	3,50
26-31	3,50x4,00	3,50x2,50	3,50x7,00	14,00	8,75	24,50	4,00
15,16	3,50x4,50	3,50x4,50	3,50x9,50	15,75	15,75	33,25	4,00
23,24	4,25x	4,25x	4,25x6,00			34,00	4,75
32-42	3,00x4,00	3,00x3,25	3,00x8,00	12,00	9,75	24,00	3,50
46-52	3,25x4,25	3,25x3,50	3,25x8,50	13,81	11,38	27,63	3,75
91	4,00x4,00	4,00x3,00	4,00x7,50	16,00	12,00	30,00	4,50
108	3,50x4,50	3,50x3,00	3,50x8,00	15,75	10,50	28,00	4,00
106	3,50x5,50	3,50x2,00	3,50x8,00	19,25	7,00	28,00	4,00
124	7,00x4,00	7,00x2,00	7,00x6,50	28,00	14,00	45,50	7,50
BONN							
Cas 9	4,00x4,50	4,00x2,50	4,00x7,50	18,00	10,00	30,00	4,50
10 1	4,50x4,50	4,50x2,50	4,50x8,00	20,25	11,25	36,00	5,00
2	x2,00	x5,00	x7,50				
12	4,00x5,00	4,00x2,50	4,00x8,00	20,00	10,00	32,00	4,50
Loëkaserne	3,75x4,30	3,75x2,50	3,75x7,50	16,13	9,38	27,38	4,00
Coh A	3,50x5,00	3,50x2,50	3,50x8,00	17,50	8,75	28,00	4,00
Graurhstrasse	4,00x4,00	4,00x2,30	4,00x7,00	16,00	9,20	28,00	4,50
Koenen Bke	3,50x4,50	3,50x2,50	3,50x7,50	15,75	8,75	26,25	4,00
Coh C	3,50x4,50	3,50x2,50	3,50x7,50	15,75	8,75	26,25	4,00
Cas 3,4,5	3,50x4,50	3,50x2,50	3,50x7,50	15,75	8,75	26,25	4,00

A	B	C	D	E	F	G	H
RÖDGEN							
E of 'A'	x3,00	x2,75	x6,25				
S of 'A'	3,50x3,50	3,50x1,75	3,50x5,75	12,25	6,13	20,13	4,00
S Stabsgebäude	3,50x3,25	3,50x1,50	3,50x5,50	11,38	5,25	19,25	4,00
STRASBOURG							
St Étienne Pd 2	3,60x4,80	3,60x2,25	3,60x7,30	17,28	8,10	26,28	4,10
Pd 4			x3,00				
DANGSTETTEN							
E Str II/S III	5,00x3,13	5,00x4,38	5,00x7,81	15,65	21,90	39,05	5,30
VINDONISSA							
Dätwiler Pd 2			5,25x7,65			40,16	4,50
Immunes Kaserne	2,70x4,70	2,70x4,10	2,70x9,60	12,69	11,07	25,92	3,30
Hisp Koh	4,20x4,50	4,20x3,50	4,20x8,60	18,90	14,70	36,12	4,80
Königsf Pd 2 a			x4,35				
W Gate b	3,15x4,80	3,15x3,30	3,15x8,55	15,12	10,40	26,93	3,45
c	3,30x4,50	3,30x3,90	3,30x8,70	14,85	12,87	28,71	3,60
d	3,15x4,50	3,15x1,95	3,15x6,75	14,18	6,14	21,26	3,45
Pd 3/4	2,65x	2,65x	2,65x				3,05
Pd 5 d	3,50x4,00	3,50x2,70	3,50x7,00	14,00	9,45	24,50	4,10
	3,30x4,50	3,30x2,35	3,30x7,45	14,85	7,76	24,59	3,90
b	3,68x4,20	3,68x2,63	3,68x7,35	15,46	9,68	27,05	4,28
c	3,68x4,55	3,68x2,36	3,68x7,70	16,74	8,68	28,34	4,28
Pd 6/7 b	3,25x4,00	3,25x2,50	3,25x7,00	13,00	8,13	22,75	3,85
c	3,50x4,25	3,50x2,00	3,50x6,85	14,88	7,00	23,98	4,10
d	3,50x3,75	3,50x2,50	3,50x6,75	13,13	8,75	23,63	4,10
Könisgf Island	3,25x5,00	3,25x2,50	3,25x8,10	16,25	8,13	26,33	3,85
Breite Pd 1 IV	3,00x3,50	3,00x2,00	3,00x6,00	10,50	6,00	18,00	3,40
III	3,00x4,25	3,00x1,90	3,00x7,00	12,75	5,70	21,00	3,40
II	3,00x5,00	3,00x2,25	3,00x7,80	15,00	6,75	23,40	3,40
I	3,00x4,50	3,00x2,00	3,00x6,90	13,50	6,00	20,70	3,40
Pd 2 IV	3,40x4,00	3,40x2,10	3,40x6,60	13,60	7,14	22,44	3,80
III	3,40x3,00	3,40x3,00	3,40x7,40	13,60	10,20	25,16	3,80
II	3,00x5,00	3,00x2,25	3,00x7,70	15,00	6,75	23,10	3,40
Pd 3 VII	3,50x4,75	3,50x2,35	3,50x7,60	16,63	8,23	26,60	4,10
VI	3,50x4,60	3,50x1,90	3,50x6,65	16,10	6,65	23,28	4,10
V	3,60x4,00	3,60x3,00	3,60x7,60	14,40	10,80	27,36	4,20
	3,60x3,00	3,60x4,00	3,60x7,60	10,80	14,40	27,36	4,20
IV	3,30x3,80	3,30x2,60	3,30x7,00	12,54	8,58	23,10	3,90
III	3,30x4,40	3,30x2,40	3,30x7,60	14,54	7,92	25,08	3,90
II	3,30x4,60	3,30x2,40	3,30x7,70	15,18	7,92	24,41	3,90
I	3,40x4,90	3,40x2,40	3,40x7,50	16,66	8,16	25,50	4,00
Pd 4 IV	3,30x3,20	3,30x3,40	3,30x7,00	10,56	11,22	23,10	3,90
III	3,30x3,00	3,30x4,00	3,30x7,80	9,90	13,20	25,74	3,90
Gemüsegarten	3,10x4,40	3,10x2,30	3,10x6,80	13,64	7,13	21,08	3,50
Breite Pd 1 5	3,00x4,00	3,00x2,90	3,00x7,10	12,00	8,70	21,30	3,40

A		B	C	D	E	F	G	H
N Gate	4	3,00x4,75	3,00x1,90	3,00x7,00	14,10	5,70	21,00	3,40
	3	3,50x4,25	3,50x2,50	3,50x7,00	14,88	8,75	24,50	3,90
	2	3,50x4,50	3,50x2,50	3,50x7,00	15,75	8,75	24,50	3,90
Pd 2	7	4,00x3,50	4,00x2,90	4,00x6,90	14,00	11,60	27,60	4,60
	6	4,00x3,50	4,00x2,60	4,00x6,50	14,00	10,50	26,00	4,60
	5	3,75x4,75	3,75x1,50	3,75x7,40	17,81	5,63	27,75	4,35
	4	3,75x4,90	3,75x2,75	3,75x7,50	18,38	10,31	28,13	4,35
	3	3,50x4,75	3,50x2,25	3,50x7,60	16,63	7,88	26,60	4,10
	2	3,90x4,33	3,90x2,90	3,90x7,50	16,89	11,31	29,25	4,50
	1	3,50x3,50	3,50x2,10	3,50x6,60	12,25	7,35	23,10	4,10
Breite Pd III R1		3,33x4,00	3,33x2,00	3,33x6,25	13,32	6,66	20,81	3,73
N-E Corn				3,33x4,33			14,42	
	U1/K1	2,90x5,20	2,90x2,20	2,90x7,75	15,08	6,38	22,48	3,30
	U2/K2	3,00x4,25	3,00x2,00	3,00x7,75	12,75	6,00	23,25	3,40
Pd V	U1/K1	4,00x4,00	4,00x2,20	4,00x6,80	16,00	8,80	27,20	4,60
VI	U1/K1	4,00x4,60	4,00x2,60	4,00x8,00	18,40	10,40	32,00	4,60
VII	U1/K1	4,00x4,00	4,00x2,20	4,00x6,80	16,00	8,80	27,20	4,60
	U2/K2	3,80x4,50	3,80x2,00	3,80x7,00	17,10	7,60	26,60	4,40
	K3	4,00x3,00	4,00x2,65	4,00x6,00	12,00	10,60	24,00	4,60
	U3/K4	4,00x3,00	4,00x2,60	4,00x6,10	12,00	10,00	24,40	4,60
	U4/K4	4,00x3,00	4,00x2,60	4,00x6,10	12,00	10,00	24,40	4,60
	U5/K6	4,00x3,25	4,00x3,00	4,00x6,70	13,00	12,00	26,80	4,60
Breite Pd 1 I-V		3,10x4,33	3,10x2,00	3,10x6,75	13,42	6,20	20,93	3,50
val Pd 2 A1/B1				3,00x4,50			13,50	3,40
Pd 3	IV,V	3,25x4,40	3,25x4,40	3,25x9,10	14,30	14,30	29,58	3,55
		2,25x4,40	2,25x4,40	2,25x9,10	9,90	9,90	22,75	2,55
	VI	3,25x3,00	3,25x5,90	3,25x9,10	9,75	19,18	29,58	3,55
	VII,VIII	3,25x7,00	3,25x4,33	3,25x11,50	22,75	14,07	37,38	3,55
Pd 4		3,30x4,25	3,30x2,40	3,30x7,00	14,03	7,92	23,10	3,70
Pd 5/6	1	3,90x4,90	3,90x2,50	3,90x7,50	19,11	9,75	29,25	4,50
		3,90x3,70	3,90x3,70	3,90x7,50	14,43	14,43	29,25	4,50
	2,3	3,90x4,90	3,90x2,20	3,90x7,60	19,11	8,58	29,64	4,50
		3,90x3,55	3,90x3,55	3,90x7,60	13,85	13,85	29,64	4,50
Oelhafen Bdg B		x4,10	x2,50	x7,10				
Scheuergasse		3,90x4,25	3,90x3,10	3,90x7,90	16,58	12,09	30,81	4,50
Breite N-EC B				12,00x5,00			60,00	
REGENSBURG								
Niederm Pd 2		x5,40	x3,00	x9,00				
Pd 3		x5,10	x3,60	x9,30				
LAURIACUM								
Cohs B-J		4,75x3,90	4,75x3,00	4,75x7,50	18,53	14,25	35,63	5,35
VINDOBONA								
FC Ph 1	A	3,90x5,00	3,90x2,90	3,90x8,50	19,50	11,31	33,15	4,60
	B			x5,00				
Ph 2	A	4,25x4,80	4,25x3,00	4,25x8,40	20,40	12,75	35,70	4,85
Ph 3	A	4,00x	4,00x	4,00x8,40			33,60	4,60

A	B	C	D	E	F	G	H
CARNUNTUM							
Coh D	3,80x3,40	3,80x2,20	3,80x6,40	12,92	8,36	24,32	4,40
Coh H	3,40x4,00	3,40x2,20	3,40x6,80	13,60	7,48	23,12	4,00
RP Pd 2 7 E	3,60x4,20	3,60x2,10	3,60x6,60	15,12	7,56	23,76	4,10
W	3,60x4,00	3,60x2,20	3,60x6,90	14,40	7,92	24,84	4,10
8 E	3,60x3,90	3,60x2,50	3,60x6,80	14,04	9,00	24,48	4,10
Pd 3/4 7 E	3,85x3,25	3,85x2,10	3,85x5,75	12,51	8,09	22,14	4,25
W	x3,40	x2,00	x5,80				
8 E	x3,60	x2,30	x6,35				
W	x3,50	x2,20	x6,20				
AQUINCUM							
R	x4,00	x3,33	x8,00				
P	3,50x4,00	3,50x3,33	3,50x8,00	14,00	11,67	28,00	4,20
SINGIDUNUM							
RR			2,50x5,80			14,50	3,10
POTAISSA							
LatP / LR			5,20x6,90			35,88	5,90
NOVAE							
Secteur II	3,25x3,75	3,25x3,25	3,25x7,60	12,19	10,56	24,70	3,95
Secteur IV	4,50x	4,50x	4,50x6,20			27,90	5,20
ALBANO							
R			3,00x4,00			12,00	3,70
In front R	3,00x4,00	3,00x4,00	3,00x8,70	12,00	12,00	26,10	3,70
Rampart			3,00x7,00			21,00	3,70
LAMBAESIS							
FC 1	4,50x6,50	4,50x6,00	4,50x13,00	29,25	27,00	58,50	5,20
2	4,00x5,00 (3 times)		4,00x14,00	20,00		56,00	4,70
3	4,00x6,00	4,00x6,00		24,00	24,00	48,00	4,70
4	3,50x5,00	3,50x2,50	3,50x8,50	17,50	8,75	29,75	4,20
			4,00x6,00				
5	4,00x5,00 (3 times)		4,00x14,00	20,00		56,00	4,70
6	4,00x3,50 (4 times)		4,00x16,50	14,00		66,00	4,70
Coh B	4,00x6,00	4,00x3,00		24,00	12,00		4,70
Coh C	4,00x6,00	4,00x3,00		24,00	12,00		4,70
Coh D	3,75x5,63	3,75x3,00		21,11	11,25		4,45

A	B	C	D	E	F	G	H
Coh E	4,13x6,00	4,13x3,38		24,78	13,96		4,83
Bdg Z			8,03x9,38			80,95	

TABLE VIII SPECIAL *CONTUBERNIA*

A - Subject of entry
B - First *contubernium*
C - Area
D - End *contubernium*
E - Area
F - End *contubernium* Type 'j' (*Schlußbau*)
G - Area

Note: All measurements are internal and where present the dimensions of the individual rooms are given

A	B	C	D	E	F	G
LONGTHORPE						
XIV Bk I	4,75x5,00	23,75 (two times)				
CHESTER						
Old Market Hall			4,50x4,20	18,90		
			4,50x2,30	10,35		
				29,25		
GLOUCESTER						
Berkeley St	4,25x9,50	40,38				
COLCHESTER						
North Hill	4,50x4,90	22,95				
Lion Walk	3,20x6,00	18,60				
NIJMEGEN						
FC Pd 5 1			6,50x8,13	52,85		
2					13,75x10,00	137,50
3,6,7,10					8,13x10,00	81,30
4/5,8/9					7,50x10,00	75,00
Cohs A,B Pd 4	3,00x8,75	26,25				
Pd 5	3,50x9,75	34,13				
Coh C Pd 5	3,25x10,50	34,13				
Coh D Pd 5	3,75x8,88	33,30	7,50x7,50	56,25		

A	B	C	D	E	F	G
VETERA I						
V					8,25x7,00	57,75
NEUSS						
149,147-145	3,50x5,00	17,50				
148	5,00x6,00	30,00				
143,142	4,50x4,00	18,00				
140-138	7,50x4,50	33,75				
122-119	4,00x4,50	18,00				
104-99	3,50x4,00	14,00	6,00x7,00	42,00		
84-87	4,00x5,00	20,00				
VINDONISSA						
Königsf Pd 5 b	3,68x7,35	27,05				
W Gate c	4,20x7,53	31,63				
d	3,40x7,00	23,80				
Pd 6/7 b	3,25x7,00	22,75				
c	4,00x6,50	26,00				
d	4,25x6,75	28,69				
Breite Pds 3,4 VI	1,80x8,00	14,40				
IV	4,00x5,40	21,60				
	4,00x3,10	12,40				
		34,00				
III	4,50x7,60	34,20				
II	4,00x7,00	28,00				
I	4,40x7,25	31,90			3,75x7,50	28,13
					3,00x4,00	12,00
					3,00x2,50	7,50
						47,63
Breite Pd 1 3	3,75x4,00	15,00				
N Gate	3,75x2,50	9,38				
	3,75x2,50	9,38				
		33,76				
Pd 2 4	2,00x7,75	15,50				
3	5,75x8,00	46,00				
Breite U1/K1	2,50x5,00	12,50				
N-E Corn Pd III	1,50x2,25	3,38				
	1,50x2,75	4,13				
	0,75x5,25	3,94				
		23,95				
U2/K2	3,35x4,00	13,40				
	3,35x2,50	8,38				
	3,35x1,90	6,37				
		28,15				
Pd V U1/K1	3,60x6,60	23,76				
Pd VI U1/K1	3,60x7,80	28,08				
Pd VII U1/K1	3,60x7,80	28,08				
U2/K2	4,00x3,00	12,00				
	4,00x6,40	25,60				
		37,60				

A	B	C	D	E	F	G
	3,50x7,50	26,25				
Breite Pd 5/6 1	4,25x4,00	17,00				
val 2,3	4,25x5,50	23,38				
REGENSBURG						
Niederm Pd 3	5,10x4,80	24,48				
	5,10x5,70	29,07				
CARNUNTUM						
Coh H Pd 4					6,00x3,00	18,00
					6,00x5,50	33,00
						51,00
AQUINCUM						
LatP R					5,00x11,93	59,65
POTAISSA						
LatP / LR					5,40x10,40	56,16
LAMBAESIS						
FC 2	2,50x15,00	37,50				
Coh B					10,00x16,00	160,00
Coh C					9,50x16,00	152,00
Coh D	6,00x9,75	58,50			8,25x14,25	117,56
Coh E	4,13x10,13	41,84			8,63x15,75	135,92

A - Subject of entry
B - Centurions' / Officers' Quarters
C - Men's Quarters (excluding veranda)
D - Total area of building (exlcuding veranda)
E - Living space of *contubernium*
F - Total living space available in men's quarters

A	B		C		D		E	F
INCHTUTHIL								
R *Principia*					807,99	774,98		
B			431,74	425,09	431,74	425,09		
A	217,87	205,47	328,74	328,62	546,49	518,12	22,88	
FC PP + 51-52	747,97	725,57	972,08	919,29	1720,05	1644,86	25,11	652,86
II + 49-50	539,90	521,41	935,87	891,87	1475,77	1413,38		
III+ 47-48	552,92	534,18	935,87	891,97	1488,79	1426,15		
IV + 45-46	552,92	534,18	935,87	891,97	1488,79	1426,15		
V + 43-44	585,36	566,01	935,87	891,97	1521,23	1457,98		
38	222,60	210,12	495,28	468,00	717,88	678,12		
25	238,57	225,35	495,28	468,00	733,85	693,35		
22	248,03	234,99	518,50	490,86	766,53	725,85		
18	240,38	227,60	518,50	490,86	758,88	708,46	31,33	438,62
17	256,37	243,18	508,30	281,14	764,67	724,32	28,76	402,64
16	214,87	202,59	508,30	481,14	723,17	683,73		
12	248,03	234,99	513,40	486,00	761,43	720,99		
4	240,38	227,60	513,40	486,00	753,78	713,60		
53	224,85	231,70	542,51	514,61	767,36	736,31	28,99	434,85
135-156					792,50	762,30		
INCHTUTHIL (Temporary Compound)								
Phase I			597,71	568,79			28,72	430,80
Phase II N			531,29	502,74			25,66	384,90
S			579,48	550,62			27,34	410,10
Offices					265,34	252,09		
RED HOUSE								
Bdg 16							77,28	
YORK								
FC 1,2,3	564,59	535,96						
Davygate	311,96	296,94						

A	B		C		D		E	F
LONGTHORPE								
IV							33,00	
VII			292,50	267,00				
VIII	178,60	167,79	392,85	367,50	571,45	535,29		
XIV Bk I	581,00	558,90	719,55	700,00	1300,55	1258,90	27,63	434,32
Ext XIV					332,45	285,00		
Bk II							33,30	
CHESTER								
Goss St Phs 2,3	*310,39*	*284,41*	477,66	449,27	*788,05*	*733,68*	16,00	192,00
Crook St Phs 1,2	283,58	258,32	496,00	447,49	779,58	705,81	22,00	264,00
Old Mkt Hall							21,62	
Hunt St/Pr St	299,00	279,57	537,50	486,22	836,50	767,79	30,59	367,08
Bdg K					731,00	665,97	32,64	
Northg Bwy T Ph 1	286,00	256,00						
Main Stone	304,20	278,30	416,50	376,74	720,70	655,04		
Foll Hse Pds 1,2							19,80	217,80
Deanery Field	291,89	266,36	431,62	390,72	723,51	657,08	30,82	339,02
LP	283,50	257,74	456,00	410,99	739,50	668,73	38,25	459,00
WROXETER								
RP 2	198,00	186,56						
3	186,30	175,12					20,00	
CAERLEON								
FC x			468,00	429,00				
ix			520,00	481,00			48,75	
viii			520,00	481,00			28,05	336,60
III	550,00	520,63						
iii			416,00	377,00				
IIa					190,00	168,44		
II	437,50	406,19						
ii			520,00	481,00			31,50	318,00
I i	422,75	392,38	520,00	481,00	1240,25	1139,38	28,05	336,60
Prysg Field	276,00	249,94	447,84	410,52	723,84	660,46	22,93	295,16
The Croft							23,04	
Roman G Ph A 1							21,00	
2							27,20	
Ph C 1							22,50	
2							24,86	
Ph D 2							27,30	
Ph E 1							22,50	
Vine Cottage			477,00	437,25			22,93	298,09
Myrtle Cottage	285,22	258,06	433,16	396,41	718,38	654,47	23,52	282,24

A	B		C		D		E	F
GLOUCESTER								
Eastg St/NMH	200,00	192,08	640,40	624,00	840,40	816,08	25,90	492,10
Berkeley St	187,50	180,32	423,80	412,80	611,30	593,12	24,09	305,37
COLCHESTER								
Culver St	273,00	246,69						
North Hill	220,00	198,08						
Lion Walk	180,00	160,89						
Gilberd School			377,16	335,72			19,89	278,46
EXETER								
Next *fabrica*							28,00	
Goldsm St Ph 1 S	214,50	202,46	318,75	307,75	533,25	510,21	18,48	221,76
N	198,00	186,56	330,00	312,40	528,00	498,96	18,48	221,76
Ph 2,3 S,N							17,78	213,36
Store-bdg							13,80	
St Nich Priory							21,76	
Bartholomew St							23,80	
NIJMEGEN								
Augustan					12,58	9,28		
FC Pd 4 PP + 1-2	659,75	629,28					21,00	
II + 3-4	451,56	430,56						
III+ 5-6	451,56	430,56						
IV + 7-8	451,56	430,56						
V + 9-10	446,25	404,63						
Pd 5 PP + 1-2	712,50	681,25	861,25	735,38	1573,75	1416,61	21,54	379,35
II + 3	478,13	447,99	480,57	386,80	958,70	834,79	21,54	296,70
III+ 6	478,13	447,99	480,57	386,80	958,70	834,79	21,54	296,70
IV + 7	478,13	447,99	480,57	386,80	958,70	834,79	21,54	296,70
V + 10	535,38	502,49	480,57	386,80	1014,95	889,29	21,54	296,70
4/5,8/9					315,06	266,68	14,87	256,46
Cohs A,B Pd 4							19,57	241,52
Pd 5	253,13	229,99	426,56	386,80	679,69	616,79	23,02	287,35
S-W Corn Pds 3/4	127,50	116,00					16,50	
Pd 5							23,56	
Coh C Pd 4	160,00	147,25					21,13	
Pd 5	238,63	216,54	397,38	364,65	636,01	581,19	21,94	
N *Primus Pilus* Pd 5	295,31	269,55	397,38	354,65	692,69	634,20	25,45	279,95
Coh D Pd 4	264,38	242,65	390,81	369,69	655,19	612,34	19,92	
Pd 5	253,13	234,35	416,25	384,75	669,38	619,10	23,48	277,39
VETERA I								
Y							21,00	
N	330,00	304,59	416,00	384,71	746,00	689,30	20,30	262,30
O S,N	330,00	304,59	416,00	384,71	746,00	689,30	29,00	

A	B		C		D		E	F
W N,S	352,50	326,04	462,00	428,89	814,50	754,93	18,60	204,60
V	368,75	339,84	473,00	434,50	841,75	774,34	21,12	290,07
S-W *Praet*					494,50	448,72		
HALTERN								
7a-f	480,00	457,25			480,00	457,25		
11g 2	78,75	70,00	309,00	280,50	387,75	350,50	13,80	
1							12,75	
11f							15,50	
11d	228,00	211,50	305,50	279,00	533,50	490,50	15,00	210,00
11c 1							16,25	
2							21,57	
3							16,88	
4,5,6 a							25,00	
b							17,50	
10 1	51,00	44,00	429,00	396,00	480,00	440,00	15,00	
2	114,75	104,00	172,25	159,00	287,00	263,00	17,87	142,96
4	146,25	133,00	175,00	162,50	321,25	295,50	21,00	105,00
5	80,50	192,50	273,00	251,00	33,75			
11b	85,50	76,50	360,75	330,00	446,25	406,50	24,75	247,50
11a							24,75	
8a S							63,00	
8b S							52,00	
8d							24,00	264,00
N of 3							15,00	150,00
OBERADEN								
Albrecht's Bk	119,40	108,28	681,21	650,33	800,91	758,61	22,81	342,15
N-W Corner 1	76,31	67,81						
2	85,56	76,56						
3	74,00	65,63						
4	76,00	67,50						
5	92,80	83,25						
6	76,31	67,81						
7	78,26	69,66						
8	132,50	121,33						
NEUSS								
93-98							23,10	
110-115	262,50	246,00	503,50	477,00	766,00	723,00	24,15	289,80
131							23,28	302,64
133,134							22,76	273,12
155-150	364,00	343,75	450,50	424,00	814,50	767,75	21,00	252,00
149,147-145	336,00	316,25	477,00	450,00	786,50	766,25	22,75	290,50
148	336,00	316,25	556,50	516,75	892,50	833,00	29,75	387,00
144	336,00	316,25	477,00	450,00	813,00	766,25	22,75	295,75
143,142	300,00	281,75	472,50	446,25	772,50	728,00	20,50	264,00
140-135	325,00	306,25	450,50	424,00	775,50	730,25	19,50	267,75
122-119	336,00	316,25	477,00	450,50	813,00	766,75	18,75	224,25

A	B		C		D		E	F
104-99	300,00	281,75	442,00	416,00	742,00	697,75	22,75	283,50
84-87	294,00	276,00	454,50	429,25	748,50	705,25	19,50	234,50
7-12	300,00	281,75	468,00	442,00	768,00	723,75	19,50	253,50
26-31							22,75	295,75
15					325,00	304,00	31,50	252,00
16					308,75	288,00	31,50	252,00
17					601,25	576,00		
23					410,00	389,50	34,00	
24					369,00	344,25	34,00	
25					647,50	621,00		
32-42					337,50	315,88	21,75	195,75
46-51	*147,00*	*135,00*	*187,63*	*177,75*	337,50	315,88	25,19	*125,95*
52					355,88	333,00	25,19	201,52
91			694,50	652,50	1022,00	978,75	28,00	420,00
108			836,00	787,50	1188,00	1137,50	25,75	386,25
106			880,00	831,25	1276,00	1225,00	25,25	
124		1233,00	1160,25	1781,00	1706,25	42,00	756,00	
62-69							30,63	
72-83							37,50	
BONN								
Cas 9	207,00	192,50	369,75	348,00	576,75	540,50	28,00	308,00
10 1	207,00	192,50	369,75	348,00	576,75	540,50	31,50	346,50
10 2	80,65	71,50	369,75	348,00	449,80	419,50	31,50	346,50
11	184,00	170,50						
12	356,50	335,50	433,50	408,00	790,00	743,50	30,00	390,00
Loékaserne	337,50	319,00	442,00	420,00	779,50	739,00	25,51	331,63
Coh A							26,25	
Graurhdorfstr	341,00	322,50	400,00	378,75	741,00	701,25	25,20	
Könen Bke	345,00	324,50	408,00	382,50	753,00	707,00	24,50	318,50
Coh C							24,50	
Cas 3	313,50	294,00	396,00	371,25	709,50	665,25	24,50	318,50
Cas 4,5	304,50	287,00	392,00	371,25	696,50	658,25	24,50	318,50
RÖDGEN								
E of 'A'					224,75	205,88		
S of 'A' N					428,63	393,75	18,38	294,08
S					290,25	265,63	18,38	202,18
Sg bdgs S 'A' N					46,35	39,78		
S					35,95	30,19		
S Stabsgebäude	57,38	50,00	280,13	259,38	337,51	309,38	16,63	182,93
STRASBOURG								
St Étienne Pd 2							25,38	

A		B		C		D		E	F
DANGSTETTEN									
W Str I						*960,00*	*932,49*		
E Str II	N					595,00	572,07		
	S	191,45	182,35	519,49	501,68	710,94	684,03	37,55	413,05
VINDONISSA									
Dätwiler Pd 2	E			405,00	371,25				
	W			380,70	348,98			40,16	281,12
Immunes Kaserne								23,76	
Hispanische Koh								33,60	
Königsf Pd 2	b							25,62	
W Gate	c							27,72	
	d							20,32	
Pd 5	d	265,00	244,00	340,00	314,50	605,00	558,50	23,45	255,78
								22,61	
	b	196,98	178,23					25,14	
	c	196,98	178,23					25,42	
Pd 6/7	b	241,88	22,29					21,13	
	c	241,88	222,29					21,88	
	d	264,00	243,36	337,13	311,03	601,13	554,39	21,88	247,49
Königsf Island				350,00	326,00			24,38	243,80
Breite Pd 1	IV							16,50	
	III							18,45	
	II							21,75	
	I							19,50	
Pd 2	IV							20,74	
	III							23,80	
	II							21,75	
Pd 3/4	VII	291,60	269,28	372,60	347,76	664,20	617,04	24,86	248,60
	VI	334,80	312,80	353,97	327,75	688,77	640,55	22,75	241,90
	V	309,38	286,49	356,90	332,00	66,28	618,49	25,20	252,00
	IV	252,00	233,64	375,90	349,05	627,90	582,69	21,39	247,90
	III	267,38	246,89	399,08	371,87	666,46	618,76	22,46	258,80
	II	242,96	223,10	396,81	369,60	639,77	592,70	23,10	259,00
	I	305,50	283,21	266,36	340,80	671,86	624,01	24,82	308,23
Gemüsegarten								20,77	
Breite Pd 1	5	456,75	435,51	372,00	353,40	828,75	859,06	20,70	
N Gate	4	299,25	238,81	423,75	401,15	723,00	639,96	19,80	297,00
	3	294,00	278,76	427,50	404,70	721,50	683,46	23,63	
	2	388,50	369,60	346,88	328,38	735,38	697,98	24,50	294,00
Pd 2	7	362,81	329,16	525,94	487,69	888,75	816,85	25,60	
	6	354,75	329,16	494,06	455,81	848,81	784,97	24,40	
	5	555,75	522,66	448,44	417,69	1004,19	940,35	23,44	257,84
	4	462,87	431,55	470,70	439,32	933,57	870,87	28,49	385,87
	3	434,38	406,39	510,75	476,70	945,13	883,09	24,51	340,12
	2	362,81	337,07	526,95	491,82	889,76	828,89	28,20	
	1	325,00	299,86	473,88	440,43	798,88	740,29	19,60	235,20
Breite Pd III	R1	41,93	36,91	245,10	229,90	287,03	266,81	19,98	159,84
N-E Corner		67,73	61,11	227,36	213,26	295,09	274,37	19,98	159,84
U1/K1		319,38	305,05	415,63	401,38	735,01	706,43	21,46	281,47
U2/K2		252,80	237,12	460,00	436,24	712,80	673,36	18,75	309,40
Pd V/VI	O1/O2	468,75	439,11	593,75	565,25	1062,50	1004,36		

A	B		C		D		E	F
Pd V U1/K1	496,88	466,79	389,50	361,00	886,38	827,79	24,80	276,08
Pd VI U1/K1	496,88	466,79	432,25	403,75	929,13	870,54	28,80	311,76
Pd VII O1/O2	324,38	297,05	593,75	565,25	918,13	862,30		
U1/K1	618,75	586,71	629,38	600,88	1248,13	1187,59	24,80	276,08
U2/K2	586,50	568,11	416,15	385,70	1005,65	953,81	24,70	310,85
K3			367,94	337,49			22,60	248,60
U3/K4	120,13	106,54	344,10	312,12	464,23	418,66	22,00	220,00
U4/K5	120,13	106,54	330,15	298,35	450,28	404,89	22,00	220,00
U5/K6	237,44	218,00	220,80	204,24	458,24	422,24	25,00	150,00
Breite Pd 1 I-V							19,62	
val Pd 2 A1/B1	102,50	94,56	430,00	408,50	532,50	503,06	13,50	175,50
Pd 3 IV,V							28,60	
							19,80	
VI							28,93	
VII,VIII							36,82	
Pd 4							21,95	
Pd 5/6 1	264,50	244,16	520,08	484,62	784,58	728,78	28,86	363,32
2,3	281,18	259,97	526,95	491,82	808,13	751,70	27,69	355,66
Oelhafen	46,53	38,13	200,48	185,90	247,01	224,03		
Scheuergasse							28,67	
Breite N-E Corn B					1139,50	1095,16		
REGENSBURG								
Niederm Pd 2			655,88	616,13				
Pd 3	242,19	223,11	668,61	629,28	910,80	852,39		
LAURIACUM								
FC 1	223,44	205,80	735,00	687,06	958,44	892,86		
2-4			962,50	912,61				
5			875,00	825,86				
6	223,44	205,80	770,00	721,76	993,44	927,56		
Cohs B-I			700,00	658,00			32,78	393,36
Coh J			475,00	446,50			32,78	
VINDOBONA								
FC Ph 1 A							30,81	
Ph 2 A							33,15	
Ph 3 A							33,60	
CARNUNTUM								
Coh B Pd 4	288,75	273,00						
Coh C Pd 4	288,75	273,00	553,44	515,49	852,19	788,49		
Coh D Pd 4	295,36	272,44	492,80	455,84	788,16	728,28	21,28	255,36
Coh E Pd 4	288,00	265,08	505,60	467,68	793,60	732,76		
Coh F Pd 4	328,13	305,24	445,55	464,55	773,68	769,79		
Coh H Pd 4	288,75	266,31	403,75	375,25	692,50	641,56	21,08	261,80
RP Pd 2 7 E							22,68	

A		B		C		D		E	F
	W							22,32	
8	E							23,04	
Pd 3/4 7	E							20,60	
AQUINCUM									
LatP R		316,59	291,12	521,14	487,01	837,73	778,13		
R		292,84	268,07	441,19	407,06	734,03	657,13		
P		292,84	268,07	463,81	427,94	756,65	696,01	25,67	333,71
SINGIDUNUM									
RR								14,50	
POTAISSA									
LatP / LR				547,68	496,65			35,88	414,96
NOVAE									
Secteur II								22,75	
Secteur IV		189,00	169,54	380,00	345,00	569,00	514,54	24,75	297,00
ALBANO									
R a						228,00	197,69	12,00	96,00
b						240,00	208,29	12,00	108,00
In front R		*448,00*	*434,29*	*693,00*	*645,82*	*1141,00*	*1080,11*	24,00	336,00
Rampart								21,00	
LAMBAESIS									
FC PP + 1		998,00	943,69	1062,00	1020,70	2060,00	1964,39	56,25	
II/III+ 2		1820,00	1759,59	1023,00	979,60			60,00	
3				868,00	824,60	3711,00	3563,79	48,00	
IV + 4		596,75	559,44	965,25	924,30	1562,00	1483,74	50,25	
V + 5		800,00	758,49	741,00	701,10	1541,00	1459,59	42,00	
VI + 6		1160,00	1112,19	1026,00	986,10	2186,29	2098,29	56,00	
Cohs B,C								36,00	
Coh D		401,63	373,24	793,13	743,78	1194,76	1117,02	32,36	564,38
Coh E		401,63	373,24	793,13	743,78	1194,76	1117,02	38,74	642,64
Bdg Z						1820,00	1755,39		

A - Subject of entry
B - Percentage of overall length taken by centurions' / officers' quarters
C - Percentage of overall area (excluding veranda where present) taken by centurions' / officers' quarters
D - Percentage of *contubernium* living area taken by *papilio*
E - Relative percentages of the overall barrack width taken by the depths of *papilio*, *arma* and veranda
Note: Where a central division of the *contubernium* is unverified the relative percentage values of the *contubernium* and veranda depths are given; where the veranda is unverified the equivalent measurement is given in brackets

A	B		C		D	E
INCHTUTHIL						
R *Principia*						67,95/32,05
B					68,39	46,81/21,63/31,56
A	33,67	33,24	39,87	40,12	70,72	55,38/22,93/21,69
FC PP + 52-51	25,90	25,54	43,49	44,11	66,63	54,15/27,13/18,72
	25,42	25,06				
II + 50-49	25,64	25,28	36,58	36,89		
	25,46	25,10				
III+ 48-47	25,46	25,10	37,14	37,46		
IV + 46-45	25,46	25,10	37,14	37,46		
V + 44-43	26,53	26,18	38,48	38,82		
38	25,80	25,43	31,01	30,99		
25	25,95	25,59	32,51	32,50		
22	25,41	25,05	32,36	32,37		
18	24,64	24,28	31,68	32,13	66,68	48,75/24,38/26,87
17	25,59	25,23	33,53	33,57	63,70	48,64/27,73/23,63
16	24,99	24,63	29,71	29,63		
12	25,50	25,14	32,57	32,59		
4	24,65	24,29	31,89	31,89		
53	26,29	25,94	29,30	31,05	65,40	53,68/28,39/17,93
INCHTUTHIL (Temporary Compound)						
Phase I	*24,68*	*24,44*	*30,74*	*30,71*	71,45	
Phase II N	*24,63*	*24,40*	*33,31*	*33,40*	67,34	49,63/24,08/26,29
S	*24,63*	*24,40*	*31,41*	*31,40*	61,19	48,05/30,49/21,46
RED HOUSE						
Bdg 16					50,00	

A	B		C		D	E
YORK						
FC 1,2,3	37,70	37,20				
LONGTHORPE						
IV					60,61	
VIII	26,38	25,88	31,25	31,35		
XIV Bk I	33,27	32,54	44,67	44,40	52,95	40,91/36,36/22,73
Bk II					66,21	52,13/26,60/21,27
CHESTER						
Goss St Phs 2,3	*30,69*	*30,11*	*39,39*	*38,76*		60,16/39,84
Crook St Phs 1,2	30,69	30,11	36,38	36,60	54,55	38,46/32,65/28,89
Hunter St/Pr St	29,38	28,82	35,74	36,41	63,16	46,09/26,95/26,95
Northg Bwy T 1,2	34,21	33,86				
Main St	32,89	32,27	41,26	41,50		
Folliot Hse					62,22	47,65/28,87/23,47
Deanery Field	33,21	32,60	40,34	40,54	62,07	49,72/30,39/19,89
LP	31,40	30,83	38,34	38,55	59,82	48,08/33,64/18,28
RHYN PARK						
					50,00	39,39/39,39/21,21
WROXETER						
RP 2					72,00	61,40/23,90/36,76
3					71,93	61,40/23,90/36,76
CAERLEON						
FC II-V	32,47	31,80				
I + i/ii	28,89	27,92	16,15	15,57	52,94	
viii					52,94	
ix					60,00	
Prysg Field	32,54	31,84	38,13	37,84	57,26	43,66/32,86/(23,48)
The Croft					58,59	46,02/32,47/21,51
Vine Cottage	31,17	30,49			57,26	
R Gates Ph A 1					56,76	
2					67,50	
Ph C 1					61,33	
2					50,00	
Ph D 2					50,00	
Myrtle Cottage	34,67	34,01	39,70	39,43	59,10	49,06/33,85/17,09
GLOUCESTER						
Eastg St/NMH	20,00	19,68	23,80	23,54	64,28	51,12/28,43/20,45
Berkeley St	25,86	25,52	30,67	30,40	60,61	49,35/32,10/18,55

A	B		C		D	E
COLCHESTER						
Culver St	23,73	23,12				
Lion Walk	20,97	20,32				
Gilberd School						75,96/24,04
EXETER						
Next *fabrica*					57,14	40,47/30,21/29,32
Goldsm St Ph 1 S	31,45	31,01	40,23	39,68	66,67	46,34/23,17/30,49
N	29,03	28,57	37,50	37,39	66,67	46,34/23,17/30,49
Ph 2,3					56,69	38,87/29,78/31,35
Store-bdg					73,91	
St Nich Priory a					53,13	
b					42,19	
Barth St a					64,29	
b					57,14	
NIJMEGEN						
FC Pd 4					71,43	
Pd 5 PP + 1-2	33,93	33,26	45,27	48,09	69,64	51,93/29,65/18,42
II-V + 3-10	29,03	28,39	48,87	53,66	69,64	51,93/29,65/18,42
Cohs A,B Pd 4					68,00	53,07/25,00/21,93
Pd 5	31,58	28,39	37,24	37,29	69,77	
S-W Corn Pd 3/4 1-3					63,64	
Pd 5 9					58,62	
Coh C Pd 4					69,23	52,94/23,53/23,53
Pd 5	30,74	30,01	37,52	37,26	66,68	
N *Pr Pilus* Pd 5	389,89	36,87	42,63	42,50	61,49	54,76/34,28/10,96
Coh D Pd 4	35,74	35,25	40,35	39,63	65,26	52,36/27,95/19,69
Pd 5	33,33	32,63	37,82	38,01	66,65	
VETERA I						
Y					66,67	50,00/25,00/25,00
N,O S,N	36,59	35,18	44,24	44,19	65,52	44,30/23,13/32,57
W	35,29	33,93	43,28	43,19	75,00	56,25/18,75/25,00
V	34,71	34,16	43,81	43,89	75,00	51,12/16,93/31,95
HALTERN						
11g	12,50	11,76	20,31	19,97	76,09	40,70/12,79/(46,51)
11f					77,42	43,96/12,08/(43,96)
11d	33,80	33,33	42,74	43,12	85,00	56,67/10,00/(33,33)
11c 1					61,54	
2					50,00	
3					39,13	
10 1	8,33	7,69	10,63	10,00	70,00	53,81/23,09/23,09
2	33,75	32,91	39,98	39,54	77,28	60,73/17,81/21,46
4	43,82	43,18	45,53	45,01		92,86/ 7,14

A	B		C		D	E
5	22,22	21,35	29,49	30,28		
11b	13,24	12,59	19,16	18,82		68,75/(31,25)
11a						68,75/(31,25)
8 a,b					50,00	
N of 3					20,00	
OBERADEN						
Albrecht's Bk	11,77	11,14	14,91	14,27		70,16/29,84
N-W Corner 2,3	*13,03*	*12,41*				
4,5	*11,27*	*10,64*				
6	*11,62*	*10,99*				
7	*12,82*	*12,20*				
8,9	*18,66*	*18,09*				
NEUSS						
93-98					66,67	48,35/24,18/27,47
110-115	28,38	27,89	34,27	34,02	65,22	47,87/25,53/26,60
131					66,15	50,81/26,10/23,09
133,134					64,28	47,37/26,32/26,31
155-150	34,57	34,16	44,69	44,77	66,67	47,06/23,53/29,41
149,147-145	34,57	34,16	42,72	41,27	69,23	50,00/22,22/27,78
148	34,57	34,16	37,65	37,97	58,82	47,62/33,33/19,05
144	34,57	34,16	38,83	38,70		
143-142	32,26	31,82	38,83	38,70	65,85	52,94/23,53/23,53
140-135	32,05	31,61	41,91	41,94	61,54	44,44/27,78/27,78
122-119	35,90	35,48	41,33	41,25	68,00	52,94/23,53/23,53
104-99	32,47	32,03	40,43	40,38	69,23	50,00/22,22/27,78
84-87	32,67	32,21	39,28	39,14	61,54	45,76/28,53/25,11
7-12	32,47	32,03	39,06	38,46	69,23	50,00/22,22/27,78
26-31					61,54	44,44/27,78/27,78
15,16					50,00	
32-42					55,17	
46-52	*41,48*	*40,60*	*43,56*	*42,74*	54,82	
91					57,14	38,00/28,67/33,33
108					60,00	42,86/28,57/28,57
106					73,33	50,00,18,15/31,85
124					66,67	44,33/22,33/33,34
BONN						
9,10 1	20,91	20,18	35,89	35,62	64,29	28,09/15,73/56,18
10 2	20,91	20,18	17,80	17,04	64,29	28,09/15,73/56,18
12	37,80	37,42	45,13	45,12	66,67	52,63/26,32/21,05
Loëkaserne	36,59	35,37	43,30	43,17	63,23	47,51/27,61/24,88
Coh A					66,67	47,71/23,71/28,58
Graurheindstr	38,27	37,27	46,02	45,99	63,49	45,45/26,10/28,41
Koenen Bke	37,04	36,65	45,82	43,09	64,29	45,05/24,92/30,03
Coh C					64,29	50,00/27,78/22,22
Caserne 3	36,54	36,13	44,19	44,19	64,29	41,37/26,32/26,31
Casernen 4,5	37,18	36,13	43,72	43,60	64,29	50,00/24,92/30,03

A		B		C		D	E
RÖDGEN							
E of 'A'						52,17	39,95/36,68/23,37
S of 'A'						66,65	
S Stabsgebäude		17,00	16,16	17,00	16,16	68,43	
STRASBOURG							
St Étienne						67,97	58,14/27,33/14,53
DANGSTETTEN							
E Str II S		26,93	26,66	26,93	26,66	41,68	
VINDONISSA							
Dätwiler							73,91/26,09
Immunes Kaserne						53,61	43,52/37,96/18,52
Hispanische Koh						56,25	
Königsf Pd 2	b					59,02	44,50/30,50/25,00
W Gate	c					53,57	40,00/34,68/25,32
	d					69,78	
Pd 5	d	37,04	36,47	43,80	43,69	59,70	45,98/31,03/22,99
						65,68	50,79/26,64/22,57
	b					61,50	45,24/28,31/26,45
	c					65,85	48,69/25,13/26,18
Pd 6/7	b					61,52	45,76/28,53/25,71
	c					68,01	45,95/21,68/32,37
	d	35,56	34,98	43,92	43,90	60,01	45,52/30,27/24,21
Königsf Island						66,65	53,31/26,65/20,04
Breite Pd 1	IV					63,64	46,67/26,67/26,66
	III					69,11	52,21/23,28/24,51
	II					68,97	54,00/24,41/21,59
	I					69,23	52,94/23,53/23,53
Pd 2	IV					65,57	48,28/25,20/26,52
	III					57,14	41,73/31,17/27,10
	II					68,97	46,96/21,09/(31,95)
Pd 3	VII	39,47	38,94	43,90	43,64	66,89	50,84/25,06/24,10
	VI	36,20	35,64	48,61	48,83	70,77	47,33/19,33/33,34
	V	39,86	39,33	46,43	46,32	57,14	43,88/33,03/23,09
						42,86	33,03/43,88/23,09
	IV	34,91	34,63	40,13	40,10	58,63	43,90/30,13/25,97
	III	33,89	33,31	40,12	39,90	64,74	50,00/27,27/22,73
	II	33,89	33,31	37,98	37,64	65,71	55,40/28,95/15,65
	I	37,90	37,35	45,47	42,15	67,12	48,48/23,82/27,70
Pd 4	IV	34,91	34,63	40,13	40,10	48,48	33,33/37,87/28,80
	III	33,89	33,31	40,12	39,90	42,86	31,89/42,60/25,51
Gemüsegarten						65,67	48,28/25,33/26,39
Breite Pd 1	5	48,33	48,10	55,11	50,67	57,97	44,94/32,58/(22,48)
	4	33,53	33,22	41,39	37,32	71,21	51,40/20,51/(28,09)
	3	32,94	32,62	40,75	40,79	62,97	45,40/26,74/(27,86)
	2	44,44	44,28	52,83	52,95	64,29	46,88/26,02/(27,10)

A		B		C		D	E
Pd 2	7	33,59	33,18	40,82	40,30	54,69	39,33/32,58/28,09
	6	33,59	33,18	41,79	41,93	57,38	39,44/29,50/31,06
	5	45,48	45,13	55,34	55,58	75,98	57,63/18,16/24,21
	4	44,36	44,00	49,58	49,55	64,51	50,72/28,57/20,70
	3	37,98	37,57	45,96	46,02	67,85	52,77/25,06/22,17
	2	35,52	35,09	40,78	40,67	59,89	48,15/32,36/19,49
	1	36,83	36,39	40,68	40,51	62,50	43,21/25,93/30,86
Breite Pd III R1		16,88	15,97	14,61	12,86	66,66	
N Gate		22,95	22,22	22,95	22,27		
U1/K1		43,45	43,18	43,45	43,18	70,27	50,42/21,41/28,17
U2/K2		35,51	35,21	35,47	35,21	68,00	51,58/24,21/24,21
Pd V O1/O2		44,12	43,72	44,12	43,72		
U1/K1						64,52	48,63/24,04/27,32
Pd VI U1/K1		44,12	43,72	53,48	53,62	63,89	50,00/25,49/24,51
Pd VII O1/O2		44,12	43,72	35,33	34,45		
U1/K1		44,12	43,72	53,58	53,62	64,52	48,63/24,04/27,32
U2/K2		39,58	39,13	59,51	59,56	69,23	52,94/23,53/23,53
K3						53,10	
U3/K4		23,70	22,99	25,88	25,45	54,55	
U4/K5		23,70	22,99	26,68	23,66	54,55	
U5/K6		44,80	44,13	51,82	51,63	52,00	
Breite Pd 1 I-V						68,40	48,55/22,38/29,07
val Pd 2 A1/B1		16,02	15,49	19,25	18,80		69,23/30,77
Pd 3 IV,V						50,00	
VI						33,70	
VII,VIII						61,79	
Pd 4						63,92	
Pd 5/6	1	28,01	27,48	33,71	33,50	66,22	52,65/26,94/20,41
						50,00	39,80/39,80/20,40
	2,3	29,46	28,94	34,79	34,58	69,01	53,85/24,18/21,97
						50,00	39,04/39,04/21,92
Oelhafen Bdg B		16,21	14,44	18,84	17,02	62,12	53,57/36,87/12,50
Scheuergasse						57,83	50,63/36,87/12,50
REGENSBURG							
Niederm Pd 2						64,29	60,00/20,00/20,00
Pd 3		24,00	23,47	26,59	26,17	58,62	50,00/35,29/14,71
LAURIACUM							
FC 1		18,57	17,99	23,31	23,05		
6		18,57	17,99	22,49	22,19		
Cohs B-I		*20,00*	*19,45*			56,53	48,15/37,04/14,81
VINDOBONA							
FC Ph 1 A						63,29	51,58/29,87/18,55
Ph 2 A						61,54	47,76/29,82/22,42
Ph 3 A							78,86/21,14

A	B		C		D	E
CARNUNTUM						
Coh B Pd 4	29,33	28,85				
Coh C Pd 4	29,33	28,85	33,88	34,62		
Coh D Pd 4	31,56	31,10	37,47	37,41	60,71	45,99/29,68/24,33
Coh E Pd 4	31,30	30,85	36,29	36,18		
Coh F Pd 4	35,59	35,06	42,41	39,65		
Coh H Pd 4	36,67	36,16	45,87	41,51	64,52	52,67/28,91/18,42
RP Pd 2 7 E					66,67	
W					64,52	51,95/28,60/19,45
8 E					60,94	48,11/30,88/21,02
Pd 3/4 7 E					60,75	
W					62,96	
8 E					61,02	
W					61,40	
AQUINCUM						
LatP R	32,76	32,10	36,91	36,48		
R	32,76	32,10	39,89	39,71	54,57	40,71/33,84/25,45
P	31,67	31,02	38,70	38,52	54,57	40,71/33,84/25,45
SINGIDUNUM						
RR						78,40/21,60
POTAISSA						
LatP / LR						71,91/(28,09)
NOVAE						
Secteur II					53,57	
Secteur IV	26,47	25,71	33,22	32,95		77,53/(22,47)
ALBANO						
In front R	*29,79*	*29,39*	*39,26*	*40,21*	*50,00*	
LAMBAESIS						
FC PP + 1	39,18	38,73	48,45	48,04	52,00	
II/III+ 2	36,08	35,62			33,33 (3 rooms)	
3	36,08	35,62				
IV + 4	39,69	39,25	38,20	37,71	66,67 (+ 1 room)	
V + 5	41,24	40,81	51,91	51,97		32,00/32,00/20,00/16,00
VI + 6	41,24	40,81	53,06	53,00		21,87/21,87/21,87/21,87/12,50

A	B		C		D	E
Coh B,C					66,67	
Coh D	26,56	26,02	33,62	33,41	65,24	51,76/27,54/20,70
Coh E	26,57	26,02	33,62	33,41	63,97	51,64/29,01/19,34

A - Subject of entry
B - Length
C - Width
D - Area
E - Proportion of block (length divided by width, the length being taken as the length of the barracks)
F - Distance between facing centurions' quarters
G - Distance between facing men's quarters
H - Distance between rear walls of barracks (+ denotes rear party wall)

A	B	C	D	E	F	G	H
INCHTUTHIL							
FC	86,87	129,54	11253,14	0,67		9,14	1,22
Cohs II-X	83,82	84,43	7076,92	0,99	4,88	10,97	1,14
YORK							
FC	75,59				5,18		1,52
Davygate		95,00			4,57		3,35
Blake St							1,20
LINCOLN							
Westgate School		*80,00*					
CHESTER							
FC	84,00						1,75
Hunter St/Pr St		87,00				11,00	1,40
Northgate Bwy	76,00				4,50		1,00
Abbey Green T					5,00		1,80
St					5,00		1,00
Deanery Field	78,00	88,00	6864,00	0,88	6,10	11,20	1,52
WROXETER							
RP					4,00	10,00	1,00
					4,00	10,00	+
CAERLEON							
FC	77,00	145,00	11165,00	0,53	6,00	10,50	2,00
Prysg Field/Croft	73,76	90,00	6638,40	0,82	6,00	10,00	3,00
Myrtle Cottage	74,00	85,00	6290,00	0,87	5,00	10,00	2,00

A	B	C	D	E	F	G	H
GLOUCESTER							
Eastgate St/NMH	102,00	85,00	8670,00	1,20		12,50	
Berkeley St	73,00	85,00	6205,00	0,86	6,60	10,75	2,50
COLCHESTER							
Culver St	88,50	87,02	7701,27	1,02			+
RR	85,84	87,02	7469,80	0,99			
Lion Walk	85,84	84,66	7267,21	1,01	4,00		+
EXETER							
Goldsmith St	62,00	80,00	4960,00	0,78	5,00	10,50	1,50
St N Pd/Barth St	*57,50*	*78,00*	*4485,00*	*0,74*	5,00	10,50	1,50
NIJMEGEN							
FC Pd 4	*80,00*	*128,00*	*10240,00*	*0,63*	5,50	9,75	+
Pd 5	*80,00*	*128,00*	*10240,00*	*0,63*		10,00	1,25
Cohs A,B Pd 4		72,50				9,63	+
Pd 5	71,25	85,00	6056,25	0,84	5,00	9,38	1,25
Cohs C,D Pd 4	65,63	72,00	4725,36	0,91	3,50	8,50	+
Pd 5	67,50	82,50	5568,75	0,82	3,75	10,00	+
VETERA I							
N,O					5,50	11,50	+
W,V					5,00	11,50	+
HALTERN							
11g	60,00	60,00	3600,00	1,00	4,50	8,00	1,00
11f	71,00					12,00	1,00
11e	71,00	76,00	5396,00	0,93			
11d	71,00	76,00	536,90	0,93	6,00	11,00	5,00
11b	68,00	72,50	4930,00	0,94	4,25	11,00	0,50
OBERADEN							
N-W Corner	*70,00*	*67,00*	*4690,00*	*1,04*	5,00		1,38
NEUSS							
93-98	74,50	83,00	6183,50	0,90	4,00	10,00	1,70
110-115	74,00	89,00	6586,00	0,83	4,00	10,50	1,50
155-150	81,00	87,25	7067,25	0,93	4,00	10,50	2,25
149-144	79,50	96,00	7632,00	0,83	5,00	11,00	

A	B	C	D	E	F	G	H
140-135	78,00	90,00	7020,00	0,87	4,50	11,00	1,50
104-99	77,00	87,25	6718,25	0,88	4,00	10,00	1,25
84-87	75,00				5,00	10,50	1,50
7-12	77,00	88,00	6776,00	0,88	4,50	10,50	1,50
26-31	78,00	89,00	6942,00	0,88		10,50	1,81
BONN							
FC	*84,00*	*127,00*	*10668,00*				
R	82,00	78,50	6437,00	1,04	6,00	11,00	+
P	78,00	80,00	6240,00	0,98	6,50	9,50	+
RÖDGEN							
S Stabsgebäude	50,50	44,00	2222,00	1,15	3,00	3,00	+
DANGSTETTEN							
	80,00	60,00	4800,00	1,33	5,54	5,54	+
VINDONISSA							
Breite Pds 3/4	69,00	91,50	6313,50	0,75	6,00/3,00	9,00	
Breite N Gt Pd 287/96,00		84,00	7644,00	0,97	5,25/6,00	13,50	+
REGENSBURG							
Niederm Pd 2		90,00				10,20	
Pd 3	86,25	90,00	7762,50	0,96	6,30	10,20	+
Grasgasse					5,50		
LAURIACUM							
FC	87,50	115,00	10062,50	0,76		12,50	
Remaining Cohs	*87,50*	82,50	7218,75	1,06		9,38	+
VINDOBONA							
FC					7,50	13,25	1,50
CARNUNTUM							
FC	85,00	115,00	9775,00	0,74			+
Coh B	85,00	75,00	6375,00	1,13			+
Coh C	87,50	75,00	652,50	1,16			+
Coh D	90,00	67,50	6075,00	1,33			+
Coh E	93,75	67,50	6328,13	1,39			+

A	B	C	D	E	F	G	H
Coh F	73,75	93,75	6914,06	0,79			+
Coh G		72,50					+
Coh H	75,00	73,75	5531,25	1,02	4,50	8,00	+
RP Pd 2						8,10	+
Pd 3/4						7,00	+
AQUINCUM							
R	72,50	96,25	6978,13	0,75	5,10	11,50	2,00
P	75,00	96,25	7218,75	0,78	5,10	11,50	2,00
SINGIDUNUM							
RR		*72,00*				10,00	
POTAISSA							
LatP / LR		88,80				11,20	1,80
NOVAE							
LP	68,00	72,00	4896,00	0,94			+
LAMBAESIS							
FC	97,00	153,00	1481,00	0,63	5,00	20,00	+
Coh B	*90,00*	*112,00*	*10080,00*	*0,80*		17,00	+
Coh C	*90,00*	*111,00*	*9990,00*	*0,81*		13,50	+
Coh D	96,00	104,25	10008,00	0,92	3,38	12,00	+
Coh E	96,00	109,50	10512,00	0,88	4,88	14,25	+

A - Subject
B - Width of *via praetoria*
C - Width of *via principalis*
D - Width of *via decumana*
E - Width of *via sagularis*
F - Width of *intervallum - praetentura*
G - Width of *intervallum - retentura*
H - Width of *porta praetoria*
I - Width of *portae principales*
J - Width of *porta decumana*

Note: Gate dimensions are to the outside edges of the carriageway or carriageways

A	B	C	D	E	F	G	H	I	J
INCHTUTHIL									
	8,00	8,00	5,18		11,43	11,43	8,84	7,92	
CARPOW									
							9,14	9,75	
YORK									
				2,13					
LINCOLN									
				5,00	10,00	10,00	8,53		
LONGTHORPE									
I								7,00	7,77
II						19,81			
CHESTER									
	15,00	15,00	8,00	6,00	20,00	16,00			
WROXETER									
				10,00					

A	B	C	D	E	F	G	H	I	J
CAERLEON									
	8,00	8,00	8,00	6,00	13,00	13,00	8,00	8,00	8,00
GLOUCESTER									
				3,80	8,00	8,00			
COLCHESTER									
Lion Walk				4,40	14,00				
Balkerne Lne				6,50		14,00			
EXETER									
				5,00	12,00				
NIJMEGEN									
Pd 1								10,00	
Pd 5	8,75	8,75	8,75		10,00		8,75	7,50	
VETERA I									
Pd 3		7,00		7,00	18,00		8,00	8,00	
HALTERN									
	47,00	30,00		16,00		1,00		7,00	6,00
OBERADEN									
					26,00				
NEUSS									
	6,00	6,00	3,00		16,00	17,00	7,00	5,50	6,00
BONN									
	10,50	10,50	13,00	10,00	15,00	10,50	7,50	7,50	7,50
RÖDGEN									
							5,50		2,00

A	B	C	D	E	F	G	H	I	J
MAINZ									
Aug/Tib				3,50	15,50				
1C				6,50	16,50				
STRASBOURG									
			6,00	6,00	21,00				
DANGSTETTEN									
							10,00	10,00	
VINDONISSA									
1C	3,75	6,00	3,75		7,50	7,50	3,75	6,00	3,75
REGENSBURG									
	6,00	8,00	5,00		24,00	24,50	10,00	10,00	
LAURIACUM									
	6,70	9,00	6,70	4,00					
VINDOBONA									
	6,00	13,00		8,00		20,00			
CARNUNTUM									
			5,00			15,00		10,00	7,50
RP Pd 2				9,00	20,00				
Pd 3/4				5,00	16,00				
AQUINCUM									
	10,00	10,00		12,50	15,00	15,00	15,00	7,50	7,50
NOVAE									
	6,00			4,00	14,00		7,75		

A	B	C	D	E	F	G	H	I	J
ALBANO									
		3,53		10,50	10,50				
LAMBAESIS									
	12,20	12,20		9,00	11,00		9,00	9,00	

A - Periods of Occupation
B - Garrison (attested or postulated)
C - Evidence
D - Province
E - Site Number (See Location Maps and List of Sites)

A	B	C	D	E
STRACATHRO				
Agricola-86	*Ala Quing* ?		*Brit*	1
CARDEAN				
Agricola-86			*Brit*	2
FENDOCH				
82-86	*Coh I Tungrorum Mill* ?		*Brit*	3
STRAGEATH				
IA Flavian	Legionaries		*Brit*	5
IB Flavian	Legs + Vexs of 2 *Cohs Q Eq* ?			
II Antonine I	*Coh Quing Eq* ?			
III Antonine II	*Vex Coh Quing Eq* + *Vex Coh Quing Ped* ?			
ARDOCH				
1C	Legs + *Coh I Baetasiorum*	RIB 2213	*Brit*	6
Antonine I				
Antonine II				
CAMELON				
Flavian			*Brit*	8
Antonine	*Coh Mill* ?			
MUMRILLS				
Antonine I	*Ala I Tungrorum*	RIB 2140	*Brit*	9
Antonine II	*Coh II Thracum Eq*	RIB 2142		

A	B	C	D	E
ROUGH CASTLE				
Antonine I Antonine II	*Vex Coh VI Nerviorum*	RIB 2144,2145	*Brit*	10
BAR HILL				
Antonine I Antonine II	*Coh I Hamiorum* *Coh I Baetasiorum CR*	RIB 2167,2172 RIB 2170	*Brit*	11
CADDER				
Antonine I Antonine II	*Coh Quing Ped* ?		*Brit*	12
BALMUILDY				
Antonine	6 centuries in final phase ?		*Brit*	14
BEARSDEN				
145/46 - 158	*Vex Coh IIII Gall Eq* ?		*Brit*	15
DUNTOCHER				
Antonine			*Brit*	17
OLD KILPATRICK				
Antonine I Antonine II	*Coh Mill Ped* ? *Coh I Baetasiorum CR*	 Brit I 1970, 310	*Brit*	18
OLD BISHOPTON				
Antonine			*Brit*	19
CRAMOND				
c 140 - late 2C Early 3C	Vex *Coh II Tung Mill Eq CL* *Coh V Gallorum*	RIB 2135 RIB 2134	*Brit*	21
INVERESK				
Antonine I Antonine II	*Ala Quing* ?		*Brit*	22

A	B	C	D	E
ELGINHAUGH				
c 80 - 100			*Brit*	23
CASTLEDYKES				
Flavian Antonine - 186/7	Milliary ?		*Brit*	24
LOUDOUN HILL				
Antonine			*Brit*	25
LYNE				
140 - 158	*Coh Mill Eq* ?		*Brit*	26
NEWSTEAD				
I 80/81 - *c 90* II *c* 90 - 105 III *c* 140 - 158/63 IV 158/63 - End 2C	*2 Alae Quing* ? Legs + Auxs ? 2 Cohs *Leg XX + Ala Aug Vocontiorum CR* *Ala Petriana Mill*	 RIB 2120,2121 	*Brit*	27
CAPPUCK				
Pds I,II Flavian Pd III Ant I Pd IV Ant II	*Vex Raetorum Gaesatorum ?*	RIB 2117	*Brit*	28
HIGH ROCHESTER				
c 139 - 143 Late 2C	*Coh I Lingonum Eq* *Coh I Aelia Dacorum Mill* *Coh I Delmatarum Eq*	RIB 1276 RIB 1289 ? RIB 1289 ?	*Brit*	29
CRAWFORD				
Ph 1 *c* 80 - 87 Ph 2 *c* 140 - 154/8 Ph 3 154/8 - 163	4 *turmae* of *Coh Q Eq / Numerus* ? *Vex Coh Quing Eq* ? Half *Coh Mill Ped* ?		*Brit*	30
RAEBURNFOOT				
Early Antonine			*Brit*	33

A	B	C	D	E
DALSWINTON				
Ft 1 Flav			*Brit*	35
Ft 2 Flav				
Ft 3 Bankshead I Flav	*Ala Milliaria* ?			
Ft 4 Bankshead II Flav		*Ala Milliaria* ?		
CARZIELD				
142 - 158	*Ala Quing* ?		*Brit*	36
GLENLOCHAR				
Pd 1 Agr	*Coh Mill Eq* ?		*Brit*	37
Pd 2 Antonine I				
Pd 3 Antonine II				
BIRRENS				
c 80 - 87			*Brit*	39
Hadr				
139 - 158	*Coh I Nerv Germ Mill Eq*	RIB 2093,2097		
158 - *c* 184	*Coh II Tung Mill Eq CL*	RIB 2100		
BEWCASTLE				
Hadr	*Coh I Aelia Dacorum Mill*	RIB 991	*Brit*	40
3C	*Coh I Nerv Germ Mill Eq*	RIB 966?,988,989		
SOUTH SHIELDS				
Pd I Ist ½ Hadr	*Coh Quing* ? / *Ala Sabiniana* ?		*Brit*	41
140 - 160	Unoccupied			
Pd II 160 - Sev				
Pd III Sev - 222				
Pd IV 222 -	*Coh V Gallorum*	RIB 1060		
WALLSEND				
Hadr	*Coh II Nerviorum* ?		*Brit*	42
2C	*Coh II Nerviorum CR*	RIB 1303		
3C	*Coh IIII Lingonum Eq*	RIB 1299,1300,1301		
		ND Occ XL 33		
BENWELL				
Hadr	*Ala Quing* ?		*Brit*	43
c 160	*Coh I Vangionum Mill Eq*	RIB 1328		
181 - 185, 3C	*Ala I Hisp Asturum*	RIB 1329		

A	B	C	D	E
RUDCHESTER				
Hadr - 180	*Coh Quing Eq* ?		*Brit*	45
Comm - 3C	*Coh I Frisavonum*	RIB 1395, 1396		
	Coh I Frixagorum	ND Occ XL 36		
HALTONCHESTERS				
Hadr	Coh Quing Eq ?		*Brit*	46
3C	*Ala I Pann Sabiniana*	RIB 1433		
		ND Occ XL 37		
CORBRIDGE				
IA 87/90	*Ala Petriana* ?		*Brit*	47
IB 87/90 - 105	Vex Lex + *Coh Mill Eq* ?			
II 106 - 121/22	*Coh Mill Eq* ?			
III 122 - 125	12 centuries infantry ?			
125 - 139	Intermission			
IVA 139/40 - 158	*Ala Q / Coh M Eq* / Legs ?			
IVB 158 - 163	*Coh I Fida Vard Mill Eq CR* ?	RIB 1128		
CHESTERS				
c 125- 140	*Ala Aug Ob Virt Appellata*	EE VII 1152,3	*Brit*	49
		Brit X 1979, 346		
c 146 - 158	*Coh I Delmatarum Eq* ?			
c 158 - 163	*Coh I Delmatarum Eq* ?	JRS 47 1957, 229		
c 163 - 180	*Coh I Vangionum Mill Eq*	RIB 1482		
Commodus	*Ala II Asturum*	RIB 1463, 1464		
		ND Occ XL 38		
CARRAWBURGH				
Hadr	*Vex Coh I Tungrorum Mill*	CIL XVI 174	*Brit*	50
2C	*Coh II Nerviorum CR* ?	RIB 1538		
3C/4C	*Coh II Batavorum* ?			
HOUSESTEADS				
Hadr	*Coh Mill Ped*		*Brit*	52
3C	*Coh I Tungrorum Mill*	RIB 1578 *et al*		
CHESTERHOLM				
St Ft 1 122/4 -			*Brit*	54
St Ft 2 223/5 - 5C	*Coh IV Gallorum*	RIB 1685-8, 1705		

A	B	C	D	E
HALTWHISTLE BURN				
Hadr	1 century infantry ?		*Brit*	56
GREAT CHESTERS				
Hadr	*Coh VI Nerviorum*	RIB 1731	*Brit*	57
166/69	*Coh VI Raetorum*	RIB 1737		
3C	*Coh II Asturum Eq*	RIB 1738, ND Occ XL 42		
BIRDOSWALD				
Hadr			*Brit*	59
205/58	*Coh I Thracum CR*	RIB 1909		
3C	*Coh I Aelia Dacorum Mill*	RIB 1909 *et al*		
	Venatores Bannienses	RIB 1905		
OLD CHURCH				
Hadr	*Coh Q* ?		*Brit*	64
STANWIX				
Hadr	*Ala Aug Gall Petr Mill CR BQ*	ND Occ XL 45	*Brit*	65
CARLISLE				
78/79 - 100/105			*Brit*	66
BOWNESS				
Hadr	*Coh Mill Eq* ?		*Brit*	67
BECKFOOT				
Hadr	*Coh Q Ped* ?		*Brit*	68
2C	*Coh III Pannoniorum Eq*	RIB 880		
MARYPORT				
c 122 - 139/42	*Coh I Hispanorum Mill Eq*	RIB 814 *et al*		
Antonine I ?	*Coh I Delmatarum Eq* ?	RIB 832 *et al*		
Late 2C - Early 3C	*Coh I Baetasiorum CR*	RIB 830 *et al*		

A	B	C	D	E
EBCHESTER				
Mid Flav - Early Hadr *c* 175 - 4C	*Coh IIII Breucorum*	RIB 1101	*Brit*	70
BINCHESTER				
Agr Late 2C / Early 3C	*Ala Hisp Vettonum CR*	RIB 1028, 1029	*Brit*	71
LEASE RIGG				
c 80 - Hadr			*Brit*	72
AMBLESIDE				
Ft 1 *c* 79 Ft 2 *c* 100/20			*Brit*	73
RAVENGLASS				
c 130 - 400 +	*Coh I Morinorum et Cersiacorum*	ND Occ XL 52	*Brit*	74
WATERCROOK				
Late Flav	*Coh Quing Ped* ?		*Brit*	75
BROUGH-BY-BAINBRIDGE				
Ft I Agr			*Brit*	76
Ft II Flav/Traj	*Coh Quing* ?			
Hadr/Early Ant	Evacuated			
Antonine I	*Coh Quing* ?			
Antonine II				
Sev - late 3C				
3C	*Coh VI Nerviorum*	RIB 722, JRS 51,192	*Brit*	77
ILKLEY				
Ft 1 Agr - early 2C			*Brit*	78
Ft 2 *c* 169 - 196/7	*Coh II Lingonum Eq*	RIB 635, 636		
Ft 3 197/8 - C'tius	*Coh Eq* ?			
Ft 4 Const - Theod				
Ft 5 Theod -				

A	B	C	D	E
RIBCHESTER				
Ph A 80 - 125/30			*Brit*	79
Ph B 125/30 - 150/60	*Ala II Asturum*	RIB 586		
Ph C 150/60 - *c* 200				
Ph D *c* 200 - mid 3C	*Numerus Equitum Sarmatarum* ?			
HAYTON				
c 70/71 short occupation			*Brit*	80
BROUGH-ON-HUMBER				
Pd IIB Flav - 85	*Coh Quing Eq* ?		*Brit*	81
Pd III	Abandoned			
Pd IV *c* 125 - early Ant				
CASTLEFORD				
Ft 1 *c* 71 - 84			*Brit*	82
Ft 2 *c* 84 - 95	*Coh IIII Gallorum Eq* ?	Tile Stamps		
SLACK				
Ph 1 Agricolan			*Brit*	83
Ph 2 Traj - early 2C	*Coh IIII Breucorum* ?	EE VII 1231		
Ph 3 122/25 - 140				
CASTLESHAW				
c 80 - 90			*Brit*	84
Early 2C	*Coh IIII Breucorum* ?	EE IX 1278		
MELANDRA CASTLE				
Ph I Agr			*Brit*	85
Ph II Traj/Hadr	*Coh I Frisavonum* ?	RIB 279		
- mid 2c	*Coh I Bracaraugustanorum* ?	Brit V 1974, 464		
TEMPLEBROUGH				
Ft I Ner - Agr			*Brit*	86
Ft II 2C - mid Ant	*Coh IIII Gallorum*	RIB 919, 620		
Ft III 3C				

A	B	C	D	E
BROUGH-ON-NOE				
Pd I Flav - *c* 120 Pd II 120 - 154/8 Pd IIa 154/8 - Sev Pd IIb Sev - 4C Pd III 4C - *c* 350	Unoccupied *Coh I Aquitanorum Eq*	RIB 283	*Brit*	87
ROCESTER				
Late 1C- 2C	Part-mounted / cavalry	Finds	*Brit*	89
LITTLECHESTER				
Agr -			*Brit*	90
DERBY				
52/7 - Agr			*Brit*	91
METCHLEY				
Early Ft *c* 48 Later Ft Domitianic			*Brit*	93
THE LUNT				
Pd I *c* 60 - 64 Pd II *c* 64 - 78 Pd III 78 - 80 Pd IV 260/68 + - ?	Legs + auxs, cavalry ? *Coh Quing Ped / Eq* ?	Gyrus Gyrus	*Brit*	94
GREAT CASTERTON				
Ft I 43/45 - *c* 70 Ft II *c* 70	Legs + *Ala Quing* ? *Ala Quing* ?		*Brit*	95
GODMANCHESTER				
Mid 1C			*Brit*	97
CAERHUN				
Flav - Theod	*Coh Quing Eq* ?		*Brit*	99

A	B	C	D	E
CAERNARVON				
Pd I 78 - Pd II 140 - Pd III 189/209 - Pd IV 369 -	*Coh I Fida Vardullorum Eq* ? *Coh I Fida Vardullorum Eq* ? *Coh I Sunucorum*	 RIB 430	*Brit*	100
PEN LLYSTYN				
78 - *c* 90	2 *Cohs Quing Eq* ?		*Brit*	101
LLANFOR				
Flavian			*Brit*	103
FORDEN GAER				
Flav - 4C	Cavalry ?		*Brit*	106
BUCKTON				
Pd I 80/90 - 120 Pd II 120 - *c* 130	*Ala Quing* ? *Ala Quing* ?		*Brit*	107
BRANDON CAMP				
Neronian			*Brit*	108
DOLAUCOTHI				
Flav - end Traj			*Brit*	109
Y GAER				
c 75 - - late 3C	*Ala Hispana Vettonum CR*	RIB 403	*Brit*	110
COELBREN				
Flav - 140/50			*Brit*	111
LOUGHOR				
c 80 - 4C			*Brit*	112

A	B	C	D	E
NEATH				
Flav - late 3C			*Brit*	113
GELLIGAER II				
103/112 - late 2C Late 3C - 4C	*Coh Quing Ped* ?		*Brit*	114
CIRENCESTER				
Pd IIa *c* 45 Pd IIb *c* 50	*Ala Quing* ? *Ala Quing* ?		*Brit*	117
STANWAY				
c 43			*Brit*	119
LONDON (Cripplegate)				
Trajanic -			*Brit*	120
DOVER				
I 117	*Classis Britannica*	Tile Stamps	*Brit*	121
II Pd I 130/40-154/55 Pd II 163/65-180 Pd III 199/200-208	*Classis Britannica*	Tile Stamps		
HOD HILL				
Claud - 54			*Brit*	123
SOUTH CADBURY				
Claud			*Brit*	124
WADDON HILL				
c 50 - 60			*Brit*	125
HEMBURY				
c 50 - 60			*Brit*	126

A	B	C	D	E
BURY BARTON				
Claud/Ner - early Flav			*Brit*	128
NANSTALLON				
54/68 - Vesp	*Coh Quing Eq* ?		*Brit*	130
BOULOGNE				
1C/2C - *c* 270	*Classis Britannica*	CIL 3540-3547	*Belgica*	131
ARLAINES				
Claud - *c* 80	*Ala Vocontiorum*	CIL XIII 3463	*Belgica*	132
VALKENBURG				
C 1 40	Vex *Coh III Gallorum Eq ?*	*Writing Tablet*	*Germ Inf*	134
C 1a 42	*Vex Ala Quing* ?			
C 2/2 47 - 69	*Vex Ala Quing* ?			
C 4 70+ - *c* 100	*COH IIII Thracum Eq PF Dom* ?			
C 5 *c* 100 - 170/74				
C 6 *c* 178 - *c* 240				
ARENTSBURG				
70 - 260/70	*Classis Germanica PF* ?		*Germ Inf*	136
ALPHEN				
1C	*Coh VI Breucorum* ?	Tile Stamps	*Germ Inf*	137
	Coh III Breucorum ?			
ZWAMMERDAM				
Pd I 47 - 69	Legionaries ?		*Germ Inf*	138
Pd II 70 - 154/55+	*Vex Coh Quing Eq* ?			
Pd III *c* 175 - 260				
UTRECHT				
Pd 1,2 *c* 47			*Germ Inf*	139
Pd 3 70				
Pd 4 2C	*Coh II Hisp Ped PF* ?			
Pd 5 *c* 200 - 260	*Coh II Hisp Ped PF* ?			
Pd 6 4C				

A	B	C	D	E
VECHTEN				
Pd 1 Aug			*Germ Inf*	140
Pd 2 70	*Coh II Brittonum Mill Eq*	CIL XIII/6 12425		
c 78/80 - 100	*Coh I Flavia Hisp Eq* + ?			
100 - 150	Unknown			
Pd 3 *c* 150 - 270	*Ala I Thracum*	CIL XIII 8818		
ALTKALKAR				
Aug/Tib			*Germ Inf*	142
Early Flav	*Ala Noricorum* ?			
Domitianic	*Ala Africorum* ?			
Traj - early Hadr	*Ala Vocontiorum* ?			
ASCIBURGIUM				
K I Aug			*Germ Inf*	147
K II Drusan				
K III Tiberian	*Cohors Silaucensium*	CIL XIII 8593		
K IV 50/60 - 69	*Ala I Tungrorum Frontoniana*	AE 1931, 31		
K V Vesp - 83/85	*Ala Moesica*	CIL XIII 8592		
KREFELD-GELLEP				
Pd I 71	*Ala Afrorum Veterana* ?		*Germ Inf*	149
	+ *Ala Sulpicia* ?			
Pd II *c* 85 - 100/105	*Coh II Brittonum Mill Eq* ?			
Pd III 100/05-115/20	*Coh II Varcianorum Eq CR* ?			
Pd IV 115/20 - 3C	*Coh II Varcianorum CR* ?			
DORMAGEN				
80/90 - 1st ½ 2C			*Germ Inf*	151
1st ½ 2C - 4C	*Ala Noricorum* ?			
ALTEBURG				
Tib/Claud			*Germ Inf*	153
Early Flav - 3C	*Classis Germania PF*	Tile Stamps		
BONN (Boeselagerhof)				
c 1 - 30	*Coh I Thracum* + *Ala Frontoniana* ?		*Germ Inf*	154

A	B	C	D	E
NIEDERBIEBER				
c 185 - 260	*Numerus Explor Germ Divitiensium* ? + *Numerus Brittonum* ?		*Germ Sup*	156
HOLZHAUSEN				
Antonine Commodus - 260	*Coh II Treverorum* ? (*Numerus Treverorum*) *Coh II Antoniana Treverorum* ? *Coh II Severiana Treverorum* ?		*Germ Sup*	157
SAALBURG				
c 135 - 260	*Coh II Raetorum CR Eq* ?		*Germ Sup*	161
KAPERSBURG				
a HK Traj b 1SK Hadr/Ant c 2SK 2C-mid 3C	*Numerus Nidensium* + cavalry ?		*Germ Sup*	162
BUTZBACH				
Pd 1 *c* 90 Pd 2 *c* 135 Pd 3 mid 2C Commodus Pd 4 3C	*Coh II Raetorum CR* ? *Coh II Aug Cyrenaica Eq* *Ala Moesica Felix Torquata* ? *Coh I Biturigum*		*Germ Sup*	164
ECHZELL				
Late Dom - mid 3C	*Ala Quing* + *Coh Quing Ped* ? *Ala Indiana Gallorum* ? *Ala Moesica Felix Torq PF* ? *Ala I Flavia Gemina* ? *Coh XXX Voluntariorum CR* ?	Tile Stamps	*Germ Sup*	165
FLORSTADT-OBERFLORSTADT				
c 100 - 3C	*Coh XXXII Voluntariorum CR* ?		Germ Sup	167
ALTENSTADT				
Pd 1 88/89 Pd 2/3 *c* 110 - 135	*Numerus* ? *Numerus* ?		*Germ Sup*	168

A	B	C	D	E
Pd 4 *c* 135 - 150	*Numerus* ?			
Pd 5 *c* 150 - 233	*Numerus* ?			
NIDDERAU-HELDENBERGEN				
Lager 3 *c* 90-early Traj			*Germ Sup*	169
OKARBEN				
Pd 1 83/85 - 88/89	*Ala II Flavia Gemina* ?		*Germ Sup*	171
Pd 2 88/89 - 98/117	*Ala Moesica FPF* ?			
HEDDERNHEIM				
H-EK 1 *c* 75/79	*Ala I Flavia Gemina* ? /		*Germ Sup*	172
H-EK 2 83/85-88/89	/ *Coh I Vindelicorum* ? /			
SK 88/89-103/11	/ *Coh XXXII Voluntariorum CR* ?			
HOFHEIM (Erdlager)				
c 40 - Flav	*Coh Quing Eq* ?		*Germ Sup*	173
HOFHEIM (Steinkastell)				
Ft I 71/74	Legs + *Coh Quing* ?		*Germ Sup*	174
Ft II 83/85				
Ft III 96/98 - 106/11	*Coh Eq* + 4 *turmae* ?			
WIESBADEN				
c 80 - 90	*Coh II Raetorum*	CIL 1583, 1584	*Germ Sup*	175
c 90 - early 2C	*Coh III Delmatarum*	CIL XIII 7581		
SELIGENSTADT				
c 100 -	*Coh I Civium Romanorum Eq* ?		*Germ Sup*	177
STOCKSTADT				
c 100 -	*Coh III Aquitanorum Eq CR* ?		*Germ Sup*	178
Ist ½ 2C - mid 2C	*Coh II Hispanorum Eq PF* ?			
Mid 2C - mid 3C	*Coh I Aquitanorum Vet Eq* ?			
WÜRZBERG				
95/105 - 148/61	*Numerus* ?		*Germ Sup*	179

A	B	C	D	E
HESSELBACH				
A 95/105 - 115/30 B 115/30 - *c* 145 C *c* 145 - 148/61	*Numerus Brittonum* ?		*Germ Sup*	180
LADENBURG				
Ph 1 74 - 89/96 Ph 2 89/96 - Ph 3 - early 2C	*Ala I Canninefatium* ?		*Germ Sup*	181
RHEINGÖNHEIM				
			Germ Sup	182
HEILBRONN-BÖCKINGEN				
85/90 *c* 150	*Coh V Delamatarum* ? *Coh I Helvetiorum* ?		*Germ Sup*	184
MILTENBERG				
c 150 - mid 3C	*Coh I Sequanorum et Rauricorum* *Eq + Explor Triputiensis* ?		*Germ Sup*	185
ÖHRINGEN (Burgkastell)				
Ph 1,2 mid 2C - 231 Ph 3 231/34 - *c* 260	*Coh I Helvetiorum* ? *Coh I Septimia Belgarum* ? *Numerus Brit Cal* ? *Numerus Brit Aur* ? *Numerus Brit Maur* ?	 Tile Stamps Tile Stamps Tile Stamps	*Germ Sup*	187
MURRHARDT				
c 150 - 259/60	*Coh XXIV Voluntariorum CR*	CIL 6530-6531,	*Germ Sup*	189
WELZHEIM (Ostkastell)				
Hadr/Ant - 198/211	*Numerus Brittonum* ?	Tile Stamps	*Germ Sup*	191
STUTTGART-CANNSTATT				
A *c* 90 - 100 B *c* 100 - 150	 *Ala I Scubulorum* ?		*Germ Sup*	192

A	B	C	D	E
KÖNGEN				
85/90 - 150			*Germ Sup*	193
ROTTWEIL KASTELL I				
72/73	*Vex Leg XI Claudia PF* ?	Tile Stamps	*Germ Sup*	195
ROTTWEIL KASTELL II				
Vesp/Dom - 120	*Coh I Biturigum* ?	Tile Stamps	*Germ Sup*	196
	+ *Coh II Aquitanorum Eq CR* ?	Tile Stamps		
	Coh III Delamatarum PF ?	Tile Stamps		
	Coh I Flavia	Tile Stamps		
ROTTWEIL KASTELL III				
73/74 - early Dom	*Coh I Biturigum* ?	Tile Stamps	*Germ Sup*	197
	Vex Leg XI Claudia PF ?	Tile Stamps		
ROTTWEIL KASTELL IV				
Early Flavian	As above ?		*Germ Sup*	198
ROTTWEIL KASTELL V				
Early Flav (Before IV, after III)	As above ?		*Germ Sup*	199
HÜFINGEN				
1 Claudian			*Germ Sup*	200
2 Early Flav	*Ala Quing* ?	Finds		
ZURZACH				
K I			*Germ Sup*	202
K II Early 1C				
K III Mid 1C - late 1C				
BURLADINGEN				
Dom - 110	*Coh Quing* ?		*Raetia*	204

A	B	C	D	E
RIßTISSEN				
K 1 *c* 50 - 69/70	*Coh Quing* + cavalry ?		*Raetia*	205
K 2 70/71 - end 2C	*Coh Quing* + cavalry ?			
UNTERKIRCHBERG				
Pd I Claud - late Ner	*Ala Quing* ?		*Raetia*	206
Pd II Ph IIa Vesp	*Ala Quing* ?			
Ph IIb Vesp-Dom	*Ala Quing* ?	Gyrus		
Pd III Dom - 100/20				
HEIDENHEIM				
c 90 - mid 2C	*Ala II Flavia PF Mill*	Inscr, Tile Stamps	*Raetia*	208
UNTERBÖBINGEN				
Mid 2C - 259/60	*Coh VI Lusitanorum* ?		*Raetia*	209
AALEN				
c 156 - 259/60	*Ala II Flavia PF Mill*	Tile Stamps	*Raetia*	210
LORENZBERG				
Mid Aug - early Claud			*Raetia*	211
FRIEDBERG				
KI Tiberian			*Raetia*	212
MUNNINGEN				
c 90 - 100	Infantry ?		*Raetia*	213
GNOTZHEIM				
c 90	*Coh V Bracaraugustanorum* ?		*Raetia*	214
211/44	*Coh III Thr CR Eq BT* ?			
THEILENHOFEN (Neues Lager)				
Trajanic			*Raetia*	215

A	B	C	D	E
WEIßENBURG (Breitung)				
Hadr	*Coh IX Batavorum Eq Mill* ?		*Raetia*	216
ELLINGEN				
117/138 - 182	*Numerus* / 2 centuries ?		*Raetia*	217
182 - 229	*Pedites Singulares* ?			
PFÜNZ				
c 90 - 233	*Coh I Breucorum CR Eq* ?		*Raetia*	218
OBERSTIMM				
Pds 1a,1b,1c 49-69/70	*Coh Quing Eq* + supplies ?		*Raetia*	219
Pd 1d 69/70 - Dom				
Pd 2 Dom - early Hadr				
STRAUBING (Kastell IV)				
Flav - Marcomm Wars			*Raetia*	222
MOOS-BURGSTALL				
c 90 - 120	*Coh III Thracum CR* ?	Tile Stamps	*Raetia*	223
KÜNZING				
HK Pd 1 *c* 90 - 120	Coh III Thracum CR Eq ?	Tile Stamps	*Raetia*	224
Pd 2 *c* 120-135	+ *Exploratores/Veredarii* ?			
SK Pd 3 *c* 150/60 - 200 ?				
Pd 4 *c* 200 - 245	*Coh V Bracaraugustanorum* ?			
SCHLÖGEN				
Hadr - Marcomm Wars	*Vex Coh V Breucorum* ?		*Noricum*	225
	Vex Legio II Italica ?			
TRAISMAUER				
H-EL Flav	*Ala I Aug Thracum*	Inscription	*Noricum*	227
SK Early 2C	*Equites Dalmatae* ?			

A	B	C	D	E
ZWENTENDORF				
H-EK			*Noricum*	228
1 SK Traj	*Coh V Breucorum CR Eq* ?	Tile Stamps		
2 SK Const/Val	*Coh I Asturum* ?	Tile Stamps		
ZEISELMAUER				
Flav -	*Coh I Asturum* ?		*Noricum*	230
M Aurelius	*Coh II Thracum Eq PF*	Inscription		
PETRONELL				
K I Flav	*Ala I Thracum Victrix* ?	Tile Stamps	*Noricum*	232
K II Traj - end 4C				
ZALALÖVŐ				
Tib/Claud - Vesp			*Pannonia*	234
ARRABONA				
Claud - 92	*Ala I Ituracorum* ?		*Pannonia*	235
Early 2C	*Ala I Ulpia Contariorum Mill CR*	RIU 198-218		
- 4C				
ÁCS-VASPUSZTA				
Late Traj	*Coh I Hispanorum* ?		*Pannonia*	236
	Coh I Thracum ?			
IŽA-LÉANYVÁR				
Ft 1 Flav - Traj/Hadr			*Pannonia*	237
Ft 2 Traj/Hadr	*Legio I Adiutrix* ?			
AQUINCUM (auxiliary fort)				
H-EL - *c* 73			*Pannonia*	238
SK *c* 73 - Traj	*Ala I Tungrorum Frontoniana* ?			
ALBERTFALVA				
c 50 - late Dom	*Ala Quing* ?		*Pannonia*	240
Hadr	*Ala I Flavia Britannica* ?			

A	B	C	D	E
ADONY				
H-EK 1 Claud/Ner-Vesp	*Coh II Batavorum* ?		*Pannonia*	241
H-EK II				
H-EK III Early Hadr	*Coh II Alpinorum* ?			
SL I Hadr	*Coh III Batavorum* ?			
SL II Late 2C	*Coh III Batavorum* ?			
INTERCISA				
I H-EK 84/85-late 2C	*Ala I Aug Ituracorum Sag* ?		*Pannonia*	242
II SK Ia late 2C	*Coh I Hemoseunorum Mill* ?			
Ib early 3C				
Ic				
IIa Const/Val				
IIb Val -				
POJEJENA				
c 200 - mid 3C	*Coh V Gallorum* ?	Tile Stamps	*Moes Sup*	244
ČEZAVA				
Claud/Tib - 317 +			*Moes Sup*	245
VELIKI GRADAC				
Ph 1 before 75			*Moes Sup*	247
Ph 2 2nd ½ 3C				
TEKIJA				
1C - 2C	*Coh V Gallorum* ?	Inscr + Build St	*Moes Sup*	248
	Coh IX Gemina Voluntariorum	Building Stone		
DROBETA				
Traj - 3C	*Coh III Campestris CR* ?	CIL III 14216	*Dacia*	249
3C	*Coh I Sag Gord Mill Eq*	AE 1959, 311		
JUPA				
ET Ft 101 -Traj/Hadr			*Dacia*	250
S Ft Traj/Hadr-mid 2C	*Coh I Sagittariorum* ?			
S Ft Mid 2C - 3C	*Coh I Vindelicorum* ?			
	Num Palmyrenorum Tibiscensium ?			
	Num Maurorum Tibiscensium ?			

A	B	C	D	E
GILĂU				
E-T Ft 117/118 Stone Ft Late Hadr	*Ala Siliana CR Torq et Arm* ?		*Dacia*	252
BOLOGA				
EL Early 2C SL 110	*Coh I Ulpia Brit Mill CR* ? *Coh II Hisp Scutata Cyr* ? + *Coh I Aelia Gaesatorum* ?	Tile Stamps Tile Stamps Tile Stamps	*Dacia*	253
BUCIUMI				
EL Early 2C SL 2C/3C	*Coh I Aug* ? / *Coh II Nervia Brit Mill Pac* ? / Coh I Flav Ulp Hisp ?	Tile Stamps Tile Stamps 5 *donaria*	*Dacia*	254
POROLISSUM				
ET Ft Early 2C S Ft Early 3C			*Dacia*	255
CĂŞEIU				
Early Traj	Cavalry ?		*Dacia*	256
FELDIOARA				
3C	*Coh II Flavia Numid Antonianae* ?		*Dacia*	257
SLĂVENI				
ET Ft - 75 S Ft 205	*Ala I Hisp (Mill)* ? *Ala I Hisp (Mill)* ?	 CIL III 13800	*Dacia*	258
VOINEŞTI				
Traj	*XI Claudia ?* *Coh I Flav Commagenorum* ?	Tile Stamps Tile Stamps	*Dacia*	259
ROME				
Traj - Sev	*Coh Vigiles*		*Italia*	262

A	B	C	D	E
OSTIA				
Hadr	*Vex Vigiles*		*Italia*	263
GEMELLAE				
- 131/32	*Coh I Chalcidenorum* ?	AE 1950 58	*Numidia*	265
Antonine -	*Ala I Pannoniorum* ?	AE 1950 60		
BU NGEM				
200/01 -	*Vex Leg III Augusta*	Inscriptions	*Tripolit*	266

TABLE XIV FORT DIMENSIONS

A - Date
B - Inside Rampart (length × width)
C - Area
D - Over Rampart (length × width)
E - Area
F - Over Defences (length × width)
G - Area
H - Proportions (length divided by width)
I - Fort Orientation

A	B	C	D	E	F	G	H	I
CARDEAN								
	183x159	2,91	195x159	3,10	246x234	5,76	1,23	NW
FENDOCH								
	170x91	1,55	183x99	1,81	200x129	2,58	1,85	SW
STRAGEATH								
I	133x112	1,49	143x126	1,80			1,13	W
II	130x112	1,46	144x126	1,81			1,14	W
III	131x112	1,47	151x126	1,90			1,20	W
ARDOCH								
1C			230x152	3,50			1,51	S
Antonine I			201x145	2,91			1,39	S
Antonine II		161x145	2,33			1,11	S	
CAMELON								
	163x151	2,46	188x174	3,27			1,08	NEE
MUMRILLS								
	148x176	2,60	158x186	2,94	178x233	4,15	0,85	NNE
ROUGH CASTLE								
	65x67	0,44	78x78	0,61	112x111	1,24	1,00	N

A	B	C	D	E	F	G	H	I
BAR HILL								
	113x114	1,29	122x123	1,50	148x153	2,26	1,00	N
CADDER								
	105x102	1,07	120x115	1,38	147x132	1,94	1,04	E
BALMUILDY								
	119x111	1,32	136x122	1,66	168x171	2,87	1,11	N
BEARSDEN								
	103x91	0,94	112x100	1,12	143x183	2,62	1,12	N
DUNTOCHER								
	47x39	0,18	56x46	0,26			1,22	NNE
OLD KILPATRICK								
	126x136	1,71	134x139	1,86	189x186	3,35	0,96	NWW
CRAMOND								
	151x132	1,99	167x146	2,44			1,14	NNE
INVERESK								
	176x131	2,31	191x146	2,79	213x177	3,77	1,31	W
ELGINHAUGH								
	122x114	1,39	130x122	1,59			1,07	S
CASTLEDYKES								
Flavian			186x172	3,20			1,08	
Antonine	174x160	2,78	183x169	3,08	226x190	4,29	1,08	SSW
LOUDOUN HILL								
				1,21				

A	B	C	D	E	F	G	H	I
LYNE								
	189x137	2,59	196x144	2,82	225x189	4,25	1,36	E
NEWSTEAD								
I	183x183	3,35	201x201	4,04	224x224	5,18	1,00	W
II	220x193	4,25	253x230	5,82	273x250	6,83	1,10	W
III	223x208	4,64	250x235	5,88	271x256	6,94	1,06	E
IV	223x208	4,64	250x235	5,88	279x264	7,37	1,06	E
CAPPUCK								
Pds I,II	74x52	0,38	83x51	0,42	109x83	0,90	1,63	N
Pd III	74x61	0,45	83x70	0,58	130x122	1,59	1,19	N
Pd IV	58x61	0,35	64x70	0,45	122x127	1,55	0,91	N
CRAWFORD								
Flavian	58x104	0,60	68x115	0,78	97x132	1,28	0,59	SSE
Antonine I	104x58	0,60	115x68	0,78	136x91	1,24	1,69	NEE
Antonine II	104x78	0,81	117x90	0,99			2,40	NEE
RAEBURNFOOT								
	73x62	0,45	80x69	0,55	90x79	0,71	1,16	
DALSWINTON								
Bankshead I			195x178	3,47			1,10	SE
Bankshead II	209x171	3,57	224x197	4,28	233x200	4,66	1,17	SW
CARZIELD								
	166x136	2,26	178x148	2,63	191x161	3,08	1,20	NNW
GLENLOCHAR								
	190x122	2,32	221x152	3,36	274x213	5,84	1,45	SWW
BIRRENS								
Flavian				0,53				
Hadrianic				1,68				
Antonine	155x106	1,64	160x111	1,78			1,44	SSE

A	B	C	D	E	F	G	H	I
BEWCASTLE								
				2,43			Irreg	E
SOUTH SHIELDS								
Pds I,II	132x101	1,33	138x111	1,53	154x127	1,96	1,09	NW
Pd III	178x101	1,80	184x111	2,04	193x120	2,32	1,66	NW
WALLSEND								
	132x111	1,47	138x117	1,61			1,18	N
BENWELL								
	171x107	1,83	177x113	2,00	187x123	2,30	1,57	NNE
RUDCHESTER								
	118x110	1,30	125x117	1,46			1,07	NNE
HALTONCHESTERS								
	128x113	1,45	136x121	1,65			1,12	N
CORBRIDGE								
			x135					SSW
CHESTERS								
	145x103	1,49	153x112	1,71	150x108	1,62	1,37	NNW
CARRAWBURGH								
	135x107	1,44	140x112	1,57			1,25	NNW
HOUSESTEADS								
	178x104	1,85	181x107	1,94			1,69	E
CHESTERHOLM								
St Ft 1			175x92	1,61			1,90	S
St Ft 2			160x96	1,54			1,67	N

A	B	C	D	E	F	G	H	I
HALTWHISTLE BURN								
	45x56	0,25	99x60	0,29			0,82	S ?
BIRDOSWALD								
	174x116	2,02	180x122	2,20	198x140	2,77	1,48	NNW
OLD CHURCH								
	117x110	1,29	122x115	1,40	130x123	1,60	1,06	NNW
STANWIX								
			175x213	3,73			0,82	
CARLISLE								
				3,24 ?				
BOWNESS								
				2,83				
BECKFOOT								
				1,03				
MARYPORT								
	139x137	1,90	165x160	2,64	188x183	3,44	1,03	
EBCHESTER								
	120x115	1,38	126x121	1,52			1,04	NW
LEASE RIGG								
	155x54	0,83	165x64	1,06	175x74	1,30	2,58	N
AMBLESIDE								
Ft 1	79x91	0,72	92x104	0,96	107x119	1,27	0,88	E
Ft 2	121x85	1,03	130x94	1,22			1,38	E

A	B	C	D	E	F	G	H	I
RAVENGLASS								
		1,46						
WATERCROOK								
	126x107	1,35	136x117	1,59			1,16	NE
BROUGH-BY-BAINBRIDGE								
Ft 2	103x84	0,87	119x100	1,19			1,19	NNE
ILKLEY								
			114x114	1,30			1,00	E
RIBCHESTER								
Ph B-D	169x123	2,08	183x137	2,51			1,34	NE
HAYTON								
	142x95	1,35	148x101	1,49	168x121	2,03	1,47	NE
BROUGH-ON-HUMBER								
	163x102	1,66	168x107	1,80	185x124	2,29	1,57	SE
CASTLEFORD								
Later Ft			184x153	2,82				S ?
SLACK								
	82x82	0,67	94x94	0,88	107x107	1,14	1,00	NE
CASTLESHAW								
	112x92	1,03	120x100	1,20	135x115	1,55	1,20	NEE
MELANDRA CASTLE								
	111x100	1,11	125x114	1,43	175x164	2,87	1,10	NNE

A	B	C	D	E	F	G	H	I
TEMPLEBROUGH								
I			183x168	3,07			1,09	NE ?
II			168x168	2,82			1,00	NE ?
III	104x125	1,30	129x150	1,89			0,86	NE
BROUGH-ON-NOE								
Pd I								SW
Pds II,III	101x81	0,82	121x101	1,22			1,20	NE
METCHLEY								
Early Ft				4,30				
Later Ft				2,50				
THE LUNT								
Pd II			168x91	1,53			1,85	SSW
Pd III			158x91	1,44			1,74	SSW
GREAT CASTERTON								
Ft I	182x116	2,11	192x126	2,42	220x154	3,39	1,52	SE
Ft II	165x116	1,91	175x126	2,21	203x154	3,13	1,39	SE
GODMANCHESTER								
				2,40 ?				
CAERHUN								
	123x123	1,51	138x138	1,90	154x154	2,37	1,00	SEE
CAERNARVON								
	132x126	1,66	164x138	2,26	165x159	2,62	1,19	SW
PEN LLYSTYN								
	132x117	1,54	142x127	1,80	166x151	2,51	1,12	S
LLANFOR								
			198x183	3,62				

A	B	C	D	E	F	G	H	I
FORDEN GAER								
	156x147	2,29	192x183	3,51			1,05	SSW
BUCKTON								
Pd II	160x126	2,02	174x140	2,44	184x150	2,76	1,24	E
BRANDON CAMP								
				3,30				
DOLAUCOTHI								
			150x125	1,88			1,20	SE
Y GAER								
	181x135	2,44	197x151	2,97	223x177	3,95	1,30	NWW
COELBREN								
			146x146	2,13			1,00	
LOUGHOR								
				2,00				
GELLIGAER II								
	111x106	1,18	123x118	1,45			1,04	SE
CIRENCESTER								
Pds IIa,IIb				1,80 ?				
STANWAY								
	x140		136x150	2,04	x160		0,91	E
LONDON (Cripplegate)								
	219x208	4,56	231x220	5,08			1,05	SSW

A	B	C	D	E	F	G	H	I
DOVER								
Ft I	x90		x93	1,00				E
Ft II	91x109	0,99	94x112	1,05				E
HOD HILL								
	160x178	2,85	167x185	3,09			0,90	NEE
WADDON HILL								
				1,82 ?				
BURY BARTON								
			120x170	1,90			0,71	N ?
NANSTALLON								
	94x83	0,78	100x89	0,89	106x95	1,00	1,12	SSW
BOULOGNE								
			400x300	12,00			1,33	SW
ARLAINES								
			280x176	4,93			1,59	E ?
VALKENBURG								
C 1	101x127	1,28	108x134	1,45	133x159	2,11	0,81	NE
C 2/3	112x128	1,43	120x136	1,63	142x158	2,24	0,88	NE
C 4	110x127	1,40	119x136	1,62	149x166	2,47	0,90	NE
C 5	111x128	1,42	121x138	1,67	151x168	2,54	0,88	NE
C 6	114x131	1,49	125x142	1,78	175x192	3,36	0,88	NE
ARENTSBURG								
			400x200	8,00				NNW
ZWAMMERDAM								
II	77x133	1,02	84x140	1,18	116x172	2,00	0,60	NE
III	87x138	1,20	89x140	1,25	139x140	2,64	0,64	NE

A	B	C	D	E	F	G	H	I
UTRECHT								
1,2			118x145	1,71			0,81	N
5			124x151	1,87			0,82	N
VECHTEN								
1			x300	4,50				NW
2,3	144x173	2,49	154x183	2,82	174x203	3,53	0,84	NW
ASCIBURGIUM								
K II a,b				2,00				
K III,IV				2,25				
K V	164x154	2,53	174x164	2,85	176x166	2,92	1,06	E
KREFELD-GELLEP								
I	104x115	1,20	110x121	1,33			0,91	NE
II,III	167x121	2,02	177x131	2,32	195x149	2,91	1,35	NE
IV	191x137	2,62	203x149	3,02	229x175	4,01	1,36	NE
DORMAGEN								
	180x155	2,79	188x165	3,10			1,14	NE
ALTEBURG								
				7,50 ?			Irreg	E
NIEDERBIEBER								
	250x185	4,63	260x200	5,20	276x226	6,24	1,30	S
HOLZHAUSEN								
	127x98	1,24	135x106	1,43	151x122	1,84	1,27	NE
SAALBURG								
	210x136	2,86	219x145	3,18	249x175	4,36	1,51	NNW

A	B	C	D	E	F	G	H	I
KAPERSBURG								
a	81x77	0,62	93x89	0,83			1,04	NNE
b	89x102	0,91	95x108	1,03			0,88	NNE
c	95x110	1,05	104x119	1,24			0,87	NNE
BUTZBACH								
Pd 2	182x142	2,58	190x150	2,85			1,27	N
Pd 3	220x142	3,12	228x150	3,42	268x190	5,09	1,52	N
ECHZELL								
	236x203	4,79	244x211	5,15	264x231	6,10	1,16	SW
FLORSTADT-OBERFLORSTADT								
			183x155	2,84				NEE
ALTENSTADT								
Pd 1			64x64	0,41			1,00	
Pd 2/3			86x52	0,45			1,65	
Pd 4			118x98	1,16			1,20	
Pd 5	124x108	1,34	133x116	1,54	162x144	2,33	1,15	S
NIDDERAU-HELDENBERGEN								
Lager 3			90x95	0,80				
OKARBEN								
Pd 1			x176					
Pd 2	281x183	5,14	291x193	5,62	327x229	7,49	1,51	E
HEDDERNHEIM								
SK			282x186	5,25				SSE
HOFHEIM (Erdlager)								
			135x140	1,89			Irreg	NNE
HOFHEIM (Steinkastell)								
	146x124	1,81	158x136	2,15	198x176	3,48	1,16	E

A	B	C	D	E	F	G	H	I
WIESBADEN								
	148x134	1,98	158x144	2,28	190x176	3,34	1,10	SEE
SELIGENSTADT								
			190x160	3,04			1,19	
STOCKSTADT								
	189x152	2,87	201x164	3,30	216x179	3,87	1,23	NE
WÜRZBERG								
	73x62	0,45	83x72	0,60	95x84	0,80	1,15	NE
HESSELBACH								
A,B	66x59	0,39	76x69	0,52	92x85	0,78	1,10	NE
C	67x59	0,40	80x72	0,58	93x85	0,79	1,11	NE
LADENBURG								
				3,00 +				
HEILBRONN-BÖCKINGEN								
			150x133	2,00				
MILTENBERG								
	160x151	2,42	168x159	2,67	186x177	3,29	1,06	NEE
ÖHRINGEN (Burgkastell)								
			155x141	2,19	215x201	4,32	1,10	E
MURRHARDT								
	157x127	1,99	164x133	2,18	196x165	3,23	1,23	NE
WELZHEIM (Ostkastell)								
				1,60				

A	B	C	D	E	F	G	H	I
STUTTGART-CANNSTATT								
A			160x185	2,96				SE
B			171x219	3,74				SE
KÖNGEN								
	156x146	165x153	2,52				1,08	SE
ROTTWEIL KASTELL I								
				7,80 +				
ROTTWEIL KASTELL II								
	252x207	5,22	260x215	5,59	278x233	6,48	1,21	E
ROTTWEIL KASTELL III								
	203x177	3,59	211x185	3,90	231x205	4,74	1,14	NWW
ROTTWEIL KASTELL IV								
			200x150	3,00			1,33	
ROTTWEIL KASTELL V								
			150x100	1,50			1,50	N
HÜFINGEN								
							Irreg	
BURLADINGEN								
	129x128	1,65	143x143	2,04	158x158	2,50	1,00	N
RIBTISSEN								
K 1			153x110	1,70			1,68	SW
K 2			163x118	1,92			1,38	SW

A	B	C	D	E	F	G	H	I
UNTERKIRCHBERG								
	195x195	3,80	205x205	4,20	225x225	5,06	1,00	N
HEIDENHEIM								
	259x183	4,74	271x195	5,28			1,39	NNE
UNTERBÖBINGEN								
	140x127	1,78	148x135	2,00	168x155	2,60	1,10	N
AALEN								
	270x203	5,48	282x215	6,06			1,31	NE
FRIEDBERG								
			142x113	1,60	146x117	1,71	1,26	W
MUNNINGEN								
	157x138	2,17	179x150	2,69	193x164	3,17	1,19	S
GNOTZHEIM								
				2,20				
THEILENHOFEN (Neues Lager)								
			150x130	1,95			1,15	E
WEIßENBURG (Breitung)								
	204x129	2,64	214x134	2,87	242x150	3,63	1,60	E ?
ELLINGEN								
	82x72	0,59	90x80	0,72	102x92	1,13	1,13	N ?
PFÜNZ								
	178x135	2,40	188x145	2,73	222x179	3,97	1,30	N

A	B	C	D	E	F	G	H	I
OBERSTIMM								
	132x108	1,43	139x114	1,58	173x159	2,75	1,22	E
STRAUBING (Kastell IV)								
			x140					S
MOOS-BURGSTALL								
	137x127	1,74	144x135	1,94	166x140	2,32	1,07	NEE
KÜNZING								
	158x124	1,96	167x133	2,22	182x148	2,69	1,26	N
SCHLÖGEN								
				0,65				
TRAISMAUER								
				4,10 ?				
ZWENTENDORF								
			x158	2,65 ?				
PETRONELL								
Pd 1 Pd 2	199x166	3,30	207x177	3,66	195x 217x187	4,06	1,17	NNW
ARRABONA								
			225x150	3,38			1,50	
ÁCS-VASPUSZTA								
			112x106	1,19			1,06	N
IŽA-LÉANYVÁR								
	170x165	2,81	180x175	3,15	240x235	5,64	1,03	W

A	B	C	D	E	F	G	H	I
ALBERTFALVA								
			190x167	3,17			1,14	E
INTERCISA								
H-EK			200x160	3,20			1,25	E
SK			200x170				1,18	E
POJEJENA								
			133x145	1,13			1,09	E
ČEZAVA								
	131x111	1,45	143x123	1,76			1,16	NE
VELIKI GRADAC								
	124x116	1,44	134x126	1,69			1,06	N
DROBETA								
	130x117	1,52	138x125	1,73			1,10	S
JUPA								
Small			107x99	1,06			1,08	W
Large			223x326	7,27			0,68	E
BOLOGA								
EL	142x120	1,70	152x130	1,98	202x180	3,64	1,17	N
SL	199x120	2,39	209x130	2,72	259x180	4,66	1,61	N
BUCIUMI								
EL	142x120	1,70	150x128	1,92			1,17	SE
SL	159x126	2,00	167x134	2,24			1,25	
POROLISSUM								
			300x233	6,99			1,29	NE

A	B	C	D	E	F	G	H	I
FELDIOARA								
			x134 ?					NE
SLÄVENI								
	188x187	3,14	198x177	3,50	250x229	5,73	1,07	NEE
ROME								
			155x175	2,71				
OSTIA								
			70x41	0,29				
GEMELLAE								
			192x145	2,78				
BU NGEM								
	126x81	1,02	136x91	1,24			1,49	SE

TABLE XV BARRACKS AND ANCILLARY BUILDINGS FORTS

A - Subject of entry
B - Date of occupation
C - Identity of the builders
D - Original interpretation of the building
E - Date of excavation

A	B	C	D	E
STRACATHRO				
	Agr		Bk	1969
CARDEAN				
P	Agr		Bks	1971/72
R	Agr		Bks	
LatP	Agr		Cav Bk/Hosp	1973
FENDOCH				
P Bks 1-4	*c* 82		Bks	1936-37
P Sheds			Sheds	
R Bks 5-10			Bks	
STRAGEATH				
I LP XV-XIII	Flav		Bks	1973-
RP VII-VI			Bks	
V			Store	
RR XII-IX			Bks	
LR IV-I			Bks	
II			*fabrica*	
LatP A			Admin/Store/Stab ?	
II LP XVII,XVI	Antonine I		Bks	
XV			Store	
XIII/XIV			Granary/Bk	
RP VIII,VII			Bks	
VI			Stable	
V			Bk	
LR XII-X			Bks	
IX			Store	
RR IV-II			Wkshops/Stores	
I			Workshop	

A	B	C	D	E
III LP XIII-XI	Antonine II		Bks	1973-
RP VII-V			Bks	
LR X,VIII			Bks	
IX			Store/Bk ?	
RR IV,II,I			Bks	
III			Wkshop/Store ?	
ARDOCH				
R	1C		Bks, Sheds	1896-97
R	Antonine I		Bks	
R	Antonine II		Bk	
CAMELON				
	Flavian		*contubernia*	1981
LP VIII-V	Antonine *c* 142		Bks	1900
RP IV-I			Bks	
R XIV			Bk	
MUMRILLS				
R	*c* 142	*II Augusta* ?	Bk	1923-28
ROUGH CASTLE				
LP N Pd 1	*c* 142		Tent-like strs	1957-61
Pd 2	*c* 144		Bk	
S	*c* 144		Bk	
RP	*c* 143		Timber strs	
LatP R	*c* 143		Stores/wkshops/bks ?	
BAR HILL				
LP i	Antonine	*II Aug / XX VV* ?		1902-05/72
RP ii			Bk	
R iii,iv,v			Bks	
CADDER				
RP XIII,XII	Antonine	*II Augusta* ?	Bks	1929-31
LR X			Shed/wkshop	
VIII,VI			Bks	
RR XI			Stable ?	
IX,VII			Bks	

A		B	C	D	E
BALMUILDY					
LP	IX,XII	Antonine	*II Augusta* ?	Bks	1912-14
RP	X,VIII			Bks	
R	XIII,XIV			Stables	
	XI,XII			Bks	
BEARSDEN					
LP	1,2	145/46	*XX Val Victrix*	Stores/Stabs	1973-82
	3			Bk	
RP	5,6			Stores/Stabs	
	7			Bk	
	8			?	
	9			Store	
	10			Workshop	
DUNTOCHER					
		Antonine		Bks	1948-51
OLD KILPATRICK					
Ant I	P I-VI	Antonine I		Bks	1923-24/31
Ant II	LP I-IV	Antonine II		Bks	
	V,VI			?	
OLD BISHOPTON					
		Antonine		Bks	
CRAMOND					
RP	A Pds 1,2	Antonine I,II		Workshop	1954-66
	Pd 3	Severan		Workshop	
	B Pd 2	Antonine II		Workshop	
	Pd 3	Severan		Workshop	
R		Antonine I		Bks	1955
INVERESK					
LR	S	Antonine		Stable	1946-47
	N			Bk	
ELGINHAUGH					
LP	5,6,7	80-100		Bks	1986
	9			Store ?	

A		B	C	D	E
RP	9-12			Bks	
LR	4,3			Bks	
RR	2,1			Bks	
CASTLEDYKES					
RP		Flavian		Bk	1960
RP		Antonine	*II Augusta* ?	Bk	
LOUDOUN HILL					
		Antonine		Bks	1936
LYNE					
LP	1	Antonine II		Stable	1900-01
	2,3			Bks ?	
RP	3,4,5			?	
R	6-9			?	
NEWSTEAD					
I	R	Agricolan		Stable	1947
II	LR	Domitianic		Bk	
III	P 1-XII	Antonine I		Bks	
IV	P I-XII	Antonine II		Bks	
	R XVII-XXV	Antonine II		Stables	
CAPPUCK					
III		Antonine I		Bks	1910/49
IV	a,b	Antonine II		Bks	
HIGH ROCHESTER					
Pds	1,2			Bk	1855/1935
CRAWFORD					
Flav	RP VI	*c* 80		Stable	1961-66
	LatP III-V	*c* 80		Bks	
Ant I	P IX	*c* 140		Workshop	
	VII,VIII	*c* 140		Bks	
	R III,IV	*c* 140		Bks	
Ant II	P IX			Workshop	
	VII,VIII			Bks	
	R III/V,IV/VI			Bks	

A	B	C	D	E
RAEBURNFOOT				
N Sector 1,2			Bks	1897/1946/59
Central S 3,4,5				-60
S Sector 6-9			Bks	
DALSWINTON				
B'head I RP N,S	Flavian		Stables	1954
Next *via princ*			?	
B'head II LP			?	
CARZIELD				
RR	*c* 142		Bks	1939
RR			Stables	
GLENLOCHAR				
R	Antonine		Bk/Stable ?	1948
BIRRENS				
Hadr	Hadr		Bks	1895/1936-
Ant I RP S,V	*c* 142		Bk	37/62-67
VI/VII			Bk	
Next VIII				
RR XVI			?	
XVII/XVIII,XX/XIX,XXI/XXII			Bks	
Northernmost			Bk	
Ant II RP S,V	158		Bk	
VI/VII			Bk	
LR XXIV/XXV,XIX/XX			Bks	
XXI,XXII			?	
BEWCASTLE				
	Hadr	*VI Victrix* ?		1937/77
	Late 3C		Bk	
SOUTH SHIELDS				
I LP A1,A2	Hadrianic		Bks	1875/1975/77
A3			Store	-81
R A6			Workshop ?	
II P B1-B4	*c* 160		Bks/Stabs ?	
R B6-B7			Bks	
B8,B9			?	
III R C20 Ph 1	Early 3C		Offs' Qs Bk	

A		B	C	D	E
	Ph 2	Mid 3C		Offs' Qs Bk	
	C18			Bk/Store ?	
	C19			Bk	
WALLSEND					
LP	1,2	Hadr		Bks	1975-84
	3,4				
RP	5,6,7			Bks	
	8			Workshop	
LR	9,10			Bks	
RR	11			Stable	
	12			Bk	
BENWELL					
LR	Bk N,S	Hadr		Bks	1926-29/37
	Stab N,S			Stables	
RR	W,E			Bks	
	Stab N,S			Stables	
RUDCHESTER					
RR	Pd I	Hadr - 180/97/207		Bk	1972
	Pd II	180/97/207		Bk	
HALTONCHESTERS					
RP	2,4,5	Hadr		Bks	1936
	1			Store	
	3,4			Stable	
	1	Severan/3C		Bk	
	2			Stable	
CHESTERS					
RP	1,2,3	Hadr		Bks	1843
	Stable			Stable	
RR				Bk	
CARRAWBURGH					
LP	N,S	Hadr		Bks	1967-69
	Next *via princ*			?	

A		B	C	D	E
HOUSESTEADS					
LP	XIII,XIV Pd I	Hadr		Bks	1896/1959-
	Pd II	Severan			60/75-77/81
	XV	4C		Workshop	
RP	XVI-XVIII	4C		Bks	
LatP	VII	4C		Bk	
R	I-VI	4C		Bks	
CHESTERHOLM					
RP	I-IIA Pd 4A	*c* 235		Bks	1980
	I-IIIB Pd 4B	250/60			
	Pd 5	275/300			
	Pd 6	*c* 370 - *c* 400			
HALTWHISTLE BURN					
LR	Site I	Hadr			1907
R	Site II			Bk	
	Site III				
GREAT CHESTERS					
		Hadr	*Coh VI Nerviorum* ?	Bks	
BIRDOSWALD					
RP	Ib-f	Hadr	*Cohs I, II Tung* ?	Bk	1928-33
	Ia	Hadr		Stable/Store	
	IIa-d	205/8-273		? Cookhouse	
LR	Level 1	Hadr		Bk	
	Level 2	Severan		Bk	
OLD CHURCH					
LR		Hadr		Bk	1934
STANWIX					
LP	1-4	*c* 160		Bks ?	
CARLISLE					
Annetwell St	Pd 1	78/9		?	1984
	Pd 2	100/05		Offs' Qs	
	N	*c* 200		Bk	1973-79
	S	*c* 200		?	

A	B	C	D	E
BOWNESS				
Ph 2	2C ?		Store/Stable	1975
Ph 3	Before 250		Bk	
BECKFOOT				
	Hadr		Bks	AP
MARYPORT				
Pd I W,E	Hadr		Bks	1966
Pd II W,E	End 2C		Bks	
Pd III W,E	3C		Stable/Store	
EBCHESTER				
LP Pd 1	*c* 100		Bk ?	1936
Pd 2	End 3C		Bk	
RP	Severus		Bk ?	1958-9
RR Pd I N,S	Mid Flav-End Flav		Bks	1972-73
Pd II N,S	End Flav		Bks	
Pds III,Iv	- end Traj		?	
Pd V	Mid Ant-early 3C		?	
Pd VI	Early 3C		?	
Pd VII	Late 3C		Bks	
BINCHESTER				
Ph 1	Late 1C		Bks	1976-79
Ph 2	Early 3C		Bks	
LEASE RIGG				
P G,J	80 +		Bks	1976/78-80
R D,H			Bks	
AMBLESIDE				
Ft 1	Agr		Bks	1913-15/
Ft 2	Hadr		Bks	20/76
RAVENGLASS				
Ph 1 1,2,3	*c* 130		Bks	1970s
Ph 2 4,5	*c* 130-200		Bks	
Ph 3 6,7,8	*c* 200-370		Bks	
Ph 4 9,10,11	*c* 370-400		Bks	

A	B	C	D	E
WATERCROOK				
RR I,II	Post Flavian		Bk	1944
BROUGH-BY-BAINBRIDGE				
Ft I	Agr		Bks	1926/28/29/
Ft II Pd 1 RP				31/52-53/57-
FA,FB,FC	pre Antonine			59/69
Pd 2 AA,AB,AC	Antonine I		Bks	
Pd 3 AA,AB,AC	Antonine II		Bks	
Pd 4 SA,SB,SC,SD	Severan	*Coh VI Nerviorum*	Bks ?	
ILKLEY				
Ft 1 LP E,W	Agr		Bks	1962
RP			Bk	
LR E			Store	
W			Stable	
Ft 2 LP	Antonine		Bk	
LR			Bk	
Ft 3 LP	Severan		Stable	
LR			Bk	
RIBCHESTER				
RR Ph B 3,2	125/30 - 150/60		Bks	1970/78
Ph C 5,4	150/60 - *c* 200	*Legio VI* ?	Bks	
Ph D 7,6	*c* 200 - mid 3C		?	
HAYTON				
LP	70/71		Bk	1975
BROUGH-ON-HUMBER				
Pd IIB LR 1	Early Flavian		Bk	1958-61
2			Bk/Stable ?	
Pd IV LR 1,2	*c* 125		Bks ?	
CASTLEFORD				
P E-W Bk	*c* 84		Bk	1982-83
N-S Bk			Bk	
R			Stable	

A		B	C	D	E
SLACK					
Ph 1	P X E,W	Agr		Bks	1913-15
	XI			Bks ?	
	R VI,V			Stables	
	VII			?	
Ph 3	P IX E,W	Hadr		Bks	
	VIII			Bks ?	
CASTLESHAW					
LP 1-4		Agr		Bks	1957-61
LR				?	
MELANDRA CASTLE					
RP	I-IV	Agr		Bks	1899/1961
TEMPLEBROUGH					
IIIa	LP,RP	3C		Bks	1916
	LatP L			Bk ?	
IIIb	LP	3C		Bk	
IIIc	LP 1,2	3C		Bks	
	RP			Store ?	
BROUGH-ON-NOE					
Pd IIa P		Antonine		Bks	1938/65-69/
Pd IIb P		Severan		Bks	67/68
Pd III		Early 4C		Stable	
ROCESTER					
Church Lane		Late 1C - mid 2C		Bk	1985-86
LITTLECHESTER					
S-W Quarter		Mid 2C		Bks ?	1980
DERBY					
		52/7		Bk ?	1974
METCHLEY					
Later Ft		Domitianic		Bks ?	1970

A	B	C	D	E
THE LUNT				
Pd I RP	*c* 60		Bks	1967-73
R 1-6			Bks	
3			Stable ?	
E Defs 1-3			?	
Pd II RP	*c* 64		Bks	
R 1,2			Bks	
Rear R			Stable	
GREAT CASTERTON				
Ft I P S	*c* 43/45		Bk ?	1960/62
S-E Angle			Cn's Qs	
RP			Bk ?	
LR Bk A			Cn's Qs	
Ft II RP	*c* 70		Bk/Hospital ?	
LR Bk B			Cn's Qs	
GODMANCHESTER				
	Mid 1C		Bk	1961
CAERHUN				
Timber Pds	Flavian			1926-29
Stone LP II,V,VII	Antonine	*XX Val Vic* ?	Bks	
X			Stable ?	
RP I,IV,VI			Bks	
VIII			Stable	
LR XVII,XIX			Bks	
RR XVI,XVIII			Stables	
CAERNARVON				
LP Pd I 1,2	Agr		Bks	1978-79
3			Ancillary	
Pd II 1,2	*c* 100		Bks	
RP X	2C		Bk	-1923
LR XVII	2C		Offs' Qs	
RR XIX,XX	2C		Bk	
PEN LLYSTYN				
LP P1,P2	Flavian		Bks	1960s
P3			Wkshop/Store	
RP P4,P5			Bks	
P6			Store	
LR R1,R2,R3,R4			Bks	

A	B	C	D	E
RR R5,R7,R8,			Bks	
R6			Bk ?	
LLANFOR				
			Bks/Stables ?	1973-76,AP
FORDEN GAER				
S-W Corner Pd 1	Flavian		Bk ?	1926-29
Pd 2	Traj/Hadr		Bk ?	
Pd 3	Ant/Sev		Bk ?	
Pd 4A,4B	3C,4C		Bk ?	
BUCKTON				
Pd I RP 1,2,3	80/90 - 120		Bks	1960s
4,5			?	
Pd II RP 1-4	120 - *c* 130		Bks	
BRANDON CAMP				
A,B,D	Neronian		Offs' Accomm ?	1983
E			Shed	
1984			Sheds	1984
II,III			Bks ?	1985
DOLAUCOTHI				
Pd 1A RR N,S	Flavian		Bks	1972-73
Pd 1B RR E,W	Flav - early 2C		Bks	
Y GAER				
R			Bks	1920s
COELBREN				
S-E Corner	Flav -140/50		Offs' Qs	1904
LOUGHOR				
Upper Stn Hse Ph 4	100/105 - 115		Bk+Stable ?	1982-83

A	B	C	D	E
NEATH				
Pd 5A	Late 1C/early 2C		Bk	1984
Pd 7	Early 2C - *c* 140		Bk	
GELLIGAER II				
LP XIV,XII	103/12		Bks	1899-1901
IX			Stable	
RP XV,XIII			Bks	
X,XI			?	
LR III			Workshop	
I			Bk	
RR IV			?	
II			Bk	
CIRENCESTER				
Pds IIA,IIB	Claudian		Offs' Qs ?	1962-64
STANWAY				
LP	43		Bks	1961/76,AP
LONDON (Cripplegate)				
LP			Bks	1950s
DOVER				
Ft I A7,A6,A5	117	*Classis Britannica*	Bk	1970-77
A8			External Bdg	
Ft II P B23-B19	130/40	*Classis Britannica*	Bks	
B24-B26			Bks	
R B30-B32			Bks	
HOD HILL				
LP Bks IX-XIII	Claudian		Bks	1951-58
RP Bks VIII,VII			Bks	
Bdg A			Vet / animals ?	
R Stables I-VI			Stables	
Bks VI-I			Bks	
Bdgs D,E F			Stores	
SOUTH CADBURY				
Site B N,S	Claudian	*II Augusta* ?	Sheds ?	1968

A	B	C	D	E
WADDON HILL				
IV,V	Claudian		Bks	1959-69
HEMBURY				
	Claudian		Bk ?	1980-82
BURY BARTON				
N-W Angle	Claudian		Offs' Qs ?	1983-84
NANSTALLON				
P Stable	Neronian		Stable	1965-69
IV,III			Bk	
R II,I			Bk	
BOULOGNE				
RR	110/120	*Classis Britannica*	Bks	1967-82
ARLAINES				
P,R	Flav		Bks	mid 19C
L side			Stable	
VALKENBURG				
C 1 LP 14	40		Stable	1941-72
13			Bk	
RP 12			?	
LatP 2-9			Bks	
1			Accomm/Admin ?	
C 1a (as for C1)	42			
C2/3 LP 13	47		?	
RP 12,11			?	
10,9			Bks	
LatP 2-5,7,8			Bks	
6			Stable	
C 4 RP 11,10	After 70		Bks	
LatP 2-4,6-9			Bks	
C 5 LP 14	*c* 100		?	
RP 11,10			Bks	
LatP 2-9			Bks	
1			Accomm/Admin ?	
C 6 LP 16	*c* 178		?	
RP 13,12			Bks ?	

A	B	C	D	E
LatP 4-11			Bks	
2			Accomm/Admin ?	
ARENTSBURG				
LP	*c* 70		Bks	1908-15
LatP L			Bks	
ALPHEN				
	Mid 1C		Offs' Qs	1985
ZWAMMERDAM				
II Fläche VIII	70		Bk ?	1970s
UTRECHT				
Ft 2 LatP	47		Bks	1929/33-36/ 38/43/44/49
VECHTEN				
Ft 3	*c* 150		Bks	1922-26/31-32/36-37
ALTKALKAR				
			Bks	1950s
ASCIBURGIUM				
K IV	50/60	*Ala Tung Front* ?	Bk ?	1975-76
K V RP	*c* 70	*Ala Moesica* ?	Bk	1969-70
RR			Offs' Qs	1975-76
KREFELD-GELLEP				
IIa LR 1,2,3	*c* 70-85		Bk/Stables	1984-87
IIIb LR 1	*c* 100/05		Stable	
2			Stable/Bk	
3			Stable/Bk ?	
IV LR 1	*c* 115/20		Stable	
2			Bk ?	

A	B	C	D	E
DORMAGEN				
Fl D LR Pd 2	*c* 100 - 200		Bk+Stable ?	1963-64/74-77
Fl C RR N,S Pd 2 Pd 3 Pd 4	End 1C - 120/40 120/40 - *c* 175 *c* 175 - End 2C		Bk+Stable Stables Bks	
Fl B RR	- 120/40		Stable ?	
ALTEBURG				
R	Flav - 3C		Bks	1887/99/1905 1927
BONN (Boeselagerhof)				
Phs 1,2	1 - 30		Bks	1983-84
NIEDERBIEBER				
LP 127,126 125 RP 160 161/162,163/164 LR 105/296	185 -		Bks Stable Stable Bks Bk	1897
HOLZHAUSEN				
A,B C			Bk ?	1932
SAALBURG				
RP N LatP P/R,W R E F	135 -		Bk ? Bk ? Stable Bk ?	1911
KAPERSBURG				
HK LatP B SK P	Trajanic Severan		Bk	
BUTZBACH				
Pd 1 RR I-III Pd 2 RR	*c* 90 *c* 135		Bks Bk	1955

A	B	C	D	E
Pd 3 RR N	Mid 2C		Bk ?	
II,I			Bks	
Pd 4 RR N			Bk ?	
II,I			Bks	
ECHZELL				
Pd 1/2a	*c* 90 - 135/55		Bks	1958/62-65
Pd 2b	135/55 - 233		Bks	
FLORSTADT-OBERFLORSTADT				
P	*c* 100	*Coh XXXII Vol CR* ?	Bks	1903,AP
ALTENSTADT				
RP Pd 4	*c* 135 - 150		Store	1955/56/59
Pd 5 W,E	*c* 150 - early 3C		Bks ?	
RR Pd 2/3 E	*c* 110 - 135		Offs' Qs	
Pd 4 E	*c* 135 - 150		?	
Pd 5 W	*c* 150 - early 3C		?	
NIDDERAU-HELDENBERGEN				
Lager 3	*c* 90		Bks	1975-79
OKARBEN				
LR Fl I Pd 1	Domitianic ?		Bk ?	1976
HEDDERNHEIM				
RR Ph 1	Vesp/Domitianic		Bk	1957-59
Ph 2 I,II,III	Dom - 88/89		Bk	
Ph 3 S			Bk Court	
Ph 3 B	88/89 - 103/11		Bk	
HOFHEIM (Erdlager)				
RP Q	*c* 40- Flav		Store	1902-10
LR Pd 1 A	*c* 40 - 55		Offs' Qs	
B,C,D,E			Men's Qs	
Pd 2 A	55 - Flavian		Offs' Qs	
B,C,D,E,			Men's Qs	
RR H,h,K,L	*c* 40 - Flav		Bks	

A			B	C	D	E
HOFHEIM (Steinkastell)						
I	LP	10,12,13	71/74 - 96/98		Bks	1969-81
		11			Stable	
	RP	6-9			Bks	
	LR	25-27			Bks ?	
	RR	21			?	
		22-24			Bks	
II	P	3,4	96/98 - 106/10		Bks	
		13			Bk	
	LR	25-27			Bks ?	
WIESBADEN						
P			Traj/Hadrianic		Bks	1895
LP		h			?	
LatP		f			?	
		c			Store ?	
		d			Stable ?	
LR		g			Bk ?	
SELIGENSTADT						
			c 150		Bk ?	1975
STOCKSTADT						
LR			2C		Stable	1898-1907
WÜRZBERG						
RR		1	*c* 115		Bk	1963
		2	*c* 95/105		Bk	
HESSELBACH						
Pd 1	LP	9,8	*c* 95/105 - 115,30		Stables	1964-66
	LatP	4-1			Bks	
Pd 2/2a	LP	10	*c* 115/30 - 148/61		Oven	
		9,8			Stables	
	LatP	4-1			Bks	
LADENBURG						
St Gallus K		Ph 1	74 - 89/96		Bk	1985-86
		Ph 2	89/96 -		Bk	
		Ph 3	- early 2C		Bk	

A	B	C	D	E
RHEINGÖNHEIM				
via praet			Bk	1912-13
HEILBRONN-BÖCKINGEN				
S of N Gate	2 Pds		Bk	1965
ÖHRINGEN (Burgkastell)				
RP	Mid 2C		Bks ?	1911/70
RR			Bks	
MURRHARDT				
LR Pd 1 B	Mid 2C - 170/80		Bk	1975
D			Stable	1977
WELZHEIM (Ostkastell)				
R W Gate	Severan		Bk	1977
STUTTGART-CANNSTATT				
	pre 90		Bks	1920
KÖNGEN				
LR C	*c* 120 ?		Stable	1896
ROTTWEIL KASTELL I				
N-E Pd 1	*c* 72/73		Bk	1983
Pd 2 N			Bk	
S			?	
ROTTWEIL KASTELL II				
LP	Late Vesp/Dom		Bk	1983
RR			Bks	1895
ROTTWEIL KASTELL III				
R D-L	73/74 - late Dom		Bks	1968-70

A	B	C	D	E
ROTTWEIL KASTELL IV				
	Early Flav		Bk	1982
ROTTWEIL KASTELL V				
LP	Early Flav		Bk	1982
R			Bk ?	1977
HÜFINGEN				
K 1 III,IV	Claudian		Bks	1913-31
K 2 Ib,Ia,II	Early Flav		Bks	
ZURZACH				
K III	Mid 1C - *c* 65		Bk	1983 - 1984
BURLADINGEN				
RP D,E,F,G	*c* 85 - 110		Bks	1912/14
RR H			Bk	
RIBTISSEN				
K 1 LR C	*c* 50 - 69/70		*valetud*	1912-14/59-
D			Bk	60
K 2 LR C	*c* 70 - 200		*valetud*	
D			Bk	
UNTERKIRCHBERG				
Pd I LR	Claud - late Ner		Bks	1974
Pd II Ph IIa 1-4	Vespasianic		Bks	
HEIDENHEIM				
LP I,II,III	*c* 90	*Ala II Flav PF Mill*	Bks	1965
RR N			Bk	1966
S			Bk	1970
UNTERBÖBINGEN				
			Bks	1973
RP 10			Bk ?	

A	B	C	D	E
AALEN				
R	160/70	*Ala II Flav FF Mill*	Bk/Stable ?	1978/81
LP	*c* 156		Bk	
LORENZBERG				
	Aug - Claud		Bks	1953-57
FRIEDBERG				
R	Tiberian		Bks ?	1982
MUNNINGEN				
RP 1-4	*c* 90 - 100		Bks	1971
5			Shed	
LR 6			Bk	
RR 7-10			Bks	
GNOTZHEIM				
P	*c* 90		Bks	1900
THEILENHOFEN (Neues Lager)				
P			Bks	1976 AP
WEIßENBURG (Breitung)				
LP 1,2	2C		Bks	1979/84-85
3			Store	
RP 4-8			Bks	
ELLINGEN				
LP D	117/38	*Ped Singulares* ?	Bk ?	1980-82
RP C Phs 1,2			Workshop	
B Phs 1,2,3			Bks	
LR Ph 1			Bk	
Ph 2			*valetud*	
PFÜNZ				
LR h			Stable ?	19C

A	B	C	D	E
OBERSTIMM				
Phs 1a-1c RP 14	49 - 69,70	(1b) *Vex Leg XIII* ?	Bk	1968-71
12			Store/Workshop	
LatP L 9			Bk	
R 6,7			Bk	
Ph 2 RP 14	69 - early Hadr		?	
12			Store/Workshop	
LatP R 6			Bk	
STRAUBING (Kastell IV)				
LP N,S	Flav - Marcom Wars	Bks	1984	
RP N,S			Bks	
MOOS-BURGSTALL				
RP W,E	*c* 90 - 120		Bks	1978-80
Anbau			Bk/Stores ?	
KÜNZING				
Pds 1,2 LP 1-4	90 - 135	*Coh II Thr CR Q Eq*	Bks	1958-66
5			?	
RP 6-9			Bks	
10			?	
LR 15,16,19			Stables	
RR 18			Bk	
20			Stable	
Pds 3,4	150/60 - 245		Bks	
SCHLÖGEN				
	Hadr		Bks	1957-59
TRAISMAUER				
	Flav		Bks	1975
ZWENTENDORF				
1 SK LR	Trajanic		Bks	1953-62
2 SK LR E,F	*c* 200		Bks	
RR			Bk	
ZEISELMAUER				
N-W Corner			Bk	1970s

A		B	C	D	E
PETRONELL					
K I	P	Flavian	*Ala I Thracum* ?	Bks	1978-83
K II	P Ph 1	Early Traj	*XV Apollinaris* ?	Bks	
	LP Ph 2 W,E	*c* 200		Bks	
	RP			Bks	
ZALALÖVŐ					
Ph 1		Tiberian		Bk	1978-79
Ph 2		Claudian		Bk	
Ph 3		Flavian		Bk	
ARRABONA					
		1C		Bks	1970s
		End 2C		Bk	
ÁCS-VASPUSZTA					
R		Late Traj - Hadr	*Coh I Hisp* ?	Bk	1966-67
IŽA-LËANYVÁR					
P		Traj/Hadr		Bks	1906-09/12-
	E			Bk ?	13/78-83
LatP	S,N			Bks ?	
RR	1,2,3			Bks ?	
AQUINCUM (auxiliary fort)					
SK		73		Bk	1980s
ALBERTFALVA					
Pd 1		*c* 50 - late Dom		Bks	
ADONY					
III	RR	Early Traj		Bks ?	1940s
INTERCISA					
H-EK	16C	84/85 - late 2C		Bk	1971/75/80
SK	Pd I a,b 16B	Late 2C - early 3C		Bk	
	Pd II a 16A	Const / Val		Bk	

A	B	C	D	E
POJEJENA				
	Trajanic		Bk	1977-78
ČEZAVA				
RP Ph IV	Trajanic		Bk	1956-70
Ph V	2C / 3C		Bk	
VELIKI GRADAC				
Ph 1 A,B	Before 75		Bks	1956-70
TEKIJA				
	1C / 2C		Bks ?	1956-70
DROBETA				
LP 1,2	Trajanic		Bks	1931
3			Store	
RP 4,5			Bks	
6			Store	
LatP 7,8			?	
LR 9			Store ?	
10,11			Bks	
RR 12			Store	
13,14			Bks	
JUPA				
Large Ft LP	Early 3C		Bk ?	1979
GILĂU				
LP	2C		Stables	1979
BOLOGA				
EL LP	Early 2C		Bks	1967-
RP			Bks	
SL LP B4-B1	Late 2C		Bks	
RP B5-B8			Bks	
R B9-B16			Bks	

A			B	C	D	E
BUCIUMI						
EL	P		2C		Bks	1963-70
SL	LP	B6,B5,B4	2C / 3C		Bks	
	RP	C1			?	
		B3,B2,B1			Bks	
POROLISSUM						
LP	B11-B7		Early 3C		Bks ?	1979
RP	B6-B1				Bks ?	
CĂŞEIU						
			2C		Bks	1980
FELDIOARA						
LP	N,S		2C / 3C		Bks	1970s
SLĂVENI						
LP	L		205		Stable ?	1962-74
	1,2,3				Bks	
RP	4,5,6				Bks	
	R				Stable ?	
LR	L				Stable ?	
	7,8,9				Bks	
RR	10,11,12				Bks	
	R				Stable	
VOINEŞTI						
E part			Trajanic		Bks	1980
ROME						
via lata			Severus	*Vigiles* ?	Bks	
OSTIA						
N,S Sides			Hadrianic		Bks	1922
GEMELLAE						
RP			Hadr ?	*III Aug* ?	Bks	1947-50,AP

A	B	C	D	E
BU NGEM				
LP 1-4	Severan	*Vex III Aug*	Bks	AP
RP 5-8			Bks	
LR 9,10,11			Bks ?	
RR 12-15			Bks ?	

A - Subject of entry
B - Number of examples to which description refers
C - Building Type
D - Officers' Quarters (+ integral / - detached)
E - Porticus (+ with / - without)
F - Rear wall configuration: 1 - separate walls
2 - party wall
3 - officers' party wall / men's separate
4 - men's party wall / officers' separate
5 - party wall with building not a barrack
G - First *contubernium* Types
H - End *contubernium* Types
I - Construction methods: T - timber (precise method unknown)
SB - sill beam
PP - post-pit
PT - post-trench
SS - stone sill wall
S - stone wall
J - Orientation (sc - *per scamna* / str - *per strigas*)
K - Position of officers' quarters (A - at rampart / B - in fort interior)

A	B	C	D	E	F	G	H	I	J	K
STRACATHRO										
				E?				SB?		
CARDEAN										
R	5	F	+		1	a	a	SB	str	A
LatP	1	H	+		1			SB	str	
FENDOCH										
P 1-4	4	A	+	+	1	a	a	SB?	str	A
Sheds	2	R						SB?	str	
R 5-10	6	A	+	+	1	a	a	SB?	str	A
STRAGEATH										
I LP XV	1	A	-	-	1	a	j	PT	sc	A
XIV	1	B?	-	-	1	a	a	PT	sc	A
XIII	1	A?	-	-	1	a	b	PT	sc	A
RP VII	1	A	-	+	1	a	a	PT	sc	A
VI	1	A	-	+	1	a	b	PT	sc	
V	1	R?		-	1			PT	sc	

A		B	C	D	E	F	G	H	I	J	K
	LR XII	1	B	+	+	1	a	a	PT	sc	A
	XI	1	B	+	-	1	a	a	PT	sc	A
	RR IV,III	2	B	-	-	1	a	a	PT	sc	A
	II	1	A	-	-	1	e	j	PT	sc	A
	I	1	A	+	-	1	a	a	PT	sc	A
	LatP A	1	B?			1?	a	b	PT	sc	
II	LP XVII,XVI	2	B	+	-	1		d	PP	sc	A
	XV	1	O		-	1			PP	sc	
	XIV	1	J?		-	1		a	PP	sc	A
	RP VIII,VII	2	B	+	-	1		a	PP	sc	A
	VI	1	O		-	1			PP	sc	
	V	1	B	+	-	1		a	PP	sc	
	LR XII-X	3	B?	+	-	1	a	a	PP	sc	A
	IX	1	O		-	1			PP	sc	
	RR IV-I	4	O		-	1			PP	sc	
III	LP XII-XI	3	B	+	-	1	a	a	PP	sc	A
	RP VII-V	3	B?	+	-	1		a	PP	sc	A
	LR X,VIII	2	B	+	-	1	a	a	PP	sc	A
	IX	1	H	+	-	1		d	PP	sc	A
	RR IV	1	A	+	-	1	a	a	PP	sc	A
	III	1	R			1			PP	sc	
	II,I	2	B	+	-	1	a	a	PP	sc	A
ARDOCH											
1C	R	5	A?		+?	1			PT	str	
		4	B?	+		1?			PP	sc	
Ant I	R								PT	sc	
Ant II	R	1	B?			1			SS	sc	
CAMELON											
Flav		1	A?	+?		1			PT		A
Ant LP	VIII-V	4	B	+		1			SS	str	
	RP IV-III	2	A	+		1			SS	str	A
	II-I	2	B	+		1			SS	str	
	R XIV	1	A	+		1			SS	sc	A
	LatP IX,XII	2	O			1			SS	str	
MUMRILLS											
R		1	B?	+		1			PP	str	
ROUGH CASTLE											
LP	Pd 2 N	1	B	+?	-	1			PP	sc	
	S	1	B	+?	+	1			PP	sc	
	LatP R	2	O			1			PH	str	

A	B	C	D	E	F	G	H	I	J	K
BAR HILL										
LP i	1	O			1			PP	sc	
RP ii	1	A?	+?		1			PP	sc	A
LR iii,v	2	A	+	-	1	a	a	PP	sc	A
RR iv	1	A	+	+?	1	a	a	PP	sc	A
CADDER										
RP XIII,XII	2	B?			1			PP	sc	
LR X Pd 1	1	R			1			PP	sc	
Pd 2	1	O			1			PP	sc	
Pd 3	1	R			1			PP	sc	
VIII,VI	2	B?			1			PP	sc	
RR XI	1	O			1			PP	sc	
IX,VII	2	B?			1			PP	sc	
BALMUILDY										
P VII,X,VIII	3	O			1			PP	sc	
IX	1	A?	+	+?	1			PP	sc	
LR XIII,XI	2	O			1			PP	sc	
RR XIV,XII	2	O			1			PP	sc	
BEARSDEN										
LP 1,2	2	O			1			PP	sc	
3	1	H	+	-	1	a	a	PP	sc	A
RP 5,6	2	O			1			PP	sc	
7	1	F	+	+	1	a	a	PP	sc	A
9	1	O		+?	1			PP	str	
10	1	X			1			PP	sc	
DUNTOCHER										
Centr Bdg	1	A	+		1			SS	str	
Others								PP		
OLD KILPATRICK										
Ant I LP I	1	B	+		1			SB/PT?	sc	A
III,IV	2	B	+		2			SB/PT?	sc	A
RP II	1	B	+		1			SB/PT?	sc	A
IV,VI	2	B	+		2			SB/PT?	sc	A
Ant II								PH	sc	

A	B	C	D	E	F	G	H	I	J	K
OLD BISHOPTON										
	1							SB		
	1							PP		
CRAMOND										
P A Pds 1,2	1	H			1			SS	sc	
Pd 3	1	H		+	1			SS	sc	
B Pds 2,3	1	H			1			SS	sc	
R	2	H			1			SS	sc	
INVERESK										
LR S	1	A?			2			PT?	str	B
	1	R?			2			PT?	str	B
N	1	A			2?			PT?	str	B
ELGINHAUGH										
LP 5,6,7	3	B	+	-	1	a	a	PT	str	A
8	1	H		-	1			PT	str	
RP 9-12	4	B	+	-	1	a	a	PT	str	A
LR 4	1	B	+	-	1	a	a	PT	sc	A
3	1	B	+	-	1		a	PT	sc	A
RR 2,1	2	B	+	-	1	a	a	PT	sc	A
CASTLEDYKES										
Flav RP	1	0					a	SB?	sc	A?
	2				1		a	SB?	str	
Ant RP	1	0						SS		
LOUDOUN HILL										
	4							PT?		
LYNE										
LP 1	1	0			1			SB?	sc	
2,3	2	R			1			SB?	sc	
RP 4-6	3	P			1			SB?	sc	
7 7-10	4	0			1			SB?	sc	
NEWSTEAD										
I R	1	0			1?			SB		
II R	1	0	+		1			SS	str	

A	B	C	D	E	F	G	H	I	J	K
III,IV P I	1	G	+?	-?	1			SS	str	A
II-XII	12	H	+?	-?	1	a	a	SS	str	
IV R XIX,XVIII, XX,XXV	4	H			1			SS	sc	
XVII,XXI/ XXII,XXIII/XIV	3	R			1			SS	sc	
CAPPUCK										
Pd III	2	O						T		
Pd IV a,b	2	O			1			SS		
HIGH ROCHESTER										
Pds 1,2	1	A			1			SS		A
CRAWFORD										
Flav VI	1	O			1			PT	sc	
III,IV,V	3	H			1		a	SS	str	
Ant I IX	1	O			1			SS	sc	
VII,VIII	2	H			1			SS	sc	
V,VI,III,IV	4	H			1			SS	sc	
Ant II IX	1	O			1			SS	sc	
VII,VIII	2	H			1			SS	sc	
V,III,VI,IV	4	H			1			SS	sc	
RAEBURNFOOT										
N Sect 1,2	2	B			1			SB		
C Sect 3	1	R			1			SB		
4,5	2	O			1			SB		
S Sect 6,8	2	H			1			SB		
7,9	2	B			1			SB		
DALSWINTON										
B I RP N,S	2	O			1			PT	str	
	1	O		+	1			PT	sc	
B II RP	3	O						PT	sc	
CARZIELD										
RR	2	A	+		2	a	a	SS	str	A
	1	O						PT	str	

A	B	C	D	E	F	G	H	I	J	K
GLENLOCHAR										
Antonine	1				1			SB		
BIRRENS										
Hadr								PT		
AI RP S/V,VI/VII	2	F	+	-	1			SS	sc	
Adj VIII	1	0			1			SS	sc	
RR XVI	1	0			1			SS	sc	
XVII/XVIII-XXI /XXII	3	F	+		1			SS	sc	A
AII RPS/V,VI/VII	2	F	+		1			SS	sc	
XXIV/XXV,XIX/XX	2	F	+		1			SS	sc	
XXI,XXII	2	0	+		1			SS	sc	
BEWCASTLE										
	1	A	+		1			SS		
SOUTH SHIELDS										
I A1,A2	2	B?	+?		1			SB	sc	
A3,A4	2	0			1			SB?		
A6	1	I	+		1			SB?	sc	
II B1,B3,B4	3	B?	+		1			SS	sc	
B2	1	B?	+		1			SB?	sc	
B6,B7	2	B?	+		1			SS	sc	
B8,B9	2	V			1			SS	sc	
III C20 Ph 1	1	B?	+		1			SS	sc	
Ph 2	1	B?	+		1	a		SS	sc	
C18	1	B?	+?		1			SS	sc	
C19	1	A?			1			SS	sc	
WALLSEND										
P 1,2,5,6,7	5	B	+	-	1	a	a	SS	sc	A
3,4,8	3	0			1			SS	sc	
R 9,10,12	3	B	+	-	1	a	a	SS	sc	A
Pd II RP	1	0			1			SS	sc	
BENWELL										
LR Bks N,S	2	A	+		2	a	a	SS	sc	A
Stab N,S	2	H			2			SS	sc	
RR W	1	R			1			SS	str	
E	1	0			1			SS	str	
Stab N,S	2	0			2			SS	sc	

A	B	C	D	E	F	G	H	I	J	K
RUDCHESTER										
Pd I R	1							SS	sc	
Pd II R	1							SS	sc	
HALTONCHESTERS										
Hadr RP 1	1	0			1			SS	str	
2	1	B			1			SS	str	
3	1	Hx			2			SS	str	
4	1	R			2			SS	str	
5	1	0			1			SS	str	
3C 1								SS	str	
2	1	Hx			1			SS	str	
CORBRIDGE										
IA LatP	1	J		-	1			PT	sc	
LR	1	0			1			PT	sc	
RR	1	A?	+	+	1	a	a	PT	sc	A
IB LatP	1	A	+		1			SB	sc	B
LR	1	A?	+	+	1			SB	sc	
RR	1	A?	+	+	1	a	a	SB	sc	A
II LatP	1	E			1			PT	sc	
LR S	1	A/C	+	+	1		a	PT	sc	A
N	1	B/C	+	-	1	a	a	PT	sc	A
RR S	1	A	+	+	1	a	a	PT	sc	A
N	1	B	+	-	1		a	PT	sc	A
III LatP	1	J						PT	sc	
LR	1	B	+		1		a	PT	sc	A
RR	2	B	+		1		a	PT	sc	A
IVA LatP	1	J			1			PT	sc	
RR	1	A	+	+	1	a	a	PT	sc	A
IVB RR	1A	+	+	A				S	sc	A
CHESTERS										
RP 1	1	B	+	-	1	a	a	SS	sc	A
2	1	A	+	+	1	a	a	SS	sc	A
3	1	A	+	+	1	i	a	SS	sc	A
Stable	1	0			1			SS	sc	
RR	1	0		+	1		a	SS	sc	
CARRAWBURGH										
N,S	2	Jx		+	1			SS	sc	A?
Next *via princ*	1	0			1			SS	sc	

A	B	C	D	E	F	G	H	I	J	K
HOUSESTEADS										
Pds I,II XIII	1	A	+	+	1	a	a	SS	str	A
XIV	1	A	+	+	1	a	h	SS	str	A
VI	1	A	+	+	1			SS	str	A
CHESTERHOLM										
RP Pds 4A-6	2	V	-	-	2	a		SS	str	A
HALTWHISTLE BURN										
Site I	1	0			1			SS		
Site II/III	1	A		-	1			SS	sc?	A
BIRDOSWALD										
RP Ib-f	1	Hx	+		1			SS	sc	
IIa	1	0			1			SS	sc	
IIa-d	1							SS	sc	
LR 1,2	2	0						SS		
OLD CHURCH										
	1	0	+		1			SS	sc	
STANWIX										
1-4	4	0			1			SS	sc	
CARLISLE										
Pd 1	2	0			1			PT	sc	
Pd 2	2	0			1			PT	sc	
Pd 3 N	1	B?		-	1		a	SS		A?
S	1	Hx			1			SS	sc	
BOWNESS										
Ph 2	1	0			1			SB		
Ph 3	1	0			1			SB		
BECKFOOT										
	6	0			1?			SS	sc	

A	B	C	D	E	F	G	H	I	J	K
MARYPORT										
Pd I W,E	2	A	-	+?	1			SS		A
Pd II W	1	B?	+	-	1			SS		A
E	1	A	-	+	1			SS		A
Pd II W,E	2	R			1			SS		
EBCHESTER										
LP Pd 1	1	O								
Pd 2	1	H	+	-	1			SS	str	A
RP	1	O						SS	str	
RR Pd I N	1	Jx	+?	-	1			PP	sc	
S	1	O	-?	-	1			PT	sc	
Pd II N	1	O	+?	+	1			PP	sc	
S	1	O	-?	-	1			PT	sc	
Pds III,IV	2	O			1			PT	sc	
Pd V,VI	1	O			1			SS	sc	
Pd VII	1	V			1			SS	sc	
BINCHESTER										
Phs 1,2								SB		
LEASE RIGG										
G	1	G	+		1	a?		PT	str	
J	1	O			1			PT	str	
D,H	2	Jx	+		1			PT	str	
AMBLESIDE										
Ft 1								T	sc?	
Ft 2								T	str	
RAVENGLASS										
Ph 1	2	Jx			1			PT	str	
Ph 2 4	1	F		-	1			SB	str	
5	1	Jx		-	1			SB	str	
Ph 3 6	1	F		+	1			SB	str	
7,8	2	Jx		+	1			SB	str	
WATERCROOK										
I,II	1	A	-	-	1			SS	sc	A

A	B	C	D	E	F	G	H	I	J	K
BROUGH-BY-BAINBRIDGE										
Ft I								PP		
Ft II Pd1 FA,FB	2	0		+?	1			PT	sc	
Pd 2 FC	1							PT	str	
AA,AB,AC	3	Hx		-	1		a	SS	sc	
Pd 3 AA	1	Hx		-	1		a	SS	sc	
AB	1	R			1			SS	sc	
Pd 4 SA,SB,SC, SD	4	0						SS	str	
ILKLEY										
Ft 1 LP	2	0	+		1			PT	sc	
RP	1							PT	sc	
LR E	1	0			1			PT	sc	
W	1	R			1			PT	sc	
Ft 2 LP	1							PT	sc	
RP	1	Jx	+		1			PT	sc	
Ft 3 LP	2	0			2			SS	sc	
LR	1	0	+		1			SS	sc	
RIBCHESTER										
Ph B B3	1	0						PT	sc	
B2	1	Jx		+?	1			PT	sc	A?
Ph C B5	1	B?		-?				PP/PT	sc	
B4	1	Jx		+	1			PP/PT	sc	A?
Ph D B7	1	0						PT/SB	sc	
B6	1	0			1			PT/SB	sc	
HAYTON										
LP	1	Hx	+	-	1	a		PT	sc	A
BROUGH-ON-HUMBER										
Pd IIB LR 1,2	2	Jx		-	1		a	PT	sc	A?
Pd IV LR 1	1	Hx		-	1		a	PT	sc	A?
2	1	Jx		-	1		a	PT	sc	A?
CASTLEFORD										
Earlier Ft	1							PH		
Later Ft P E-W	1	A?		+	1		n	PT	sc	A?
N-S	1	A?		+	1		n	PT	str	A?
R	1	S						PT	sc	

A			B	C	D	E	F	G	H	I	J	K
SLACK												
Ph 1	P	X E,W	2	A	+	+	2	a?	a?	PT	sc	A
		XI	1	0						PT	sc	A
	R	VI,V	2	0			1			PT	sc	
Ph 3		IX E,W	2	A	+	+	2	e?	h	SS	sc	A
		VIII	1	0						SS	sc	
CASTLESHAW												
Agr	P	1	1	H			1			T	sc	
		2,3	2	Hx			1			T	sc	
		4	1	0			1			T	sc	
	LR		1	0			1			T	sc	
MELANDRA CASTLE												
RP			4	E	+	-	1		a	PT	str	
TEMPLEBROUGH												
III a)	P		1	0	+					PP	str	
	LatP		1	0						PP	str	
b)	LP		1	0						SS	str	
c)	LP	1	1	H	+		1			SS	str	
		2	1	H	+	+	1	a?	a	SS	str	B
	RP		1	0			1			SS	str	
BROUGH-ON-NOE												
Pd I	P									T	str?	
Pd II	P					+				PT	sc	
Pd III	P		1	R			1			SS	str	
ROCESTER												
			1	B	+	-?	1	a		PT		A
LITTLECHESTER												
SW Quarter										SB		
DERBY												
			1							PT		

A	B	C	D	E	F	G	H	I	J	K
METCHLEY										
Later Ft		0						T		
THE LUNT										
Pd I RP	2/3	0	+	+				PT	str	
R 1,2,4-6	5	C	+	+	1	a	a	PT	str	A
3	1	R						PT	str	
E Defs 1	1	H		+?	1		a	PT	str	
2,3	2	C?	+	+	1			PT	str	
Pd II RP	2/3	0	+					PT	str	
R 1,2	2	C	+	+	1	a	a	PT	str	A
Rear R	1	R			1			PT	str	
GREAT CASTERTON										
Ft I S P	1	G?	+?		1			PT	str	
S-E Angle	1	0	+?					PT	str	
RP	1	0			1			PT	str	
LR A	1	A?			1			PT	sc	A
Ft II RP	2/1	0			2?			PT	sc	
LR B	1	A?			1			PT	sc	A
GODMANCHESTER										
	1							PT?		
CAERHUN										
LP II,V,VII,X	4	0			1			SS	sc	
RP I,IV,VI	3	A	+		1			SS	sc	A
VIII	1	0			1			SS	sc	
LR XVII,XIX	2	A	+		1			SS	sc	A
RR XVI,XVII	2	0			1			SS	sc	
CAERNARVON										
LP Pd I 1,2	2							PT	str	
3	1	B?		-	1	a?		PT	str	A?
Pd II 1	1	A	-	+	1	a		PT	str	A
2	1	A	+	+	1	a		PT	str	A
RP X	1	C?		-	1		a	SS	sc	
LR XVII	1	0	-		1			SS	sc	
RR XIX	1	0		-?	1			SS	sc	
XX	1	H?		-	1		a	SS	sc	

A		B	C	D	E	F	G	H	I	J	K
PEN LLYSTYN											
LP	P1	1	A	+	+	1	a	a	PT+SB	sc	A
	P2	1	B?	+?	+	1	a	a	PT+SB	sc	A
	P3	1	0			1			SB	sc	
RP	P4	1	A	+	+?	1	a?		PT+SB	sc	A
	P5	1	A	+	+?	1	a?	n	PT+SB	sc	A
	P6	1	0		1				PT+SB	sc	
LR	R1	1	A	+	+	1	a	h	PT+SB	sc	A
	R2	1	A	+	+	1	a		PT+SB	sc	A
	R3	1	A	+		1	a		PT+SB	sc	A
	R4	1	B	+	-	1			PT+SB	sc	A
RR	R5	1	B	+	-	1	a?	a	PT+SB	sc	A
	R6	1	0			1			PT+SB	sc	
	R7	1	B	+	-	1	a		PT+SB	sc	A
	R8	1	B	+	-	1				sc	
LLANFOR											
		2									
FORDEN GAER											
S-W Corn	Pd 1	1								str	
	Pd 2	1							PP?	str	
	Pd 3	1				1?			PP	str	
BUCKTON											
RP	Pd I 1,2,3	3	B?	+?	-	1			PT	sc	
	4	1	Jx			1			PT	sc	
	5	1	0			1			PT	sc	
	Pd II 1	1	B?	+?	-	1		a	PT	sc	
	3,4,5	3	B?	+?	-	1			PT	sc	
BRANDON CAMP											
E		1	S			1			PT		
A,B,D		3	W?			1			PT		
1984		9	0			1			PT		
II		1	Hx			1	a	a	PT	str	
III		1	Hx			1			PT	sc	
IV		1	Hx			1			PT		
DOLAUCOTHI											
Pd 1A	N,S	2	0						PT	str	
Pd 1B	E,W	2	Jx			1			PT	sc	

A	B	C	D	E	F	G	H	I	J	K
Y GAER										
R	6?				1			SB/PT?	sc	
COELBREN										
S-E Corner	1							SB		A
LOUGHOR										
Ph 4	1	O	+?	+?	1			PT+SB	sc	
NEATH										
Pd 5A	1			-?				PT/SB?		
Pd 7	1			-?				PT/SB?		
GELLIGAER II										
LP XIV,XII	2	A	+	+	1	e?		SS	sc	A
IX	1	R			1			SS	sc	
RP XV,XIII	2	A	+	+	1	e?		SS	sc	A
X	1	O			1			SS	sc	
XI	1	R			1			SS	sc	
LR III	1	O/H			1			SS	sc	
I	1	A	+	-	1	e?		SS	sc	A
RR IV	1	I			1			SS	sc	
II	1	A	+	-	1	e?		SS	sc	A
CIRENCESTER										
Pds IIA,IIB	1				1?			PP	sc?	
STANWAY										
LP	2				2?			PT/PP?	str	
LONDON (Cripplegate)										
St Alban Wood St	1				1?			PP	sc?	
DOVER										
Ft I A7,A6,A5	3	H		-	1	a	a	SS	sc	
A8	1	H		-	1			SS	str	
Ft II B23-B20	4	H		-	1			SS	sc	
B19	1	H		+	1			SS	sc	

A		B	C	D	E	F	G	H	I	J	K
	B24-B26	3	H		-	1	a	a	SS	sc	
	B30	1	H		-	1			SS	sc	
	B31,B32	2	H		-	1			SS	str	
B24	Ph II	1	H		-	1	a		SS	sc	
	Ph III	1	A?	+	-	1			SS	sc	
B32	Phs II,III	1	C?	+?	-	1	a	b?	SS	str	
	Ph IIIB	1	A?	+?	-	1	a		SS	str	
HOD HILL											
LP	XI,X,IX	3	G	-	-	1	a		PT	sc	B
	XII+XIII	1?2	H	+	-	1		a	PT	str	B
	C	1	O		-	1			PT	str	
RP	VIII,VII	2	G	+	-	1	a	a	PT	sc	
	B	1	O		-	1			PT	str	B
R	Stab I-VI	6	H		-	1			PT	str	
	Bks VI-II	5	G	+	-	1	a	a	PT	str	B
	I	1	G	+	-	1	a	n	PT	str	B
	F	1	O		-	1			PT	sc	
	E,D	2	O		-	1			PT	sc	
SOUTH CADBURY											
Site B	N		S			1			PT		
	S	1	Hx			1			PT		
WADDON HILL											
IV		1	A	+		1		o	PT	sc	A
V		1	A	+	+	1		o	PT	sc	A
HEMBURY											
		1							PT		
BURY BARTON											
N-W Angle		1							PT	str	A?
NANSTALLON											
P	Stable	1	S			1			PT	sc	
	IV,III	2	B	+	-	1	a	a	PT	sc	A
R	II	1	O			1			PT	sc	
	I	1	B	+	-	1	a?	a?	PT+SB	sc	

A		B	C	D	E	F	G	H	I	J	K
BOULOGNE											
RR		7	A	+	+	1	a	a	SS	sc	A/B
ARLAINES											
R		5	B	+	-	2	a	a	SS		B
VALKENBURG											
C 1 P	13	1	A	+	+	1			PP	sc	B
	14	1	G	+	+	1			PP	sc	B
	12	1	0			1			PP	str	
	10	1	0	+	1				PP	str	
LatP	2,4,6,8	4	A	+	+	1	a	j	PP	str	A
	3,5,7,9	4	B	-	+	1	a	j	PP	str	A?
	1	1	0						PP	sc	
C 1a LatP		7	B	+	-	1	a	j	PP	str	A
C 2/3 P	13	1	0						PT	sc	
	12	1	0			1			PT	str	
	10	1	A/B?		-	2		a	PT	str	A
	9	1	A/B?		-	2		a	PT	str	B
LatP	2	1	A	+	+	2	a		PT	str	A
	3	1	A	+	+	2	a		PT	str	A
	4	1	A	+	-	2	g		PT	str	A
	5	1	B	+	-	2	b		PT	str	A
	6	1	R?		+	1			PT	str	
	7,8	2	A	+	+	B	a	j	PT	str	A
C 4 P	11	1	B?		+	1		a	PT	str	A?
	10	1	A	+	+	1		a	PT	str	B
LatP	2,3,4	3	Jx		-	1		d	PT	str	B?
	6	1	B?		-	1			PT	str	
	7	1	A	+	-	1	a		PT	str	B
	8	1	B	+	-	1	a		PT	str	B
	9	1	A	+	-	1	a	d	PT	str	B
C 5 P	14	1	0		+	1		a	PT	sc	
	11	1	B/		-	1		a	PT	str	A
	10	1	A	+	-	1			PT	str	B
LatP	1	1	J			2			PT	sc	
	2	1	A		-	1		b	PT	str	B
	3	1	B	+	-	1	a	g	PT	str	B
	4	1	A?		-	1	a?	g	PT	str	B
	5	1	B?		-	1		G	PT	str	
	6	1	0			1			PT	str	
	7	1	A	+	+	1	a		PT	str	
	8	1	B	+	+	1	a		PT	str	
	9	1	A	=	=	1	a	b	PT	str	B

A		B	C	D	E	F	G	H	I	J	K
C 6 P	16	1	A/B?		-	1			PT	sc	
	13	1	B?	+?	-	1		a	PT	str	A
	12	1	A	+	-	1	a?		PT	str	B
LatP	4	1	Jx		-	1		b	PT	str	B
	5	1	B?	+	+	1	a	b	PT	str	B
	6	1	Jx	+?	+	1	a?	b	PT	str	
	7	1	B?	+?	+	1		b	PT	str	
	2	1	H			1			PT	str	
	8	1	H/B?		+				PT	str	
	9	1	A	+	-	1	a		PT	str	B
	10	1	B	+	+	1	a		PT	str	B
	11	1	A	+	+	1	a	b	PT	str	B
	2	1	H			1			PT	sc	
ARENTSBURG											
LP		1	M		-	1			PT	str	
LatP L		4?	A?	+					PT	str	B
ALPHEN											
		1							PT?		
ZWAMMERDAM											
LatP R		1			-				PT	str	
UTRECHT											
LatP									PT	sc	
VECHTEN											
3									PT?		
ALTKALKAR											
									PT?		
ASCIBURGIUM											
K V RP		1							PT	str	
RR		1							PT	sc	

A	B	C	D	E	F	G	H	I	J	K
KREFELD-GELLEP										
II LR 1,2,3	3	Jx		+?	1			PT	sc	
III LR 1	1	Jx?		+	1			PT	sc	
2	1	Jx		+	1			PT	sc	
3	1	Jx?			1			PT	sc	
IV LR 1	1	Hx		+	1			PT	sc	
2	1	Jx						PT	sc	
DORMAGEN										
F1 D Pd 2	1	Jx						SB?	str	
F1 C Pds 2,3,4 N	1	Jx		-				SB	str	
S	1	Jx		-	1			SB	str	
F1 B	1	Jx			1?			SB	sc	
ALTEBURG										
RR	2	J			1			SS	str	
BONN (Boeselagerhof)										
Phs 1,2								T		
NIEDERBIEBER										
LP 127,126	2	B?			1			PT?	sc	
125	1	T			1			SS	sc	
RP 160	1	T			1			SS	sc	
161/162,163/164	2	B?			1			PT	sc	A
LR 105/296	1	B?			1			PT	str	B
HOLZHAUSEN										
LatP A	1	B?		-?	1			SB	str	
C,B	2	0						SB	str	
SAALBURG										
P N	1?	0						SB?	str	
LatP P/R	1	0						SS	str	
W	1	R			1			PT?	str	
R E	1	T			1			SS?	sc	
F	1	J						SB	sc	

A			B	C	D	E	F	G	H	I	J	K
KAPERSBURG												
HK	LatP	B	1	0			1				str	
SK	P		1	0			1				sc	
BUTZBACH												
RR	Pd 1	I,II	2	Jx		+?	1			PT	sc	
	Pd 2		1	Jx		+?				PT	sc	
	Pd 3	N	1	Jx						SB	sc	
		II,I	2	A	+	+?	1	a		SB	sc	A
	Pd 4	II,I	2	A	+	+?	1	a?		SB	sc	A
ECHZELL												
Pd 1/2a	P	LR Fm1	6	A	+	+	1	j	j	PT	sc	B
	LatP	LP Fm2	5	A	+	+	1	a	j	PT	str	B
		RR Fm2	2	A	+	+	1	a	j	PT	sc	B
Pd 2b	R		3							PT	sc	
FLORSTADT-OBER-FLORSTADT												
P				B?	+		1?			SS	str	
ALTENSTADT												
RP	Pd 4		1							PT	str	
	Pd 5	W,E	2	B?			1			PT	str	
RR	Pd 2/3	E	1			+				PT	str	
	Pd 4	E	1							PT	str	
	Pd 5	W	1			+				PT	str	
NIDDERAU-HELDENBERGEN												
										T		
OKARBEN												
LR	Pd 1		1							PT	str	
HEDDERNHEIM												
RR	Ph 1		1	B?	+	-	1		j?	PT/SB?	str	A
	Ph 2	I,II,III	3	B	+	-	1	i?	a	PT/SB?	str	A
	Ph 3	S	1	I?						PT/SB?		A
	Ph 3	N	1	B?	+		1		a	PT/SB?	str	A

A			B	C	D	E	F	G	H	I	J	K
HOFHEIM (Erdlager)												
RP	Q		1	0			1			PT	str	
LR	Pd 1	A-D	5	0						PT	str	
	Pd 2	A	1	0		-				PT	sc	
		B	1	J		-	1			PT	sc	
		C	1	J		+	1	a	a	PT	sc	
		D	1	J			1	a		PT	sc	
		E	1	J			1	a	a	PT	sc	
RR	H		1	0			1			PT	str	
	h		1	J			1			PT	sc	
	K,L		2	H		-	1			PT	sc	
HOFHEIM (Steinkastell)												
I	LP	10	1	A	+	+	1	a	a	PT	sc	A
		11	1	R			1			PT	sc	A
		12,13	2	B	+	-	1	a	a	PT	sc	A
	RP	6	1	A	+	+	1	a	a	PT	sc	A
		7	1	B	+	-	1	a	a	PT	sc	A
		8,9	2	B	+	-	1	a	a	PT	sc	A
	LR	25-27	3	J		-	1	a	a	PT	sc	
	RR	21	1	H		-	1			PT	sc	
		22-24	3	B	+	-	1	a	a	PT	sc	A?
II	P	3	1	A	-	+	1	a	h	PT	sc	A
		4	1	A	-	+	1	a	1	PT	sc	A
	LP	13	Unchanged from I									
	LR	25-27	Unchanged from I									
WIESBADEN												
P										PT	sc	
		h	1	0						SS	sc	
LatP	L	f	1	0			1			SS	sc	
	R	c,d	2	0			1			SS	sc	
LR		g	1	P			1			SS	sc	
SELIGENSTADT												
Centre			1							SS		
STOCKSTADT												
LR			1							SS	sc	
WÜRZBERG												
RR	1		1							PT	str?	

A	B	C	D	E	F	G	H	I	J	K
HESSELBACH										
Pd 1 LP 9,8	2	0			1			PT	str	
LatP 4,3,2	3	0	+	-	1			PT	str	
1	1	0	+	+?	1			PT	str	B?
6	1	U			1			PT	str	
Pd 2/2a LP 10	1	S			1			PT	sc	
8,9	2	0			1			PT	str	
R 4	1	G	+	+	1	a	a	PT	str	A
3	1	H	+	+	1	a	a	PT	str	A
6	1	0			1			PT	str	
2,1	2	G	+	+	1	a	a	PT	str	A
LADENBURG										
Ph 1,2	1	Jx						PT		
Ph 3	1			+				PT		
RHEINGÖNHEIM										
	1									
HEILBRONN-BÖCKINGEN										
Pd 1	1							SB		
Pd 2	1							PT		
MILTENBERG										
								SB?		
ÖHRINGEN (Burgkastell)										
RP								SS	str	
RR								SS	str	
MURRHARDT										
LR B	1	A?	+?		1		j	SB	str	B
D	1	0						SB	sc	
WELZHEIM (Ostkastell)										
R	1							SB?		

A	B	C	D	E	F	G	H	I	J	K
STUTTGART-CANNSTATT										
A								T		
KÖNGEN										
LR	1	0			1			SS	sc	
ROTTWEIL KASTELL I										
Pd 1	1	A?		+	1			PT+PP		
Pd 2	1	A?		+	1			PT+PP		
	1	R			1			PT		
ROTTWEIL KASTELL II										
LP	1							SS	str	A
RR								SS		
ROTTWEIL KASTELL III										
R	8	A	+	+	1	a	e	PT	sc	A
ROTTWEIL KASTELL IV										
	1	0			1			PP		
ROTTWEIL KASTELL V										
LP	1							PT	str	
HÜFINGEN										
K I III,IV	2	H			1			PT	sc?	
K II Ib Pd 1,2	1	J			1			PT	sc	
Ia Pd 1	1	H?		+?				PT	sc	
II Pd 2	1	Jx						PT	sc	
BURLADINGEN										
RP D	1	B	+	-	2	a		PT	sc	A
E	1	A?	+	+?	2	a		PT	sc	A
F	1	B	+	-	1	a		PT	sc	
G,H	2	0			1			PT	sc	

A			B	C	D	E	F	G	H	I	J	K
RIßTISSEN												
K 1	LR	C	1	M						PT	sc	
		D W,E	2	Jx			2		a	PT	sc	
		E	1	H		-	1?			PT	str	
HEIDENHEIM												
LP	I		1	I	+	+	1	B?	K	PT	sc	
	II,III		2	I	+	+	1	B?	K	PT	sc	
UNTERBÖBINGEN												
RP			1	0			1			SS	sc	
AALEN												
LP			1	Jx		+?	1		a	PT	sc	A
LORENZBERG												
										SB/PT		
FRIEDBERG												
R			4	B?			1			PH	sc	
MUNNINGEN												
RP	1		1	Jx			1			PT	sc	A?
	2,3		2	A?			1			PT	sc	A?
	4		1	A?		+?	1			PT	sc	A?
	5		1	0			1			PT	sc	
LR	6		1	A?			1		g	PT	sc	A
RR	7,8		2	A?		+?	1			PT	sc	A?
	9,10		2	A?		+?	1		g	PT	sc	A?
GNOTZHEIM												
P											str	
THEILENHOFEN (Neues Lager)												
P										PP	sc	

A			B	C	D	E	F	G	H	I	J	K
WEIßENBURG (Breitung)												
LP	1,2		2	R			1			PP	sc	
	3		1	0						PP		
RP	4,5		2	J	+	+	2	a	a	PP	sc	
	6,7		2	A	+	+	2	a		PP	sc	
	8		1	0								
ELLINGEN												
LP	D		1	R		-	1			PT	sc	
RP	C	Ph 1	1	R			1			PT	sc	
		Ph 2	1	R		+	1			PP	sc	
P/R	B	Ph 1	2?	J			2?		a	PP	str	
		Ph 2	2?	J			2			PT	str	
		Ph 3	2	B?	+		2	a	a	PT	str	A?
LatP	E	Ph 1	1	R			1			PP	sc	
		Ph 2	1	0			1			SS	sc	
LR		Ph 1	1	A?	+?	+	1			PT	sc	A?
		Ph 2	1	Q			1			PT	sc	
PFÜNZ												
LR	h		1	T			1			SS	sc	
OBERSTIMM												
Pd 1a	RP	12	1	B			1			PT	sc	
	LatP	9	1	0			1		j?	PT	sc	
		6	1	A	+	+	1	a	j	PT	str	B
		5	1						j?	PT	str	
Pd 1b	LP	13	1	0		+				PT	sc	
	RP	14	1	A	+	+	1	a	j	PT	sc	A
		12	1	B?		+	1			PT	sc	
	LatP	9	1	0						PT	str	
		6	1	A	+	+	1	a	j	PT	str	
		5,4	2	0			2		j	PT	str	
Pd 1c	LP	13	1	0		+				PT	sc	
	RP	14	1	A?	+?	+?	1	a?	j?	PT	sc	A
		12	1	B?		+	1			PT	sc	
	LatP	9	1	0						PT	str	
		6	1	A	+	+	1	a	g	PT	str	B
		5	1	0		+				PT	str	
Pd 2	RP	14	1	0		+				PT	sc	
		12	1	B?		+	1			PT	sc	
	LatP	6	1	A?			1?	a?	e?	PT	str	B
STRAUBING (Kastell IV)												
LP	N,S		2	B?		-?	2			PT	sc	A?
RP	N,S		2	B		-?	2		a?	PT	sc	B?

A			B	C	D	E	F	G	H	I	J	K
MOOS-BURGSTALL												
RP	E		1	A	+	+	1	k		PT	sc	A
	W		1	A	+	+	2	k		PT	sc	A
	Anbau		i	J		+	5			PT	sc	
KÜNZING												
Pds 1,2	P	1,6	2	A	+	+	1	a	a	PT	sc	A
		2,3,7,8	4	A	+	+	1	a	a	PT	sc	A
		4,9	2	+	+	+	5	a	a	PT	sc	A
	LR	15	1	O		+	1			PT	sc	
		16	1	O			1			PT	sc	
		19	1	M			i			PT	sc	
	RR	18	1	A	+	+	1	a	a	PT	sc	B
		20	1	R			1			PT	sc	
Pds 3,4										SS		
SCHLÖGEN												
										T?		
TRAISMAUER												
H-EK										SB		
ZWENTENDORF												
1 SK	LR									PT	str	
2 SK	LR		2	H	+	-	1	a	a	SS	str	
	RR		1							SS	sc	
ZEISELMAUER												
N-W Corner			1	O								
PETRONELL												
Ph 1	P									T	str	
Ph 2	LP	W	1	A	+		1	a	b	SS	str	B
		E	1	J			1			SS	str	
	RP	E	1	A?	+?		1	a	b	SS	str	B
		W	1	J?			1			SS	str	
ZALALÖVŐ												
Pd 1			1	O			1			PP		
Pds 2,3			1	O			1			SB		

A	B	C	D	E	F	G	H	I	J	K
ARRABONA										
1C								PP/PT		
Late 2C								SS		
ÁCS-VASPUSZTA										
	1?							PP		
IŽA-LÉANYVÁR										
Ft 2 LP	1	Jx			1		a	SS	str	B
	2	H			1	a	a	SS	str	A?
RP	3	G	+		1	a	a	SS	str	A
	1	H	+		1		a	SS	str	A
	1	O			1			SS	str	
LatP	2	R			1		a	SS	sc	
Centre	1	Jx			1			SS	str	
RR	2	R			1			SS	str	
	1	O			1			SS	str	
AQUINCUM (auxiliary fort)										
H-EL Pds 1,2								PT		
SK	4	A	+	+	1			SS		
ALBERTFALVA										
Pd 1								T		
ADONY										
III RR?								SS		
INTERCISA										
H-EK 16C	1	O		+				T		
SK I a-b 16B	1	H		+	1			SS	sc	
II a 16A	1	Jx			1			S	sc	
POJEJENA										
	1							T		

A	B	C	D	E	F	G	H	I	J	K
ČEZAVA										
RP Ph IV	1	G?			1			SS	str	A?
Ph V	1	0			1			SS	str	
VELIKI GRADAC										
Centre A,B	2	0			1			T		
TEKIJA										
					1?			SS		
DROBETA										
LP 1,2	2	G	+		1	a	a	SS	sc	A
3	1	H			1			SS	sc	
RP 4	1	G	+		1	b	a	SS	sc	A
5	1	G	+		1	a	a	SS	sc	A
6	1	H			1			SS	sc	
LR 9	1	H			1			SS	sc	
10,11	2	G	+		1	b	c	SS	sc	A
RR 12	1	H			1			SS	sc	
13	1	G	+		1	c	a	SS	sc	A
14	1	G	+		1		a	SS	sc	A
LatP 7,8	2	A?	+		1	a	a?	SS	sc	B
JUPA										
Large Ft LP	1	0			1			SS	sc	
GILĂU										
LP	1							SS	sc	
BOLOGA										
EL LP	2							T	sc	
RP	2							T	sc	
SL LP B4-B2	4?	0						T	sc	
B1	1	0						SS	sc	
RP B8-B5	5?							T	sc	
R B9-B16	8?							T	sc	

A		B	C	D	E	F	G	H	I	J	K
BUCIUMI											
EL									PP	sc	
SL	P B6-B1	6	O			1			SS	sc	
	C1	1	O			1			SS	sc	
POROLISSUM											
LP	B11,B9,B8	3	O			1			T	sc	
	B10	1	O			1			SS	sc	
	B7	1	M			1			SS+T	sc	
RP	B6	1	O			1			SS	sc	
	B5	1	M			1			SS	sc	
	B4	1	S			1			SS	sc	
	B3	2	J?			2			SS	sc	
	B2	1	O			1			SS	sc	
	B1	1	R			1			SS	sc	
CĂŞEIU											
P		8?	Jx			1			PT	sc	
R		8?	Jx			1			PT	sc	
FELDIOARA											
LP	N	1	O						SS	sc	
	S	1	O						T	sc	
SLĂVENI											
LP	L	1	O		+	1			SS	str	
	1	1	A?	+	+	1	a?	a	SS	sc	A
	2,3	2	H?	+	+	1	a?	a	SS	sc	A
RP	4	1	A?	+	+	1	a?	a	SS	sc	A
	5,6	2	H?	+	+	1	a?	a	SS	sc	A
	R	1	H		+	1			SS	str	
R		Repeat *praetentura* ?									
VOINEŞTI											
		1	O								
ROME											
via lata		6	H		+	2	a	a	S		

A		B	C	D	E	F	G	H	I	J	K
OSTIA											
			H			1			S		
GEMELLAE											
RP										sc?	
BU NGEM											
LP	1	1	J	+		1		a	SS	sc	
	2	1	G	+		2		j	SS	sc	A
	3	1	A	+	+	2		a	SS	sc	B
	4	1	H			1			SS	sc	
RP	5	1	A	+		1	c	a	SS	sc	B
	6	1	G	+		2	a	h	SS	sc	B
	7	1	A	+		2	a	h	SS	sc	B
	8	1	H			1			SS	sc	
LR	9,10	2	H			2			SS	sc	
	11	1	D			1			SS	sc	
RR	12	1	J			1			SS	sc	
	13	1	G	+		2			SS	sc	
	14	1	J			2			SS	sc	
	15	1	G	+		1			SS	sc	A

A - Subject of entry
B - Overall
C - Officers' Quarters
D - Men's Quarters
E - Width of space (when present) between officers' and men's quarters
F - Total number of *contubernia* (details of special *contubernia*)

A			B		C		D		E		F	
CARDEAN												
LatP			27,40	27,03							8	
R			48,77	48,37	12,19	11,79	36,58				10	
FENDOCH												
P	Bks		47,24	46,84	10,67	10,27	36,57				10	
	Sheds		47,24	46,84								
R	Bks		48,01	47,61	10,67	109,27	37,34				10	
STRAGEATH												
I	LatP	A	35,13	34,83							9	(EC)
	LP	XV	47,00	46,70	12,50	12,20	33,00	32,70	1,50	1,80	9	(EC)
		XIV	48,00	47,70	12,50	12,20	34,50	34,20	1,00	1,30	9	
		XIII	48,00	47,70	12,50	12,20	34,50	34,20	1,00	1,30	8	(EC)
	RP	VII	41,25	40,95	11,20	10,90	30,05				7	
		VI	42,50	42,20	11,20	10,90	31,30				7	
		V	42,50	42,20								
	LR	XII	47,50	47,20	13,70	13,40	33,80				10	
		XI	46,60	46,30	14,00	13,70	30,60				10	
		X	47,00	46,70	12,90	12,60	34,10				10	(EC)
		IX	44,80	44,50	18,30	18,00	26,50				8	(EC)
	RR	IV,III	47,25	46,95	11,25	10,95	35,00	34,70	1,00	1,30	10	
		II	45,00	44,70								
		I	47,85	47,55	19,50	19,20	28,35				8	
II	LP	XVII	43,00	42,70	13,75	13,45	29,25				7/8	
		XVI	42,50	42,20	13,75	13,45	28,75				7	
		XV	42,50	42,20								
		XIV	21,50	21,10							5?	
	RP	VIII	42,98	42,68	13,70	13,40	29,28				7	
		VII	42,67	42,37	12,80	12,50	29,87				10	
		VI	42,00	41,70								
		V	41,75	41,45	12,80	12,50	28,95				10	
	LR	XII	42,50	42,20	11,80	11,50	30,70				10	
		XI	43,80	43,50	11,00	10,70	32,80				10	

A		B		C		D	E	F
	X	44,25	43,95	12,75	12,45	31,50		10
	IX	42,60	42,30					
RR	IV-I	47,00	46,70					
III LP	XIII	41,25	40,95	14,50	14,20	26,75		8
	XII	42,20	41,90	15,10	14,80	27,10		8
	XI	42,40	42,10	16,10	15,80	26,30		8
RP	VII	47,24	47,94	18,59	18,29	28,65		10
	VI	46,30	46,00	13,40	13,10	32,90		8
	V	46,00	45,70	14,60	14,30	31,40		9
LR	X	46,00	45,70	12,40	12,10	33,60		11
	IX	45,80	45,50	13,30	13,00	32,50		10
	VIII	46,20	45,90	12,25	11,95	33,95		11
RR	IV	44,50	44,20	13,41	13,11	31,09		10
	III	45,72	45,42					
	II	45,72	45,42	13,70	13,40	32,02		10
	I	44,20	43,90	18,90	18,60	25,30		6
ARDOCH								
IC P		*48,00*						
R		62,00	61,60					
Ant II R		47,24	46,84					
CAMELON								
Flavian		*46,50*	*46,10*	*7,00*	*6,60*	*39,50*		*10*
Ant LP VIII-V		51,82	50,92					
RP IV,III		51,82	50,92	11,28	10,38	40,54		
II,I		51,82	50,92					
R XIV		51,82	50,92	12,50	11,60	39,32		
LatP IX		24,99	24,09					
XII		26,82	25,92					
MUMRILLS								
R		45,11	44,81					
ROUGH CASTLE								
LP N Pd 1		25,00	24,70					
Pd 2		26,52	26,22	9,50	9,20	17,02		
		41,76	*41,46*	*9,50*	*9,20*	*32,26*		*10*
S		26,52	26,22					
BAR HILL								
LP i		20,00	19,70					
RP ii		43,00	42,70					
LR iii		43,50	43,20	9,50	9,20	34,00		10

A		B		C		D		E	F
	v	43,50	43,20	10,00	9,70	33,50			10
RR	iv	43,50	43,20	10,00	9,70	33,50			10

CADDER

RP	XIII,XII	36,58	36,28						
LR	X Pd 1	29,26	28,96						
	Pd 2	26,21	25,91						
	Pd 3	22,56	22,26						
	VIII,VI	37,19	36,89						
RR	XI	37,19	36,89						
	IX,VII	37,19	36,89						
LatP	IV	20,12	19,82						

BALMUILDY

LP	IX	39,62	39,22	8,53	8,13	31,09			
	VII	39,62	39,22						
RP	X,VIII	44,81	44,41						
LR	XIII,XI	42,37	41,97						
RR	XIV,XII	46,33	45,93						
LatP	IV	29,26	28,19						
	V	25,30	24,90						

BEARSDEN

LP	1	35,40	35,10						
	2	35,40	35,10						8
	3	35,40	35,10	6,00	5,70	29,40			8
RP	5	36,00	35,70						
	6	9,00	8,70						
	7	36,00	35,70	6,00	5,70	30,00			8
	9	15,00	14,70						
	10	*41,00*	*40,70*						

DUNTOCHER

Central Bdg		19,10	18,20	8,00	7,30	11,10	10,90		

OLD KILPATRICK

LP	I,III,V	53,64	53,24						
RP	II,IV,VI	51,82	51,42						

CRAMOND

P	A Pds 1-3	47,00	46,30						
	B Pd 2	38,00	37,30						
	Pd 3	44,00	43,30						

A		B		C		D	E	F
INVERESK								
LR	S,N	48,77	48,37	12,65	12,25	36,12		
ELGINHAUGH								
LP	5,6,7	48,00	47,60	12,50	12,10	35,50		10
	8	48,00	47,60					
RP	9-12	47,50	47,10	11,75	11,35	35,75		10
LR	4	45,00	44,60	20,00	19,60	25,00		6
	3	45,00	44,60	20,00	19,60	25,00		7
RR	2	45,00	44,60	13,50	13,10	31,50		9
	1	45,00	44,60	17,50	17,10	27,50		8
CASTLEDYKES								
RR	Flav	34,14	33,74					
	Ant	*48,01*	*47,61*					
LOUDOUN HILL								
		47,55	47,15					
LYNE								
LP	1-3	44,20	43,80					
RP	4,5	53,34	52,94					
	6	51,82	51,42					
LR	7	42,67	42,27					
	8	41,15	40,75					
	9	43,59	43,19					
	10	45,11	44,71					
NEWSTEAD								
II	R	68,28	67,38					
III,IV	LP	57,91	57,01	5,33	4,43	52,58		10
	RP	60,96	60,06	5,33	4,43	55,63		10
IV	R XIX	85,04	84,14					
	XVIII	18,29	17,39					
	XVII	60,20	59,30					
	XX	67,06	66,16					
	XXI/XXII-XXV	88,39	87,49					
CAPPUCK								
Pd IV	a	29,26	28,56					
	b	15,24	14,56					

A		B		C		D		E	F
CRAWFORD									
Flav	RP VI	55,72	55,42						
	LatP III-V	31,75	31,45						
Ant I	P IX,VII	20,25	19,55						
	VIII	20,00	19,30						
	R VI-III	20,00	19,30						
Ant II	P IX	20,25	19,55						
	VIII-V	24,50	23,80						
	III,IV	24,50	23,80	8,00	7,30	16,50			
V+III,VI+IV		*48,30*	*47,60*	*8,00*	*7,30*	*40,30*			
RAEBURNFOOT									
N Sector	1,2	14,75	14,45						
C Sector	3	18,00	17,70						
	4	17,00	16,70						
	5	22,00	21,70						
S Sector	6,8	19,00	18,70						5
	7,9	19,00	18,70						
DALSWINTON									
B I	RP N,S	*46,00*	*45,60*						
B II	RP	43,59	43,19						
CARZIELD									
RR	Bk	43,28	42,58	15,39	14,69	27,89			8
	St	43,28	42,88						
BIRRENS									
Ant I	RP S+V	40,00	39,30						
Adj	VII,VI/VII	42,06	41,36						
XX/XIX,XVII/XVIII		40,84	40,14	8,45	7,75	32,39			8
	XXI/XXII	40,23	39,53						
	N	40,00	39,30						
Ant II	RP S+V	40,00	39,30						
	VI/VII	42,50	41,80						
LR	XXIV/XXV	42,00	41,30						
RR	XIX/XX,XXI,XXII	42,00	41,30						
SOUTH SHIELDS									
I	A1	41,00	40,60						
	A2	40,60	40,20						
	A3	41,50	41,10						
	A4	42,25	41,85						
	A6	42,00	41,60	4,20	3,80	33,60	34,40		

A		B		C		D	E	F
				4,20	3,80			
II	B1,B3	40,25	39,85					
	B2	40,75	40,05					
	B4	43,00	42,60					
	B6,B7	43,00	42,30					
	B8	4,00	3,30					
	B9	7,90	7,20					
III	C19	*37,00*	*36,30*	16,50	15,80	*20,50*		
	C20 Ph 1	*42,00*	*41,30*					
	Ph 2	*42,00*	*41,30*	11,00	10,30	*31,00*		
WALLSEND								
LP	1,2	45,00	44,30	12,00	11,30	33,00		9
	3,4	45,00	44,30					
RP	5,6,7	46,00	45,30	11,50	10,80	34,50		9
	8	46,00	45,30					
LR	9	46,00	45,30	11,25	10,55	34,75		9
	10	46,00	45,30	10,00	9,30	36,00		9
	11	46,00	45,30					
	12	46,00	45,30	10,50	9,80	35,50		9
RP	Pd II	46,00	45,30					
BENWELL								
LR	Bks N,S	45,72	45,02	10,21	9,51	35,51		9
	St N,S	46,94	46,24					
RR	*via q* W,E	22,86	22,16					
	St N,S	46,94	46,24					
RUDCHESTER								
		45,72	45,02					*8*
HALTONCHESTERS								
Hadr	RP 1	38,86	38,16					
	2-5	39,62	38,92					
3C		45,72	45,02					
CORBRIDGE								
IA	LatP	33,00	32,60					8
	LR	48,50	47,90					
	RR	49,00	48,60	15,00	14,60	34,00		8
IB	LatP	33,00	32,60	14,00	13,60	19,00		
	LR	48,50	48,10					
	RR	49,00	48,60	12,50	11,90	36,50		10
II	LatP	33,00	32,60					10
	LR S	49,00	48,60	12,00	11,60	37,00		10

A	B		C		D		E		F
N	49,00	48,60	11,25	10,85	37,75				10
RR S	48,50	47,10	12,00	11,60	36,50				8
N	48,50	47,90	12,00	11,60	36,50				10
III LatP	34,00	33,60							10
LR	48,50	47,90	12,00	11,60	36,50				10
RR S	49,00	48,60	12,25	11,85	36,75				10
N	49,00	48,60	12,25	11,85	36,75				10
IVA LatP	30,00	29,60							6
RR	49,00	48,60	12,00	11,60	37,00				8
IVB RR	49,00	48,30	12,00	11,30	37,00				8
CHESTERS									
RP 1,2	43,00	42,30	8,60	7,90	34,40				10
3	42,00	41,30	9,00	8,30	33,00				10
St	44,00	43,30							
CARRAWBURGH									
	45,00	*44,30*							
HOUSESTEADS									
XIII,XIV Pds I,II	49,38	48,68	9,25	8,55	40,13				10 (EC)
HALTWHISTLE BURN									
Site I	9,75	9,15							
Site II/III	39,50	38,90	8,75	8,15	30,00	29,40	0,75	1,35	
GREAT CHESTERS									
	42,00								
BIRDOSWALD									
RP 1b-f,1a	49,38	48,68							
OLD CHURCH									
	40,54	39,84							
STANWIX									
1,2	*36,00*	*35,30*							
3,4	*34,00*	*33,30*							

A	B		C		D		E		F
BOWNESS									
Ph 3	57,00	56,60							
BECKFOOT									
P	*40,54*	*39,84*							
MARYPORT									
Pds I,II E			11,25	10,55			1,00	1,70	
EBCHESTER									
LP Pd 2	*40,00*	*39,30*	9,00	8,30	*31,00*				
RR Pds I,II N	*46,00*	*45,70*							
S					*34,96*				
LEASE RIGG									
G	39,50	39,10	6,00	5,60	33,50				8
D	30,50	30,10							
H	*34,50*	*30,10*							
WATERCROOK									
I,II	49,50	48,80	13,10	12,40	35,80	25,10	0,60	1,30	*10*
ILKLEY									
Ft 1 LP S E	42,82	42,42							
W	42,82	42,42	8,53	8,13	34,29				
LR E,W	*42,06*	*41,66*							
Ft 2 LR	*39,62*	*39,22*							
Ft 3 LP	21,34	20,94							
LR	*38,40*	*38,00*							
HAYTON									
LP	36,00	35,60	8,00	7,60	28,00				7
SLACK									
Ph 1 X E,W	42,67	42,27							5
R VI,V	46,94	46,54							
Ph 3 IX E,W	46,94	46,24	10,97	10,27	35,97				5

A	B		C		D	E	F
CASTLESHAW							
Agr LR 1-4	31,39	30,99					
MELANDRA CASTLE							
RP I-IV	41,15	40,75					
TEMPLEBROUGH							
III a) P	38,40	38,00					
R	27,43	27,03					
c) LP 1	36,12	35,42					
2	30,78	30,08	7,01	6,31	23,77		6
RP	18,29	17,59					
BROUGH-ON-NOE							
Pd III P	39,01	38,31					
ROCESTER							
			16,00	15,60			
METCHLEY							
Later Ft	22,90	22,50					
THE LUNT							
Pd I RP	41,80	41,40					
R 1	45,72	45,32	9,90	9,50	35,82		11
2	45,72	45,32	11,50	11,10	34,33		10
3	53,00	52,60					
4	47,05	46,65	8,00	7,60	39,05		11
5	45,72	45,32	8,00	7,60	37,72		11
6	41,00	40,60					
E Defs	24,60	24,20					
Pd II RP	30,48	30,08					
R 1	27,80	27,40	9,90	9,50	17,90		5
2	30,85	30,45	11,50	11,10	19,35		5
Rear R	27,00	26,60					
GREAT CASTERTON							
Ft I LP			10,36	9,96			
LR A	*45,72*	*45,32*					
Ft II LR B	*45,72*	*45,32*					

A		B		C		D	E	F
CAERHUN								
LP	II,V,VII,X	*48,50*	*47,80*					
RP	I	50,29	49,59	14,02	13,32	36,27		
	IV	51,82	51,12	14,90	14,20	36,92		
	VI	52,12	14,63	13,93		37,49		
	VIII	51,00	50,30					
LR	XVII	52,43	51,73	17,38	16,68	35,05		
	XIX	51,82	51,12	16,77	16,07	35,05		
RR	XVI,XVIII	51,21	50,51					
CAERNARVON								
LP	Pd III 1			18,40	18,00		1,00	
	2			20,50	20,10			
LR	XVII			14,00	13,30			
RR	XIX	43,50	42,80					
	XX	46,50	45,70					
PEN LLYSTYN								
LP	P1	47,25	46,85	12,00	11,60	35,25		10
	P2	47,25	46,85	*12,00*	*11,60*	*35,25*		*10*
	P3	47,25	46,85					
RP	P4	47,25	46,85	12,25	11,85	35,00		*10*
	P5	47,25	46,85	14,50	14,10	32,75		10
	P6	47,00	46,60					
LR	R1	47,60	47,20	12,50	12,10	35,10		10 (EC)
	R2	47,60	47,20	12,25	11,85	35,35		10
	R3	47,60	47,20	12,00	11,60	35,60		*10*
	R4	47,60	47,20					*10*
RR	R5	47,30	46,90	11,75	11,35	35,55		10
	R6	47,25	46,85					
	R7,R8	47,75	47,35					10
BUCKTON								
RP	Pd I 1-4	49,10	48,70					
	Pd II 1-3	48,80	48,40					
	4	48,80	49,40	13,00	12,60	35,80		
BRANDON CAMP								
A,B		8,00	7,60					
D		9,00	8,60					
E		6,50	6,10					
1984		6,00	5,60					
		14,60	14,20					
II		18,90	18,50					6
III		22,55	22,15					
IV		19,50	19,10					

A		B		C		D		E		F
Y GAER										
R		*54,86*								
LOUGHOR										
Upper St Hse	Ph 4					25,20	24,80			2+Stable
GELLIGAER II										
LP	XIV	44,30	43,60	12,65	11,95	31,65				*10*
	XII	44,65	43,95	12,65	11,95	32,00				*10*
	IX	44,65	43,95							
RP	XV	44,50	43,80	12,95	12,25	31,55				*10*
	XIII	44,50	43,80	12,19	11,49	32,31				*10*
	X	20,12	19,42							
	XI	18,69	17,99							
LR	III	34,59	33,89							
	I	44,09	43,39	11,89	11,19	32,20				*10*
RR	IV	45,11	44,41	14,63	13,93	15,85				
				14,63	13,93					
	II	45,26	44,56	13,26	12,56	32,00				*10*
STANWAY										
LP		*36,58*								
LONDON (Cripplegate)										
LP		*74,00*	*73,30*							
DOVER										
Ft I	A7,A6,A5	35,00	34,30			35,00	34,30			8
Ft II	B23-19,24-26	35,00	34,30			35,00	34,30			8
	B30	24,50	23,80			24,50	23,80			3
	B19 PII	37,00	36,30			37,00	36,30			4
	PIII	37,00	36,30			37,00	36,30			6
	B24 PII	38,45	37,75			38,45	37,75			9 (FC)
	PIII	39,10	38,40	21,40	20,70	17,70				4
	B32 PII			4,35	3,65					
	PIII A			5,90	5,20					
HOD HILL										
LP	XI	32,91	32,51	6,50	6,10	23,41	23,01	3,00	3,40	
	X	33,83	33,43	8,23	7,83	22,10	21,70	3,50	3,90	6
	IX	34,14	33,74	11,58	11,18	21,95	21,55	0,61	1,01	
	XII/XIII	44,20	43,80	18,00	17,60	26,20				7

A		B		C		D	E	F
	C	7,50	7,10					
RP	VIII	38,10	37,70	16,25	15,85	21,85		6
	VII	37,19	37,70	12,50	12,10	24,69		7
	A	25,00	24,60					
	B	17,50	17,10					
R	Stabs I	58,52	58,12					
	II	58,83	58,43					
	III,IV	58,98	58,58					
	V	58,22	57,82					
	VI	56,69	56,29					
	Bks VI	36,57	36,17	10,25	9,85	26,32		
	V	36,57	36,17					
	IV	36,42	36,12	12,00	11,60	24,42		
	III	36,57	36,17	12,00	11,60	24,57		
	II	35,97	35,57	12,50	12,10	23,47		
	I	36,27	35,87	11,00	10,60	25,27		6
	D	40,54	40,14					
	E,F	34,14	33,74					
SOUTH CADBURY								
Site B	N	7,30	7,00					
	S	9,40	9,10					3
WADDON HILL								
IV		49,00	48,60	20,00	19,60	29,00		
V		47,00	46,60	20,00	19,60	27,00		
NANSTALLON								
P	Stable	18,50	18,10					
	IV Pd 1	32,92	32,52	7,50	7,10	25,42		7
	Pd 2	34,62	34,22	9,20	8,80	25,42		7
	III	32,00	31,60	3,80	3,40	28,20		8
R	II	32,00	31,60					
	I	32,31	31,91	4,50	4,1-	27,81		8
BOULOGNE								
RR	B	51,20	50,50	7,50	6,80	43,70		10
	D-G	46,70	46,00	7,50	6,80	39,20		10
	D-G	48,70	48,00	7,50	6,80	41,20		10
ARLAINES								
R		42,00	41,30	9,00	8,30	33,00		8

A		B		C		D		E		F
VALKENBURG										
C 1 P	13	56,00	55,60	17,00	16,60	39,00				12
	14	56,00	55,00							
LatP	2	39,50	39,10	9,50	9,10	30,00				8 (EC)
	3	39,50	39,10	8,50	8,10	29,00		2,00	2,40	8 (EC)
	4	39,50	39,10	10,50	10,10	29,00				8 (EC)
	5	39,50	39,10	9,50	9,10	29,00		2,00	2,40	8 (EC)
	1	30,00	29,60							
	6	39,50	39,10	11,50	11,10	28,00				8 (EC)
	7	39,50	39,10	10,00	9,60	28,00		1,50	1,90	8 (EC)
	8	39,50	39,10	11,50	11,10	28,00				8 (EC)
	9	39,50	39,10	11,00	10,60	27,50		1,00	1,40	8 (EC)
C 1a LatP	a	39,00	38,60	11,50	11,10	27,50				
	b	43,00	42,60	12,50	12,10	30,50				7 (EC)
	c	43,20	42,80	12,50	12,10	30,70				7 (EC)
C 2/3 P	13	56,00	55,60							
	9,10	41,50	41,10							
LatP	2,3			9,75	9,35					
	4			12,00	11,60					
	5			13,00	12,60					
	6	40,70	40,30							
	7,8	40,70	40,30	10,00	9,60	30,70				7 (EC)
C 4 P	11	41,00	40,30							
	10	41,00	40,60	10,50	10,10	30,70				7 (EC)
LatP	2-4,6	47,00								
	7	47,00	46,60	9,00	8,60	38,00				10
	8	47,00	46,60	8,00	7,60	39,00				11
	9	47,00	46,60	12,00	11,60	35,00				10 (EC)
C 5 P	14	45,00	44,60							
	11	42,50	42,10							
	10	42,50	42,10	12,50	12,10	30,00				
LatP	2	49,00	48,60							
	3	49,00	48,60	13,00	12,60	36,00				9 (EC)
	4,5	49,00	48,60							9 (EC)
	1	16,00	15,60							4
	6	49,00	48,60							
	7	49,00	48,60	8,00	7,60	41,00				9
	8	49,00	48,60	8,00	7,60	41,00				10
	9	49,00	48,60	11,50	11,10	37,50				9 (EC)
C 6 P	16	45,00	44,60							
	13	41,00	40,60							
	12	41,00	40,60	12,00	11,60	29,00				
LatP	4	51,50	51,10							
	5,6	51,50	51,10	12,50	12,10	39,00				9 (EC)
	7	51,50	51,10							
	2	16,00	15,60							4
	8	51,50	51,10							
	9	51,50	51,10	11,50	11,10	40,00				9 (EC)

A		B		C		D	E	F
	10	51,50	51,10	9,00	8,60	42,50		10 (EC)
	11	51,50	51,10	13,00	12,60	38,50		9 (EC)
ARENTSBURG								
LP		14,50	14,10					
LatP	L	33,00	32,60	15,00	14,60	18,00		
DORMAGEN								
Fl D	Pd 2	*59,00*	*58,60*	*17,50*	*17,10*	41,50		10
Fl C	Pds 2-4 N,S	*59,00*	*58,60*					
ALTEBURG								
RR		86,00	85,30					
NIEDERBIEBER								
LP	127,126	79,00	78,60					10
	125	31,00	30,30					
RP	160	71,00	70,30					
	161/162,163/164	77,00	76,60					10
SAALBURG								
P	N	51,50	51,10					
LatP	E	72,00	71,30					
	W	59,00	58,60					
R	E	48,50	48,10					
KAPERSBURG								
HK	LatP B	*25,50*	*25,10*					
BUTZBACH								
Pd 3	II			6,00	5,70			
	I			7,50	7,20			
Pd 4	II			6,65	6,35			
	I			6,10	5,80			
ECHZELL								
LR Pds 1,2a	Fm1	67,13	66,73	15,00	14,60	52,13		12 (FC,EC)
	Fm2	63,00	62,60	21,00	20,60	42,00		9 (EC)

A			B		C		D		E		F	
RR	S				15,50	15,10						
	N				15,00	14,60						
FLORSTADT-OBERFLORSTADT												
P			60,00	59,30								
ALTENSTADT												
RP	Pd 5	W	*47,00*		*11,00*		*36,00*				*8*	
HEDDERNHEIM												
RR	Ph 1		54,00	53,60	15,40	15,00	38,60				9	(EC)
	Ph 2		51,00	50,60	15,00	14,60	36,00				10	(FC)
	Ph 3	S	23,25	22,85								
		N	47,50	47,10								
HOFHEIM (Erdlager)												
RP	Q		35,00	34,60								
LR	A	Pd 2	32,00	31,60								
	B	Pd 2	31,20	30,80			31,20	30,80			8	
	C	Pds 1,2	30,40	30,00			30,40	30,00			8	
	D	Pds 1,2	29,60	29,20			29,60	29,20			8	
	E	Pd 2	30,00	29,60			30,00	29,60			8	
HOFHEIM (Steinkastell)												
Pd I	LP	10	48,00	47,60	10,00	9,60	398,00				10	
		11	48,00	47,60								
		12,13	48,00	47,60	10,50	10,10	37,50				11	
	RP	6	48,00	47,60	10,50	10,10	37,50				11	
		7	48,00	47,60	10,00	9,60	38,00				11	
		8,9	48,00	47,60	12,00	11,60	36,00				11	
	LR	25-27	41,25	40,85			41,25	40,85			10	
	RR	21	52,00	51,60							13	
		22	52,00	51,60	7,88	7,48	44,12				11	
		23,24	52,00	51,60	8,63	8,23	43,37				11	
Pd II	RR	3	53,20	52,80	13,60	13,20	37,70	37,30	1,90	2,30	8	(EC)
		4	52,60	52,20	11,25	10,85	38,75	38,35	2,60	3,00	8	(EC)
WIESBADEN												
P	Bks		*51,00*									
	h		21,00	20,30								
LatP	f		19,00	18,30								
	c		11,50	10,80								

A		B		C		D	E	F
	d	32,00	31,30					
R	g	30,00	29,30					
STOCKSTADT								
LR		40,20	39,50					
HESSELBACH								
Pd 1 LP	9	10,60	10,30					
	8	13,50	13,20					
LatP	4,3	34,75	34,45					
	6	15,50	15,20					
	2	34,75	34,45					
	1	34,75	34,45	4,50	4,20	30,25		8
Pd 2 LP	10	5,50	5,20					
/2a	9,8	14,50	14,20					
LatP	4	35,25	34,95	8,00	7,70	27,25		7
	3	35,25						9
	6	12,25	11,95					
	2	35,50	35,20	13,50	13,20	22,00		5
	1	35,50	35,20	9,50	9,20	26,00		6
MURRHARDT								
LR B		*45,00*	*44,60*	*10,00*	*9,60*	*35,00*		*9*
D		*10,00*	*9,60*					
KÖNGEN								
LR		18,60	17,90					
ROTTWEIL KASTELL III								
R		71,00	70,60	18,00	17,60	53,00		14 (EC)
ROTTWEIL KASTELL IV								
		21,00	20,60					
ZURZACH								
						25,20		6

A	B		C		D	E	F
BURLADINGEN							
RP D,E	*52,00*	*51,60*	16,00	15,60	*36,00*		*10*
F	*52,00*	*51,60*	13,00	*12,60*	*39,00*		*10*
G	*52,00*	*51,60*					
RR H	52,00	51,60					
RIßTISSEN							
K 1,2 LR C,D	*30,00*	*29,60*					
HEIDENHEIM							
LP	82,00	81,70	14,00	13,70	54,00		12 (2FC)
			14,00	13,70			
AALEN							
LP	80,00	79,60					
MUNNINGEN							
RP,LR,RR	*60,00*	*59,70*	*15,00*	*14,70*	*45,00*		*11* (EC)
RP 5	*60,00*	*59,70*					
GNOTZHEIM							
P	*32,52*	*32,12*					
WEIßENBURG (Breitung)							
LP 1,2	24,00	23,60					6
RP 4,5	46,00	45,60	*7,00*	*6,60*	*39,00*		10
ELLINGEN							
LP D	28,00	27,60					
RP C Phs 1,2	21,60	21,20					
P/R W,E Ph 1	43,00	42,60					
Ph 3	51,25	50,85	9,00	8,60	42,25		10
LatP E Ph 1	10,40	10,00					
Ph 2	10,60	9,90					
LR Ph 2	10,40	10,00					
PFÜNZ							
LR h	40,00	39,30					

A	B	C	D	E	F
OBERSTIMM					
LP 13 Phs 1b,1c	*44,69* *44,39*				
RP 1 Phs 1b,1c	44,80 44,50	10,40 10,10	34,40		9 (EC)
Ph 2	44,80 44,50				
12 Phs 1a-c,2	44,80 44,50				
LatP 9 Phs 1a-c	*47,00* *46,70*				
R 6 Phs 1a-c,2	47,00 46,70	12,00 11,70	35,00		9 (EC)
5 Phs 1a-c	*47,00* *46,70*				
4 Ph 1b	*47,00* *46,70*				
STRAUBING (Kastell IV)					
LP S,N	*40,00* *39,60*				
RP S,N	*36,00* *35,60*				
MOOS-BURGSTALL					
RP E,W		16,00 15,70			
KÜNZING					
Pds 1,2 P 1-4,6-9	50,80 50,40	12,60 12,20	38,20		10
5,10	50,80 50,40				
LR 15,16,19	48,40 48,00				
RR 18	50,20 49,80	11,00 10,60	39,20		10
20	47,05 46,65				
ZWENTENDORF					
2 SK E	*38,00* *37,30*	9,00 8,30	*29,00*		*10*
F	*38,00* *37,30*	10,40 9,70	*27,60*		*10*
PETRONELL					
Pd 2 Ph 2 LP W	77,00 76,30	16,00 15,30	61,00		12 (EC)
E	77,00 76,30				
RP	77,00 76,30	18,00 17,30	59,00		11 (EC)
ZALALÖVŐ					
Pds 1,2,3	26,00 25,60				
IŽA-LÉANYVÁR					
LP RP	56,00 55,30	8,50 7,80	47,50		8
RP	44,00 43,30				

A		B		C		D	E	F	
LatP	L,R	50,00	49,30						
RR	1,2,3	50,00	49,30						
AQUINCUM (auxiliary fort)									
SK		35,00	34,30	11,00	10,30	24,00			
ČEZAVA									
RP	Ph IV	31,00	30,30	*6,00*	*5,30*	*25,00*			
	V	31,00	30,30						
VELIKI GRADAC									
A		18,00	17,60						
B		20,00	19,60						
DROBETA									
LP	1	43,50	42,80	13,50	12,80	30,00			8 (FC)
	2	43,50	42,80	13,50	12,80	30,00			4
RP	3	43,50	42,80						7
	4	43,50	42,80	13,50	12,80	30,00			8 (FC)
	5	43,50	42,80	13,50	12,80	30,00			5
	6	43,50	42,80						7
LR	9	48,00	47,30						7
	10,11	48,00	47,30	12,00	11,30	36,00			5 (FC)
RR	12	48,00	47,30						7
	13	48,00	47,30	12,00	11,30	36,00			5 (FC)
	14	48,00	47,30	12,00	11,30	36,00			5
LatP	7,8	28,00	27,30	7,00	6,30	21,00			4
JUPA									
LP		33,00	32,30						
GILÄU									
LP		41,50	40,80						
BOLOGA									
EL	LP	40,00	39,60						
	RP	50,00	49,60						
SL	LP B4,B3,B2	40,00	39,60						
	B1	40,00	39,30						
	RP B8,B5	50,00	49,60						

A		B		C		D	E	F
BUCIUMI								
SL	LP	B6,B5,B4	52,00	51,30				
	RP	C1	14,70	14,00				
		B3	50,00	49,30				
		B2,B1	52,00	51,30				
POROLISSUM								
P		B11,B9,B8	50,00	49,60				
		B10,B7-B1	50,00	49,30				
FELDIOARA								
LP	N		46,00	45,30				
	S		46,00	45,60				
SLÄVENI								
P			46,00	45,30				
1-6			46,00	45,30	8,00	7,30	38,00	8
ROME								
			155,00	154,30				25
GEMELLAE								
RP							45,40	8
BU NGEM								
LP	1		28,00	27,30				
	2		30,00	29,30	5,00	4,30	25,00	
	3		30,00	29,30	5,50	4,80	24,50	
	4		30,00	29,30				
RP	5		29,00	28,30	3,50	2,80	25,50	9 (FC)
	6		29,00	28,30	7,00	6,30	22,00	7 (EC)
	7		29,00	28,30	7,00	6,30	22,00	6 (EC)
	8		28,00	27,30				
LR	9,10		38,00	37,30				
	11		35,00	34,30				
RR	12		35,00	34,30				
	13		35,00	34,30	6,50	5,80	28,50	7 (EC)
	14		35,00	34,30				
	15		35,00	34,30	8,00	7,30	27,00	

TABLE XVIII WIDTHS

A - Subject of entry
B - Overall
C - Officers' Quarters
D - Men's Quarters
E - Veranda (internal) (Where the veranda is not verified the equivalent measurement is shown in brackets)
F - Building proportions (length divided by width)

A			B		C		D		E	F	
CARDEAN											
LatP			4,57	4,17						6,00	6,48
R			9,75	9,35	9,75	9,35	9,75	9,35		5,00	5,17
FENDOCH											
P	Bks		9,91	9,51	9,91	9,51	7,92	7,52	1,52	4,77	4,93
	Sheds		5,79	5,39							
R	Bks		8,84	8,44	8,84	8,44	6,71	6,31	1,52	5,43	5,64
STRAGEATH											
I	LatP	A	*6,69*	*6,30*			*6,69*	*6,39*		5,25	5,45
	LP	XV	10,20	9,90	10,20	9,90	8,60	8,30		4,61	4,72
		XIV	7,00	6,70	7,00	6,70	7,00	6,70		6,86	7,12
		XIII	8,20	7,90	8,20	7,90	8,20	7,90		5,85	6,04
	RP	VII	10,50	10,20	10,50	10,20	9,00	8,70	1,20	3,93	4,01
		VI	8,00	7,70	8,00	7,70	6,75	6,45	0,95	5,31	5,48
		V	7,60	7,30						5,59	5,78
	LR	XII	9,50	9,20	9,50	9,20	7,80	7,50	1,20	5,00	5,13
		XI	8,60	8,30	8,60	8,30	8,60	8,30		5,42	5,58
		X	9,50	9,20	7,60	7,30	7,60	7,30	1,60	4,95	5,08
		IX	9,00	8,70	9,00	8,70	7,00	6,70	1,70	4,98	5,11
	RR	IV	9,00	8,70	9,00	8,70	9,00	8,70		5,25	5,40
		III	8,50	8,20	8,50	8,20	8,50	8,20		5,56	5,73
		II	8,60	8,30	8,60	8,30	6,50	6,20	(1,80)	5,23	5,39
		I	12,20	11,90	12,20	11,90	9,00	8,70	2,90	3,92	4,00
II	LP	XVII	7,80	7,50	7,80	7,50	7,80	7,50		5,51	5,69
		XVI	9,40	9,10	9,40	9,10	9,40	9,10		4,52	4,64
		XV	6,33	6,03						6,71	7,00
		XIV	7,75	7,45	7,75	7,45	7,75	7,45		2,77	2,85
	RP	VIII	7,33	7,03	7,33	7,03	7,33	7,03		6,11	6,07
		VII	8,00	7,70	8,00	7,70	8,00	7,70		5,33	5,50
		VI	5,60	5,30						7,50	7,87
		V	7,90	7,60	7,90	7,60	7,90	7,60		5,28	5,45

A			B		C		D		E	F	
	LR	XII	9,25	8,95	9,25	8,95	9,25	8,95		4,59	4,72
		XI	9,90	9,60	9,90	9,60	9,90	9,60		4,42	4,53
		X	9,80	9,50	9,80	9,50	9,80	9,50		4,52	4,63
		IX	5,00	4,70						8,52	9,00
	RR	IV	9,00	8,70						5,22	5,37
		III	6,00	5,70						7,83	8,19
		II	5,00	4,70						9,40	9,94
		I	10,60	10,30						4,43	4,53
III	LP	XIII	9,40	9,10	9,40	9,10	9,40	9,10		4,39	4,50
		XII	12,20	11,90	12,20	11,90	12,20	11,90		3,46	3,52
		XI	10,90	10,60	10,90	10,60	10,90	10,60		3,89	3,97
	RP	VII	9,50	9,20	9,50	9,20	9,50	9,20		4,97	5,21
		VI	9,60	9,30	9,60	9,30	9,60	9,30		4,82	4,95
		V	10,80	10,50	10,80	10,50	10,80	10,50		4,26	4,35
	LR	X	9,50	9,20	9,50	9,20	9,50	9,20		4,84	4,97
		IX	8,40	8,10	8,40	8,10	8,40	8,10		5,45	5,62
		VIII	8,40	8,10	8,40	8,10	8,40	8,10		5,50	5,67
	RR	IV	8,50	8,20	8,50	8,20	7,00	6,70	(1,20)	5,24	5,39
		III	4,50	4,20	4,50	4,20	4,50	4,20		10,16	10,81
		II	7,00	6,70	7,00	6,70	7,00	6,70		6,53	6,78
		I	10,25	9,95	10,25	9,95	10,25	9,95		4,31	4,41
ARDOCH											
1C	P		6,00	5,60			6,00	5,60		8,00	8,50
	R		12,00	11,60			12,00	11,60		5,17	5,31
Ant	II	R	7,62	7,22			7,62	7,22		6,20	6,49
CAMELON											
Flavian			*8,00*	*7,60*	*8,00*	*7,60*	6,50	6,10	*1,10*	5,81	6,07
Ant	LP	VIII	7,92	7,02	7,92	7,02	7,92	7,02		6,54	7,25
		VII,VI	8,23	7,33	8,23	7,33	8,23	7,33		6,30	6,95
		V	9,45	8,55	9,45	8,55	9,45	8,55		5,48	5,96
	RP	IV,III	9,45	8,55	9,45	8,55	7,92	7,02	(0,63)	5,48	5,96
		II,I	7,92	7,02	7,92	7,02	7,92	7,02		6,54	7,25
	R	XIV	10,36	9,46	10,36	9,46	7,92	7,02	(1,54)	5,00	5,38
	LatP	IX	13,41	12,51						1,86	1,93
		XII	10,06	9,16						2,67	2,83
MUMRILLS											
R			14,48	14,18	14,48	14,18	14,48	14,18		3,11	3,16
ROUGH CASTLE											
LP	N	Pd 1	3,05							8,20	
		Pd 2	5,79	5,49	5,79	5,49	5,79	5,49		4,58	4,78
	S		7,32	7,02	6,25	5,95	6,25	5,95	0,77	3,62	3,74

A		B		C		D		E	F	
BAR HILL										
LP	i	8,00	7,70						2,50	2,56
RP	ii	9,50	9,20	9,50	9,20	8,00	7,70	(1,20)	4,53	4,64
LR	iii	9,75	9,45	9,75	9,45	8,00	7,70	(1,45)	4,46	4,57
	v	10,00	9,45	10,00	9,45	8,00	7,70	(1,70)	4,35	4,55
RR	iv	9,50	9,20	9,50	9,20	8,00	7,70	1,20	4,58	4,70
CADDER										
RP	XIII,XII	8,23	7,93	8,23	7,93				4,44	4,58
LR	X Pd 1	9,75	9,45						3,00	3,06
	Pd 2	5,79	5,49						4,53	4,72
	Pd 3	9,14	8,84						2,47	2,52
	VIII,VI	9,14	8,84	9,14	8,84				4,07	4,17
RR	XI	7,32	7,02						5,08	5,25
	IX,VII	9,14	8,84	9,14	8,84				4,07	4,17
LatP	IV	8,84	8,54						2,28	2,32
BALMUILDY										
LP	IX	12,65	12,25	12,65	12,25	11,28	10,88	0,97	3,13	3,20
	VII	12,19	11,79	12,19	11,79				3,25	3,33
RP	X	12,95	12,55	12,95	12,55				3,46	3,54
	VIII	12,19	11,79	12,95	11,79				3,68	3,77
LR	XIII	5,79	5,39						7,32	7,79
	XI	11,89	11,49	11,89	11,49				3,56	3,65
RR	XIV	5,49	5,09						8,44	9,02
	XII	11,58	11,18	11,58	11,18				4,00	4,11
LatP	IV	5,49	4,42						5,33	6,38
	V	5,18	4,28						4,88	5,82
BEARSDEN										
LP	1,2	4,25	3,95						8,33	8,89
	3	5,00	4,70	5,00	4,70	5,00	4,70		7,08	7,47
RP	5	4,55	4,25						7,91	8,40
	6	4,00	3,70						2,25	2,35
	7	5,60	5,30	4,55	4,25	4,55	4,25	0,75	6,43	6,74
	9	4,50	4,20						3,33	3,50
	10	4,50	4,20						9,11	9,69
DUNTOCHER										
Centr Bdng		9,33	8,75	9,33	8,75	7,00	6,25		2,05	2,08
OLD KILPATRICK										
LP	I	8,38	7,98	8,38	7,98	8,38	7,98		6,40	6,67
	III,V	9,45	9,05	9,45	9,05	9,45	9,05		5,68	5,93

A		B		C		D		E	F	
RP	II	8,99	8,59	8,99	8,59	8,99	8,59		5,74	5,99
	IV	7,92	7,52	7,92	7,52	7,92	7,52		6,54	6,84
	VI	9,45	9,05	9,45	9,05	9,45	9,05		5,73	5,68
CRAMOND										
RP	A Pds 1,2	8,50	7,80						5,53	5,94
	Pd 3	5,50	4,80					(2,30)	8,55	9,65
	B Pd 2	5,60	4,90						6,79	7,61
	Pd 3	5,60	4,90						7,86	8,84
R	Pd 1	4,72	4,02							
INVERESK										
LR	S	22,25	21,85	10,21	9,81	9,14	8,74	(0,67)	4,78	4,93
		12,50	*12,10*							
	N	11,89	11,49	11,89	11,49	10,06	9,66	(1,43)	4,10	4,21
ELGINHAUGH										
P	5-7,9-12	8,00	7,60	8,00	7,60	8,00	7,60		6,00	6,26
	8	7,30	6,90						6,58	6,90
R	1,2,3,4	8,25	7,85	8,25	7,85	8,25	7,85		5,45	5,68
CASTLEDYKES										
RP		7,32	6,92			7,32	6,92		4,66	4,88
		13,72	*13,32*			*13,72*	*13,32*		3,50	3,57
LOUDOUN HILL										
		7,62	7,22						6,24	6,53
LYNE										
LP	1	7,62	7,22						5,80	6,07
	2	8,53	8,13						5,18	5,39
	3	10,06	9,66						4,39	4,53
RP	4	9,25	8,85						5,77	5,98
	5,6	3,81	3,41						14,00	15,52
LR	7	3,81	3,41						11,20	12,40
	8	4,35	3,95						9,46	10,32
	9	4,08	3,68						10,68	11,74
	10	3,81	3,41						11,84	13,11

A			B		C		D		E	F	
NEWSTEAD											
I		R	9,91	9,51							
II		R	17,37	16,47						3,93	4,09
III,IV		LP	10,97	10,07	10,97	10,07	10,97	10,07		5,28	5,66
		RP VI-II	10,67	9,77	10,67	9,77	10,67	9,77		5,71	6,15
		I	10,67	9,77	10,67	9,77	7,32	6,42	(2,45)	5,71	6,15
IV	R	XIX	12,19	11,29						6,98	7,45
		XVIII	16,15	15,25						1,13	1,14
		XVII	10,97	10,07						5,49	5,89
		XX	8,53	7,63						7,86	8,67
		XXI/XXII	13,41	12,51						6,59	6,99
		XXIII/XXIV	13,41	12,51						6,59	6,99
		XXV	5,18	4,28						17,06	20,44
CAPPUCK											
IV	a		5,18	4,48						5,65	6,38
	b		6,71	6,01						2,27	2,42
HIGH ROCHESTER											
Pds 1,2			8,61	7,91	8,61	7,91	7,09	6,39	(0,82)		
CRAWFORD											
Flav	P	VI	8,10	7,70						6,88	7,20
	LatP	III,IV,V	8,50	8,10	8,50	8,10	8,50	8,10		3,74	3,88
Ant I	P	IX	5,10	4,70						3,97	4,16
		VII	8,50	8,10	8,50	8,10	8,50	8,10		2,38	2,41
		VIII	8,50	8,10	8,50	8,10	8,50	8,10		2,35	2,38
	R	VI-III	8,50	8,10	8,50	8,10	8,50	8,10			
Ant II	P	IX	5,25	4,85						3,86	4,03
		VII,VIII	8,50	8,10	8,50	8,10	8,50	8,10		2,88	2,94
	R	VI-III	8,50	8,10	8,50	8,10	8,50	8,10		2,88	2,94
RAEBURNFOOT											
N Sector		1	7,50	7,20	7,50	7,20	7,50	7,20		1,97	2,01
		2	7,20	6,80	7,20	6,80	7,20	6,80		2,05	2,13
Central S		3	8,00	7,70	8,00	7,70	8,00	7,70		2,25	2,30
		4	8,00	7,70	8,00	7,70	8,00	7,70		2,13	2,17
		5	9,00	8,70	9,00	8,70	9,00	8,70		2,44	2,49
S Sector		6	7,70	7,40	7,70	7,40	7,70	7,40		2,47	2,53
		7	8,00	7,70	8,00	7,70	8,00	7,70		2,38	2,43
		8	9,00	8,70	9,00	8,70	9,00	8,70		2,11	2,15
		9	7,60	7,30	7,60	7,30	7,60	7,30		2,50	2,56

A			B		C		D		E	F	
DALSWINTON											
B I	RP	N	7,01	6,61						6,56	6,90
		S	7,92	7,52						5,81	6,06
			7,62	7,22			5,58	5,18	2,04		
B II	RP		7,62	7,22						5,72	5,98
CARZIELD											
RR			12,19	11,49	12,19	11,49	10,36	9,66	(1,13)	3,55	3,71
GLENLOCHAR											
Ant			9,14	8,84							
BIRRENS											
I	RP	V+S	9,75	9,05	9,75	9,05	9,75	9,05		4,10	4,34
		½	*4,50*	*3,80*							
		VI/VII	9,75	9,05	9,75	9,05	9,75	9,05		4,31	4,57
		Adj VIII	4,50	3,80						9,35	10,88
		RR XVI	4,50	3,80							
		XVII/XVIII,XIX/XX,XXI/XXII	9,75	9,05	9,75	9,05	9,75	9,05		4,19	4,44
		N	6,10	5,40	6,10	5,40	6,10	5,40		6,56	7,28
II	RP	S+V,VII/VI	12,50	11,80	12,50	11,80	12,50	11,80		3,20	3,30
	LR	XXIV/XXV	12,80	12,10	12,80	12,10	12,80	12,10		3,28	3,41
		½	*6,10*	*5,40*	*6,10*	*5,40*	*6,10*	*5,40*			
	RR	XIX/XX	12,80	12,10	12,80	12,10	12,80	12,10		3,28	3,41
		½	*6,10*	*5,40*	*6,10*	*5,40*	*6,10*	*5,40*			
		XXI	6,10	5,40						6,89	7,65
		XXII	6,71	6,01						6,25	6,87
SOUTH SHIELDS											
I	A1		10,40	10,00	10,40	10,00	10,40	10,00		3,94	4,06
	A2		10,00	9,60	10,00	9,60	10,00	9,60		4,06	4,19
	A3		4,50	3,90	4,50	3,90	4,50	3,90		9,22	10,54
	A6		9,80	9,40	9,80	9,40	7,50	7,10	(1,60)	4,29	4,43
II	B1		7,60	6,90	7,60	6,90	7,60	6,90		5,30	5,78
	B2		8,00	7,60	8,00	7,60	8,00	7,60		5,09	5,27
	B3		9,90	9,20	9,90	9,20	9,90	9,20		4,07	4,33
	B4		9,90	9,20	9,90	9,20	9,90	9,20		4,34	4,63
	B6,B7		9,50	8,80	9,50	8,80	9,50	8,80		4,53	4,81
	B8		4,30	3,60						0,93	0,92
	B9		4,30	3,60						1,84	2,00
III	C20	Ph 1	6,10	5,40						6,89	7,65
		Ph 2	6,25	5,55						6,72	7,44
	C18		7,00	6,30							
	C19		13,50	12,80	13,50	12,80	5,00	4,30		2,74	2,84

A			B		C		D		E	F	
WALLSEND											
LP	1,2		7,50	6,80	7,50	6,80	7,50	6,80		6,00	6,51
	3		8,00	7,30						5,63	6,01
	4		5,00	4,30						9,00	10,30
RP	5,6,7		7,50	6,80	7,50	6,80	7,50	6,80		6,13	6,66
	8		5,50	4,80						8,36	9,44
R	9,10,12		8,50	7,80	8,50	7,80	8,50	7,80		5,41	5,81
	11		8,50							5,41	5,81
RP	Pd II		5,40	4,70						8,52	9,63
BENWELL											
LR	Bks	N,S	11,89	11,19	11,89	11,19	10,06	9,36	(1,13)	3,84	4,02
	Stabs	N	12,50	11,80						3,76	3,92
		S	11,28	10,58							
RR	Bks	W	15,85	15,15						1,44	1,46
		E	4,27	3,57						5,35	6,21
	Stabs	N	10,36	9,66						4,53	4,79
		S	11,89	11,19						3,95	4,13
HALTONCHESTERS											
Hadr	RP	1	5,64	4,94						6,89	7,72
		2	8,53	7,83						4,64	4,97
		3,4	8,84	8,14						4,48	4,78
		5	8,23	7,53						4,81	5,17
3C		2	9,75	9,05						4,69	4,97
CORBRIDGE											
IA	LatP		10,00	9,60						3,30	3,40
	LR		5,15	4,75						9,42	10,08
	RR		12,00	11,60	12,00	11,60	10,00	9,60	1,30	4,08	4,19
IB	LatP		11,75	11,35	11,75	11,35	10,00	9,60	1,35	2,81	2,87
	LR		5,00	4,60						9,70	10,46
	RR		11,50	10,90	11,50	10,90	10,00	9,60	0,80	4,26	4,46
II	LatP		5,50	5,10						6,00	6,39
	LR	S	12,00	11,60	12,00	11,60	10,25	9,85	1,05	4,08	4,19
		N	8,00	7,60	8,00	7,60	8,00	7,60		6,13	6,39
	RR	S	12,00	11,60	12,00	11,60	10,25	9,85	1,05	4,04	4,06
		N	8,00	7,60	8,00	7,60	8,00	7,60		6,06	6,30
III	LatP		5,00	4,60						6,80	7,30
	LR		9,00	8,60	9,00	8,60	9,00	8,60		5,39	5,57
	RR	S	12,00	11,60	12,00	11,60	12,00	11,60		4,08	4,19
		N	9,00	8,60	9,00	8,60	9,00	8,60		5,44	5,65
IVA	LatP		7,10	6,70						4,23	4,42
	RR		10,60	10,20	10,60	9,60	9,10	8,70		4,62	4,76
IVB			11,00	10,40	11,00	10,40	9,00	8,30	1,30	4,45	4,64

A		B		C		D		E	F	
CHESTERS										
RP	1	8,60	7,90	8,60	7,90	8,60	7,90		5,00	5,35
	2	9,60	8,90	9,60	8,90	8,00	7,30	0,90	4,48	4,75
	3	10,50	9,80	10,50	9,80	9,00	8,30	0,80	4,00	4,21
	St	15,00	14,30						2,93	3,03
R		12,19	11,49	9,75	9,05			1,74		
CARRAWBURGH										
N		11,00	10,30			9,00	8,30	1,30	4,09	4,30
HOUSESTEADS										
XIII,XIV	Pd I	10,67	9,97	10,67	9,97	8,75	8,05	1,22	4,63	4,88
	Pd II					9,10	8,40	0,87		
HALTWHISTLE BURN										
Site I		9,75	9,15						1,00	1,00
Site II/III		8,80	8,20	8,80	8,20	5,50	4,90	(2,70)	4,49	4,74
BIRDOSWALD										
RP	1b-f	8,50	7,80	8,50	7,80	8,50	7,80		5,81	6,24
	1a	5,85	5,15						8,44	9,45
OLD CHURCH										
		7,92	7,22			7,92	7,22		5,19	5,52
STANWIX										
1,2		*6,50*	*5,80*						*5,54*	*6,09*
3,4		*8,50*	*7,80*						*4,00*	*4,27*
CARLISLE										
Pd 1		7,50	7,10							
Pd 2		3,00	2,60							
		8,00	7,60	8,00	7,60					
Pd 3	N	10,00	9,30			10,00	9,30			
	S	5,10	4,40			5,10	4,40			

A			B		C		D		E	F	
BOWNESS											
Phase 2			3,80	3,50							
Phase 3			8,40	8,00							
MARYPORT											
Pd I	W,E		9,80	9,10	9,80	9,10	7,75	7,05	(1,35)		
Pd II	E		9,80	9,10	9,80	9,10	7,75	7,05	1,35		
	W		10,25	9,55	10,25	9,55	10,25	9,55			
Pd III	W,E		5,90	5,20							
EBCHESTER											
LP	Pd 2		11,50	10,80	11,50	10,80	11,50	10,80		3,48	3,64
RR	Pds I,II	N	9,82	9,42			7,00	6,60	2,42	4,68	4,85
		S	8,91	8,51			8,91	8,51			
	Pd V		11,25	10,55							
	Pd VII		7,00	6,30							
LEASE RIGG											
G							7,00	6,60			
J			9,00	8,60							
D,H			8,50	8,10			8,50	8,10		3,59	3,72
RAVENGLASS											
Ph 1	1						10,00	9,60			
Ph 2	4,5						9,50	9,10			
Ph 3	6		10,80	10,40			9,60	9,20	0,80		
	7		11,50	11,10			9,40	9,00	1,70		
	8						9,50	9,10			
WATERCROOK											
I,II			8,84	8,14	8,84	8,14	8,23	7,53		5,60	6,00
BROUGH-BY-BAINBRIDGE											
Ft II	Pd 1	FA					6,40	6,00			
		FB					7,01	6,61			
	Pd 2	AA	9,14	8,44			9,14	8,44			
		AB	8,38	7,68			8,38	7,68			
		AC	*8,23*	*7,53*			*8,23*	*7,53*			
	Pd 3	AA	9,14	8,44			9,14	8,44			
		AB	9,38	7,68			8,38	7,68			

A			B		C		D		E	F	
ILKLEY											
Ft 1	LP	W	7,92	7,52	7,92	7,52	7,92	7,52		5,41	5,64
	LR	E	3,51	3,11						11,98	13,40
		W	9,14	8,74						4,60	4,85
Ft 2	LR		4,27	3,87	4,27	3,87	4,27	3,87		9,28	10,13
Ft 3	P	E	6,86	6,16						3,11	3,40
		W	6,55	5,85						3,26	3,58
	LR		8,53	7,83	8,53	7,83	8,53	7,83		4,50	4,85
RIBCHESTER											
Ph B	B2		9,00	8,70							
Ph C	B4		9,25	8,95			8,00	7,70	0,95		
Ph D	B6		8,00	7,70							
HAYTON											
LP			7,35	6,95	7,35	6,95	7,35	6,95		4,90	5,12
BROUGH-ON-HUMBER											
Pd IIB	1		5,60	5,20	5,60	5,20	5,60	5,20		8,39	8,96
	2		6,10	5,70	6,10	5,70	6,10	5,70		7,70	8,18
Pd IV	1		9,30	8,90			9,30	8,90		5,05	5,24
	2		8,50	8,10			8,50	8,10		5,53	5,75
CASTLEFORD											
Later Ft	P		10,00	9,60	10,00	9,60	8,50	8,10	1,10		
			11,10	10,70	11,10	10,70	8,70	8,30	2,00		
	R		4,00	3,60							
SLACK											
Ph 1	X	E,W	8,59	8,19	8,59	8,19	7,20	6,80	0,99	4,97	5,16
	VI		7,01	6,61						6,70	7,04
	V,VII		8,53	8,13						5,50	5,72
Ph 3	IX	E,W	8,89	8,19	8,89	8,19	7,98	7,28	0,21	5,28	5,65
CASTLESHAW											
Agr	LP	1	9,63	9,23	9,63	9,23	9,63	9,23		3,26	3,36
		2,3	4,27	3,87	4,27	3,87	4,27	3,87		7,35	8,01
		4	6,48	6,08	6,48	6,08	6,48	6,08		4,84	5,10
	LR		3,66	3,26						8,58	9,51

A	B		C		D		E	F	
MELANDRA CASTLE									
RP I-IV	9,07	8,67	9,07	8,67	9,07	8,67		4,54	4,70
TEMPLEBROUGH									
III c LP 1	7,77	7,07			7,77	7,07		4,65	5,01
2	9,14	8,44	9,14	8,44	7,62	6,92	(0,82)	3,37	3,56
RP	6,55	5,85						2,79	3,01
BROUGH-ON-NOE									
Pd III P	9,60	8,90						4,06	4,30
ROCESTER									
	9,25	8,85	9,25	8,85	9,25	8,85			
DERBY									
	9,50	7,20							
METCHLEY									
Later Fort	7,60	7,20						3,01	3,13
THE LUNT									
Pd I RP	8,25	7,85	8,25	7,85	8,25	7,85		5,07	5,27
R 1	6,10	5,70	6,10	5,70	6,10	5,70		7,50	7,95
2	6,10	5,70	6,10	5,70	6,10	5,70		7,50	7,95
3	9,20	8,80	9,20	8,80	9,20	8,80		5,76	5,98
4	6,10	5,70	6,10	5,70	6,10	5,70		7,71	8,18
5	6,10	5,70	6,10	5,70	6,10	5,70		7,50	7,95
6	5,50	5,10						7,45	7,96
E Defs 1	6,00	5,60			4,75	4,35	0,85	4,10	4,32
2,3	6,00	5,60	6,00	5,60	6,00	5,60			
Pd II RP	4,50	4,10	4,50	4,10	4,50	4,10			
	6,00	5,60	6,00	5,60	6,00	5,60			
R 1	6,10	5,70	6,10	5,70	6,10	5,70		4,56	4,81
2	6,10	5,70	6,10	5,70	6,10	5,70		5,06	5,34
Rear R	6,50	6,10						4,15	4,36
GREAT CASTERTON									
Ft I P S					4,88	4,48			
RP					6,10	5,70			
LR A	9,14	8,74	9,14	8,74				5,00	5,19

A		B		C		D		E	F	
Ft II RP		17,68	17,28							
LR	B	9,75	9,35	9,75	9,35				4,69	4,85
CAERHUN										
LP	II	7,60	6,90						6,38	6,92
	V	9,00	8,30						5,39	5,76
	VII	8,50	7,80						5,71	6,13
	X	7,50	6,80						6,47	7,,03
RP	I	10,06	9,36	10,06	9,36	8,53	7,83	(0,83)	5,00	5,30
	IV	10,06	9,36	10,06	9,36	8,84	8,14	(0,52)	5,15	5,46
	VI	9,83	9,13	9,83	9,13	8,53	7,83	(1,30)	5,30	5,63
	VIII	7,60/7,00								
LR	XVII	12,04	11,34	12,04	11,34	10,36	9,66	(0,98)	4,35	4,56
	XIX	11,28	10,58	11,28	10,58	9,60	8,90	(0,98)	4,59	4,83
RR	XVI,XVIII	9,91	9,21						5,17	5,48
CAERNARVON										
LP	Pd I 3	6,20	5,80	6,20	5,80	6,20	5,80			
	Pd II 1	12,50	12,10	12,50	12,10	9,85	9,45	1,80		
	2	9,90	9,50	9,90	9,50	7,15	6,75	2,20		
RP	X	7,60	6,90	7,60	6,90	7,60	6,90			
R	XVII	8,00	7,30	8,00	7,30					
	XIX	11,50	10,80	11,50	10,80	11,50	10,80		3,78	3,96
	XX	11,50	10,80	11,50	10,80	11,50	10,80		4,04	4,23
PEN LLYSTYN										
LP	P1	9,00	8,60	8,80	8,40	6,65	6,25	1,75	5,25	5,45
	P2	9,10	8,70	7,80	7,40	7,80	7,40	1,05	5,19	5,399
	P3	7,00	6,60						6,75	7,10
RP	P4	9,75	9,35	9,75	9,35	6,80	6,40	(2,55)	4,85	5,01
	P5	9,90	9,50	9,90	9,50	6,80	6,40	(2,70)	4,77	4,93
	P6	8,60	8,20						5,47	5,68
LR	R1	8,70	8,30	8,70	8,30	7,05	6,65	1,25	5,47	5,69
	R2	8,65	8,25	8,65	8,25	6,75	6,35	1,50	5,50	5,72
	R3	8,50	8,10	8,50	8,10	7,00	6,60	(1,10)	5,88	5,83
	R4	8,60	8,20	8,60	8,20	8,60	8,20		5,53	5,76
RR	R5	8,50	8,10	8,50	8,10	8,50	8,10		5,56	5,79
	R6	9,00	8,60						5,25	5,45
	R7	8,65	8,25	8,65	8,25	8,65	8,25		5,52	5,74
	R8	9,30	8,90	9,30	8,90	9,30	8,90		5,13	5,32
FORDEN GAER										
S-W Corn Pd 3						11,37	10,97			

A		B		C		D		E	F	
BUCKTON										
RP Pd I	1	9,25	8,85	9,25	8,85	9,25	8,85		5,31	5,50
	2	8,85	8,45	8,85	8,45	8,85	8,45		5,55	5,76
	3	7,80	7,40	7,80	7,40	7,80	7,40		6,29	6,58
	4	6,35	5,95	6,35	5,95	6,35	5,95		7,73	8,18
Pd II	1	8,75	8,35	8,75	8,35	8,75	8,35		5,58	5,80
	2	8,50	8,10	8,50	8,10	8,50	8,10		5,75	5,98
	3	9,05	8,65	9,05	8,65	9,05	8,65		5,39	5,60
	4	9,80	9,40	9,80	9,40	9,80	9,40		4,98	5,15
BRANDON CAMP										
A		5,25	4,85						1,52	1,57
B		5,55	5,15						1,44	1,48
D		4,50	4,10						2,00	2,10
E		5,00	4,60						1,30	1,33
1984		4,50	4,10						3,24	3,46
II		4,88	4,48			4,88	4,48		3,87	4,13
III		5,79	5,39			5,79	5,39		3,89	4,11
IV		10,67	10,27						1,83	1,86
PUMPSAINT										
Pd 1B E		8,00	7,60			6,65	6,25	0,95		
W		8,50	8,10					1,55		
Y GAER										
R		*9,14*								
LOUGHOR										
Ph 4		5,25	4,85	5,25	4,85	3,35	2,95	0,50		
NEATH										
Pd 7		6,50	6,10	6,50	6,10	6,50	6,10			
GELLIGAER II										
LP XIV		10,82	10,12	10,82	10,12	8,89	8,19	1,23	4,09	4,31
XII		10,90	10,20	10,90	10,20	9,14	8,44	1,06	4,10	4,31
IX		12,50	11,80						3,57	3,72
RP XV		11,43	10,73	11,43	10,73	8,89	8,19	1,84	3,89	4,08
XIII		11,43	10,73	11,43	10,73	8,99	8,29	1,74	3,89	4,08
X		12,42	11,72						1,62	1,66
XI		11,28	10,58						1,66	1,70
LR III		8,15	7,45						4,24	4,55

A		B		C		D		E	F	
	I	10,82	10,12	10,82	10,12	9,14	8,44	(0,98)	4,07	4,29
	IV	10,06	9,36	*10,06*	*9,36*	*5,18*	*4,48*	*(4,18)*	4,48	4,74
	II	10,52	9,82	10,52	9,82	9,14	8,44	(0,68)	4,30	4,54
STANWAY										
P		*5,79*								
LONDON (Cripplegate)										
		9,40	8,70			7,25	6,55	1,45	7,87	8,43
DOVER										
Ft I	A7,A6,A5	5,60	4,90			5,60	4,90		6,25	7,00
	A8	6,50	5,80			6,50	5,80			
Ft II	B23-B20	5,75	5,05			5,75	5,05		6,09	6,79
	B19	8,90	8,20			6,60	5,90	1,60	3,93	4,18
	B24	5,70	5,00			5,70	5,00		6,14	6,86
	B25,B26	5,90	5,20			5,90	5,20		5,93	6,60
	B30	6,38	5,68			6,38	5,68		3,84	4,19
	B32	6,35	5,65			6,35	5,65			
	B19 PII	8,70	8,00			6,60	5,90	1,40		
	PIII	8,70	8,00			4,90	4,20	3,10		
	B24 PII	5,70	5,00			5,70	5,00		6,14	6,86
	PIII	7,80	7,10	7,80	7,10	5,70	5,00	(1,40)	4,49	4,83
HOD HILL										
LP	XI	10,50	10,10	9,50	9,10	6,00	5,60	(4,10)	3,13	3,22
	X	8,23	7,83	8,23	7,83	5,49	5,09	(2,34)	4,11	4,27
	IX	9,00	8,60	8,23	7,83	5,49	5,09	(3,11)	3,79	3,92
	XII/XIII	11,58	11,18	11,58	11,18	5,18	4,78		3,82	3,92
	C	4,50	4,10						1,67	1,73
RP	VIII	9,45	9,05	4,57	4,17	4,57	4,17	(4,48)	4,03	4,17
	VII	6,71	6,31	6,71	6,31	4,88	4,48	(1,43)	5,54	5,99
	A	12,00	11,60						2,08	2,12
	B	4,00	3,60						4,38	4,75
R	Stab I	8,23	7,83			4,57	4,17	3,26	7,11	7,42
	II	4,88	4,48			4,88	4,48		12,06	13,04
	III	9,14	8,74			5,49	5,09	3,25	6,45	6,70
	IV	4,27	3,87			4,27	3,87		13,80	15,14
	V	4,42	4,02			4,42	4,02		13,17	14,38
	VI	7,32	6,92			3,66	3,26	3,26	7,74	8,13
	Bks VI	5,79	5,39	5,79	5,39	4,27	3,87	(1,12)	6,32	6,71
	V					4,27	3,87			
	IV	6,10	5,70	6,10	5,70	4,27	3,87	(1,43)	5,97	6,34
	III	6,25	5,85	6,25	5,85	4,27	3,87	(1,58)	5,85	6,18
	II	8,38	7,98	8,38	7,98	4,27	3,87	(3,71)	4,29	4,46
	I	6,10	5,70	6,10	5,70	3,96	3,56	(1,74)	5,94	6,29

A		B		C		D		E	F	
	D	5,49	5,09						7,38	7,89
	E,F	4,57	4,17						7,47	8,09
SOUTH CADBURY										
Site B	N	4,80	4,50						1,52	1,56
	S	4,80	4,50						1,96	2,02
WADDON HILL										
IV		9,75	9,35	9,75	9,35	4,50	4,10	(4,85)	5,03	5,20
V		10,97	10,57	10,97	10,57	5,00	4,60	(5,57)	4,28	4,41
BURY BARTON										
N-W Corner		10,00	9,60	10,00	9,60					
NANSTALLON										
P	Stable	3,66	3,26						5,05	5,55
	IV Pd 1	8,53	8,13	8,53	8,13	8,53	8,13		3,86	4,00
	Pd 2	8,53	8,13	8,53	8,13	8,53	8,13		4,06	4,21
	III	7,62	7,22	7,62	7,22	7,62	7,22		4,20	4,38
	II	7,32	6,92	7,32	6,92	7,32	6,92		4,37	4,57
	I	8,23	7,83	8,23	7,83	8,23	7,83		3,93	4,08
BOULOGNE										
RR	B	8,10	7,40	8,10	7,40	6,50	5,80	0,90	6,32	6,82
	D-G	8,10	7,40	8,10	7,40	8,10	7,40	0,90	5,77	6,22
		8,10	7,40	8,10	7,40	8,10	7,40	0,90	6,01	6,49
ARLAINES										
R		9,00	8,30	9,00	8,30	9,00	8,30		4,67	4,98
VALKENBURG										
C 1	P 13	12,00	11,60	12,00	11,60	7,50	7,10	(4,10)	4,67	4,79
	14	12,00	11,00	12,00	11,00	8,00	7,00	(3,00)	4,67	5,00
	12	5,50	5,10			5,50	5,10			
	10	11,00	10,60							
	LatP 2	7,50	7,10	7,50	7,10	6,50	6,10	(0,60)	5,27	5,51
	3	7,50	7,10	6,50	6,10	6,50	6,10	(0,60)	5,27	5,51
	4	7,50	7,10	7,50	7,10	6,20	5,80	0,90	5,27	5,51
	5	7,00	6,60	7,00	6,60	7,00	6,60	0,90	5,64	5,92
	6	7,50	7,10	7,60	7,10	6,50	6,10	0,60	5,27	5,51
	7	7,00	6,60	6,50	6,10	6,50	6,10	0,10	5,64	5,92

A		B		C		D		E	F	
	8	8,00	7,60	7,50	7,10	7,00	6,60	0,60	4,94	5,14
	9	7,50	7,10	7,50	7,10	7,00	6,60	0,10	5,27	5,51
	1	7,50	7,10						4,00	4,17
C 1a	a	7,50	7,10	7,50	7,10	7,50	7,10		5,20	5,44
	b	7,75	7,35	7,75	7,35	7,75	7,35		5,55	5,80
	c	8,00	7,60	8,00	7,60	8,00	7,60		5,40	5,63
C 2/3 P	12	7,20	6,80							
	10	7,00	6,60	7,00	6,60	7,00	6,60		5,93	6,23
LatP	2	11,75	11,15	11,75	11,35	11,75	11,15			
						9,00	8,60	2,35		
	3	11,00	10,60	11,00	10,60	9,50	8,90	1,10		
	4	8,00	7,60	8,00	7,60	7,40	7,00	0,20		
	5	9,00	8,60	9,00	8,60	8,50	8,10			
	6	17,50	17,10						2,33	2,36
	7	8,50	8,10	8,50	8,10	7,50	7,10	0,60	4,79	4,98
	8	11,50	11,10	11,50	11,10	10,00	9,60	1,10	3,54	3,63
C 4 P	11	7,50	7,00			6,50	6,10	0,60	5,47	5,80
	10	7,60	7,20	7,60	7,20	6,00	5,60	1,20	5,39	5,64
LatP	2					6,50	6,10			
	3,4					7,00	6,60			
	6	7,60	7,20			7,60	7,20		6,18	6,47
	7	7,60	7,20	7,60	7,20	7,00	6,60	(0,20)	6,18	6,47
	8	7,60	7,20	7,60	7,20	7,60	7,20		6,18	6,47
	9	7,80	7,40	7,80	7,40	6,50	6,10	(0,90)	6,18	6,47
C 5 P	14	7,60	7,20						5,92	6,19
	11	7,00	6,60	7,00	6,60	7,00	6,60		6,07	6,38
	10	8,00	7,60	8,00	7,60	6,00	5,60	(1,60)	5,31	5,54
LatP	1	11,00	10,60						1,45	1,47
	2	10,00	9,60	10,00	9,60	9,00	8,60	(0,60)	4,90	5,06
	3	7,50	7,10	7,50	7,10	7,50	7,10		6,53	6,85
	4					8,00	7,60			
	5	7,50	7,10	7,50	7,10	7,50	7,10		6,53	6,85
	6	7,60	7,20						6,45	6,75
	7	7,70	7,30	7,70	7,30	7,00	6,60	0,30	6,36	6,66
	8	9,00	8,60	8,00	7,60	8,00	7,60	0,60	5,44	5,65
	9	10,00	9,60	10,00	9,60	8,50	8,10	1,10	4,90	5,06
C 6 P	16	9,50	9,10						4,74	4,90
	13	7,50	7,10			7,50	7,10		5,47	5,72
	12	10,50	10,10	10,50	10,10	8,20	7,80	(1,90)	3,90	4,02
LatP	4					9,00	8,60			
	5	9,00	8,60	8,00	7,60	8,00	7,60	0,60	5,72	5,94
	6	8,00	7,60	8,00	7,60	7,30	6,90	0,30	6,44	6,72
	7	7,00	6,60	6,00	5,60	6,00	5,60	0,60	7,36	7,74
	2	6,50	6,10						2,46	2,56
	8	9,60	9,20			8,00	7,60	1,20	5,36	5,55
	9	8,30	7,90	8,30	7,90	6,70	6,30	(1,20)	6,20	6,16
	10	10,50	10,10	8,50	8,10	8,50	8,10	1,60	4,90	5,06
	11	10,50	10,10	10,50	10,10	9,00	8,60	1,10	4,90	5,06

A		B		C		D		E	F	
ARENTSBURG										
LP		7,75	7,35			6,00	5,60	1,25	1,87	1,92
LatP	L	6,00	5,60	6,00	5,60				5,50	5,82
ASCIBURGIUM										
K V	RP					5,50	5,10			
	RR	8,50	8,10	8,50	8,10	*7,10*	*6,70*	*1,00*		
K IV						6,40	6,00			
KREFELD-GELLEP										
IIa	1,2,3	11,10	10,70			9,40	9,10	1,20		
IIIb	1	9,50	9,10			7,10	6,70	1,50		
	2	12,00	11,60			10,00	9,60	1,60		
IV	1	7,80	7,40			5,40	5,00	2,00		
DORMAGEN										
Fl C	S Pd 2,3	8,90	8,50			8,90	8,50		6,63	6,89
Fl B		6,50	6,10			6,50	6,10			
ALTEBURG										
RR		10,00	9,30			10,00	9,30		8,60	9,17
NIEDERBIEBER										
LP	126	14,50	14,10	14,50	14,10	14,50	14,10		5,45	5,57
	125	10,00	9,60						3,10	3,16
RP	160	10,40	10,00						6,83	7,03
	161/162	15,00	14,60	15,00	14,60	15,00	14,60		5,13	5,25
	163/164	14,00	13,60	14,00	13,60	14,00	13,60		5,50	5,63
LR	105/296	13,50	13,10	13,50	13,10	13,50	13,10			
HOLZHAUSEN										
LatP	A	7,67	7,27							
	C	4,00	3,60							
SAALBURG										
LatP	P/R	10,00	9,30			10,00	9,30		7,20	7,67
	W	10,00	9,60			10,00	9,60		5,90	6,10
R	F	7,50	7,10			7,50	7,10			
	E	9,60	9,20						5,05	5,23

A			B		C		D		E	F	
KAPERSBURG											
HK	LatP	B	*6,75*	*6,35*			*6,75*	*6,35*		*3,78*	*3,95*
SK	P		5,40	5,00			5,40	5,00			
BUTZBACH											
Pd 1		III					9,75	9,35			
		II					9,50	9,10			
		I	12,10	11,70			9,85	9,45	2,00		
Pd 2									1,40		
Pd 3		II	10,80	10,50	10,80	10,50	8,40	81,10	2,10		
		I	*10,65*	*10,35*	*10,65*	*10,35*	*8,75*	*8,45*	*2,10*		
Pd 4		N					10,50	10,20			
		II	10,25	9,95	10,25	9,95	9,25	8,95	2,00		
		I	*11,50*	*11,20*	*11,50*	*11,20*	*9,40*	*9,10*	*2,20*		
ECHZELL											
LR	Pds 1,2a	Fm1	12,50	12,10	11,50	11,10	10,00	9,60	1,75	5,37	5,51
		Fm2	12,50	12,10	11,50	11,10	10,00	9,60	1,75	5,04	5,17
RR	Pds 1,2a	S,N	11,00	10,60	11,00	10,60					
ALTENSTADT											
RP	Pd 5	W	9,00	8,60			9,00	8,60		*5,22*	*5,42*
RR	E	Pd 2/3	6,20	5,80	6,20	5,80					
		Pd 4	8,60	8,20	8,60	8,20			1,50		
	W	Pd 5	4,80	4,40							
HEDDERNHEIM											
RR	Ph 1		11,75	11,35	11,75	11,35	11,75	11,35		4,60	4,72
	Ph 2	II	10,00	9,60	10,00	9,60	10,00	9,60		5,10	5,27
	Ph 3	N	10,00	9,60	10,00	9,60	10,00	9,60		4,75	4,91
		S	*15,50*	*15,10*						*1,50*	*0,19*
HOFHEIM (Erdlager)											
RP	Q		7,50	7,10						4,67	4,87
LR	A	Pd 2	10,80	10,40	10,80	10,40				2,96	3,04
	B	Pd 2	11,60	11,20			10,40	10,00	(0,80)	2,69	2,75
	C	Pds 1,2	11,20	10,80			9,00	8,60	1,80	2,71	2,78
	D	Pds 1,2	12,40	12,00			9,60	9,20	2,40	2,38	2,43
	E	Pd 2	12,00	11,60			9,40	9,00	2,20	2,50	2,55
RR	H		5,40	5,00							
	h		11,25	10,85			11,25	10,85			
	K		4,50	4,10							
	L		6,50	6,10							

A		B			C			D			E	F	
HOFHEIM (Steinkastell)													
Pd I	LP	10	10,50	10,10	10,50	10,10		8,25	7,85		1,85	4,57	4,71
		11	9,00	8,60								5,33	5,53
		12,13	9,75	9,35	9,75	9,35		9,75	9,35			4,92	5,09
	RP	6	10,50	10,10	10,50	10,10		9,00	8,60		1,10	4,57	4,71
		7	9,00	8,60	9,00	8,60		9,00	8,60			5,33	5,53
		8,9	9,50	9,10	9,50	9,10		9,50	9,10			5,05	5,23
	LR	25,26,27	9,75	9,35				9,75	9,35			4,23	4,37
	RR	21	5,25	4,85								9,90	10,64
		22,23,24	9,75	9,35	9,75	9,35		9,75	9,35			5,33	5,52
Pd II	P,R	3	13,10	12,70	13,10	12,70		9,00	8,60		2,00	4,06	4,16
		4	12,80	12,40	12,20	11,80		6,80	6,40		3,00	4,11	4,21
WIESBADEN													
P	h		9,00	8,30								2,33	2,45
LatP	f		7,50	6,80								2,53	2,69
	c		7,50	6,80								1,53	1,69
	d		8,50	7,80								3,76	4,01
R	g		10,50	9,80								2,86	2,99
STOCKSTADT													
LR			8,60	7,90								4,67	5,00
HESSELBACH													
Pd 1	P	9	4,25	3,95								2,49	2,61
		8	4,00	3,70								3,38	3,57
	LatP	4	4,50	4,20								7,72	8,20
		3	4,25	3,95								8,18	8,72
		6	10,75	10,45								1,44	1,45
		2	4,50	4,20								7,72	8,20
		1	6,50	6,20	4,88	4,58		4,88	4,58		1,32	5,35	5,56
Pd 2/2a	P	10	2,75	2,45								2,00	2,12
		9	5,50	5,20								2,64	2,73
		8	4,00	3,70								3,63	3,84
	LatP	4	7,75	7,45	7,75	7,45		6,25	5,95		1,20	4,55	4,69
		3	5,50	5,20	4,00	3,70		4,00	3,70		1,20	6,41	6,72
		6	11,50	11,20								1,07	1,07
		2	7,75	7,45	7,75	7,45		5,25	4,95		2,20	4,58	4,72
		1	6,75	6,45	6,75	6,45		5,00	4,70		1,45	5,26	5,46
LADENBURG													
Ph 3												2,50	

A		B		C		D		E	F	
MURRHARDT										
LR	B	*12,50*	*12,10*	*12,50*	*12,10*	*10,00*	*9,60*	*2,10*	*3,60*	*3,69*
	D	*5,00*	*4,60*						*2,00*	*2,09*
KÖNGEN										
LR		6,00	5,30						3,10	3,38
ROTTWEIL KASTELL I										
Pd 1						8,00	7,60	2,50		
Pd 2	N					8,00	7,60	2,50		
	S					9,00	8,60			
ROTTWEIL KASTELL II										
LP						8,75	8,05			
ROTTWEIL KASTELL III										
R		11,00	10,60	11,00	10,60	9,00	8,60	1,60	6,45	6,66
ROTTWEIL KASTELL IV										
		4,50	4,10						4,67	5,02
HÜFINGEN										
K 1	III,IV	5,00	4,60			5,00	4,60			
K 2	Ib Pds 1,2	7,80	7,40			7,80	7,40			
	Ia Pd 1	6,50	6,10			4,60	4,20	1,50		
	II Pd 2	6,50	6,10			6,50	6,10			
ZURZACH										
K III		9,30	8,90	9,30	8,90	7,40	7,00	1,50		
BURLADINGEN										
RP	D	8,50	8,10	8,50	8,10	8,50	8,10		6,12	6,37
	E	8,50	8,10	8,50	8,10	6,25	5,85	1,85	6,12	6,37
	F	8,00	7,60	8,00	7,60	6,25	5,85		6,12	6,37
	G	6,25	5,85						8,32	8,82
	H	9,00	8,60			9,00	8,60		5,78	6,00

A		B		C		D		E	F	
RIßTISSEN										
K 1 LR	C	9,50	8,90						3,16	3,33
	D	6,50	6,10			6,50	6,10		4,62	4,85
	E	2,50	2,10							
K 2	C	9,50	9,10						3,16	3,33
	D W	8,00	7,60			8,00	7,60		3,75	3,89
	E	7,50	7,10			7,50	7,10		4,00	4,17
	E	6,75	6,35							
UNTERKIRCHBERG										
Pd II Ph IIa		11,75	11,35	11,75	11,35	11,75	11,35			
HEIDENHEIM										
LP	I,II,III	11,00	10,70	11,00	10,70	9,40	9,10	1,30	7,45	7,64
RR	N					9,50	9,20			
	S					10,00	9,70			
UNTERBÖBINGEN										
RP	10	9,00	8,30			9,00	8,30			
AALEN										
LP		9,50	9,10	9,50	9,10	8,25	7,85	0,85	8,42	8,75
FRIEDBERG										
R		6,50	6,20	6,50	6,20	6,50	6,20			
MUNNINGEN										
RP	1	*9,50*	*9,20*	*9,50*	*9,20*	*7,90*	*7,60*	*1,30*	*6,32*	*6,49*
	2,3,4	*9,50*	*9,20*	*9,50*	*9,20*	7,90	7,60	*1,30*	*6,32*	*6,49*
	5	6,00	5,70							
LR	6	*9,50*	*9,20*	*9,50*	*9,20*	7,90	7,60	*1,30*	*6,32*	*6,49*
	7,8,9,10	*9,50*	*9,20*	*9,50*	*9,20*	7,90	7,60	*1,30*	*6,32*	*6,49*
WEIßENBURG										
LP	1,2	7,50	7,10						3,20	3,32
RP	4,5,6,7	11,50	11,10	11,50	11,10	7,50	7,10	3,00	4,00	4,11

A				B		C		D		E	F	
ELLINGEN												
LP	D			9,40	9,00			9,40	9,00		2,98	3,07
RP	C	Ph 1		7,00	6,60			7,00	6,60		3,09	3,21
		Ph 2		11,60	11,20			7,20	6,80	4,00	1,86	1,89
P/R	B	Ph 1	W,E	8,20	7,80			8,20	7,80		5,24	5,46
		Ph 2	W,E	11,00	10,60			11,00	10,60			
		Ph 3	W	10,80	10,40	10,80	10,40	9,00	8,60	1,40	4,75	4,89
			E	9,00	8,60			9,00	8,60		5,69	5,91
LatP	E	Ph 1		6,40	6,00						1,63	1,67
		Ph 2		8,40	8,00						1,26	1,24
LR		Ph 1		9,30	8,90	9,30	8,90	7,40	7,00	1,50		
		Ph 2		12,00	11,60						0,87	0,86
PFÜNZ												
LR	h			6,00	5,30							
OBERSTIMM												
RP	14	Pds 1b,1c		9,20	8,90	9,20	8,90	6,80	6,50	2,10	4,87	5,00
		Pd 2		9,80	9,50			7,20	6,90	2,30	4,57	4,68
	12	Pds 1a,1b		11,00	10,70			8,40	8,10	2,30	4,07	4,16
		Pd 1c		11,60	11,30			8,00	7,70	3,30	3,86	3,94
		Pd 2		12,40	12,10			8,00	7,70	2,20	3,61	3,68
										1,50		
LatP	R 6	Pd 1a,1b		9,20	8,90	9,20	8,90	7,20	6,90	1,70	5,11	5,25
		Pd 1c		9,20	8,90	9,20	8,90	7,60	7,30	1,30	5,11	5,25
		Pd 2		*9,20*	*8,90*	*9,20*	*8,90*	*7,60*	*7,30*	*1,30*	*5,11*	*5,25*
	5	Pds 1a,1b		9,20	8,90					1,70	5,11	5,25
		Pd 1c								1,70		
MOOS-BURGSTALL												
RP	E			10,80	10,50	10,80	10,50	9,00	8,70	1,50		
	W			11,40	11,10	11,40	11,10	9,00	8,70	2,10		
	Anbau			9,20	8,90							
STRAUBING (Kastell IV)												
LP	S			9,70	9,30	9,70	9,30	9,70	9,30		4,12	4,26
	N			9,00	8,60	9,00	8,60	9,00	8,60		4,44	4,60
RP	S			10,00	9,60	10,00	9,60	10,00	9,60		3,60	3,71
	N			8,50	8,10	8,50	8,10	8,50	8,10		4,24	4,40
ZWENTENDORF												
2 SK	E			9,70	9,00	9,70	9,00	9,70	9,00		3,92	4,14
	F			8,50	7,80	8,50	7,80	8,50	7,80		4,47	4,78

A	B	C	D	E	F
PETRONELL					
Pd 2 Ph 2 LP W	16,00 15,30	16,00 15,30	12,00 11,30	(3,30)	4,81 4,99
E	12,25 11,55				6,29 6,69
RP	16,00 15,30	16,00 15,30	12,00 11,30	(3,30)	4,81 4,99
ZALALÓVŐ					
Pds 1,2,3	10,00 9,60				2,60 2,67
IŽA-LÉANYVÁR					
LP	11,70 11,00		11,70 11,00		4,79 5,03
P	10,00 9,30	10,00 9,30	7,50 6,80	(1,80)	
RP	11,70 11,00				3,76 3,94
LatP S,N	12,50 11,80				4,00 4,18
R	11,70 11,00				
RR	12,50 11,80				
AQUINCUM (auxiliary fort)					
SK	9,50 8,80	9,50 8,80	8,00 7,30	1,50	3,68 3,90
INTERCISA					
H-EK 16C				2,00	
SK 16B	7,25 6,85		5,00 4,60	2,25	
ČEZAVA					
RP Ph IV	6,50 5,80	6,50 5,80	4,70 4,00	(1,10)	4,77 5,22
Ph V	7,00 6,30		7,00 6,30		4,43 4,81
VELIKI GRADAC					
A,B	13,00 12,60				
DROBETA					
P 1,4	9,00 8,30	9,00 8,30	6,50 5,80	(1,80)	4,83 5,16
2,5	9,00 8,30	9,00 8,30	7,00 6,30	(1,30)	4,83 5,16
3,6	3,50 2,80				12,46 15,29
R 9,12	7,50 6,80				6,40 6,96
10,13	10,00 9,30	10,00 9,30	7,50 6,80	(1,80)	4,80 5,09
11,14	8,00 7,30	8,00 7,30	6,50 5,80	(0,80)	6,00 6,48
LatP 7,8	13,00 12,30	13,00 12,30	7,50 6,80		2,15 2,22

A			B		C		D		E	F	
JUPA											
LP			8,00	7,30						4,13	4,42
BOLOGA											
SL	P	B4	8,25	7,85						4,85	5,04
		B8	8,25	7,85						6,06	6,32
		B2	7,50	7,10						5,33	5,58
		B6	7,50	7,10						6,66	6,99
		B1	6,75	6,05						5,93	6,50
BUCIUMI											
SL	LP	B6	9,00	8,30	9,00	8,30	9,00	8,30		5,78	6,18
		B5	19,00	18,30	19,00	18,30	19,00	18,30		2,74	2,40
		B4	9,00	8,30	9,00	8,30	9,00	8,30		5,78	6,18
	RP	C1	8,00	7,30	8,00	7,30	8,00	7,30		1,84	1,92
		B3	9,00	8,30	9,00	8,30	9,00	8,30		5,56	5,94
		B2	19,00	18,30	19,00	18,30	19,00	18,30		2,74	2,80
		B1	9,00	8,30	9,00	8,30	9,00	8,30		5,78	6,18
POROLISSUM											
LP	B11		12,00	11,60						4,17	4,28
	B10		10,00	9,30						5,00	5,30
	B9		7,00	6,60						7,14	7,52
	B8		12,00	11,60						4,17	4,28
	B7		23,50	22,80						2,13	2,16
RP	B6		6,50	5,80						7,69	8,50
	B5		13,00	12,30						3,85	4,01
	B4		6,50	5,80						7,69	8,50
	B3	1,2	7,00	6,30						7,14	7,83
	B2		16,00	15,30						3,13	3,22
	B1		27,00	26,30						1,86	1,87
FELDIOARA											
LP	N		20,40	19,70	20,40	19,70	20,40	19,70		2,25	2,30
	S		17,00	16,60	17,00	16,60	17,00	16,60		2,71	2,75
SLÄVENI											
P			11,20	10,50			9,00	8,30	1,50	4,11	4,31
1,4			11,00	10,30	11,00	10,30	9,00	8,30	1,30	4,18	4,40
2,3,5,6			12,00	11,30	10,00	9,30	10,00	9,30	1,30	3,83	4,01

A		B		C		D		E	F	
ROME										
via lata		11,67	10,97			11,67	10,97		13,28	14,07
OSTIA										
N		7,50	6,80							
S		6,38	5,68							
GEMELLAE										
RP						9,00	8,30			
BU NGEM										
LP	1	8,00	7,30						3,50	3,74
	2	7,50	6,80	7,50	6,80	4,00	3,30	(2,80)	4,00	4,31
	3	7,50	6,80	7,50	6,80	4,50	3,80	2,30	4,00	4,31
	4	5,50	4,80						5,45	6,10
RP	5	8,50	7,80	8,50	7,80	5,50	4,80	(2,30)	3,41	3,63
	6	6,00	5,30	6,00	5,30	4,00	3,30	(1,30)	4,83	5,34
	7	7,50	6,80	7,50	6,80	5,00	4,30	(1,80)	3,87	4,16
	8	6,00	5,30						4,67	5,15
LR	9,10	5,25	4,55						7,24	8,20
	11	12,00	11,30						2,92	3,04
RR	12	5,50	4,80						6,36	7,15
	13	7,00	6,30	7,00	6,30	5,50	4,80	(0,80)	5,00	5,44
	14	6,00	5,30						5,83	6,47
	15	7,50	6,80	7,50	6,80	6,50	5,80	(0,30)	4,67	5,04

A - Subject of entry
B - Breadth × depth of *papilio* or rear room
C - Breadth × depth of *arma* or front room
D - Breadth × depth of *contubernium* or whole room
E - Area of *papilio* or rear room
F - Area of *arma* or front room
G - Area of *contubernium* or whole room
H - Interval spacing of side walls

Note: All measurements are internal

A		B	C	D	E	F	G	H
STRACATHRO								
		3,00x	3,00x3,00	3,00x		9,00		3,40
CARDEAN								
LatP				2,93x3,00			8,79	3,33
R		3,00x4,25	3,00x3,50	3,00x8,85	12,75	10,50	26,55	3,40
FENDOCH								
P		3,35x3,51	3,35x3,96	3,35x7,62	11,76	13,27	25,53	3,75
R		3,51x3,66	3,51x1,83	3,51x5,79	12,85	6,42	20,32	3,91
STRAGEATH								
I LatP	A	3,01x1,52	3,01x4,27	3,01x6,09	4,58	12,85	18,33	3,31
LP	XV	2,75x5,35	2,75x1,60	2,75x6,09	14,71	4,40	20,21	3,05
	XIV	3,50x4,30	3,50x1,75	3,50x6,20	15,05	6,13	21,70	3,80
	XIII	3,50x4,50	3,50x2,80	3,50x7,60	15,75	9,80	26,60	3,80
RP	VII	3,50x5,00	3,50x2,80	3,50x8,10	17,50	9,80	28,35	3,80
	VI	3,75x4,00	3,75x1,65	3,75x5,95	15,00	6,19	22,31	4,05
LR	XII	3,00x4,00	3,00x3,60	3,00x7,90	12,00	10,80	23,70	3,30
	XI	3,00x4,40	3,00x3,30	3,00x8,00	13,20	9,90	24,00	3,30
	X	2,90x3,00	2,90x3,25	2,90x6,55	8,70	9,43	19,00	3,20
	IX	2,90x3,10	2,90x2,90	2,90x6,30	8,99	8,41	18,27	3,20
RR	IV,III	3,50x4,00	3,50x4,00	3,50x8,30	14,00	14,00	28,00	3,80
	II	3,50x4,00	3,50x1,50	3,50x5,80	14,00	5,25	20,30	3,80
	I	3,50x3,50	3,20x3,50	3,20x7,30	11,20	11,20	23,36	3,50
II LP	XVII	3,50x1,60	3,50x4,75	3,50x7,00	5,60	16,63	24,50	3,80
	XVI	3,50x4,50	3,50x3,60	3,50x8,33	15,75	12,60	29,16	3,80
	XIV	2,60x3,20	2,60x3,20	2,60x6,70	8,32	8,32	17,42	2,90

A			B	C	D	E	F	G	H
	RP	VIII	3,70x3,75	3,70x2,60	3,70x6,60	13,88	9,62	24,42	4,00
		VII	2,50x2,70	2,50x4,25	2,50x7,33	6,75	10,63	18,33	2,80
		V	2,50x3,20	2,50x3,50	2,50x7,15	8,00	8,75	17,88	2,80
	LR	XII	3,00x4,00	3,00x4,20	3,00x8,60	12,00	12,60	25,80	3,30
		XI	3,10x5,20	3,10x3,10	3,10x9,00	16,12	9,61	27,90	3,40
		X	3,00x5,00	3,00x3,20	3,00x8,70	15,00	9,60	26,10	3,30
	RR	IV	3,30x2,00	3,30x2,50	3,30x4,90	6,60	8,25	16,17	3,60
		III	x2,50	x2,50	x5,30				
		II	x1,55	x1,55	x3,40				
		I	x6,75	x2,80	x9,90				
III	LP	XIII	3,00x4,50	3,00x4,00	3,00x8,80	13,50	12,00	26,40	3,30
		XII	3,00x4,80	3,00x5,50	3,00x10,60	14,40	16,50	31,80	3,30
		XI	3,00x3,80	3,00x5,30	3,00x9,40	11,40	15,90	28,20	3,30
	RP	VII	2,60x5,00	2,60x3,75	2,60x9,95	13,00	9,75	23,53	2,90
		VI	5,50x3,20	5,50x5,10	5,50x8,60	17,60	28,05	47,30	5,80
		V	3,00x3,75	3,00x5,80	3,00x9,85	11,25	17,40	29,55	3,30
	LR	IX			3,00x7,50			22,50	3,30
		X	2,75x4,80	2,75x3,80	2,75x8,90	13,20	10,45	24,48	3,05
		VIII	3,00x4,75	3,00x3,00	3,00x8,05	14,25	9,00	24,15	3,30
	RR	IV	2,50x3,10	2,50x3,10	2,50x6,50	7,75	7,75	16,25	2,80
		III	2,75x1,50	2,75x1,50	2,75x3,30	4,13	4,13	9,06	3,05
		II	3,00x3,10	3,00x3,10	3,00x6,50	9,30	9,30	19,50	3,30
		I	4,00x4,90	4,00x4,00	4,00x9,20	19,60	16,00	36,80	4,30
CAMELON									
Flavian			3,80x2,65	3,80x2,65	3,80x5,65	10,07	10,07	21,47	4,20
MUMRILLS									
R			x6,10	x6,10	x12,50				
ROUGH CASTLE									
LP	N	Pd 2	x3,00	x2,00	x5,30				
			3,38x3,00	*3,38x2,00*	*3,38x5,30*	*10,14*	*6,76*	*17,91*	
BAR HILL									
R	iii,v,iv				2,50x7,60			19,00	2,80
BALMUILDY									
LP	IX				x9,75				

A	B	C	D	E	F	G	H
BEARSDEN							
LP 3			3,00x4,00			12,00	3,30
RP 7			3,00x3,80			11,40	3,30
OLD KILPATRICK							
Ant II LP I	2,44x3,81	2,44x3,05	2,44x7,26	9,30	7,44	17,71	2,84
INVERESK							
LR S	x3,51	x5,79	x10,36				
ELGINHAUGH							
LP 5,6,7	3,00x3,40	3,00x3,40	3,00x7,20	10,20	10,20	21,60	3,40
8			3,00x6,50			19,50	3,40
RP 9-12	3,00x3,40	3,00x3,40	3,00x7,20	10,20	10,20	21,60	3,40
LR 4	3,75x3,53	3,75x3,53	3,75x7,45	13,24	13,24	27,94	4,25
3	3,00x3,53	3,00x3,53	3,00x7,45	10,59	10,59	22,34	3,40
RR 2,1	3,00x3,53	3,00x3,53	3,00x7,45	10,59	10,59	22,34	3,40
CASTLEDYKES							
RP	3,80x3,25	3,80x3,25	3,80x6,90	12,35	12,35	26,22	4,20
	x8,00	x4,00	x12,40				
LOUDOUN HILL							
	3,21x3,21	3,21x3,21	3,21x6,82	10,30	10,30	21,89	3,61
LYNE							
LP 2	x3,67	x3,67	x7,74				
3	x5,43	x3,43	x9,26				
NEWSTEAD							
II P			5,33x10,36			55,22	
III,IV XII-II			3,66x9,14			33,45	4,50
I			3,66x6,10			22,33	4,50
IV R XVII	x2,29	x6,55	x9,60				
XXIII/XXIV	x5,33 x1,83	x3,66					

A	B	C	D	E	F	G	H
CRAWFORD							
Flav P VI			3,00x7,50			22,50	3,40
LatP IV			3,00x7,25			21,75	3,40
Ant II R III,IV,V,VI			*3,35x7,01*			*23,48*	*3,75*
RAEBURNFOOT							
N Sector 1,2	x4,25	x2,00	x6,55				
Cetral S 3	x4,00	x2,50	x6,85				
5	x4,30	x3,50	x8,10				
S Sector 6			3,00x7,50			22,50	
8			3,00x8,00			24,00	
7	x3,80	x3,00	x7,20				
9	x4,50	x2,50	x7,30				
DALSWINTON							
B I RP N	x3,66	x2,44	x6,40				
S	x3,35	x3,66	x7,16				
B II RP	3,20x3,35	3,20x2,97	3,20x6,71	10,72	9,50	21,47	3,60
CARZIELD							
RR Bk	3,05x3,66	3,05x3,89	3,05x8,74	11,16	11,86	26,96	3,45
Stab			3,66x3,05			11,16	
BIRRENS							
Ant I XVII/XVIII	3,81x3,35	3,81x3,35	3,81x8,53	12,76	12,76	32,50	4,51
VI/VII,XXI/XXII	x3,35	x3,35	x8,53				
XIX/XX							
Ant II XXIV/XXV	x4,88	x4,88	x11,58				
XIX/XX							
SOUTH SHIELDS							
I A3			11,75x3,75			44,06	12,15
A6	x3,50	x2,00	x6,20				
III C20 Ph 2			2,10x5,10			10,71	2,80
WALLSEND							
P 1,2,5,6,7			3,50x6,10			21,35	3,70
R 9,10,12			3,50x7,20			25,20	3,70

A			B	C	D	E	F	G	H
BENWELL									
LR	Bk	N,S			3,35x8,53			28,58	4,05
	St	N			3,66x11,28			41,28	4,36
		S			3,35x9,91			45,29	5,27
					4,57x9,91				
RR	Adj	*via qu*	x2,13	x2,13	x10,67				
	St	N	x4,27	x4,27	x8,84				
		S	x5,18	x5,18	x10,36				
RUDCHESTER									
Pd 1			3,60x						4,00
Pd 2			3,35x						3,75
HALTONCHESTERS									
Hadr	2		x3,96	x3,20	x7,32			27,89	4,36
	3				3,66x7,62				
3C	1				3,35x				
	2				3,35x7,92			26,53	4,05
CORBRIDGE									
IA	LatP				3,25x8,25			26,81	3,95
	RR		3,40x3,75	3,40x4,25	3,40x8,50	12,75	14,45	28,90	4,10
IB	LatP		x4,00	x7,00	x11,50				
	RR		3,00x3,75	3,00x5,00	3,00x9,50	11,25	15,00	28,50	3,70
II	LatP		*2,75*x2,00	2,75x2,00	*2,75*x4,50	*5,50*	5,50	*12,38*	3,45
	LR	S	*2,80*x3,10	2,80x5,60	*2,80*x9,60	*8,68*	15,68	*26,88*	3,50
		N	*3,10*x2,25	3,10x4,00	*3,10*x7,00	*6,98*	12,40	*21,70*	3,80
	RR	S	3,10x3,10	3,10x5,50	3,10x9,50	9,61	17,05	29,45	3,80
		N	2,90x2,50	2,90x3,60	2,90x7,00	7,25	9,00	20,30	3,60
III	LatP		2,80x2,00	2,80x2,00	2,80x4,70	5,60	5,60	13,16	3,50
	LR		3,00x3,10	3,00x4,25	3,00x8,00	9,30	13,50	24,00	3,70
	RR	S	3,00x3,90	3,00x6,75	3,00x11,00	11,70	20,25	33,00	3,70
		N	3,00x3,00	3,00x4,00	3,00x7,50	9,00	12,00	22,50	3,70
IVA	LatP		4,25x3,00	4,25x2,00	4,25x5,70	12,75	8,50	24,23	4,95
	RR		4,00x3,00	4,00x4,00	4,00x7,60	12,00	16,00	30,40	4,70
IVB	RR		4,00x3,00	4,00x3,90	4,00x7,60	12,00	15,60	30,40	4,70
CHESTERS									
RP	1		2,60x2,90	2,60x3,90	2,60x7,50	7,54	10,14	19,50	3,30
	2				2,60x6,60			17,16	3,30
	3				2,33x7,60			17,71	3,03
R			3,66x3,96	3,66x4,42	3,66x8,53	14,49	16,18	31,22	4,36

A	B	C	D	E	F	G	H
CARRAWBURGH							
N	x3,25	x3,10	x7,10				
HOUSESTEADS							
XIV Pd I			3,35x7,62			25,53	4,05
Pd II			4,88x7,92			38,65	5,58
XIII Pd I	3,50x4,60	3,50x2,00	3,50x7,30	16,10	7,00	25,55	4,20
	3,50x2,80	3,50x3,80	3,50x7,30	9,80	13,30	25,55	4,20
BIRDOSWALD							
RP Ib-f			3,65x7,25			26,46	4,35
CARLISLE							
N	3,30x3,50	3,30x4,15	3,30x8,50	11,55	17,00	28,05	4,00
S			3,30x3,50			11,55	4,00
BOWNESS							
Ph 3			7,00x7,00			49,00	7,40
EBCHESTER							
RR Pd I N	x3,10	x4,10	x7,20				
S			x8,11				
LEASE RIGG							
G			4,00x6,20			24,80	4,40
D,H	3,00x2,67	3,00x4,30	3,00x7,50	8,01	12,90	22,50	3,40
RAVENGLASS							
Ph 1 1	3,50x2,60	3,50x5,60	3,50x8,60	9,10	19,60	30,10	3,90
Ph 2 4	3,50x3,30	3,50x3,60	3,50x8,35	11,55	12,60	29,23	3,90
5	3,50x3,50	3,50x3,85	3,50x8,00	12,25	13,48	28,00	3,90
Ph 3 6	x3,80	x3,80	x8,00				
7	4,00x4,00	4,00x4,00	4,00x8,40	16,00	16,00	33,60	4,40
8	x4,00	x4,40	x8,80				
BROUGH-BY-BAINBRIDGE							
Ft II Pd 2 AA			3,51x7,47			26,22	4,21
AB			3,51x7,01			24,61	4,21
Pd 3 AA			3,51x7,47			26,22	4,21

A		B	C	D	E	F	G	H
	AB	x3,20	x3,20	x7,01				
Pd 4	AAi			3,51x7,47			26,22	
ILKLEY								
Ft 1 LR	W	x2,44	x5,99	x8,63				
Ft 2 LP		4,27x	4,27x	4,27x				4,67
Ft 3 LP	E	x3,05	x2,44	x6,19				
	W	x2,13	x3,05	x5,88				
RIBCHESTER								
Ph B B2		2,25x3,30	2,25x	2,25x	7,43			
Ph C B4		2,40x3,80	2,40x3,10	2,40x7,40	9,12	7,44	17,76	2,70
Ph D B6		x4,10	x2,45	x7,00				
HAYTON								
LP				3,80x6,35			24,13	4,20
BROUGH-ON-HUMBER								
Pd IIB	1	3,85x3,20	3,85x1,55	3,85x5,00	12,32	5,97	19,25	4,25
	2	3,85x3,50	3,85x1,50	3,85x5,40	13,48	5,78	20,79	4,25
Pd IV	1			*4,00*x8,50			34,00	
	2	4,50x3,25	4,50x4,00	4,50x7,75	14,63	18,00	34,88	4,90
CASTLEFORD								
E-W Bk		2,25x5,25	2,25x1,85	2,25x7,75	11,81	4,16	17,44	2,65
N-S Bk		33,30x3,20	3,30x3,20	3,30x7,00	10,56	10,56	23,10	3,70
R				7,00x3,50			24,50	7,40
				2,00x3,50			7,00	2,40
SLACK								
Ph 1 X	E,W			4,57x6,40			29,25	4,97
Ph 3 IX	E,W			6,71x7,62			51,13	7,41
MELANDRA CASTLE								
RP II		3,35x6,10	3,35x2,13	3,35x8,63	20,44	7,14	28,91	3,75
TEMPLEBROUGH								
III e LP	1			3,20x6,10			19,52	3,90
	2	2,90x2,75	2,90x3,05	2,90x6,11	7,98	8,85	17,72	3,60

A		B	C	D	E	F	G	H
BROUGH-ON-NOE								
Pd III	P	x3,81	x3,81	x8,23				
ROCESTER								
		3,35x4,00	3,35x3,50	3,35x8,00	13,40	11,73	26,80	3,75
THE LUNT								
Pd I	RP W	4,00x4,00	4,00x3,25	4,00x7,60	16,00	13,00	30,40	4,40
	E	x4,50	x2,30	x7,25				
Pds I,II	1	3,00x3,60	*3,00*x1,50	*3,00*x5,50	10,80	*4,50*	*16,50*	3,40
	2	4,00x3,64	*4,00*x1,25	*4,00*x5,50	14,56	*5,00*	*22,00*	4,40
	4,5	3,30x4,10	*3,30*x1,25	*3,30*x5,80	13,53	*4,13*	*19,14*	3,70
	R 3			38,00x2,50			95,00	
				38,00x1,75			66,50	
				38,00x1,25			47,50	
E Defs	1	3,50x4,00	*3,50*x1,30	*3,50*x5,70	14,00	*4,55*	*19,95*	3,90
	2,3	x3,60	x1,25	x5,25				
Pd II	Rear R	21,00x3,75	21,00x1,50	21,00x5,50	78,75	31,50	115,50	
GREAT CASTERTON								
Ft I	LP			3,05x4,36			13,30	3,45
CAERHUN								
RR	XVI,XVIII			17,00x8,00			136,00	
				14,00x8,00			112,00	
CAERNARVON								
LP	Pd I B3	3,00x3,50	3,00x1,90	3,00x5,70	10,50	5,70	17,10	3,40
	Pd II B1	3,25x3,50	3,25x5,20	3,25x9,00	11,38	16,90	29,25	3,65
	B2	4,00x4,00	4,00x2,15	4,00x6,50	16,00	8,60	26,00	4,40
RP	X	3,00x4,50	*3,00*x1,75	*3,00*x6,75	13,50	*5,25*	*20,25*	3,70
R	XX			4,42x10,21			45,13	5,12
PEN LLYSTYN								
LP	P1	3,15x4,00	3,15x1,65	3,15x6,00	12,60	5,20	18,90	3,55
	P2	3,50x3,50	3,50x2,75	3,50x6,60	12,25	9,63	23,10	3,90
RP	P4	3,35x4,20	3,35x1,75	3,35x6,25	14,07	5,86	20,94	3,75
	P5	3,15x4,00	3,15x1,90	3,15x6,25	12,60	5,99	19,69	3,55
LR	R1	3,25x3,90	3,25x2,35	3,25x6,40	12,68	7,64	20,80	3,65
	R2	3,40x4,00	3,40x1,95	3,40x6,20	13,60	6,63	21,08	3,80
	R3	3,15x4,00	3,15x2,25	3,15x6,40	12,60	7,09	20,16	3,55
	R4			2,70x				

A		B	C	D	E	F	G	H
RR	R5	3,25x3,80	3,25x3,70	3,25x7,75	12,35	12,03	25,19	3,65
	R7	3,05x4,00	3,05x3,55	3,05x7,80	12,20	10,83	23,79	3,45
	R8	3,10x4,00	3,10x3,75	3,10x8,15	12,40	11,63	25,27	3,50
BUCKTON								
RP	Pd I 2	x4,25	x3,50	x8,10				
	3	x3,15	x3,80	x7,30				
	4	4,00x3,65	4,00x1,60	4,00x5,50	14,60	6,40	22,00	4,40
	Pd II 1	3,65x3,35	3,65x4,65	3,65x8,35	12,23	16,97	30,48	4,05
BRANDON CAMP								
A		4,00x2,50	4,00x	4,00x	10,00			4,40
B		4,20x3,25	4,20x3,25	4,20x7,00	13,65	13,65	29,40	4,60
D		3,40x4,40	3,40x3,30	3,40x8,00	14,96	11,22	27,20	3,80
II				3,00x3,50				
PUMPSAINT								
Pd 1A	S			3,20x				3,60
Pd 1B	E	x3,60	x1,70	x5,75				
	W	x3,00	x3,30	x6,70				
LOUGHOR								
				4,35x3,60			15,66	
				5,75x3,30			18,98	
				12,69x2,75			34,65	
NEATH								
Pd 5A		3,00x	3,00x4,40	3,00x		13,20		3,40
Pd 7		3,00x4,00	3,00x1,50	3,00x5,70	12,00	4,50	17,10	3,40
GELLIGAER II								
LP	IX	43,25x5,16	41,85x5,18	42,90x11,04	223,17	216,78	473,62	
RP	XI	17,29x3,66	17,29x5,18	17,29x9,54	63,28	89,56	164,95	
LR	III			10,67x6,75 (2)			72,02	
				9,75x6,75			65,81	
RR	IV			9,45x3,95 (2)			37,33	
LONDON (Cripplegate)								
				6,70x6,20			41,54	

A		B	C	D	E	F	G	H
DOVER								
Ft I	A7,A6,A5			3,75x4,62			17,33	4,45
	A8			3,80x5,00			19,00	4,50
Ft II	B19	3,70x2,50	3,70x2,50	3,70x5,50			20,35	4,40
				3,70x5,50			20,35	
	B24-26			3,60x4,60			16,56	4,30
	B30			4,80x5,00			24,00	
	B32			x5,45				
	P19 PII			8,00x5,10			40,80	8,70
	PIII			5,00x3,60			18,00	5,70
	B32 PII	4,50x3,20	*4,50*x1,85	*4,50*x5,50	14,40	*8,33*	24,75	5,20
	PIII	3,10x3,75	*3,10*x1,20	*3,10*x5,50	11,63	*3,72*	*17,05*	3,80
HOD HILL								
LP	X			2,74x3,05			8,36	3,14
	IX			2,74x3,66			10,03	3,14
	XII/XIII			2,74x3,05			8,36	3,14
RP	VIII			3,05x3,96			12,08	3,45
	VII			3,05x3,96			12,08	3,45
R	Stable II			5,49x3,35			18,39	5,89
				3,68x3,35			12,33	4,08
	Bks IV			2,74x2,13			5,84	3,14
	II,I			3,96x3,05			12,08	4,36
SOUTH CADBURY								
Site B	S			2,00x4,00			8,00	2,30
WADDON HILL								
IV				2,75x3,70			10,18	3,05
V				3,00x4,20			12,60	3,40
HEMBURY								
				3,50x2,40			8,40	3,90
NANSTALLON								
P	IV	3,40x4,40	3,40x2,90	3,40x7,80	14,96	9,86	26,52	3,80
	III	3,30x3,95	3,30x2,40	3,30x6,85	13,04	7,92	22,61	3,70
R	I	3,51x4,42	3,51x3,35	3,51x8,17	15,51	11,76	28,68	3,91
BOULOGNE								
RR		*3,35x*	*3,35x13,35x*					*4,05*

A		B	C	D	E	F	G	H
ARLAINES								
R		3,20x4,00	3,20x2,00	3,20x6,70	12,80	6,40	21,44	3,90
VALKENBURG								
C 1 P	13	3,00x4,00	3,00x2,00	3,00x6,40	12,00	6,00	19,20	3,40
	14			5,00x7,50			37,50	6,00
LatP	1			7,00x6,50			45,50	7,40
	2	3,00x3,70	3,00x2,00	3,00x6,10	11,10	6,00	18,30	3,40
	3	2,70x3,80	2,70x2,00	2,70x6,20	10,26	5,40	16,74	3,10
	4	2,70x3,40	2,70x1,90	2,70x5,70	9,18	5,13	12,69	3,10
	5	2,70x3,50	2,70x2,10	2,70x6,00	9,45	5,67	16,20	3,10
	7	3,00x3,40	3,00x2,00	3,00x5,80	10,20	6,00	17,40	3,40
	8	3,20x4,00	3,20x1,80	3,20x6,20	12,80	5,76	19,84	3,60
	9	3,00x4,50	3,00x1,80	3,00x6,70	13,50	5,40	20,10	3,40
C 1a LatP	a	3,00x3,50	3,00x3,40	3,00x7,30	10,50	10,20	21,90	3,40
	b	3,00x3,60	3,00x2,00	3,00x6,00	10,80	6,00	18,00	3,40
	c	3,20x3,50	3,20x3,40	3,20x7,30	11,20	10,88	23,36	3,60
C 2/3 P	12	2,80x3,80	2,80x1,80	2,80x6,00	10,64	5,04	16,80	3,20
	10	3,10x3,60	3,10x1,80	3,10x5,80	11,16	5,58	17,98	3,50
LatP	2	3,00x3,50	3,00x3,50	3,00x7,40	10,50	10,50	22,20	3,40
	3	3,00x3,30	3,00x4,80	3,00x8,50	9,90	14,40	25,50	3,40
	4	3,00x3,00	3,00x2,50	3,00x5,90	9,00	7,50	17,70	3,40
	5	3,00x3,00	3,00x3,20	3,00x6,60	9,00	9,60	19,80	3,40
	6	7,00x8,00	7,00x8,00	7,00x16,40	56,00	56,00	114,80	7,40
	7	3,70x4,00	3,70x2,00	3,70x6,40	14,80	7,40	23,68	4,10
	8	3,70x4,00	3,70x4,00	3,70x8,40	14,80	14,80	31,08	4,10
C 4 P	11	2,70x3,60	2,70x2,00	2,70x6,00	9,72	5,40	16,20	3,10
	10			2,50x				
LatP	2	2,50x2,60	2,50x1,80	2,50x4,80	6,50	4,50	12,00	2,90
	3	2,70x1,30	2,70x3,75	2,70x5,45	3,51	10,13	14,72	3,10
	4	2,70x3,00	2,70x1,80	2,70x5,20	8,10	4,86	14,04	3,10
	6			2,60x7,00			18,20	
	7	2,60x3,75	2,60x1,80	2,60x5,95	9,75	4,68	15,47	3,00
	8	3,20x3,20	3,20x2,00	3,20x5,60	10,64	6,40	17,92	3,60
	9	2,80x1,80	2,80x3,30	2,80x5,50	5,04	9,24	15,40	3,20
C 5 P	14	3,00x3,00	3,00x2,80	3,00x6,20	9,00	8,40	18,60	3,40
	11	2,80x3,50	2,80x2,50	2,80x6,40	9,80	7,00	17,92	3,20
	10	2,50x2,00	2,50x2,50	2,50x4,90	5,00	6,25	12,25	2,90
LatP	1	3,00x3,00	3,00x2,00	3,00x5,40	9,00	6,00	16,20	3,40
	2	2,50x3,70	2,50x2,50	2,50x6,20	9,25	6,25	15,50	2,90
	3	2,50x2,40	2,50x2,60	2,50x5,40	6,00	6,50	13,50	2,90
	4	2,50x4,00	2,50x2,00	2,50x6,40	10,00	5,00	16,00	2,90
	5	2,50x3,75	2,50x2,00	2,50x6,15	9,38	5,00	15,38	2,90
	6			2,50x5,50			13,75	2,90
	7	3,50x3,10	3,50x2,00	3,50x5,50	10,85	5,00	19,25	3,90
	8	2,50x2,50	2,50x2,40	2,50x5,40	6,25	6,00	13,50	2,90
	9	2,50x2,50	2,50x3,50	2,50x6,40	6,25	8,75	16,00	2,90

A		B	C	D	E	F	G	H
C 6 P	16	3,00x5,00	3,00x2,00	3,00x7,40	15,00	6,00	22,20	3,40
	13	3,00x3,80	3,00x2,50	3,00x6,70	11,40	7,50	20,40	3,40
	12	3,70x4,00	3,70x3,00	3,70x7,40	14,80	11,10	27,38	4,10
Lat P	4	3,00x4,30	3,00x2,50	3,00x7,20	12,90	7,50	21,60	3,40
	5	3,00x3,00	3,00x3,00	3,00x6,40	9,00	9,00	19,20	3,40
	6	3,00x3,20	3,00x2,20	3,00x5,80	9,60	6,60	17,40	3,40
	7	3,75x2,00	3,75x2,00	3,75x4,40	7,50	7,50	16,50	4,15
	8			3,20x7,00			22,40	3,60
	9	2,90x3,00	2,90x2,00	2,90x5,40	8,70	5,80	15,66	3,30
	10	3,00x3,00	3,00x3,50	3,00x6,90	9,00	10,50	20,70	3,40
	11	3,00x3,20	3,00x3,40	3,00x7,20	9,60	10,20	21,60	3,40
	2			3,20x5,50			17,60	3,60
ARENTSBURG								
LP		x3,25	x1,85	x5,40				
ZWAMMERDAM								
Fl VIII	RP	3,50x3,75	3,50x2,00	3,50x6,50	13,13	7,00	22,75	3,90
ASCIBURGIUM								
K IV		4,00x2,70	4,00x2,70	4,00x5,80	10,80	10,80	23,20	4,40
K V	RP	3,50x3,60	3,50x1,20	3,50x5,20	12,60	4,20	18,20	3,90
	RR	*3,00x3,70*	*3,00x2,70*	*3,00x6,10*	*11,10*	*8,10*	*18,30*	*3,40*
KREFELD-GELLEP								
IIa	1,3	3,70x3,30	3,70x5,20	3,70x9,00	12,21	19,24	33,30	4,10
IIIb	1			3,50x3,00			10,50	3,90
	2	3,60x4,80	3,60x3,80	3,60x9,00	17,28	13,68	32,40	4,00
	3			3,50				
IV	1			3,50x4,70			16,45	3,90
DORMAGEN								
Fl D	Pd 2	3,50x3,00	3,50x	3,50x				3,00
Fl C	N Pd 2	4,00x2,80	4,00x		11,20			4,20
	S Pd 2	3,30x4,50	3,30x3,40	3,30x8,30	14,85	11,22	27,39	3,50
	Pd 3	3,30x6,25	3,30x1,60	3,30x8,25	20,63	5,28	27,23	3,50
	Pd 4	4,00x	4,00x	4,00x				
Fl B		4,00x2,40	4,00x3,20		9,60	12,80		4,20
ALTEBURG								
RR		4,00x3,00	4,00x2,50	4,00x6,20	12,00	10,00	24,80	4,70

A	B	C	D	E	F	G	H
NIEDERBIEBER							
LP 126	4,10x	4,10x	4,10x				6,25
RP 161/162	4,60x5,40	4,60x6,50	4,60x12,30	24,84	29,90	56,58	5,00
163/164	4,60x6,25	4,60x6,00	4,60x12,65	28,75	27,60	58,19	5,00
LR 105/296	5,60x7,00	5,60x5,25	5,60x12,65	39,20	29,40	70,84	6,00
HOLZHAUSEN							
LatP A	3,34x3,70	3,34x3,00	3,34x7,10	12,36	10,02	23,71	3,74
SAALBURG							
LatP	2,50x5,00	2,50x2,50	2,50x8,20	20,50	6,25	12,50	3,20
W	x3,50	x3,50	x7,40				
R F	2,50x4,00	2,50x1,50	2,50x3,90	10,00	3,75	9,75	2,90
KAPERSBURG							
2 SK			3,00x3,00			9,00	3,70
BUTZBACH							
Pd 1 III	x4,20	x4,05	x8,85				
II	x4,35	x4,05	x8,70				
I	*3,00*x4,50	*3,00*x3,90	*3,00*x8,85	*13,50*	*11,70*	*15,00*	*3,40*
Pd 2		x4,80					
Pd 3 II	3,45x3,60	3,45x3,75	3,45x7,80	12,42	12,94	26,91	3,75
I	*3,00*x*3,45*	*3,00*x3,90	*3,00*x6,45	*10,35*	*11,70*	*19,36*	*3,30*
Pd 4 III			x9,75				
II	3,30x4,50	3,30x3,60	3,30x8,55	14,85	11,88	28,22	3,60
I	3,60x*3,45*	3,60x4,50	3,60x9,00	*12,42*	16,20	32,40	3,90
ECHZELL							
LR Pds 1,2a	3,63x4,50	3,63x4,00	3,63x9,00	16,34	14,52	32,67	4,03
Pd 2b			3,50				
ALTENSTADT							
RP Pd 5 W	4,20x4,70	4,20x3,60	4,20x8,70	19,74	15,12	36,54	4,60
E	x4,70						
RR E Pd 2/3			3,00x4,00			12,00	3,40
Pd 4	3,00x4,00	3,00x3,60	3,00x8,10	12,00	10,80	24,30	3,40
W Pd 5			x3,80				

A			B	C	D	E	F	G	H
OKARBEN									
LR	Fl I	Pd 1			1,40x				
HEDDERNHEIM									
RR	Ph 1		3,00x5,60	3,00x4,60	3,00x11,40	16,80	13,80	34,20	3,40
	Ph 2	II	3,30x3,50	3,30x4,90	3,30x9,00	11,55	16,17	29,70	3,70
		I	3,30x	3,30x4,00	3,30x		13,20		3,70
	Ph 3	N	3,30x4,40	3,30x4,00	3,30x9,10	14,52	13,20	30,03	3,70
		S			3,50x				
HOFHEIM (Erdlager)									
RP	Q				x6,25				
LR	B	Pd 2	3,40x	3,40x	3,40x8,40			28,56	3,80
					3,40x9,80			33,32	3,80
	C	Pds 1,2	3,40x3,20	3,40x4,00	3,40x8,00	10,88	13,60	27,20	3,80
	D	Pds 1,2	3,20x3,80	3,20x4,80	3,20x9,00	12,16	15,36	28,80	3,60
	E	Pd 2	3,20x3,60	3,20x4,60	3,20x8,50	11,52	14,72	27,20	3,60
RR	H				x4,50				
	h		4,00x5,90	4,00x4,00	4,00x10,30	26,60	16,00	41,20	4,40
	K				3,10x3,50			10,85	
	L				5,60x				
HOFHEIM (Steinkastell)									
Pd 1	LP	10	3,38x3,38	3,38x3,38	3,38x7,13	11,42	11,42	24,20	3,78
		11	x3,00	x4,50	x8,25				
		12,13	3,00x4,13	3,00x4,13	3,00x8,63	12,39	12,39	25,89	3,40
	RP	6	3,38x4,13	3,38x2,63	3,38x7,88	13,96	8,89	26,63	3,78
		7	3,38x4,50	3,38x3,38	3,38x8,25	15,21	11,42	27,89	3,78
		8,9	3,00x3,75	3,00x4,50	3,00x8,25	11,25	13,50	24,75	3,40
	LR	25-27	3,75x4,20	3,75x4,20	3,75x9,00	15,75	15,75	33,75	4,15
	RR	21			3,38x4,13			13,96	3,78
		22-24	3,75x4,13	3,75x4,13	3,75x8,63	15,49	15,49	32,36	4,15
Pd 2	3		3,80x4,00	3,80x2,90	3,80x7,30	15,20	11,02	27,74	4,20
	4		3,80x4,00	3,80x2,00	3,80x6,40	15,20	7,60	24,32	4,20
WIESBADEN									
P	h				9,00x6,50			58,50	
LatP	f				x6,00				
	c				10,00x6,00				
	d				x7,00				
R	g		3,50x3,50	5,00x4,50	x9,00	12,25	22,50		
SELIGENSTADT									
Centre			3,00x3,00	3,00x3,00	3,00x6,70	9,00	9,00	20,10	3,70

A			B	C	D	E	F	G	H
HESSELBACH									
Pd 1	LatP	Bks			*3,75x4,15*			*15,56*	*4,05*
Pd 2/2a	R	4			3,38x4,75			16,06	3,78
		3			3,25x2,88			9,36	3,65
		2			4,00x4,13			16,52	4,40
		1			3,75x3,88			14,55	4,05
LADENBURG									
Phs 1,2			3,50x4,00	3,50x	3,50x	14,00			3,90
Ph 3			3,75x	3,75x	3,75x				4,15
MURRHARDT									
LR	B		3,60x5,80	3,60x*3,00*	3,60x*9,20*	20,88	*10,80*	*33,12*	4,00
ROTTWEIL KASTELL I									
N-E	Pds 1,2	N	3,70x4,30	3,70x2,70	3,70x7,40	15,91	9,99	27,38	4,10
	Pd 2	S	x4,30	x4,30					
ROTTWEIL KASTELL II									
LP			x4,25	x2,40	x7,35				4,95
ROTTWEIL KASTELL III									
P			3,00x3,75	3,00x3,75	3,00x8,00	11,25	11,25	24,00	3,40
ROTTWEIL KASTELL IV									
LP			3,25x	3,25x	3,25x				
HÜFINGEN									
K 1	III,IV				x4,00				
K 2	Ib	Pd 1	3,00x2,75	3,00x3,50	3,00x7,00	8,25	10,50	21,00	3,40
		Pd 2	3,00x3,60	3,00x2,50	3,00x7,00	10,80	7,50	21,00	3,40
	Ia	Pd 1			2,70x3,70			9,99	
	II	Pd 2	2,90x	2,90x	2,90x5,25			15,23	3,30
ZURZACH									
K III			3,35x4,25	3,35x1,75	3,35x6,40	14,24	5,86	21,44	3,75

A			B	C	D	E	F	G	H
BURLADINGEN									
RP	D		3,50x3,25	3,50x3,50	3,50x7,50	11,38	12,25	26,25	3,90
	E		3,50x4,00	3,50x1,50	3,50x5,80	14,00	5,25	20,30	3,90
	F		3,50x3,70	3,50x1,50	3,50x5,60	12,95	5,25	19,60	3,90
RIBTISSEN									
K 1 LR	D	E,W	2,75x3,63	2,75x1,25	2,75x5,38	9,98	3,44	14,80	3,15
	E				x3,75				
K 2	D	E	*3,25x3,75*	*3,25x2,25*	*3,25x6,50*	*12,19*	*7,31*	*21,13*	*3,65*
	E		x3,75	x1,25	x5,50				
UNTERKIRCHBERG									
Pd II Ph IIa	1		4,00x4,00	4,00x6,00	4,00x10,40	16,00	24,00	41,60	4,40
	4		x4,80	x5,20	x10,40				
HEIDENHEIM									
LP	I,II,III		4,00x4,25	4,00x4,00	4,00x8,60	17,00	16,00	34,40	4,30
RR	N		4,50x4,50	4,50x4,00	4,50x8,80	20,25	18,00	39,60	4,80
	S		*4,00*x4,00	*4,00*x4,00	*4,00*x8,50	16,00	16,00	34,00	4,30
AALEN									
LP			4,50x4,38	4,50x2,63	4,50x7,25	19,71	11,84	32,63	4,90
FRIEDBERG									
R			x4,25	x1,75	x6,30				
MUNNINGEN									
RP	1		x3,25	x3,25	x7,00				
	2,3		3,25x3,50	3,25x3,13	3,25x7,00	11,38	10,17	22,75	3,55
RR	7-10		3,25x3,75	3,25x2,75	3,25x7,00	12,19	8,94	22,75	3,55
WEIßENBURG (Breitung)									
LP	1,2		3,25x3,00	3,25x3,00	3,25x6,40	9,75	9,75	20,80	3,65
RP	4,5,6,7		3,00x3,00	3,00x3,00	3,00x6,40	9,00	9,00	19,20	3,40
ELLINGEN									
LP	D		x3,80	x3,80	x8,00				
RP	C Ph 1		x3,70	x2,60	x6,60				

A			B	C	D	E	F	G	H
	Ph 2		x3,20	x3,20	x6,80				
P/R B	Ph 1	W,E	3,40x3,60	3,40x3,60	3,40x7,60	12,24	12,24	15,84	3,80
	Ph 3	W,E	3,80x3,80	3,80x3,80	3,80x8,00	14,44	14,44	30,40	4,20
LatP E	Ph 1		3,40x2,60	3,40x2,60	3,40x5,60	8,84	8,84	19,04	3,80
LR	Ph 1		3,20x3,80	3,20x2,80	3,20x6,80	12,16	8,96	21,76	3,60
	Ph 2		4,40x4,40	4,40x4,40		19,36	19,36		4,80
OBERSTIMM									
RP 14	Pd 1b		2,90x4,00	2,90x2,00	2,90x6,40	11,60	5,80	18,56	3,20
	Pd 2			x2,60					
12	Pd 2		x3,20	x4,00					
LatP 6	Pds 1a,b		2,80x4,50	2,80x1,70	2,80x6,50	12,60	4,76	18,20	3,10
	Pd 1c		3,20x4,20	3,20x2,00	3,20x6,80	13,44	6,40	21,76	3,50
	Pd 2		3,20x4,20	3,20x2,60	3,20x7,20	13,44	8,32	23,04	3,50
5	Pds 1a,b		x4,50	x1,70	x6,50				
4	Pd 1b		x4,50	x1,70	x6,50				
STRAUBING (Kastell IV)									
LP S			3,50x3,90	3,50x4,50	3,50x8,80	13,65	15,75	30,80	3,90
N			3,50x4,30	3,50x3,60	3,50x8,30	15,05	12,60	29,05	3,90
RP S			x4,00	x4,25	x9,00				
N			3,50x3,75	3,50x3,00	3,50x7,50	13,13	10,50	26,25	3,90
MOOS-BURGSTALL									
RP E			3,20x4,20	3,20x4,00	3,20x8,60	13,44	12,80	27,52	3,50
W			3,20x4,20	3,20x3,80	3,20x8,40	13,44	12,16	26,88	3,50
Anbau			3,40x2,80	3,40x2,80	3,40x5,80	9,52	9,52	19,72	3,70
KÜNZING									
P 1-4,6-9			3,50x4,40	3,50x3,80	3,50x8,60	15,40	13,30	30,10	3,90
LR 15					7,40x3,90			28,85	
19					x2,60				
					x3,60				
					x2,80				
RR 18			3,60x4,20	3,60x4,00	3,60x8,60	15,12	14,40	30,96	4,00
20			x4,00	x4,00					
ZWENTENDORF									
2 SK E					4,50x8,75			39,38	5,20
F					4,20x7,60			31,92	4,90

A	B	C	D	E	F	G	H
PETRONELL							
LP Pd 2 Ph 1 W	4,00x5,50	4,00x3,75	4,00x10,00	22,00	15,00	40,00	4,70
E	x3,75	x3,75	x8,70				
RP	4,00x3,00	4,00x6,50	4,00x10,00	12,00	26,00	40,00	4,70
ZALALÖVŐ							
Pds 1,2,3	2,25x	2,25x	2,25x				2,65
IŽA-LÉANYVÁR							
LP	4,50x4,80	4,50x4,80	4,50x10,30	21,60	21,60	46,35	5,20
P			5,00x5,00			25,00	
LatP S,N	x5,00	x4,50	x10,20				
RR	x4,50	x4,50	x9,70				
R Centre	4,50x4,80	4,50x4,80	4,50x10,30	21,60	21,60	46,35	5,20
INTERCISA							
SK 16B			3,30x4,00			13,20	3,70
16A		3,40x6,25			21,25		
ČEZAVA							
RP Ph IV			2,86x3,00			8,58	3,56
Ph V			9,00x5,00			45,00	9,70
	3,30x2,10	3,30x2,10	3,30x5,00	6,93	6,93	16,50	4,00
DROBETA							
P 1,4			2,60x5,10			13,26	3,30
2			7,00x5,40			37,80	7,70
3,6			5,00x2,50			12,50	5,70
5			5,00x5,40			27,00	5,70
Lat P 7,8			4,00x6,10			24,40	4,70
R 9,10			6,00x6,10			36,60	6,70
11			6,00x5,10			30,60	6,70
12			7,50x6,10			45,75	8,20
13			7,00x6,10			42,70	8,20
POROLISSUM							
RP B3	x2,45	x2,45	x5,60				

A		B	C	D	E	F	G	H
SLÄVENI								
P	1,4			4,00x7,60			30,40	4,70
	2,3,5,6			4,00x8,60			34,40	4,70
OSTIA								
N				4,75x6,25			29,69	
S				4,75x5,00			23,75	
BU NGEM								
LP	1	2,50x2,50	2,50x2,50	2,50x5,70	6,25	6,25	14,25	3,20
	2			2,50x3,50			8,75	
RP	5	2,50x3,50	2,50x2,00	2,50x6,20	8,75	5,00	15,50	3,20
	6			2,50x4,00			10,00	3,20
	7			3,00x4,50			13,50	3,70
	8			3,50x5,00			11,50	4,20
LR	10			3,00x5,50			16,50	3,70
RR	12	2,50x3,00	2,50x1,50	2,50x5,20	7,50	3,75	13,00	3,20
	13			3,50x5,00			17,50	4,20
	14	2,50x3,00	2,50x3,00	2,50x6,70	7,50	7,50	16,75	3,20
	15			4,00x6,00			24,00	4,70

TABLE XX SPECIAL *CONTUBERNIA*

A - Subject of entry
B - First *contubernium*
C - Area
D - End *contubernium*
E - Area
F - End *contubernium* Type 'j' (*Schlußbau*)
G - Area

Note: All measurements are internal and where present the dimensions of the individual rooms are given

A	B	C	D	E	F	G
STRAGEATH						
I LatP A			5,03x4,27	21,48		
			5,03x1,52	7,65		
				29,13		
LP XV					7,60x3,40	25,84
					7,60x1,80	13,68
					7,60x4,40	33,44
						72,96
XIII			6,80x4,00	27,20		
			6,80x3,10	48,28		
				48,28		
RP VI			5,00x3,00	15,00		
			5,00x3,00	15,00		
				30,00		
RR II	6,00x4,30	25,80			6,25x4,10	25,63
	6,00x3,25	19,50			6,25x4,00	25,00
		45,30				50,63
LR X			5,25x6,50	34,13		
IX			3,00x3,00	9,00		
			3,00x3,00	9,00		
			2,00x6,25	12,50		
				30,50		
CHESTERS						
RP 3	1,00x7,60	7,60				
HOUSESTEADS						
XIII Pd I			3,50x9,40	32,90		

A			B	C	D	E	F	G
PEN LLYSTYN								
LR	R1				3,60x2,50	9,00		
					3,60x4,70	16,92		
						25,92		
GELLIGAER II								
LP	XIV		3,60x9,42	33,91				
	XII		3,96x9,50	37,62				
RP	XV		3,81x10,03	38,21				
	XIII		3,20x10,03	32,10				
LR	I		4,87x9,42	45,88				
	II		4,11x9,12	37,48				
DOVER								
Ft II	B32	PIIIB			7,65x2,70	20,66		
	B24	PII	3,00x4,50	13,50				
VALKENBURG								
C 1	LatP	3					5,00x7,00	35,00
		6					4,30x7,00	30,10
		7					4,30x8,00	34,40
		8					4,30x7,00	30,10
		9					4,00x7,00	28,00
C 1a	LatP	b,c					9,00x7,50	67,50
C 2/3	LatP	4	6,00x6,00	36,00				
		5	5,00x3,50	17,50				
			5,00x3,50	17,50				
				35,00				
		7,8					7,50x9,00	67,50
C 4	LatP	2			3,50x5,00	17,50		
		3			3,00x5,50	16,50		
		4			3,50x5,50	19,25		
		9			2,30x5,00	11,50		
C 5	LatP	2			6,00x3,75	22,50		
					6,00x2,80	16,80		
						39,30		
		3			6,00x2,80	16,80		
					6,00x2,50	15,00		
						31,80		
		4			6,00x4,00	24,00		
					6,00x2,50	15,00		
						39,00		

A		B	C	D	E	F	G
	5			6,00x3,75	22,50		
				6,00x2,00	12,00		
					34,50		
	9			6,80x2,80	19,04		
				6,80x3,75	25,50		
					44,54		
C 6 LatP	4			7,00x4,50	31,50		
				7,00x3,00	21,00		
					52,50		
	5			7,00x3,00	21,00		
				7,00x3,00	21,00		
					42,00		
	6			7,00x3,00	21,00		
				7,00x2,00	14,00		
					35,00		
	7			7,00x2,00	14,00		
				7,00x2,00	14,00		
					28,00		
	11			7,10x3,20	22,72		
				7,10x3,30	23,43		
					46,15		
ECHZELL							
LR Pds 1,2a	Fm1	4,50x8,50	38,25			7,00x11,50	80,50
	Fm2					11,00x11,50	126,50
HEDDERNHEIM							
RR Ph 2	II	3,25x7,60	24,70				
HOFHEIM (Steinkastell)							
Pd II	3			6,00x4,00	24,00		
				6,00x4,60	27,60		
					51,60		
	4			5,80x7,00	40,60		
ROTTWEIL KASTELL III							
R				5,50x8,00	44,00		
ZURZACH							
K III		3,00x6,75	20,25				

A	B	C	D	E	F	G
HEIDENHEIM						
LP I,II,III	4,50x4,25	19,13				
	4,50x4,00	18,00				
		37,13				
MUNNINGEN						
RR 9,10			6,50x7,00	45,50		
OBERSTIMM						
RP 14 Pd 1b					8,00x8,40	67,20
LatP 6 Pds 1a,b					10,00x8,70	87,00
Pd 1c			7,00x6,60	46,20		
Pd 2			5,40x7,00	37,80		
5 Pds 1a,b					10,94x8,44	92,33
PETRONELL						
Pd 2 Ph 2 LP W			5,25x5,50	28,88		
			5,25x3,75	19,69		
				48,57		
RP			7,50x3,00	22,50		
			7,50x6,50	48,75		
				71,25		
DROBETA						
LP 1	4,50x5,10	22,95				
RP 4	4,50x5,10	22,95				
LR 10	9,00x6,10	54,90				
11	9,00x5,10	45,90				
13	3,00x6,10	18,30				
BU NGEM						
RP 5	1,75x3,50	6,13				
	1,75x2,00	3,50				
		9,63				
6			3,00x2,75	8,25		
			3,00x2,75	8,25		
				16,50		
7			3,00x2,50	7,50		
			3,00x3,00	9,00		
				16,50		
RR 13			4,80x7,50	36,00		

TABLE XXI AREAS

A - Subject of entry
B - Officers' Quarters
C - Men's Quarters (excluding veranda)
D - Total area of building (excluding veranda)
E - Living space of *contubernium*
F - Total living space available in men's quarters

A			B		C		D		E	F
CARDEAN										
LatP							125,36	112,72	8,79	70,32
R			118,85	110,24	356,66	342,02	475,51	452,26	23,25	232,50
FENDOCH										
P	Bks		105,74	97,67	289,63	275,01	395,37	372,68	25,03	250,30
	Sheds						273,52	252,47		
R	Bks		94,32	86,68	250,55	235,62	344,87	322,30	19,27	192,70
STRAGEATH										
I	LatP	A			235,02	222,56	235,02	222,56	17,43	186,00
	LP	XV	127,50	120,78	283,80	271,41	411,30	392,19	19,11	293,16
		XIV	87,50	81,74	241,50	229,14	329,00	310,88	21,18	190,62
		XIII	102,50	96,38	282,90	270,18	385,40	366,56	25,55	227,13
	RP	VII	117,60	111,18	270,45	261,44	388,05	372,62	27,30	191,10
		VI	89,60	83,93	211,28	201,89	360,05	285,82	21,19	148,33
	LR	XII	130,15	123,38	292,37	282,23	422,52	405,51	22,80	228,00
		XI	120,40	113,71	263,16	253,98	383,56	367,69	23,10	231,00
		X	98,64	91,98	259,16	248,93	357,80	340,91	18,13	193,17
		IX	164,70	156,60	185,50	177,55	350,20	334,15	17,40	151,80
	RR	IV	101,25	95,27	315,00	301,89	416,25	397,16	28,00	280,00
		III	95,63	89,79	297,50	284,54	393,13	391,16	28,00	280,00
		II	79,12	73,87	226,20	213,90	305,32	287,77	19,25	
		I	237,90	228,48	255,15	246,65	493,05	475,13	22,40	179,20
II	LP	XVII	107,25	100,88	228,15	242,78	335,40	343,66	22,23	155,61
		XVI	129,25	122,40	270,25	261,63	399,50	384,03	29,16	204,12
		XV					269,03	254,47		
		XIV			166,63	157,94	166,63	157,94	16,64	83,20
	RP	VIII	100,42	96,31	214,62	205,84	315,04	302,15	23,52	164,64
		VII	102,40	96,25	238,96	230,00	341,36	326,25	17,38	173,80
		VI					235,20	221,01		
		V	101,12	95,00	228,71	220,02	329,83	315,02	16,75	167,50
	LR	XII	109,15	102,93	283,98	274,77	393,13	377,70	24,60	246,00
		XI	108,90	102,72	324,72	314,88	433,62	417,60	25,81	258,10

A		B		C		D		E	F
	X	124,95	118,28	308,70	299,25	433,65	417,53	24,61	246,10
	IX					213,00	198,81		
RR	IV					423,00	406,29		
	III					282,00	266,19		
	II					235,00	219,49		
	I					498,20	481,01		
III LP	XIII	136,30	129,22	251,45	243,43	387,75	372,65	25,50	204,00
	XII	184,22	176,12	330,62	322,49	514,84	498,61	30,90	247,20
	XI	175,49	167,48	186,67	178,78	462,16	446,26	27,30	218,40
RP	VII	176,61	168,27	272,18	263,58	448,79	431,85	22,25	222,50
	VI	128,64	121,83	315,84	305,97	444,48	427,80	45,65	365,20
	V	157,68	150,15	339,12	329,70	496,80	479,85	28,65	257,85
LR	X	117,80	111,32	319,20	309,12	437,00	420,44	23,65	260,15
	IX	111,72	105,30	273,00	263,25	384,72	368,55	22,50	225,00
	VIII	102,90	96,80	285,18	275,00	388,08	371,80	23,25	255,75
RR	IV	113,99	107,50	217,63	208,30	331,62	315,80	15,50	155,00
	III					205,74	190,76		
	II	95,90	89,78	224,14	214,53	320,04	304,31	18,60	186,00
	I	193,73	185,07	259,33	251,74	453,06	436,81	35,60	213,60
ARDOCH									
IC P						288,00			
R						744,00	714,56		
Ant II R						359,97	338,18		
CAMELON									
Flav		*56,00*	*50,16*	*256,75*	*240,95*	*312,75*	*291,11*	20,14	*201,40*
Ant LP	VIII					410,41	357,46		
	VII,VI					426,48	373,24		
	V					489,70	435,37		
RP	IV,III	106,60	88,75	321,08	284,59	427,68	373,34		
	II,I					410,41	357,46		
R	XIV	129,50	109,74	311,41	276,03	440,91	385,77		
LatP	IX					335,12	301,37		
	XII					269,81	237,43		
MUMRILLS									
R						653,19	635,41		
ROUGH CASTLE									
LP N	Pd 1	76,25							
	Pd 2	55,01	50,51	98,55	93,44	153,56	143,95		
		55,01	50,51	*186,79*	*177,12*	241,80	227,63	*16,90*	*169,00*
S						165,75	156,01		

A		B		C		D		E	F
BAR HILL									
LP	i					160,00	151,69		
RP	ii					344,00	328,79		
LR	iii	92,63	86,94	272,00	261,80	364,63	348,74	19,00	190,00
	v	100,00	94,09	268,00	157,95	368,00	352,04	19,00	190,00
RR	iv	95,00	89,24	268,00	257,95	363,00	347,19	19,00	190,00
CADDER									
RP	XIII,XII					301,05	287,70		
LR	X Pd 1					285,29	273,67		
	Pd 2					151,76	142,25		
	Pd 3					206,20	196,78		
	VIII,VI					339,92	326,11		
RR	XI					272,37	258,97		
	IX,VII					339,92	326,11		
LatP	IV					177,86	169,26		
BALMUILDY									
LP	IX	107,90	99,59	350,70	338,26	458,60	437,85		
	VII					482,97	462,40		
RP	X					580,29	557,35		
	VIII					533,36	523,59		
LR	XIII					245,32	226,22		
	XI					503,78	482,24		
RR	XIV					254,35	233,78		
	XII					536,50	513,50		
BEARSDEN									
LP	1,2					150,45	138,65		
	3	30,00	26,79	147,00	138,13	177,00	164,92	12,00	96,00
RP	5					163,80	151,73		
	6					36,00	32,19		
	7	27,30	24,23	136,50	127,50	163,80	151,80	11,40	91,20
	9					67,5-	61,74		
	10					184,50	170,94		
DUNTOCHER									
Centr Bdg		74,64	63,88	77,70	68,13	152,34	132,01		
OLD KILPATRICK									
LP	I					449,50	424,86		
	III,V					506,90	481,82		
RP	II					465,86	441,70		

A		B		C		D		E	F
	IV					410,41	386,68		
	VI					489,70	465,35		
CRAMOND									
RP	A Pds 1,2					399,50	361,14		
	Pd 3					258,50	222,24		
	B Pd 2					212,80	182,77		
	Pd 3					246,40	212,17		
INVERESK									
LR	S	129,16	120,17	330,14	316,05	459,30	435,23		
						609,63	585,28		
	N	150,41	140,75	363,37	348,92	513,78	489,67		
ELGINHAUGH									
LP	5,6,7	100,00	91,96	284,00	269,80	384,00	361,76	20,40	204,00
	8					350,40	328,44	19,50	
RP	9,10,11,12	94,00	86,26	286,00	271,70	380,00	357,96	20,40	204,00
LR	4	165,00	153,86	206,25	196,25	371,25	350,11	26,48	158,88
	3	165,00	153,86	206,25	196,25	371,25	350,11	21,28	148,26
RR	2	111,38	102,84	259,88	247,28	371,26	350,12	21,18	190,62
	1	144,38	134,24	226,88	215,88	371,26	350,12	21,18	169,44
CASTLEDYKES									
RP						249,90	233,48		
						658,70	*634,17*		
LOUDOUN HILL									
						362,33	340,42	20,60	
LYNE									
LP	1					336,80	316,24		
	2					377,03	356,09		
	3					444,65	423,11		
RP	4					493,40	468,53		
	5					203,23	180,53		
	6					197,43	175,34		
	7					162,57	144,14		
	8					179,00	160,96		
	9					177,85	158,94		
	10					171,87	152,46		

A			B		C		D		E	F
NEWSTEAD										
II	P								55,22	
	R						1186,02	1109,75		
III,IV	LP		58,47	44,61	576,80	529,48	635,27	574,09	33,45	334,50
	RP	VI-II	56,87	43,28	593,57	543,51	650,44	586,79	33,45	334,50
		I	56,87	43,28	407,21	357,14	464,08	400,42	22,33	223,30
IV R	XIX						1036,64	949,94		
	XVIII						295,38	265,20		
	XVII						660,39	597,15		
	XX						572,11	504,80		
XXI/XXII,XXIII/XXIV							1185,31	1094,50		
	XXV						457,86	374,46		
CAPPUCK										
IV a							151,57	127,95		
b							102,26	87,51		
CRAWFORD										
Flav P		VI					451,33	426,73	22,50	
LatP		III,IV,V					269,88	254,75		
Ant I P		IX					103,28	92,89		
		VII					172,13	158,36		
		VIII					170,00	156,33		
	R	VI-III					170,00	156,33		
Ant II P		IX					106,31	94,82		
		VIII-V					208,25	192,78		
		III,IV	68,00	59,13	140,25	133,65	208,25	192,78		
V+III,VI+IV			*68,00*	*59,13*	*342,55*	*326,43*	*410,55*	*385,56*		
RAEBURNFOOT										
N Sector		1					110,63	104,04		
		2					106,20	98,26		
Central S		3					144,00	136,29		
		4					136,00	128,59		
		5					198,00	188,79		
S Sector		6					146,30	138,38	22,50	112,50
		7					152,00	143,99		
		8					171,00	163,69	24,00	120,00
		9					144,40	136,51		
DALSWINTON										
B I	RP	N					*322,46*	*301,42*		
		S					*364,32*	*342,91*		
B II	RP						332,16	311,83		

A		B		C		D		E	F
CARZIELD									
RR	D	187,60	168,79	288,94	269,42	476,54	438,21	23,02	184,16
BIRRENS									
Ant I	RP S+V					390,00	355,67		
	½					*180,00*	*149,34*		
	VI/VII					410,09	374,31		
	½					189,27	157,17		
	Adj VIII					189,27	157,17		
RR	XIX/XX,XVII/XVIII	82,39	70,14	315,80	293,13	398,19	363,27	25,52	204,16
	½	*38,03*	*29,45*	*145,76*	*123,08*	*183,79*	*152,53*	*12,76*	*102,08*
	XXI/XXII					392,24	357,75		
	½					*181,04*	*150,21*		
	N					244,00	212,22		
Ant II	RP S+V					500,00	463,74		
	VI/VII					531,25	493,24		
	LR XXIV/XXV					537,60	499,73		
	½					*256,20*	*223,02*		
	RR XIX/XX					537,60	499,73		
	½					*256,20*	*223,02*		
	XXI					256,20	223,02		
	XXII					281,82	248,21		
SOUTH SHIELDS									
I	A1					426,40	406,00		
	A2					406,00	385,92		
	A3					186,75	160,29	44,06	
	A6	82,32	71,44	252,00	248,50	334,32	319,94		
II	B1					305,90	274,97		
	B2					326,00	304,38		
	B3					398,48	366,62		
	B4					425,70	391,92		
	B6,B7					408,50	372,24		
	B8					17,20	11,88		
	B9					33,97	25,92		
III	C19	222,75	202,24	82,50	67,94	305,25	270,18		
	C20 Ph 1					256,20	223,02		
	Ph 2	68,75	57,17	201,50	172,05	270,25	229,22	10,71	
WALLSEND									
LP	1,2	90,00	76,84	247,,50	224,40	337,50	301,24	21,35	192,15
	3					360,00	323,39		
	4					225,00	190,49		
RP	5,6,7	86,25	73,44	258,75	234,60	345,00	308,04	21,35	192,15
	8					253,00	217,44		
LR	9	95,63	82,29	295,38	271,05	391,01	353,34	25,20	226,80
	10	85,00	72,54	306,00	280,80	391,00	353,34	25,20	226,80
RR	11					391,00	353,34		

A		B		C		D		E	F
	12	89,25	76,44	301,75	276,90	391,00	353,34	25,20	226,80
RP	Pd II					248,40	212,91		
BENWELL									
LR	Bks N,S	121,40	106,42	357,23	332,37	478,63	438,79	28,58	257,22
	Stab N					586,75	545,63	41,28	
	S					529,48	489,22	33,20	
								45,29	
RR	Bks W					362,33	33,72		
	E					97,61	79,11		
	Stab N					486,30	446,68		
	S					558,12	517,43		
HALTONCHESTERS									
Hadr	1					219,17	188,51		
	2					337,96	304,74		
	3					350,24	316,81	27,89	
	4					350,24	316,81		
	5					326,07	293,07		
3C	2							26,53	
CORBRIDGE									
IA	LatP					330,00	312,96	26,81	214,48
	LR					249,78	227,53		
	RR	180,00	169,36	340,00	326,40	520,00	495,76	27,20	217,60
IB	LatP	164,50	154,36	190,00	182,40	354,50	336,76		
	LR					242,50	221,26		
	RR	143,75	129,71	365,00	350,40	508,75	480,11	26,25	262,50
II	LatP					181,50	166,26	*11,00*	*110,00*
	LR S	144,00	134,56	379,25	364,45	523,25	499,01	*24,36*	*243,60*
	N	90,00	82,46	302,00	286,90	392,00	369,36	*19,38*	*193,80*
	RR S	144,00	134,50	374,13	374,13	518,13	508,69	26,66	213,28
	N	96,00	88,16	292,00	277,40	388,00	365,56	26,25	262,50
III	LatP					170,00	154,56	11,20	112,00
	LR	108,00	99,76	328,50	313,90	436,50	413,66	22,80	228,00
	RR S	147,00	137,46	441,00	426,30	588,00	563,76	31,95	319,50
	N	110,25	101,91	330,75	316,05	441,00	417,96	21,00	210,00
IVA	LatP					213,00	198,32	21,25	127,50
	RR	127,20	118,32	336,70	321,90	463,90	440,22	28,00	224,00
IVB	RR	132,00	120,64	333,00	318,20	465,00	438,84	27,60	220,80

A	B		C		D		E	F
CHESTERS								
RP 1	73,96	62,41	295,84	271,76	369,80	334,17	17,68	176,80
2	82,56	70,31	275,20	251,12	357,76	321,43	17,16	171,60
3	94,50	81,34	297,00	273,90	391,50	355,24	17,71	184,70
Stab					660,00	619,19		
RR							30,67	
HOUSESTEADS								
XIV Pd I	98,70	85,24	351,14	323,05	449,84	408,29	25,53	255,30
Pd II							38,65	386,50
XIII Pd I							23,10	240,80
HALTWHISTLE BURN								
Site I					95,06	83,72		
Site II/III	77,00	66,83	165,00	144,06	242,00	210,89		
BIRDOSWALD								
RP Ib-f					419,73	379,70	26,46	
Ia					288,87	250,70		
STANWIX								
1,2					*234,00*	*204,74*		
3,4					*289,00*	*259,74*		
CARLISLE								
N							28,55	
S							11,55	
BOWNESS								
Ph 3					478,80	452,80		
MARYPORT								
Pd I W,E	110,25	96,01						
Pd II E	110,25	96,01						
EBCHESTER								
LP Pd 2	103,50	89,64	356,60	334,80	460,00	424,44		

A			B		C		D		E	F
LEASE RIGG										
G					234,50	221,10	276,50	258,06	24,80	198,40
D,H							259,25	243,81	20,91	
RAVENGLASS										
Ph 1	1						*475,00*			
Ph 2	4,5						*451,25*			
Ph 3	6,7,8						*456,00*			
WATERCROOK										
I,II			115,80	100,94	294,63	264,30	410,43	365,24		
BROUGH-BY-BAINBRIDGE										
Ft II	Pd 2	AA							26,22	
		AB							24,61	
	Pd 3	AA							26,22	
	Pd 4	AAi							26,22	
ILKLEY										
Ft 1	LP	E					339,13	319,00		
		W	67,56	61,14	271,58	257,86	339,14	319,00		
	LR	E					*147,63*	*129,56*		
		W					384,43	364,11		
Ft 2	LR						*169,18*	*151,78*		
Ft 3	LP	E					146,39	128,99		
		W					139,78	122,50		
	LR						*327,55*	*297,54*		
RIBCHESTER										
Ph C	B4								16,56	
HAYTON										
LP			58,80	52,82	205,80	194,60	264,60	197,42	24,13	168,91
BROUGH-ON-HUMBER										
Pd IIB	1						*263,20*	*242,32*	18,29	*182,90*
	2						*286,70*	*265,62*	19,26	*192,60*
Pd IV	1						*437,10*	*433,38*	34,00	*340,00*
	2						*399,50*	*377,46*	32,63	*326,30*

A			B		C		D		E	F
CASTLEFORD										
Later Ft	E-W Bk								15,97	
	N-S Bk								21,12	
	W Yard								24,50	
									7,00	
SLACK										
Ph 1	X	E,W					307,22	287,44	29,25	146,25
	VI						329,05	307,63		
	V						400,40	378,37		
Ph 3	IX	E,W	97,52	84,11	287,04	261,86	384,56	345,97	51,13	255,65
CASTLESHAW										
Agr	1						302,29	286,04		
	2,3						134,04	119,93		
	4						203,41	188,42		
LR							*114,89*	*101,03*		
MELANDRA CASTLE										
RP	I-IV						373,23	353,30	27,58	
TEMPLEBROUGH										
III c	LP	1					280,65	250,42	19,52	
		2	64,07	53,26	181,13	164,49	245,20	217,75	17,72	106,32
	RP						119,80	102,90		
BROUGH-ON-NOE										
Pd III	P						374,50	340,96		
ROCESTER										
			148,00	138,06					25,13	
METCHLEY										
Later Ft							174,04	162,00		
THE LUNT										
Pd I	RP						344,85	324,99	29,00	
	R	1	60,39	54,15	218,50	204,17	278,89	258,32	15,30	168,30

A		B		C		D		E	F
	2	70,15	63,27	208,74	195,05	278,89	258,32	19,56	195,60
	3					487,60	462,88	95,00	
								66,50	
								47,50	
	4	48,80	43,32	238,21	222,59	287,01	265,91	17,66	194,26
	5	48,80	43,32	230,09	215,00	278,89	258,32	17,66	194,26
	6					225,50	207,06		
E Defs	1					147,60	135,52		
Pd II RP						137,16	123,33		
						182,88	168,45		
R	1	60,39	54,15	109,19	102,03	169,58	156,18	15,30	76,50
	2	70,15	63,27	118,04	110,30	188,19	173,57	19,56	97,80
Rear R						198,12	183,49	110,25	

GREAT CASTERTON

Ft I	LP							13,30	
	LR A					*417,88*	*396,10*		
Ft II	LR B					*448,77*	*423,74*		

CAERHUN

LP	II					*368,60*	*329,82*		
	V					*436,50*	*396,74*		
	VII					*412,25*	*372,84*		
	X					*363,75*	*325,04*		
RP	I	141,04	124,68	309,38	283,99	250,42	408,67		
	IV	149,89	132,91	326,37	300,53	476,26	433,44		
	VI	148,81	127,18	319,79	293,55	468,50	420,73		
	VIII					397,80	392,34		
LR	XVII	209,26	189,15	363,12	338,58	572,38	527,73		
	XIX	189,17	170,02	336,48	311,95	525,65	481,97		
RR	XVI,XVIII					507,49	465,20	136,00	
								112,00	384,00

CAERNARVON

LP	Pd I 3							16,20	
	Pd III 1	230,00	217,80					28,28	
	2	202,95	190,95					24,60	
RP	X							18,75	
LR	XVII	112,00	97,09						
RR	XIX					500,25	462,24		
	XX					534,75	493,56	45,13	

PEN LLYSTYN

LP	P1	105,60	97,44	234,41	220,31	340,01	317,75	17,80	178,00
	P2	*93,60*	*85,84*	*274,95*	*260,85*	*368,55*	*346,69*	21,88	218,80
	P3					330,75	309,21		
RP	P4	119,44	110,78	238,00	224,00	357,44	334,78	19,93	*199,30*

A		B		C		D		E	F
	P5	143,55	133,95	222,70	209,60	366,25	343,55	18,59	185,90
	P6					404,20	382,12		
LR	R1	108,65	100,43	247,46	233,42	356,21	333,85	20,32	208,80
	R2	105,96	97,76	238,61	224,47	344,57	322,23	20,23	202,30
	R3	102,00	93,96	249,20	234,96	351,20	328,92	19,69	*196,90*
	R4					409,36	387,04		
RR	R5	99,88	91,94	302,18	287,96	402,06	379,90	24,38	243,80
	R6					425,25	402,91		
	R7					413,04	390,64	23,03	230,30
	R8					444,08	421,42	24,03	240,30
BUCKTON									
RP	Pd I 1					454,18	431,00		
	2					434,54	411,52		
	3					382,98	360,38		
	4					311,79	289,77		
	Pd II 1					427,00	404,14		
	2					414,80	392,04		
	3					441,64	418,66		
	4	127,40	118,44	350,84	336,52	478,24	454,96	29,20	
BRANDON CAMP									
A						42,00	36,86		
B						44,40	39,14	27,30	27,30
D						40,50	35,26	26,18	26,18
E						32,50	28,06		
1984						27,00	22,96		
						65,70	58,22		
II						92,23	82,88	10,50	63,00
III						130,56	119,16		
IV						208,07	196,16		
Y GAER									
R						*501,42*			
LOUGHOR									
Ph 4				84,42	73,16			15,66	*34,64*
								18,98	
								34,65	
NEATH									
Pd 7								16,50	

A		B		C		D		E	F
GELLIGAER II									
LP	XIV	136,83	120,93	289,05	266,89	425,88	387,82		
	XII	137,89	121,89	300,16	277,76	438,05	399,65		
	IX					558,13	518,61		439,95
RP	XV	148,02	131,44	288,16	266,07	436,18	397,51		
	XIII	139,33	123,29	298,15	275,53	437,48	398,82		
	X					249,89	227,60		
	XI					210,82	190,33		152,84
LR	III					281,91	252,48		209,85
	I	128,65	113,24	301,99	279,45	430,64	392,69		
RR	IV	*294,36*	*260,77*	*82,10*	*79,01*	*376,46*	*339,78*		*74,66*
	II	139,50	123,34	300,16	277,76	439,66	401,10		
STANWAY									
P						*211,80*			
LONDON (Cripplegate)									
LP								41,54	
DOVER									
Ft I	A7,A6,A5			196,00	168,07	196,00	168,07	17,33	138,64
Ft II	B23-20			201,25	173,22	201,25	173,22		
	B19			231,00	202,37	231,00	202,37	20,35	162,80
	B24			199,50	171,50	199,50	171,50	15,56	132,48
	B25,B26			206,50	178,36	206,50	178,36	16,56	132,48
	B30			156,31	135,18	156,31	135,18	24,00	
	A8							19,00	
	B19 PII							40,80	163,20
	PIII							18,00	108,00
	B24 PII			219,17	188,75	219,17	188,75	16,56	145,98
	PIII	166,92	146,97	100,89	88,40	267,81	235,37	16,56	66,24
	B32 PII	27,62	20,62					*22,73*	
	PIIIA	37,47	29,38					*15,35*	
	PIIIA,B	65,86							
HOD HILL									
LP	XI	61,75	55,51	158,46	147,90	220,21	203,41		
	X	67,73	61,31	140,54	130,30	208,27	191,61	8,36	50,16
	IX	95,30	87,54	123,85	114,83	219,15	202,37	10,03	
	XII/XIII	208,44	196,77	135,72	125,24	344,16	322,01	8,36	58,52
	C					33,75	29,11		
RP	VIII	74,26	66,09	99,85	91,11	174,11	157,20	12,08	72,48
	VII	83,88	76,35	120,49	110,61	204,37	186,96	12,08	84,56
	A					300,00			
	B					70,00	61,56		
LatP	Stab I					267,44	242,36		

A		B		C		D		E	F
	II					287,09	261,77	18,39	
								12,33	
	III					323,80	298,17		
	IV					251,84	226,70		
	V					257,33	232,44		
	VI					207,49	183,51		
Bk	VI	59,35	53,09	112,39	101,86	171,74	154,95		
	IV	73,20	66,12	104,27	94,51	177,47	160,63	5,84	
	III	75,00	67,86	104,91	95,09	179,91	162,95		
	II	104,75	96,56	100,22	90,83	204,97	187,39	12,08	
	I	67,10	60,42	100,07	89,96	167,17	150,38	12,08	72,48
D						222,56	204,31		
E,F						156,02	140,70		
SOUTH CADBURY									
Site B	N					35,04	31,50		
	S					45,12	40,95	8,00	24,00
WADDON HILL									
IV		195,00	183,26	130,50	118,90	325,50	302,16	10,18	
V		219,40	207,17	135,00	124,20	354,40	331,37	12,60	
NANSTALLON									
P	Stab					67,71	56,01		
IV	Pd 1	63,98	57,72	216,83	206,66	280,81	264,38	24,82	173,74
	Pd 2	78,48	72,54	216,83	206,66	295,31	278,20	24,82	173,74
III		28,96	24,55	214,88	203,60	243,84	228,15	20,96	167,68
II						234,24	218,67		
I		37,04	32,10	228,88	217,75	265,92	249,85	27,27	218,16
BOULOGNE									
RR	B	60,75	50,32	284,05	253,46	334,80	303,78		
	D-G	60,75	50,32	254,80	227,36	315,55	277,68		
		60,75	50,32	267,80	238,96	328,55	289,28		
ARLAINES									
R		81,00	68,89	297,00	273,90	378,00	342,79	19,20	153,60
VALKENBURG									
C 1	P 13	204,00	192,56	292,50	276,90	496,50	469,46	18,00	216,00
	14							37,50	
LatP	1					225,00	210,16	45,50	
	2	71,25	64,61	195,00	183,00	266,25	247,61	17,10	

A		B		C		D		E	F
	3	55,25	49,41	188,50	176,90	243,75	226,31	15,66	144,62
	4	78,75	71,71	179,80	168,20	258,55	239,91	14,31	
	5	66,50	60,06	203,00	191,40	269,50	251,46	15,12	
	6	86,25	78,81	182,00	170,80	268,25	249,61		
	7	65,00	58,56	182,00	170,80	247,00	229,36	16,20	147,80
	8	86,25	78,81	196,00	184,80	282,25	263,61	18,56	160,02
C 1a LatP	a	86,25	78,81	206,25	195,25	292,50	274,06	20,70	
	b	96,88	88,94	236,38	224,18	333,26	313,12	16,80	168,30
	c	100,00	91,96	245,60	233,32	345,60	325,28	22,08	199,98
C 2/3 P	12							15,68	
	10							16,74	
LatP	2	114,56	106,12					21,00	
	3	107,25	99,11					24,30	
	4	96,00	88,16					16,50	
	5	117,00	108,36					18,60	
	6							112,00	
	7	85,00	77,76	230,25	217,97	315,25	295,73	22,20	200,70
	8	115,00	106,56	296,40	280,80	411,40	387,36	29,60	245,10
C 4 P	11							15,12	
	10	79,80	72,72	183,00	170,80	262,80	243,52		
LatP	2							11,00	
	3							13,65	
	4							12,96	
	6							18,20	
	7	68,40	61,92	266,00	250,80	334,40	312,72	14,43	144,30
	8	60,80	54,72	296,40	280,80	357,20	335,52	16,64	183,04
	9	93,60	85,84	227,50	213,50	321,10	299,34	14,28	140,02
C 5 P	14							17,40	
	11							16,80	
	10	100,00	91,96	180,00	168,00	280,00	259,96	11,25	
LatP	1					176,00	165,36	15,00	60,00
	3	97,50	89,46	270,00	255,60	367,50	345,06	12,50	131,80
	4							15,00	159,00
	5							14,38	149,54
	6							13,75	
	7	61,60	55,48	287,00	270,60	348,60	326,08	15,85	142,65
	8	64,00	57,76	328,00	311,60	392,00	369,36	12,25	122,50
	9	115,00	106,56	318,75	303,75	433,75	410,31	15,00	164,54
C 6 P	16							21,00	
	13							18,90	
	12	126,00	117,16	237,80	226,20	363,80	343,36	25,90	
LatP	4							15,00	
	5	100,00	91,96	312,00	296,40	412,00	388,36	18,00	186,00
	6	100,00	91,96	284,70	269,10	384,70	361,06	16,10	164,60
	7							15,00	
	2					104,00	95,16	17,60	70,40
	8							22,40	
	9	95,45	87,69	268,00	252,00	363,45	339,69	14,50	
	10	76,50	69,66	361,25	344,25	437,75	413,91	19,50	
	11	136,50	127,26	346,50	331,10	483,00	458,36	19,80	204,55

A	B	C	D	E	F
ARENTSBURG					
LP			112,38 103,64		
LatP	90,00	81,76			
ASCIBURGIUM					
K IV				21,60	
K V RP				16,80	
RR				*19,20*	
KREFELD-GELLEP					
IIa 1,3				30,45	
IIIb 1				10,50	
2				30,96	
IV E				16,45	
DORMAGEN					
Fl C S Pd 2			*525,10 498,10*	26,07	
Pd 3			*525,10 498,10*	25,91	
Fl B				*22,40*	
ALTEBURG					
RR			860,00 793,29	22,00	
NIEDERBIEBER					
LP 126			1145,50 1108,26		
125			310,00 221,19		
RP 160			738,40 703,00		
161/162			1155,00 1118,36	54,74	547,40
163/164			1078,00 1041,76	56,35	563,50
LR 105/296				68,60	
HOLZHAUSEN					
LatP A				22,38	
SAALBURG					
LatP P/R			*720,00 663,09*	26,75	
W			590,00 562,56	13,75	
R E			465,60 442,52		

A			B		C		D		E	F
KAPERSBURG										
HK	LatP	B					*172,13*	*159,39*		
2 SK	P								9,00	
BUTZBACH										
Pd 1	I								25,20	
Pd 3	II		64,80	59,85					25,36	
	I		79,88	74,52					*22,05*	
Pd 4	II		68,16	63,18					26,73	
	I		70,15	64,96					28,62	
ECHZELL										
LR	Pds 1,2a	Fm1	172,50	162,06	540,05	519,20	712,55	681,26	30,86	427,35
RR	Pds 1,2a	Fm2	241,50	228,66	442,00	425,20	683,50	653,86	30,86	373,38
ALTENSTADT										
RP	Pd 5	W	*99,00*	*91,16*	*324,00*	*309,60*	*423,00*	*400,76*	34,86	*278,88*
RR	E	Pd 2/3							12,00	
		Pd 4							22,80	
HEDDERNHEIM										
RR	Ph 1		180,95	170,25	453,55	438,11	634,50	634,50	30,60	275,40
	Ph 2	II	150,00	140,16	360,00	345,60	510,00	485,76	28,05	277,15
	Ph 3	N					475,00	452,16	27,72	
		S					*360,38*	*345,04*		
HOFHEIM (Erdlager)										
RP	Q						262,50	245,66		
LR	A	Pd 2	345,60	328,64			345,60	328,64		
	B	Pd 2			324,48	308,00	324,48	308,00	30,00	240,00
	C	Pds 1,2			273,60	258,00	273,60	258,00	24,48	195,84
	D	Pds 1,2			284,16	268,64	284,16	268,64	27,52	220,16
	E	Pd 2			282,00	266,40	282,00	266,40	26,24	209,92
RR	h								42,60	
	K								10,85	
HOFHEIM (Steinkastell)										
Pd I	LP	10	105,00	96,96	313,50	298,30	418,50	395,26	22,84	228,40
		11					432,00	409,36		
		12,13	102,38	94,44	365,63	350,63	468,01	445,07	24,78	272,58
	RP	6	105,00	96,96	342,00	326,80	447,00	423,76	22,85	251,35
		7	90,00	82,56	342,00	326,80	432,00	409,36	26,63	292,93

A		B		C		D		E	F
	8,9	114,00	105,56	342,00	326,80	456,00	432,36	24,75	272,25
LR	25,26,27			402,19	381,95	402,19	381,95	31,50	315,00
RR	21					273,00	250,26	13,96	181,48
	22	76,83	69,94	430,17	412,52	507,00	482,46	30,98	340,78
	23,24	84,14	76,95	422,86	405,51	507,00	482,46	30,98	340,78
Pd II	3	178,16	167,64	339,30	320,78	517,46	497,42	26,22	235,14
	4	137,25	128,03	263,50	245,44	400,75	373,47	22,80	200,20

WIESBADEN

P	h					189,00	168,49		
LatP	f					142,50	124,44		
	c					86,25	73,44		
	d					272,00	244,14		
R	g					315,00	287,14		

SELIGENSTADT

								18,00	

STOCKSTADT

LR						345,72	312,05		

HESSELBACH

Pd 1	LP	9					45,05	40,69		
		8					54,00	48,84		
	LatP	4					156,38	144,69	*15,56*	*140,04*
		3					147,69	136,08	*15,56*	*140,04*
		6					166,63	158,84		
		2					156,38	144,69	15,56	140,04
		1	21,96	19,24	147,62	138,55	169,58	157,79		
Pd2/2a	LP	10					15,13	12,74		
		9					79,75	73,84		
		8					58,00	52,54		
	LatP	4	62,00	57,37	170,31	162,14	232,31	219,51	16,06	112,42
		3					141,00	129,32	9,36	84,24
		6					140,88	133,84		
		2	104,63	98,34	115,50	108,90	220,13	207,24	16,52	82,60
		1	64,13	59,34	130,00	122,20	194,13	181,54	14,55	87,30

MURRHARDT

LR	B	*125,00*	*116,16*	*350,00*	*336,00*	*475,00*	*452,16*		
	D					*50,00*	*44,16*		

A	B		C		D		E	F
KÖNGEN								
LR					111,60	94,87		
ROTTWEIL KASTELL III								
R	198,00	186,56	477,00	455,80	675,00	642,36	22,50	336,50
ROTTWEIL KASTELL IV								
					94,50	84,46		
HÜFINGEN								
K 2 Ib Pd 1							18,75	
Pd 2							18,30	
Ia Pd 1							9,90	
II Pd 2							15,23	
ZURZACH								
K III			186,48	176,40			20,10	140,85
BURLADINGEN								
RP D	136,00	126,36	*306,00*	*291,60*	*442,00*	*417,96*	23,63	*236,30*
E	136,00	126,36	*225,00*	*210,60*	*361,00*	*336,96*	19,25	*192,50*
F	104,00	95,76	*243,75*	*228,15*	*347,75*	*323,91*	18,20	*182,00*
G					325,00	301,86		
RIßTISSEN								
K 1 C					*285,00*	*263,44*		
D W,E					*195,00*	*180,56*	13,42	
K 2 C					*285,00*	*263,44*		
D W					*240,00*	*224,96*		
E					*225,00*	*210,16*	*19,50*	
UNTERKIRCHBERG								
Pd II Ph IIa 1							40,00	
HEIDENHEIM								
LP I,II,III	308,00	296,39	507,60	491,40	815,60	787,79	33,00	404,26
RR N							38,25	
S							*32,00*	

A			B		C		D		E	F
AALEN										
LP							*685,00*		31,55	
MUNNINGEN										
RP			*142,50*	*135,24*	*355,50*	*342,00*	*498,00*	*477,24*	21,55	261,00
RP	5						*360,00*	*340,29*		
RR			*142,50*	*135,24*	*355,50*	*342,00*	*498,00*	*477,24*	21,13	256,80
WEIßENBURG (Breitung)										
LP	1,2						180,00	167,56	19,50	117,00
RP	4,5		80,50	73,26	292,50	274,06	373,00	347,32	18,00	180,00
ELLINGEN										
LP	D						263,20	248,40		
RP	C	Ph 1					151,20	139,92		
		Ph 2					155,52	144,16		
R/R	B	Ph 1 W,E					352,60	332,28	24,48	244,80
		Ph 3 W	97,20	89,44	380,25	363,65	477,45	453,09	28,88	288,80
		E	81,00	73,96	380,25	363,65	461,25	437,61	28,88	288,80
LatP	E	Ph 1					66,65	60,00	17,68	
		Ph 2					89,04	79,20		
LR	Ph 1								21,12	
	Ph 2						124,80	116,00	38,72	
PFÜNZ										
LR	h						240,00	208,29		
OBERSTIMM										
RP	14	Pd 1b	95,68	89,89	233,92	223,60	329,60	313,49	17,40	206,40
		Pd 2			322,56	307,05	*439,04*	*422,75*		
	12	Pds 1a,1b			376,32	360,45	492,80	476,15		
		1c			358,40	342,65	519,68	502,85		
		Pd 2			358,40	342,65	555,52	538,45		
LatP	6	Pds 1a,b	110,40	104,13	252,00	241,50	362,40	345,63	17,36	225,88
		Pd 1c	110,40	104,13	266,00	255,50	376,40	359,63	19,84	204,92
		Pd 2	110,40	104,13	266,00	255,50	376,40	359,63	21,76	211,88
STRAUBING (Kastell IV)										
LP	S						*388,00*	*368,28*	29,40	
	N						360,00	340,56	27,65	
RP	S						*360,00*	*341,76*		
	N						*306,00*	*285,36*	23,63	

A		B		C		D		E	F
MOOS-BURGSTALL									
RP	E	168,00	164,85					26,24	
	W	182,40	174,27					25,60	
KÜNZING									
P	1-4,6-9	151,20	141,52	351,44	336,16	502,64	477,68	28,70	287,00
	5,10					264,16	241,92		
LR	15					348,48	326,40	28,85	
	16					174,24	153,60		
	19					517,88	484,40		
RR	18	129,80	120,84	364,56	348,88	494,68	469,72	29,52	295,20
	20					432,86	410,52		
ZWENTENDORF									
2SK	E	87,30	74,70	281,30	261,00	368,60	335,70	39,38	393,80
	F	88,40	75,66	234,60	215,28	323,00	290,94	31,92	319,20
PETRONELL									
Pd 2 Ph 2	LP W	256,00	234,09	732,00	689,30	988,00	923,39	37,00	455,57
	E					943,25	881,27		
	RP	288,00	264,69	708,00	666,70	996,00	931,39	38,00	451,25
ZALALÖVŐ									
Pds 1,2,3						260,00	245,76		
IŽA-LÉANYVÁR									
LP								43,20	
P		85,00	72,54	356,25	323,00	441,25	395,54	25,00	200,00
RP						514,80	476,30		
LatP	S,N					625,00	581,74		
R								43,20	
RR	1,2,3					625,00	581,74		
AQUINCUM (auxiliary fort)									
SK		104,50	90,64	192,00	175,20	296,50	265,84		
INTERCISA									
SK	16B							13,20	

A		B		C		D		E	F
ČEZAVA									
LP	Ph IV	*39,00*	*30,74*	*117,50*	*100,00*	*156,50*	*130,74*	8,58	
	Ph V					217,00	190,89	45,00	
VELIKI GRADAC									
A						234,00	221,76		
B						260,00	246,96		
DROBETA									
LP	1	121,50	106,24	195,00	174,00	316,50	280,24	13,26	115,77
	2	121,50	106,24	210,00	189,00	331,50	295,24	37,80	151,20
	3					152,25	119,84	12,50	87,50
RP	4	121,50	106,24	195,00	174,00	316,50	280,24	13,26	115,77
	5	121,50	106,24	210,00	189,00	331,50	295,24	27,00	135,00
	6					152,25	119,84	12,50	87,50
LatP	7,8	91,00	83,64	157,50	142,80	248,50	226,44	24,40	97,60
LR	9					360,00	321,64	36,60	256,20
	10	120,00	105,09	270,00	244,80	390,00	349,89	36,60	201,30
	11	96,00	82,49	234,00	208,80	330,00	291,29	30,60	168,30
RR	12					360,00	321,64	45,75	320,25
	13	120,00	105,09	270,00	244,80	390,00	349,89	42,70	189,10
	14	96,00	82,49	234,00	208,80	330,00	291,29		
JUPA									
LP						264,00	235,79		
BOLOGA									
SL	LP B4					330,00	310,86		
	B2					300,00	281,16		
	B1					270,00	237,77		
	RP B8					412,50	392,50		
	B6					375,00	355,00		
BUCIUMI									
SL	LP B6					468,00	425,79		
	B5					988,00	938,79		
	B4					468,00	425,79		
	RP C1					117,60	102,20		
	B3					468,00	425,79		
	B2					988,00	938,79		
	B1					468,00	425,79		

A		B		C		D		E	F
POROLISSUM									
LP	B11,B8					600,00	575,36		
	B10					500,00	458,49		
	B9					350,00	327,36		
	B7					1175,00	1124,04		
RP	B6,B4					325,00	285,94		
	B5					650,00	606,39		
	B3 1,2					350,00	310,59		
	B2					800,00	754,29		
	B1					1350,00	1296,59		
FELDIOARA									
LP	N					938,40	892,41		
	S					782,00	756,96		
SLÄVENI									
LP				515,20	475,65				
	1,4	88,00	75,19	342,00	315,40	430,00	390,59	30,40	243,20
	2,3,5,6	80,00	67,89	380,00	353,40	460,00	421,29	34,40	275,20
ROME									
via lata						1808,85	1692,67		
OSTIA									
N								29,69	
S								23,75	
GEMELLAE									
RP				408,60	376,82				
BU NGEM									
LP	1					224,00	199,29	12,50	
	2	37,50	29,24	100,00	82,50	137,50	111,74	8,75	
	3	41,25	32,64	110,25	93,10	151,50	125,74		
	4					165,00	140,64		
RP	5	29,75	21,84	140,25	122,40	170,00	144,24	13,50	117,63
	6	42,00	33,39	88,00	72,60	130,00	105,99	10,00	76,50
	7	52,50	42,84	110,00	94,60	162,50	137,44	13,50	84,00
	8					168,00	144,69	17,50	
LR	9					199,50	169,72		
	10					199,50	169,72	16,50	
	11					420,00	411,60		

A		B		C		D		E	F
RR	12					192,50	164,64	11,25	
	13	45,50	36,54	156,75	136,50	202,25	173,04	17,50	141,00
	14					210,00	181,79	15,00	
	15	60,00	49,64	175,50	156,60	135,50	206,24	24,00	

A - Subject of entry
B - Percentage of overall length taken by officers' quarters
C - Percentage of overall area (excluding veranda where present) taken by officers' quarters
D - Percentage of *contubernium* living area taken by *papilio*
E - Relative percentages of the overall barrack width taken by the depths of *papilio*, *arma* and veranda
Note: Where a central division of the *contubernium* is unverified the relative percentage values of the *contubernium* and veranda depths are given; where the veranda is unverified the equivalent measurement is given in brackets

A		B		C		D	E
CARDEAN							
R		24,99	24,37	24,99	24,38	54,84	
FENDOCH							
P Bks		22,59	21,93	26,74	26,21	46,99	39,02/44,09/16,89
R Bks		22,22	21,57	27,35	26,89	66,67	52,28/26,03/21,69
STRAGEATH							
I LatP	A					26,25	
LP	XV	26,60	26,12	31,00	30,80	76,98	
	XIV	26,04	25,58	26,60	26,30	71,07	
	XIII	26,04	25,58	26,60	26,29	61,64	
RP	VII	27,15	26,62	30,31	29,84	64,10	55,54/31,11/13,35
	VI	26,35	25,83	24,89	29,36	70,80	60,58/25,04/14,39
LR	XII	28,84	28,40	30,80	30,40	52,63	43,48/39,13/17,39
	XI	30,04	29,59	30,04	29,59	57,14	
	X	27,45	26,98	27,45	26,98	48,00	39,76/43,03/17,21
	IX	40,85	40,45	47,03	46,87	51,67	40,18/37,75/22,07
RR	IV,III	23,81	23,32	24,55	23,99	50,00	
	II					61,54	54,81/20,49/24,69
	I	40,75	40,38	48,25	48,09	50,00	32,99/32,99/34,02
II LP	XVII	31,98	31,50	31,98	31,50	25,20	
	XVI	32,35	31,87	32,35	31,87		
	XIV					50,00	42,94/42,94/14,12
RP	VIII	31,88	31,40	31,88	31,87	59,06	
	VII	30,05	29,50	30,00	29,50	38,85	
	V	30,66	30,16	30,66	30,16	47,76	
LR	XII	27,76	27,25	27,76	27,25	48,78	
	XI	25,11	24,60	25,11	24,60	62,65	

A			B		C		D	E
		X	28,81	28,33	28,81	28,33	60,98	
	RR	IV					44,44	27,72/34,83/37,45
		III					50,00	
		II					50,00	40,77/40,77/18,46
		I					70,68	
III	LP	XIII	35,15	34,68	35,15	34,68	52,94	
		XII	35,78	35,32	35,78	35,32	46,60	
		XI	38,15	37,53	38,15	37,53	41,76	
	RP	VII	39,35	38,15	39,35	38,15	57,14	
		VI	28,94	28,48	28,94	28,48	38,10	
		V	31,74	31,29	31,74	31,29	39,27	
	LR	X	26,96	26,48	26,96	26,48	55,81	
		IX	29,04	28,57	29,04	28,57		
		VIII	26,52	26,03	26,52	26,03	61,29	
	RR	IV	30,13	29,66	34,37	34,04	50,00	41,88/41,88/16,24
		III					50,00	
		II	29,97	29,50	29,97	29,50	50,00	
		I	42,76	42,37	42,76	42,37	55,06	
CAMELON								
Flav			*15,05*	*14,32*	*17,91*	*17,23*	50,00	41,41/41,41/17,18
Ant	RP	IV,III	21,77	20,38	24,93	23,77		90,66/9,34
	R	XIV	24,12	22,78	29,37	28,45		79,88/20,12
MUMRILLS								
R							50,00	
ROUGH CASTLE								
LP	N	Pd 2	35,82	35,09	35,82	35,09	60,00	
			22,75	*22,19*	*22,75*	*22,19*		
	S							88,01/11,99
BAR HILL								
LR		iii	21,84	21,30	25,40	24,93		83,97/16,03
		v	22,99	22,45	27,17	26,73		81,72/18,28
RR		iv	22,99	22,45	26,17	25,70		86,36/13,64
BALMUILDY								
LP	IX		21,53	20,73	23,53	22,75		

A	B		C		D	E
BEARSDEN						
LP 3	16,95	16,24	16,95	16,24		
RP 7	16,67	15,97	16,67	15,97		83,53/16,47
DUNTOCHER						
Centr Bdg	41,88	40,11	49,00	48,39		
OLD KILPATRICK						
Ant II LP I					55,54	
CRAMOND						
RP A Pds 1,2						70,50/29,50
INVERESK						
LR S	25,94	25,33	28,12	27,61	37,74	
						92,56/7,44
N	25,94	25,33	29,28	28,74		86,63/13,37
ELGINHAUGH						
LP 5-7	26,04	25,42	26,04	25,42	50,00	
RP 9-12	24,74	24,10	24,74	24,10	50,00	
LR 4,3	44,44	43,95	44,44	43,95	50,00	
RR 2	30,00	29,37	30,00	29,37	50,00	
1	38,89	38,34	38,89	38,34	50,00	
CASTLEDYKES						
RP					50,00	
LOUDOUN HILL						
					50,00	
LYNE						
LP 2					50,00	
3					61,29	

A	B		C		D	E
NEWSTEAD						
III LP	9,20	7,77	9,20	7,77		
RP VI-II	8,74	7,38	8,74	7,38		
I	8,74	7,38	12,25	10,81		71,35/28,65
IV XVII					25,90	
XXIII/XXIV						49,26/16,91/33,83
HIGH ROCHESTER						
Pds 1,2						*89,63/10,37*
CRAWFORD						
Ant II R III,IV	32,65	30,67	32,65	30,67		
V+III,VI+IV	*16,56*	*15,34*	*16,65*	*15,34*		
RAEBURNFOOT						
N Sector 1,2					68,00	
Central S 3					64,00	
5					55,13	
S Sector 7					55,88	
9					64,29	
DALSWINTON						
B I RP N					60,00	
S					47,79	
Adj *via princ*						70,06/29,94
B II RP					53,01	
CARZIELD						
RR	35,56	34,50	39,37	38,52	48,48	42,19/44,79/13,02
BIRRENS						
Ant I XVII/XVIII	20,69	19,31	20,69	19,31	50,00	
Ant II					50,00	
SOUTH SHIELDS						
I A6	20,00	18,27	24,62	22,33	63,64	49,32/28,15/22,53
III C19	44,59	43,53	72,97	74,85		
C20 Ph 2	26,19	24,94	26,19	24,94		

A		B		C		D	E
WALLSEND							
LP	1,2	26,67	25,51	26,67	25,51		
RP	5,6,7	25,00	23,84	25,00	23,84		
LR	9	24,46	23,29	24,46	23,29		
	10	21,74	20,53	21,74	20,53		
RR	12	22,83	21,63	22,83	21,63		
BENWELL							
LR	Bks	22,33	21,12	25,36	24,25		88,30/11,70
RR	Adj *via q*					50,00	
	Stab					50,00	
HALTONCHESTERS							
Hadr	2					55,31	
CORBRIDGE							
IA	RR	30,61	30,04	34,62	34,16	46,88	40,28/45,73/13,99
IB	LatP	42,42	41,72	46,40	45,84	36,36	
	RR	25,51	24,49	28,26	27,02	42,86	29,28/52,35/8,37
II	LR S	24,49	23,87	27,52	26,97	35,63	31,79/57,44/10,77
	N	22,96	22,33	22,96	22,33	36,00	
	RR S	24,74	24,22	27,79	26,45	36,05	31,79/57,44/10,77
	N	24,74	24,22	24,74	24,22	40,98	
III	LatP					50,00	
	LR	24,74	24,22	24,74	24,22	50,00	
	RR S	25,00	24,38	25,00	24,38	36,62	
	N	25,00	24,38	25,00	24,38	42,86	
IVA	LatP					60,00	
	RR	24,49	23,87	27,42	25,88	42,86	
IVB	RR	24,49	23,40	28,39	27,49	43,48	36,61/47,54/15,85
CHESTERS							
RP	1	20,00	18,68	20,00	18,68	42,65	
	2	20,00	18,68	23,08	19,65		88,00/12,00
	3	21,43	20,10	24,14	22,90		90,48/9,52
R						47,26	39,18/43,64/17,18
CARRAWBURGH							
N						51,18	

A	B	C	D	E
HOUSESTEADS				
XIII Pd I	18,73 17,56	21,94 20,88	69,70	61,58/26,78/11,64
			42,42	37,49/50,87/11,64
XIV Pd I				86,21/13,79
HALWHISTLE BURN				
Site II/III	22,15 20,95	31,82 31,69		
CARLISLE				
N			45,75	
MARYPORT				
Pd I W,E				82,46/17,54
EBCHESTER				
LP Pd 2	22,50 21,12	22,50 21,12		
RR Pd I N			43,06	32,24/42,57/25,19
LEASE RIGG				
D,H			38,31	
RAVENGLASS				
Ph 1 1			31,71	
Ph 2 4			47,83	
5			47,62	
Ph 3 6			50,00	45,24/45,24/9,52
7			50,00	41,23/41,23/17,54
8			47,62	
WATERCROOK				
I,II	26,15 24,75	28,21 27,64		
BROUGH-BY-BAINBRIDGE				
Fort II Pd 3 AB			50,00	

A	B		C		D	E
ILKLEY						
Ft 1 LP W	19,92	19,17	19,92	19,17		29,65/70,35
Ft 2 R					57,19	
Ft 3 P E						55,56/44,44
W						41,12/58,88
RIBCHESTER						
RR S Ph C					66,67	59,71/29,85/10,44
HAYTON						
LP	22,22	21,35	22,22	21,35		
BROUGH-ON-HUMBER						
Pd IIB 1					67,37	
2					70,00	
Pd IV 2					44,83	
CASTLEFORD						
Later Ft E-W Bk					73,94	64,03/22,55/13,42
N-S Bk					50,00	38,10/38,10/23,81
SLACK						
Ph 1 X E,W						86,60/13,40
Ph 3 IX E,W	23,37	22,21	25,39	24,31		96,91/3,09
MELANDRA CASTLE						
RP					73,23	
TEMPLEBROUGH						
IIIc 2	22,77	20,98	26,13	24,46	47,41	41,51/46,10/12,39
BROUGH-ON-NOE						
Pd III P					50,00	
ROCESTER						
					53,33	

A		B		C		D	E
THE LUNT							
Pd I RP	W					55,17	
	E					66,18	
R	1	21,63	22,95	21,63	22,95	70,59	
	2	25,15	24,49	25,15	24,49	74,44	
	4	17,00	16,29	17,00	16,29	76,64	
	5	17,50	16,77	17,50	16,77	76,64	
E Defs	1					75,47	
	2,3					74,23	
Pd II R	1	35,61	34,67	35,61	34,67	70,59	
	2	37,28	36,45	37,28	36,45	74,44	
CAERHUN							
RP I		27,88	26,86	31,31	30,51		
IV		28,75	27,78	31,47	30,66		
VI		28,07	27,09	31,76	30,23		
LR XVII		33,15	32,24	36,56	35,84		
XIX		32,36	31,44	35,99	35,28		
CAERNARVON							
LP Pd I	3					64,81	48,50/26,50/25,00
Pd II	1					40,23	48,50/26,50/25,00
	2					65,04	47,89/25,79/26,32
RP X						72,00	
PEN LLYSTYN							
LP P1		24,40	24,76	31,06	30,67	70,80	54,14/22,22/23,64
P2		*24,40*	*24,76*	*24,40*	*24,76*	56,00	47,91/37,70/14,39
RP P4		25,93	25,29	33,42	33,09	70,59	49,40/20,66/29,94
P5		30,69	30,10	39,19	38,99	67,80	46,54/22,01/31,45
LR R1		26,26	25,64	30,53	30,08	62,40	52,00/31,33/16,67
R2		25,74	25,11	30,74	30,34	67,23	53,72/26,16/20,12
R3		25,21	24,58	29,04	28,57	64,00	54,41/30,64/14,95
RR R5		24,84	24,20	24,84	24,20	50,67	
R7		52,98					
R8		51,61					
BUCKTON							
RP Pd I	2					54,84	
	3					45,32	
Pd II	1					41,88	
	4	26,64	26,03	26,64	26,03	69,52	

A	B	C	D	E
BRANDON CAMP				
B			50,00	
D			57,14	
PUMPSAINT				
Pd 1B E			67,92	57,60/27,20/15,20
W			47,62	38,26/42,01/19,72
LOUGHOR				
Ph 4				87,50/12,50
NEATH				
Pd 7			72,73	
GELLIGAER II				
LP XIV	28,56 27,41	32,13 31,19		85,88/14,12
XII	28,33 27,19	31,48 30,50		89,13/10,87
IX			49,90	
RP XV	29,10 27,97	33,94 33,07		80,28/19,72
XIII	27,39 26,23	31,85 30,91		81,34/18,66
XI			41,40	
LR I	26,97 25,79	29,87 28,84		88,76/11,24
RR IV	*64,86 62,73*	*78,19 76,74*		47,37/52,63
II	29,30 28,19	31,73 30,75		91,76/8,24
LONDON (Cripplegate)				
				81,06/18,94
DOVER				
Ft II B19			50,00	37,86/37,86/24,28
				77,48/22,52
B19 PII				78,45/21,55
PIII				53,70/46,30
B24 PIII	54,73 53,91	62,33 62,44		
HOD HILL				
LP XI	19,75 18,76	28,04 27,29		38,84/(61,16)
X	24,33 23,42	32,52 32,00		66,67/(33,33)
IX	33,92 33,14	43,49 43,26		60,16/(39,84)
XII/XIII	40,72 40,18	60,56 61,14		

A		B		C		D	E
RP	VIII	42,65	42,02	42,65	42,02		45,65/(54,35)
	VII	33,61	32,02	41,04	40,85		74,03/(25,97)
R	Stabs I						53,70/46,30
	III						59,02/40,98
	VI						46,81/53,19
	Bks VI	28,03	27,23	34,55	34,26		75,61/24,39
	IV	32,95	32,12	41,25	41,16		70,85/29,15
	III	32,81	32,07	41,69	37,72		68,75/31,25
	II	34,75	34,02	51,11	51,53		48,45/51,55
	I	30,33	29,55	40,14	40,18		64,54/35,46
WADDON HILL							
IV		40,82	40,33	59,91	60,65		43,18/56,82
V		42,55	42,06	61,91	62,52		42,86/57,14
NANSTALLON							
P	IV Pd 1	22,78	21,83	22,78	21,83	60,27	
	Pd 2	26,57	25,72	22,57	25,72	60,27	
	III	11,88	10,76	11,88	10,76	62,20	
R	I	13,97	12,85	13,97	12,85	56,89	
VALKENBURG							
C 1	P 13	30,36	29,86	41,09	41,02	66,66	39,68/19,84/(40,49)
	14						71,43/(28,57)
	LatP 2	24,05	23,27	26,46	25,75	64,91	58,72/31,74/(9,53)
	3	21,52	20,72	22,36	21,52	65,52	59,38/31,24/(9,38)
	4	26,58	25,83	30,07	29,48	64,15	54,86/30,62/14,51
	5	24,05	23,27	24,38	23,58	62,50	52,35/32,27/13,85
	6	29,11	28,39	31,76	31,16		
	7	25,32	24,55	25,97	25,17	62,96	61,82/36,36/1,82
	8	29,11	28,39	30,20	29,53	68,97	62,51/28,12/9,37
	9	27,85	27,11	29,64	29,75	71,43	70,31/28,13/1,56
C 1a	LatP a	29,49	28,76	29,49	28,76	50,72	
	b	29,07	28,40	29,07	28,40	64,29	
	c	28,94	28,27	28,94	28,27	50,72	
C 2/3	P 12					67,86	
	10					66,67	
	LatP 2					50,00	37,62/37,62/24,75
	3					40,74	35,89/52,15/11,96
	4					54,55	52,63/43,86/3,51
	5					48,39	
	6					50,00	
	7	24,57	23,82	27,95	27,51	66,67	60,64/30,27/9,09
	8	24,57	23,82	26,96	26,29	50,00	43,96/43,96/12,08
C 4	P 11					64,29	58,08/32,24/9,68
	10	25,61	24,88	30,37	29,86		

A		B		C		D	E
Lat P	2					59,09	
	3					25,74	
	4					62,50	
	7	19,15	18,45	20,45	19,80	67,57	65,22/31,30/(3,48)
	8	17,02	16,31	17,02	16,31	61,54	
	9	25,53	24,89	29,15	28,67	35,29	29,99/55,02/(14,99)
C 5 P	14					51,72	
	11					58,33	
	10	29,41	28,74	35,71	35,37	44,44	32,81/40,94/(26,25)
LatP	1					60,00	
	2					88,10	54,41/36,77/(8,82)
	3	26,53	25,71	26,54	25,93	48,00	
	4					66,67	
	5					65,22	
	7	16,33	15,64	17,67	17,01	60,78	57,39/37,06/5,56
	8	16,33	15,64	16,33	15,64	51,02	45,47/43,62/10,91
	9	23,47	22,84	26,51	25,97	41,67	35,19/49,30/15,50
C 6 P	16					71,43	
	13					60,32	
	12	29,27	28,57	34,63	34,12	57,14	44,99/33,69/(21,32)
LatP	4					63,24	
	5	24,27	23,68	24,27	23,68	50,00	45,45/45,45/9,09
	6	24,27	23,68	25,99	25,47	59,26	56,16/38,58/5,26
	7					50,00	43,47/43,47/13,05
	8						85,36/14,64
	9	22,33	21,72	26,26	25,81	60,00	48,36/32,30/(19,34)
	10	17,48	16,83	17,48	16,83	46,15	37,08/43,20/19,72
	11	25,24	24,66	28,26	27,76	47,06	41,57/44,14/14,29
ARENTSBURG							
LatP		45,45	44,79				
LP						63,73	51,18/26,43/17,86
ZWAMMERDAM							
LatP						65,22	
ASCIBURGIUM							
K IV						50,00	
K V	RP					75,00	
	RR					*57,81*	*50,00/36,49/13,51*

A	B	C	D	E
KREFELD-GELLEP				
IIa			59,77	52,48/35,39/12,12
IIIb 1				17,24/82,76
2			55,82	47,06/37,26/15,68
IV 1				54,02/45,98
DORMAGEN				
Fl D Pd 2	*29,66*	*29,18*		
Fl C S Pd 2			56,96	
Pd 3			79,62	
Fl B			42,86	
ALTEBURG				
RR			54,55	
NIEDERBIEBER				
RP 161/162			45,38	
163/164			51,02	
LR 105/296			57,14	
HOLZHAUSEN				
A			55,22	
SAALBURG				
P/R			62,16	53,49/32,54/13,97
W			50,00	
F			72,73	
BUTZBACH				
Pd 1 III			50,91	
II			51,79	
I			53,57	43,27/37,50/19,23
Pd 2				77,43/22,57
Pd 3 II			48,98	38,00/39,78/22,22
I			46,94	36,44/41,33/22,22
Pd 4 II			55,56	44,55/35,64/19,80
I			43,40	34,31/44,77/20,92

A		B		C		D	E
ECHZELL							
LR Pds 1,2a	Fm1	22,34	21,88	24,21	23,79	52,94	43,86/39,08/17,06
	Fm2	33,33	32,91	35,33	34,97	52,94	43,86/39,08/17,06
ALTENSTADT							
RP Pd 5 W		*23,40*		*23,40*		56,63	
RR E Pd 4						52,63	43,99/39,54/16,47
HEDDERNHEIM							
RR Ph 1		28,52	27,99	28,52	27,99	54,90	
Ph 2	II	29,41	28,85	29,41	28,85	41,67	
Ph 3						52,38	
HOFHEIM (Erdlager)							
LR B Pd 2							92,45/7,55
C Pds 1,2						44,44	35,60/44,40/20,00
D Pds 1,2						44,19	34,50/43,67/21,83
E Pd 2						43,90	34,67/44,19/21,14
RR h						60,00	
HOFHEIM (Steinkastell)							
Pd I LP	10	20,83	20,17	25,09	24,53	50,00	39,27/39,27/21,46
	11					40,00	
	12,13	21,88	21,22	21,88	21,22	50,00	
RP	6	20,83	20,17	23,49	22,88	61,09	52,52/33,47/14,01
	7	20,83	20,17	20,83	20,17	57,12	
	8,9	25,00	24,37	25,00	24,37	45,45	
LR	25-27					50,00	
RR	22	15,15	14,50	15,15	14,50	50,00	
	23,24	16,60	15,95	16,60	15,95	50,00	
Pd II 3		25,56	25,00	34,43	33,70	57,97	44,94/32,58/22,47
4		21,39	20,79	34,25	34,28	66,66	44,33/22,33/33,33
SELIGENSTADT							
						50,00	
HESSELBACH							
Pd 1 LatP	1	12,95	12,19	12,95	12,19		76,42/23,58
Pd 2/2a LatP	4	22,70	22,03	26,69	26,14		79,84/20,16
	3						70,59/29,41
	2	38,03	37,50	47,53	47,45		65,28/34,72
	1	26,76	26,14	33,03	32,69		72,83/27,17

A	B	C	D	E
MURRHARDT				
LR B	*22,22 21,52*	*26,32 25,69*	65,91	53,18/27,55/(19,27)
ROTTWEIL KASTELL I				
Pds 1,2 N			61,43	45,26/28,42/26,32
Pd 2 S			50,00	
ROTTWEIL KASTELL II				
LP			63,91	
ROTTWEIL KASTELL III				
R	25,35 24,93	29,33 29,04	50,00	41,20/41,20/17,60
HÜFINGEN				
K 2 Ib Pd 1			44,00	
Pd 2			59,02	
Ia Pd 1				71,18/28,82
ZURZACH				
K III			70,83	56,60/23,40/20,00
BURLADINGEN				
RP D	*30,77 30,23*	*30,77 30,23*	48,15	
E	*30,77 30,23*	*37,67 37,50*	72,73	54,41/20,40/25,19
F	*25,00 24,42*	*29,91 29,56*	71,15	
RIßTISSEN				
K 1 D W,E			74,39	
K 2 D E			62,50	
E			75,00	
UNTERKIRCHBERG				
Pd II Ph IIa 1			40,00	
3			48,00	

A			B		C		D	E
HEIDENHEIM								
LP	I,II,III		34,15	33,90	37,76	37,62	51,52	44,49/41,90/13,61
RR	N						52,94	
	S						50,00	
AALEN								
LP							62,48	55,74/33,44/10,82
FRIEDBERG								
R							70,83	
MUNNINGEN								
RP	1		25,00	24,62	28,61	28,34	50,00	41,67/41,67/16,67
	2,3		25,00	24,62	28,61	28,34	52,79	44,10/39,51/16,39
RR	7-10		25,00	24,62	28,61	28,34	57,69	48,00/35,33/16,67
WEIßENBURG (Breitung)								
LP	1,2						50,00	
RP	4,5		*15,22*	*14,47*	*21,58*	*21,09*	50,00	33,33/33,33/33,33
	6,7						50,00	33,33/33,33/33,33
ELLINGEN								
LP	D						50,00	
RP	C	Ph 1					58,73	
		Ph 2					50,00	
P/R	B	Ph 1 W,E					50,00	
		Ph 3 W	17,56	16,91	20,36	19,74	50,00	42,21/42,21/15,58
		E	17,56	16,91	17,56	16,90	50,00	
LatP	E	Ph 1	50,00					
LR		Ph 1					57,58	46,85/34,63/18,52
		Ph 2					50,00	
OBERSTIMM								
RP	14	Pds 1b,1c	23,21	22,70	27,56	27,15	66,67	49,35/24,68/25,97
		Pd 2						75,79/24,21
	12	Pd 1b						78,49/21,51
		Pd 1c						70,76/29,24
		Pd 2					44,44	
LatP	6	Pds 1a,1b	25,53	25,05	28,59	27,45	72,58	56,99/21,51/21,51
		Pd 1c	25,53	25,05	29,33	28,95	67,74	55,98/26,69/17,33
		Pd 2	25,53	25,05	29,33	28,95	61,76	51,85/32,10/16,05

A	B	C	D	E
5 Pds 1a,1b			71,43	56,99/21,51/21,51
6 Pd 1b			71,43	56,99/21,51/21,51
STRAUBING (Kastell IV)				
LP S			46,43	
N			54,43	
RP S			48,48	
N			55,56	
MOOS-BURGSTALL				
RP E			51,22	43,28/41,27/15,46
W			52,50	41,58/37,63/20,79
Anbau			50,00	34,57/34,57/30,86
KÜNZING				
P 1-4,6-9	24,80 24,21	30,08 29,63	53,66	41,50/35,83/22,68
RR 18	21,91 21,29	26,24 25,73	51,22	40,82/38,78/20,40
15				74,42/25,58
ZWENTENDORF				
2 SK E	23,68 22,25	23,68 22,25		
F	27,37 26,01	27,37 26,01		
PETRONELL				
Pd 2 Ph 2 LP W	20,78 20,05	25,91 25,35	59,46	43,83/29,92/26,25
E			50,00	
RP	23,38 22,67	28,92 28,42	31,58	23,45/50,77/25,77
IŽA-LÉANYVÁR				
LP			50,00	
P	15,18 14,10	19,26 18,34		73,54/26,46
LatP S,N			52,63	
R			50,00	
RR			50,00	
AQUINCUM (auxiliary fort)				
SK	31,43 30,03	35,24 34,10		

A	B		C		D	E
ČEZAVA						
RP Ph IV	*19,35*	*17,49*	*24,92*	*23,51*		75,00/25,00
Ph V					50,00	
DROBETA						
P 1,4	31,03	29,91	38,39	37,91		73,89/26,11
2,5	31,03	29,91	36,65	35,98		80,58/19,42
LatP 7,8	25,00	23,08	36,62	36,94		
R 10,13	25,00	23,89	30,77	30,04		77,22/22,78
11,14	25,00	23,89	29,09	28,32		86,45/13,55
POROLISSUM						
RP B3					50,00	
SLÄVENI						
P						83,53/16,47
P 1,4	17,39	16,11	20,47	19,25		85,38/14,62
2,3,5,6	17,39	16,11	17,39	16,11		86,88/13,12
BU NGEM						
LP 1					50,00	
2	16,67	14,68	27,27	26,17		55,55/44,45
3	18,33	16,38	26,19	25,96		57,45/52,55
RP 5	12,07	9,89	17,50	15,14	63,64	44,84/25,66/29,50
6	24,14	22,26	32,31	31,50		75,49/24,51
7	24,14	22,26	32,31	31,50		71,43/28,57
RR 12					66,67	
13	18,57	16,91	22,50	21,12		86,21/13,79
14					50,00	
15	22,86	21,28	25,48	24,07		95,24/4,76

TABLE XXIII BARRACK DISTRIBUTION FORTS

A - Subject of entry
B - Fort type
C - Barrack group configuration type (number if more than one example)
D - Length of unit
E - Width of unit
F - Area of unit
G - Distance between facing officers' quarters
H - Distance between facing men's quarters
I - Distance between rear walls of barracks (+ denotes rear party wall)

A		B	C	D	E	F	G	H	I
CARDEAN									
R		H	2	48,77					1,40
FENDOCH									
P		B	6(2)	47,24	24,08	1137,54	4,57	7,92	
R			1	48,01	32,92	1580,49	4,88	9,14	1,83
STRAGEATH									
I	LP	A	3	48,00	27,60	1324,80	1,80	1,80	0,25
	RP		6	42,50	19,00	807,50	2,00	3,20	
	LR		6	47,50	21,50	1021,25	3,50	3,50	
			6	47,00	21,10	991,70	4,90	5,90	
	RR		6	48,00	21,50	1032,00	4,50	4,50	
			6	45,00	21,50	967,50	0,50	6,00	
II	LP	A	7	43,00	18,80	808,40			1,50
	RP		7		16,80				1,50
	LR		2	44,25	34,80	1539,90	3,00	3,00	3,00
	RR		1	47,00	24,00	1128,00	4,00	4,00	4,00
III	LP	A	3	43,00	37,80	1625,40	5,40	5,40	1,50
	RP		3		37,00		4,00	4,00	3,00
	LR		4	46,20	32,50	1501,50	4,30	4,30	
	RR		6	40,00	21,00	840,00	3,00	3,00	
ARDOCH									
1C	LR	D	5		48,00			4,88	4,88?
	R		5		62,00			7,01	

A	B	C	D	E	F	G	H	I
CAMELON								
Ant LP VIII,VII	D	6	51,82	24,69	1279,44	9,14	9,14	
VI,V		6	51,82	24,69	1279,44	6,40	6,40	
RP IV,III		6	51,82	24,38	1263,37	3,66	7,62	
II,I		6	51,82	24,38	1263,37	7,62	7,62	
MUMRILLS								
	H							
ROUGH CASTLE								
LP N,S	E	7	26,52	15,75	417,69		3,15	3,15
BAR HILL								
LR iii,v	A	6	43,50	24,00	1044,00	4,00	8,00	
CADDER								
RP XI,XIII	A	6	36,58	24,38	891,82	7,32	7,32	
LR VIII,VI		7	37,19	20,12	748,26			1,22
RR IX,VII		7	37,19	20,12	748,26			1,22
BALMUILDY								
LP	A	8	39,62	34,14	1352,63		8,53	
RP		8	44,81	34,14	1529,81		8,53	
BEARSDEN								
LP	A	2	35,00	22,50	787,50	9,00	9,00	1,50
RP		7	35,50	16,00	568,00	8,00	8,00	
OLD KILPATRICK								
LP	E	1	53,64	33,53	1798,55	5,49	5,49	+
RP		1	51,82	33,53	1737,52	8,84	8,84	+
CRAMOND								
RP A,B Pds 1,2	A	7	47,00	16,00	752,00			0,76
Pd 3		7	47,00	12,50	587,50			0,76

A	B	C	D	E	F	G	H	I
INVERESK								
LR	C	6	48,77	28,04	1367,51	5,49	8,84	
ELGINHAUGH								
LP	D	3	48,00	33,50	1608,00	5,00	5,00	3,00
RP		6(2)	47,50	21,00	997,50	5,00	5,00	2,00
R		6(2)	45,00	22,50	1012,50	5,00	5,00	
CASTLEDYKES								
RP	E	8	48,01	34,14	1639,06		7,60	
LYNE								
LP	A	6	44,20	30,48	1347,22		12,19	
NEWSTEAD								
III,IV LP	C	6(3)	57,91	30,02	1738,46	8,53	8,53	
RP		6(3)	60,96	29,72	1811,73	7,92	7,92	
CRAWFORD								
Flav IV,V	K	6	31,75	22,25	706,44	5,80	5,80	
Ant I LR V,VI	A	6	19,50	21,80	425,10	5,00	5,00	
RR III,IV		6	20,00	21,25	425,00	4,10	4,10	
Ant II LR V,VI		6	25,00	22,00	550,00	5,00	5,00	
RR III,IV		6	24,50	21,00	514,50	3,90	3,90	
RAEBURNFOOT								
S Sector 6-9	A	6(2)	19,00	23,00	437,00	5,00	5,00	
DALSWINTON								
B I RP N,S	G	7	*46,00*	16,76	*770,96*			1,52
CARZIELD								
RR	H	7	43,28	23,16	1002,36			+

A	B	C	D	E	F	G	H	I
BIRRENS								
Ant I RP	A	5	43,00	23,50	1010,50	5,00	5,00	
RR			42,06	38,50	1619,31	5,00	5,00	
Ant II RP	A	5	43,00	26,50	139,50	3,00	3,00	
SOUTH SHIELDS								
I P A1,A2	A	6	41,00	23,75	973,75	3,50	3,50	
II LP B1,B2,B3	A	1	41,00	38,00	1558,00	9,80	9,80	2,40
III	B							
IV	F							
WALLSEND								
P 1,2	A	7	45,00	17,00	765,00			2,50
5,6,7		1	46,00	31,00	1426,00	7,00	7,00	2,00
BENWELL								
LR	F	7	45,72	23,47	1073,05			+
RUDCHESTER								
	F							
HALTONCHESTERS								
RP	D	9	39,62	45,87	1817,37			
CORBRIDGE								
I	F							
II R	F	8(2)	49,50	25,00	1237,50	5,60	5,60	
III RR	F	8	49,50	25,00	1237,50	4,00	4,00	
IVA, IVB	F							
CHESTERS								
RP	A	2	43,00	32,50	1397,50	2,80	5,60	1,00
CARRAWBURGH								
	E	6		25,50				

A	B	C	D	E	F	G	H	I
HOUSESTEADS								
PdsI,II XIII,XIV	B	8	49,38	27,25	1345,61	6,40		
CHESTERHOLM								
St Ft 2	G							
BIRDOSWALD								
	E							
OLD CHURCH								
	F							
MARYPORT								
Pd I W,E	F	6		25,35		5,75	9,50	
LEASE RIGG								
	B							
AMBLESIDE								
Agr	A							
RAVENGLASS								
Ph 1,4	G							
Ph 2 4,5	G	7		19,50			0,75	
Ph 3 6,7,8		2		35,90		7,00	0,75	
WATERCROOK								
	F							
BROUGH-BY-BAINBRIDGE								
1C FA,FB	E	8		21,34		9,14		
Ft II Pd 1	E	5		25,91			0,46	

A	B	C	D	E	F	G	H	I
ILKLEY								
	A							
RIBCHESTER								
RR Phs B,C,D	F	8				2,44		
HAYTON								
LP	C	6			5,10	5,10		
BROUGH-ON-HUMBER								
Pd IIB LR	F	8	*47,00*	13,70	*643,90*		1,65	
Pd IV LR	F	7	*47,00*	18,00	*846,00*			0,50
CASTLEFORD								
Early Fort	E							
Later Fort	G							
SLACK								
P X	A	7	42,67	16,46	702,35			+
IX		7	46,94	17,07	801,27			+
CASTLESHAW								
LP 1,2		6	31,39	21,95	689,01	8,23	8,23	
3,4		6	31,39	18,75	588,56	7,92	7,92	
MELANDRA CASTLE								
RP I,II	G	8	41,15	18,59	764,98		1,07	
III,IV		7	41,15	18,29	752,63			0,69
TEMPLEBROUGH								
III a P	J		38,40					
III c		6	36,12	24,38	880,61		8,84	
BROUGH-ON-NOE								
Pd II	G							

A	B	C	D	E	F	G	H	I
THE LUNT								
R 1,2	A	6	45,72	15,50	708,66	3,00	3,00	
4,5		8	45,72	19,10	873,25	6,00	6,00	6,00
GREAT CASTERTON								
Fts I,II	D							
CAERHUN								
RP I,IV,VI	A	2	52,12	35,50	1850,26	4,00	7,00	3,50
LR XVII,XIX		6	52,43	27,50	1441,83	4,50	7,50	
CAERNARVON								
LP Pd II 1,2	D	8		24,80		2,75	6,00	
PEN LLYSTYN								
P P1,P2,P4,P5	A	6	47,25	21,00	992,25	3,60	7,35	
R R2,R3,R4		1	47,60	31,40	1494,64	3,90	5,50	1,25
BUCKTON								
RP Pd I 1,2,3	E	1	49,10	32,30	1585,93	5,25	5,25	1,20
Pd II 1,2		6	48,80	42,35	2066,68	5,10	5,10	
3,4		6	48,80	43,00	2098,40	4,35	4,35	
PUMPSAINT								
Pd 1A	H	6					5,30	
Pd 1B	F							
Y GAER								
R	F	*1*	*54,86*	*39,00*	*2139,54*	*6,10*		
GELLIGAER II								
P	A	6	44,50	27,58	1227,31	5,79	9,75	
CIRENCESTER								
	C							

A	B	C	D	E	F	G	H	I
STANWAY								
P	0	7	36,58	11,58	423,60			+
LONDON (Cripplegate)								
	G							
DOVER								
Ft I A6,A5	A	7	35,00	12,60	441,00			1,50
Ft II B24-B26	A	1	34,20	25,50	872,10	6,50	6,50	1,15
HOD HILL								
P IX,X,XI	K	2	34,00	33,50	1139,00	7,50	13,50	1,00
VII,VIII		6	41,00	25,00	1025,00	6,50	15,00	
I,II,III,IV		6	36,00	21,50	774,00	6,00	12,00	
WADDON HILL								
IV,V		8	49,00	25,00	1225,00	4,00	8,00	
NANSTALLON								
P IV,III	A	7	32,92	19,00	625,48			3,00
R II,I		8	32,31	18,50	597,74	2,50	2,50	
BOULOGNE								
RR	F	6(4)	47,50	20,00	950,00		6,00	2,00
ARLAINES								
R	B?	6(2)	42,00	24,00	1008,00	6,00	6,00	+
VALKENBURG								
C 1 LatP	K	6(4)	39,50	19,00	750,50	2,86	6,00	1,70
C 1a LatP	K	6	43,00	21,50	924,50	4,00	4,00	2,00
C 2/3 LatP 7,8	J	7	40,70	20,00	814,00			+
C 4 P 10,11	J	6	41,00	19,00	779,00	5,00	6,00	
LatP 2-4,7-9		1(2)	47,00	31,00	1457,00	7,50	8,50	1,00
C 5 P 10,11	P	6	42,50	20,00	850,00	5,00	6,00	
LatP 2-5		6(2)	49,00	22,50	1102,50			
6,7		6	49,00	19,00	931,00		5,00	
8,9		6	49,00	22,00	1078,00	4,50	6,00	

A	B	C	D	E	F	G	H	I
C 6 P 12,13	P	6	41,00	22,00	902,00	5,00	5,50	1,50
LatP 4-6,9-11		1(2)	51,50	32,50	1673,75	5,00	6,00	1,50
KREFELD-GELLEP								
IIa	F							
IIIb	F							
DORMAGEN								
	P							
NIEDERBIEBER								
LP 161-164	D	7	77,00	30,00	2310,00			2,00
SAALBURG								
	D							
BUTZBACH								
Pd 1 RR II,I	D	6		29,60			10,50	
Pd 3 RR II,I		6		28,25		6,00	11,00	
Pd 4 RR II,I		6		29,00		6,00	9,60	
		1						2,50
ECHZELL								
Pd 1/2a	A	6(3)	67,13	31,75	2131,38	9,00	12,88	
		6(3)	62,00	31,75	1968,50	9,00	12,88	
ALTENSTADT								
	G							
HEDDERNHEIM								
R Ph 2	G	7						3,00
HOFHEIM (Erdlager)								
LR A-C		1	32,00	38,80	1241,60		4,40	0,20
D-E		6	30,00	28,40	852,00		4,00	

A		B	C	D	E	F	G	H	I
HOFHEIM (Steinkastell)									
LP		A	7	48,00	20,25	972,00			0,75
RP			7	48,00	20,25	972,00	3,75	3,75	0,75
RR			5	52,00	37,50	1950,00	3,75	3,75	
LR			5	41,25	37,50	1546,88	3,75	3,75	
HESSELBACH									
Pd 1	4,3	B	6	34,75	14,75	512,56	6,00	6,00	
	2,1		6	34,75	14,50	503,88	3,75	5,50	
Pd 2/2a	4,3	B	6	35,25	16,50	581,63	4,75	5,00	
	2,1		6	35,50	17,50	621,25	3,00	7,00	
MURRHARDT									
LR Pd 1			6	*45,00*	*27,50*	*1237,50*			
ROTTWEIL KASTELL III									
R		E	6(4)	71,00	26,75	1899,25	4,50	9,00	1,00
ROTTWEIL KASTELL V									
		D?							
BURLADINGEN									
RP		A	2	52,00	29,50	1534,00	4,00	4,00	+
RIßTISSEN									
K 1 LR			7	*30,00*	12,25	*367,50*			
UNTERKIRCHBERG									
LR PdII Ph IIa			1		39,00			5,00	+
HEIDENHEIM									
LP		A	1	82,00	38,00	3116,00	3,00	6,50	+
AALEN									
		E							

A	B	C	D	E	F	G	H	I
FRIEDBERG								
R	F	7(2)		17,50				0,50
MUNNINGEN								
P	A	6(2)	60,00	24,50	1470,00		8,25	0,90
GNOTZHEIM								
P	G	*32,52*						
THEILENHOFEN (Neues Lager)								
	E							
WEIßENBURG (Breitung)								
RP 4,5	E	7	46,00	22,00	1012,00			+
ELLINGEN								
B Ph 3		7	51,25	19,20	984,00			+
OBERSTIMM								
Pd 1a LatP 6,5	G	6	47,00	23,13	993,11	4,38		
Pd 1b LatP	G	1	47,00	31,25	1468,75	4,38		+?
STRAUBING (Kastell IV)								
LP	E	7	*40,00*	18,50	*740,00*			+
RP		7	*36,00*	17,50	*630,00*			+
MOOS-BURGSTALL								
RP	E	6		26,20		4,00	8,30	
KÜNZING								
P 1,2,6,7	A	8(2)	50,80	27,00	1371,60	4,50	6,50	
3,4,8,9		6(2)	50,80	28,75	1460,50	6,00	10,50	

A	B	C	D	E	F	G	H	I
ZWENTENDORF								
2 SK		6	38,00	30,00	1140,00	12,00	12,00	
PETRONELL								
Pds 1,2	G							
IŽA-LÉANYVAR								
Ft 2	B?	1	56,00	34,00	1904,00	4,00	9,00	1,00
AQUINCUM (auxiliary fort)								
SK		6	35,00	24,00	840,00	5,00	8,00	2,00
DROBETA								
P	A	8(2)	43,50	25,00	1087,50	7,00	10,00	
R		7	48,00	12,50	600,00	4,50	4,50	4,50
BOLOGA								
EL	E							
BUCIUMI								
SL P	A	1(2)	50,50	31,00	1565,50	4,50	4,50	+
POROLISSUM								
	E							
CĂŞEIU								
	A?							
FELDIOARA								
	E							
SLĂVENI								
P	A	2(2)	46,00	44,00	2024,00	14,00	14,00	2,00

A	B	C	D	E	F	G	H	I
ROME								
via lata		6(3)	155,00	58,33	9041,15	35,00	35,00	+
OSTIA								
		10	70,00	40,50	2835,00		26,75	
GEMELLAE								
	D							
BU NGEM								
	A	2	30,00	25,00	750,00	3,00	5,00	+
		1	29,00	25,00	725,00	5,00	7,00	+
		1	35,00	25,00	875,00	4,00	5,00	+

TABLE XXIV ROADS AND GATES

A - Subject of entry
B - Width of *via praetoria*
C - Width of *via principalis*
D - Width of *via decumana*
E - Width of *via sagularis* a) *praetentura*
F - b) *retentura*
G - c) left hand side
H - d) right hand side
I - Width of *intervallum* a) *praetentura*
J - b) *retentura*
K - c) left hand side
L - b) right hand side
M - Width of *porta praetoria*
N - Width of *portae principales*
O - Width of *porta decumana*

Note: Gate dimensions are to the outside edges of the carriageway or carriageways

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
CARDEAN														
				7,50	6,00	7,50		9,00	7,50	10,50				
FENDOCH														
	10,15	9,14	7,92	3,96	3,96	3,96	3,96	9,14	7,92	7,92	7,92	10,36	10,36	2,74
STRAGEATH														
I	9,00	7,00	5,00	3,00	3,00		4,00	9,50	9,50	7,50	8,00	5,00		3,50
II	5,00	5,00	4,50	4,50	4,50	3,00		9,00	5,00	11,50	8,00	5,00		3,40
III	5,60	6,00	4,50	6,00	4,50		5,00	10,00	11,00	13,00	12,00	5,00		4,25
ARDOCH														
1C		6,10	5,33											
CAMELON														
	6,40	12,19	6,40	3,66	3,66	3,66	7,62	6,10	9,14	9,14	7,62	6,40	6,40	6,70
MUMRILLS														
		4,27	4,27				3,35					2,13	2,13	

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
ROUGH CASTLE														
	3,00	7,32		2,44		1,22		4,27				3,05	4,57	2,74
BAR HILL														
					3,00			9,00	9,00	8,00	8,00	3,00	3,00	
CADDER														
		6,71	5,18	5,79	3,35		3,96	9,14	6,10	7,62	7,01	2,29	2,29	
BALMUILDY														
	6,10	8,53	6,10	4,27	6,10	6,10	6,10	4,27	6,10	6,10	6,10	3,66	3,66	3,66
BEARSDEN														
	3,50		3,50	3,00	3,00	3,00	3,00	10,00	7,00	5,50	5,50			
DUNTOCHER														
									4,57			4,88	4,27	
OLD KILPATRICK														
		4,88						9,14		7,01	7,01	3,05	3,05	
CRAMOND														
	6,10	9,14	6,00	6,40			7,62	9,00	12,95		9,00			
INVERESK														
Pd 1							3,66				9,75			
Pd 2							9,75				9,75			
ELGINHAUGH														
	7,00	7,00	7,00	7,00	4,00	5,00	5,00	7,00	7,00	5,00	5,00	5,00	5,00	5,00
CASTLEDYKES														
Ant		6,71		6,40	6,40	6,40	6,40	9,14	9,14	9,14	9,14	6,10	5,49	3,96

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
LYNE														
								8,53	9,75	19,51	9,14	3,66	3,66	4,57
NEWSTEAD														
I								15,24	15,24	15,24	15,24			
II				4,27	4,27	4,27	4,27		7,62					
III,IV								6,71		7,62	9,14	3,05	3,96	
CAPPUCK														
	5,49													
CRAWFORD														
Flav	4,00	5,00						5,00	6,50		5,00			
Ant I	5,50	6,25	3,50					5,00	5,00	5,00	4,25			
Ant II	5,50	7,00	3,50	5,00	5,00	5,00	5,00	5,00	5,00	7,00	11,00			
RAEBURNFOOT														
		4,50		2,44	2,44	2,44	2,44	4,88	4,88	4,88	4,88			
DALSWINTON														
BII								9,14		9,14				
CARZIELD														
					7,62		7,62		7,62		10,67			
GLENLOCHAR														
	4,57	9,14	6,10	4,57	4,57	4,57	4,57							
BIRRENS														
Ant I	6,10	5,00	6,10					6,10	6,10	6,10	6,10			
Ant II	6,10	5,00	6,10		4,27			6,10	6,71	6,10	6,10			
SOUTH SHIELDS														
II	4,00	16,00						5,00		5,00	3,50	7,00	6,00	
III,IV								4,50	15,00	5,00	5,00		7,50	7,00

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
WALLSEND														
	7,00	6,00	6,00					7,50	6,00	6,00	3,50	7,00		7,00
BENWELL														
			7,00						6,40	5,03	5,03			7,32
RUDCHESTER														
												9,14	9,14	9,14
HALTONCHESTERS														
								5,00		6,10	4,57	7,62	7,62	
CORBRIDGE														
IA - IVB										8,00	8,00		5,90	
CHESTERS														
								6,00			4,50	5,50	6,25	5,50
CARRAWBURGH														
								10,00						
HOUSESTEADS														
	7,00	7,00	7,00					7,00	7,00	7,00	8,00	7,00	6,75	6,75
CHESTERHOLM														
St Ft 1						3,25					8,00	4,00	4,00	4,00
St Ft 2							4,00	11,00						
HALTWHISTLE BURN														
								5,60	2,00	2,00	5,00			
BIRDOSWALD														
		6,10				8,53	4,88						4,88	4,88

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
OLD CHURCH														
										9,75	9,14			
CARLISLE														
Pd 2		7,00				3,00				8,00			7,00	
BOWNESS														
Ph 2								20,00						
LEASE RIGG														
	5,00	5,00								5,00	7,50			
AMBLESIDE														
Ft 1												3,35		
Ft 2												4,11	2,74	2,74
RAVENGLASS														
Ph 1							2,60				10,50			
Ph 2							3,50				10,00			
Ph 3							3,00				7,75			
WATERCROOK														
	4,00	4,00	2,86	3,30	3,30		3,30	3,30	3,30		3,30	3,30	9,50	7,00
BROUGH-BY-BAINBRIDGE														
Ft I								7,62			9,14	3,35		
ILKLEY														
Ft 1	5,33	3,81			1,52	1,52			7,01	5,49			3,81	
Ft 2	4,27	4,27			2,59	2,59			3,35	4,88			3,81	
Ft 3	4,27	4,27				2,59			1,00	6,71			3,81	
RIBCHESTER														
Ph B-D													9,14	7,01

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
HAYTON														
				4,50										
BROUGH-ON-HUMBER														
Pd IIB			3,50			2,90			8,15					6,35
Pd IV			3,75			3,00			4,70					
CASTLEFORD														
L Ft	9,00	6,00			3,76				4,00					6,00
SLACK														
	3,81	4,50	3,81	3,81	3,50	3,00	5,50	5,50	3,81	5,50	3,96	2,74/5,49		4,88
CASTLESHAW														
	6,10	4,57		3,96		3,96		7,32		9,45				
MELANDRA CASTLE														
				2,36			2,36	7,32			2,36	6,10	6,10	3,66
TEMPLEBROUGH														
III	4,88	4,88	4,11	4,72	4,72	3,96	3,96	9,14	9,14	9,14	9,14			
BROUGH-ON-NOE														
Pd I											9,14			
THE LUNT														
Pd II	5,60	5,00						8,00		5,25			5,50	
GREAT CASTERTON														
Ft I						3,60				9,40		4,11		
Ft II	5,00					3,60				9,40		6,40	6,00	
GODMANCHESTER														
									7,50					

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
CAERHUN															
		5,00	5,00	5,50	2,00	3,00	4,00	3,50	5,00	6,00	7,00	7,50	7,50	2,50	3,00
CAERNARVON															
		6,509	5,00	6,50	3,50	4,00			3,50	4,00	7,00	9,50			
PEN LLYSTYN															
		4,50	7,00	5,00	4,00	3,00	5,00	4,00	9,00	9,00	9,00	8,00		5,50	6,00
BUCKTON															
	Pd II	7,50	7,00		7,00	7,00		7,00	7,00	7,00		7,00	7,50	7,50	
PUMPSAINT															
			6,00												
GELLIGAER II															
		6,93	7,62	5,18					5,18	5,18	5,18	5,18		7,01	
LONDON (Cripplegate)															
		6,67	6,67											7,00	
DOVER															
	Ft I								5,00		4,50				
	Ft II	8,00	6,00						6,00		3,00	15,50	5,40	4,40	
HOD HILL															
		7,50	7,50						11,00	22,00	14,00	16,00	6,00	3,65	
WADDON HILL															
										10,00	18,00				
HEMBURY															
									6,40						

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
BURY BARTON														
								11,00						
NANSTALLON														
	6,00	6,10	4,57	2,44	2,44	2,44	2,44	7,50	2,44		5,00		5,00	5,00
BOULOGNE														
					4,00		4,00		10,00		10,00			
VALKENBURG														
C 1	6,00	8,00						6,00	6,00	6,00	6,00		3,00	
C 1a	7,00	6,00												
C 2/3	4,00	4,00						6,00	13,00	6,00	6,00		3,00	
C 4		4,00						6,00	6,00	6,00	6,00		4,00	
C 5		5,00						6,00	5,00	5,00	5,00		3,50	
C 6		6,00						6,00	5,00	7,00	7,00		3,00	
ARENTSBURG														
		20,00						24,00		7,00				
ZWAMMERDAM														
II									4,50					
VECHTEN														
2,3		7,00											7,00	
ASCIBURGIUM														
K V									8,00		8,00	4,50	7,50	8,00
KREFELD-GELLEP														
IIa						4,50				7,50				
IIIb										9,00				
DORMAGEN														
	5,50	8,50					6,00				6,00			

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
NIEDERBIEBER														
	15,00	10,00						8,50		6,00	6,00	8,00	7,00	2,50
HOLZHAUSEN														
							9,33				23,99	8,00	3,50	3,50
SAALBURG														
	6,00	5,00	9,00/4,00					8,00	12,00	10,00				
BUTZBACH														
Pd 3							3,25				7,00	7,00	8,00	4,00
Pd 4							3,50				8,00	7,00	8,00	4,00
ECHZELL														
	7,00	7,00	6,00					8,00	7,00	7,00	7,00	7,00	7,00	2,00
ALTENSTADT														
Pd 5										6,00		9,00	4,00	
OKARBEN														
														3,33
HEDDERNHEIM														
K 1			6,00											
K 2			7,50											
HOFHEIM (Erdlager)														
	5,50	6,00	5,00					4,00	15,00	5,00	10,00	5,00	7,00	
HOFHEIM (Steinkastell)														
Pd I	6,00	5,25						8,25	5,25	8,25	8,25	5,25	6,75	2,63
WIESBADEN														
	5,50	5,50	3,00	5,00	5,00	5,00	5,00	11,00	16,00	9,00	11,00	3,00	3,00	2,00

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
STOCKSTADT														
												7,50	3,00	3,00
WÜRZBERG														
												3,00	3,00	3,00
HESSELBACH														
A	3,00	3,00			1,50			8,50	5,00	7,00	5,00	3,00	2,50/3,00	
B/C	3,50	3,00	2,50		1,50	2,00	2,20	7,00	3,50	5,00	5,30	3,00	3,00	1,25
LADENBURG														
					6,00									
MILTENBERG														
												3,50	3,50	4,00
ÖHRINGEN (Burgkastell)														
		8,00								11,50			3,00	9,00
MURRHARDT														
					3,00	2,50			13,50	7,25		7,00	4,00	4,00
WELZHEIM (Ostkastell)														
					3,30					3,30				
STUTTGART-CANNSTATT														
B												4,00	7,50	3,50
KÖNGEN														
	5,00	6,00							8,00		7,00	8,00	7,00	8,00
ROTTWEIL KASTELL II														
								7,50		12,60	10,00		4,30	

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
ROTTWEIL KASTELL III														
			7,50						10,00	10,00	10,00		6,00	2,00
ROTTWEIL KASTELL V														
										13,00			3,50	
BURLADINGEN														
	6,00	4,00		4,80	5,50		6,00	9,50	9,00	6,00	7,00	8,00	4,00	
UNTERKIRCHBERG														
Pd II Ph IIa									6,50	6,50				
HEIDENHEIM														
				4,00		4,00		8,25	5,00	7,00	7,00	10,00	10,00	10,00
UNTERBÖBINGEN														
													10,00	4,00
AALEN														
		7,00								8,00		7,00	7,00	7,00
MUNNIGEN														
	5,50	5,00	5,50					5,90	5,90					
WEIßENBURG (Breitung)														
											8,00			
ELLINGEN														
								4,00	6,00		6,00	3,30		3,00
PFÜNZ														
						4,25						8,00	8,50	8,50

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
OBERSTIMM														
	6,00	6,50	5,00	3,50		3,50	3,50	6,00	2,00	6,00	5,00			3,50
STRAUBING (Kastell IV)														
	4,00													
MOOS-BURGSTALL														
													7,30	
KÜNZING														
	7,00	7,00	7,50	6,50	6,50	6,00	5,00	5,50	5,50	5,50	5,00	6,00	7,00	3,00
PETRONELL														
Pd 2	7,50	6,00	7,50					8,50	7,50	9,00	9,00	7,50		7,50
IŽA-LÉANYVÁR														
Ft 2		10,00	7,00					9,00	11,00		9,00		7,50	7,50
INTERCISA														
H-EK		5,00					3,00						5,00	
SK	5,00	5,00					3,00						4,00	
ČEZAVA														
Traj												5,00	3,50	
DROBETA														
Traj								6,00	3,50	7,50	7,50	3,00	3,50	2,50
BOLOGA														
EL	7,00	7,00						3,00		4,00	3,00			
SL	7,50	7,50						3,00		5,00	5,00	7,50	7,00	7,50
BUCIUMI														
SL	6,30	7,20			2,20		2,40	9,00		8,00	8,00	8,00	7,00	3,75

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
FELDIOARA														
	4,00	5,00		2,00		4,00		8,00		10,00		4,00	5,00	
SLÄVENI														
	10,00							5,00	5,00	10,00	10,00			
OSTIA														
												3,50		
GEMELLAE														
								5,00		5,00	5,00			
BU NGEM														
								6,00	6,00	6,00	6,00	3,50	2,90	2,90

TABLE XXV HISTORY FORTLETS

A - Periods of Occupation
B - Garrison (attested or postulated)
C - Evidence
D - Province
E - Site Number (See Location Maps and List of Sites)

A	B	C	D	E
WILDERNESS PLANTATION				
Antonine I			*Brit*	13
DUNTOCHER				
Antonine I	1 century ?		*Brit*	16
OUTERWARDS				
Primary Ant I Secondary Ant II			*Brit*	20
DURISDEER				
Antonine			*Brit*	31
TASSIESHOLM				
Antonine			*Brit*	32
BARBURGH MILL				
c 142 - 148	1 century ?		*Brit*	34
GATEHOUSE OF FLEET				
Flavian	1 century ?		*Brit*	38
CHAPEL HOUSE (Milecastle 9)				
120/25 - *c* 383			*Brit*	44

A	B	C	D	E
SEWINGSHIELDS (Milecastle 35)				
120/25 - *c* 383			*Brit*	51
HOUSESTEADS MILECASTLE (Milecastle 37)				
120/25 - *c* 383			*Brit*	53
CASTLE NICK (Milecastle 39)				
Hadrianic			*Brit*	55
POLTROSS BURN (Milecastle 48)				
120/25 - *c* 330			*Brit*	58
HIGH HOUSE (Milecastle 50)				
120/25 - 4C			*Brit*	60
HIGH HOUSE (Turf Wall Milecastle)				
122/6 -			*Brit*	61
BANKSHEAD (Milecastle 52)				
Hadrianic			*Brit*	62
RANDYLANDS (Milecastle 54)				
120/25 - 4C			*Brit*	63
PEN LLYSTYN				
100/30 - 120/50			*Brit*	102
MARTINHOE				
55 - 75	1 century ?		*Brit*	129
VALKENBURG (Boven)				
c 100			*Germ Inf*	135

A	B	C	D	E
WERTHAUSEN				
c 100 - early 3C			*Germ Inf*	148
HEIDENBURG				
2C - 3C			*Germ Inf*	152
KEMEL (Ältere Schanze)				
Domitianic	½ century ?		*Germ Sup*	158
KEMEL (Jüngere Schanze)				
Trajanic/Hadrianic	1 century ?		*Germ Sup*	159
SAALBURG (Kleinkastell)				
c 90 -			*Germ Sup*	160
DEGERFELD				
EL *c* 100 - 160/75	*Vex Coh II Cyrenaica* ?		*Germ Sup*	163
SK 160/75 - early 3C	*Vex Coh II Cyrenaica* ?			
NEUWIRTSHAUS				
Late Hadrianic			*Germ Sup*	170
WAGBACHKASTELL				
Late 1C - 115/25			*Germ Sup*	182
HASELBURG				
Pd 1 *c* 150 - 170/80	1 C *Coh I Seq et Raur Eq*		*Germ Sup*	186
Pd 2 170/80				
Pd 3 170/80 - 259/68	Officiales Brittonum	CIL XIII		
MAINHARDT				
Late 2C			*Germ Sup*	189

A	B	C	D	E
RÖTELSEE				
Late 2C - 260	*c* 20 men ?		*Germ Sup*	190
NERSINGEN				
Ph 1 30/40 - 70s Ph 2 *c* 85			*Raetia*	207
WEINBERG				
3C			*Raetia*	220
BOLJETIN				
Ph I Tib - Hadr			*Moesia*	246

TABLE XXVI FORTLET DIMENSIONS

A - Date
B - Inside Rampart (length × width)
C - Area
D - Over Rampart (length × width)
E - Area
F - Over Defences (length × width)
G - Area
H - Proportions (length divided by width)
I - Orientation

A	B	C	D	E	F	G	H	I
WILDERNESS PLANTATION								
	20,75x18,00	0,04	28,45x24,20	0,07			1,18	N
DUNTOCHER								
	18,29x18,29	0,18	56,00x46,00	0,26			1,23	NNE
OUTERWARDS								
Primary	14,47x14,02	0,02	18,97x18,47	0,04			1,03	NNE
Secondary	13,25x12,80	0,02	19,75x19,30	0,04			1,04	NNE
DURISDEER								
	32,00x18,29	0,06	41,00x27,29	0,11	46,00x32,29	0,15	1,50	NE
TASSIESHOLM								
	39,62x22,56	0,09	46,62x29,56	0,14	51,62x34,56	0,18	1,58	SEE
BARBURGH MILL								
	28,50x29,50	0,08	34,50x35,50	0,13	45,50x46,50	0,21	0,97	N
GATEHOUSE OF FLEET								
	51,00x43,00	0,22	58,00x49,50	0,29	102,0x93,50	0,95	1,17	SW

A	B	C	D	E	F	G	H	I
CHAPEL HOUSE								
	17,83x14,94	0,03	23,33x20,94	0,05			1,19	NNE
SEWINGSHIELDS								
	17,70x15,00	0,02	23,60x21,00	0,05			1,12	N
HOUSESTEADS								
	15,09x17,53	0,03	20,09x22,53	0,05			0,86	N
CASTLE NICK								
	18,50x15,00	0,03	23,00x19,00	0,04			1,21	N
POLTROSS BURN								
	21,34x18,52	0,04	27,34x24,54	0,07			1,15	N
HIGH HOUSE								
	23,16x18,29	0,04	28,16x23,29	0,07			1,27	NNW
HIGH HOUSE (Turf Wall)								
	20,12x16,76	0,03	32,12x28,76	0,09			1,20	NW
RANDYLANDS								
	23,62x19,58	0,05	28,62x24,58	0,07			1,21	N
PEN LLYSTYN								
	40,00x29,50	0,12	48,00x37,50	0,18	58,00x47,50	0,27	1,36	SW
MARTINHOE								
	27,43x27,43	0,08	37,43x37,43	0,14			1,00	N
VALKENBURG								
	29,00x34,00	0,10	35,00x41,00	0,14	39,00x45,00	0,18	0,85	NE

A	B	C	D	E	F	G	H	I
WERTHAUSEN								
	44,00x38,00	0,17	47,00x41,00	0,19			1,16	SEE?
HEIDENBURG								
	26,00x31,00	0,08	34,00x39,00	0,13			0,84	S
KEMEL (Ältere Schanze)								
	22,00x23,00	*0,05*	27,00x28,00	0,08			0,96	NE
KEMEL (Jüngere Schanze)								
	37,50x26,00	*0,10*	42,50x31,00	0,13			1,37	NE
SAALBURG								
	76,00x72,00	0,55	84,00x80,00	0,67	96,00x92,00	0,88	1,05	NNW
DEGERFELD								
EL	26,50x24,00	0,06	34,50x32,00	0,11	44,50x42,00	0,19	1,10	NE
SK	54,00x52,25	0,28	57,00x55,25	0,31	67,00x65,25	0,44	1,03	NE
NEUWIRTSHAUS								
	27,20x21,60	0,06	36,00x30,40	0,11	61,60x56,80	0,35	1,18	E
WAGBACHKASTELL								
				0,25?				E
HASELBURG								
Pd 1	41,00x36,50	0,15	41,50x37,00	0,15				
Pds 2,3	50,50x41,50	0,21	53,00x44,00	0,23	61,00x52,00	0,32	1,20	NE
MAINHARDT								
	23,00x23,00	0,05	25,00x25,00	0,06			1,00	E
RÖTELSEE								
	16,50x16,50	0,03	18,50x18,50	0,03	24,50x24,50	0,06	1,00	E

A	B	C	D	E	F	G	H	I
NERSINGEN								
	25,20x22,20	0,06	29,00x26,00	0,08	40,00x37,00	0,15	1,14	SE
BOLJETIN								
	50,00x41,50	0,21	58,00x49,50	0,29			1,17	NE

TABLE XXVII BARRACKS AND ANCILLARY BUILDINGS FTLETS

A - Subject of entry
B - Date of occupation
C - Identity of the builders
D - Original interpretation of the building
E - Date of excavation

A	B	C	D	E
WILDERNESS PLANTATION				
E half	Ant I	*II Augusta*	Bk	1965-66
DUNTOCHER				
L side	Ant I		Bk	1948-51
OUTERWARDS				
Primary W,E	Ant I		Bks/Stabs ?	1970s
Secondary W,E	Ant II		Bks	
DURISDEER				
Pds 1,2 L	Ant		Bks	1940s/50s
TASSIESHOLM				
Pd 1 L	Ant I		Bk	1938-39/50
BARBURGH MILL				
W	*c* 142 - 48		Offs'/Men's Qs	1971
E			Men's Qs	
GATEHOUSE OF FLEET				
L 1,2,3,4	Flav		Stores/Wkshops	1960-61
Bk			Bk	
R Bk			Bk	
5			Store/granary	
6			?	

A	B	C	D	E
CHAPEL HOUSE				
Pd I L,R	*120/25* - *c* 195			1929
Pd II L,R	200/05 - *c* 295			
SEWINGSHIELDS				
Phs 1,2 B I	120/25 - *c* 195			1980s
Phs 3,4 B III,II	200/05 - *c* 383			
HOUSESTEADS				
L,R	120/25 -	*VI Minervia ?*		1933
CASTLE NICK				
L	2C ?		Bk	1985
R C,D,E	2C ?		Sheds	
POLTROSS BURN				
L,R Pd 1 W,E	120/25 - 180		Bks	pre 1911
Pd 2 W,E	*c* 180 - 270		Bks	
HIGH HOUSE				
Pd I W,E	Hadr/Ant			1909-12
Pd II W,E	3C			
HIGH HOUSE (Turf Wall)				
R	122/6		Bk	1934
BANKSHEAD				
N-E Quarter	2C		Bks ?	1934
RANDYLANDS				
L				1933
PEN LLYSTYN				
L I N,S			Barn	1960s
R VIA			Store	

A	B	C	D	E
MARTINHOE				
W Phs 1,2	*c* 55 - 75		Bk	1960s
E			Bk	
S			?	
VALKENBURG				
L,R,Rear	*c* 100		Bk	1985
WERTHAUSEN				
N,S	*c* 100 -		Bks	1924/55
HEIDENBURG				
Pds 1,2	2C,3C			1929
KEMEL (Ältere Schanze)				
N-W,S-E	Domitianic		Bks	1898
KEMEL (Jüngere Schanze)				
R	Hadr/Traj		Bk	1898
SAALBURG				
S-E Corner	*c* 90			1911
DEGERFELD				
EL W,E Phs 1,1a	*c* 100 - 160/75		Bks	1897-98/
SK E Bk Ph 2	160/75 - early 3C		Bk	1910/64-66
E			Stab ?	
NEUWIRTSHAUS				
R	late Hadr		Bk	1883/1977
WAGBACHKASTELL				
W	late 1C	*I Adiutrix*	Bk?	1953

A	B	C	D	E
HASELBURG				
Pds 1,2 N-E Corn L,R	*c* 150 - 170/80		? Bks	1975
MAINHARDT				
	late 2C		Bks	1975
RÖTELSEE				
L,R,Rear	late 2C - 260		Bk	1974
NERSINGEN				
S-W N-E	*c* 40 - 85		Bk Store/stab/wkshp	1983
WEINBERG				
Kaserne II	3C		Bk	1917-18
BOLJETIN				
L	late 1C		Bk	1956-70
R a,B			Bk	
Rear			Bk	

TABLE XXVIII DESCRIPTION FORTLETS

A - Subject of entry
B - Number of examples to which description refers
C - Building Type
D - Officers' Quarters (+ integral / - detached)
E - Porticus (+ with / - without)
F - Rear wall configuration: 1 - separate walls
2 - party wall with rampart
G - First *contubernium* Types
H - End *contubernium* Types
I - Construction methods T - timber (precise method unknown)
SB - sill beam
PP - post-pit
PT - post-trench
SS - stone sill wall
S - stone wall
J - Orientation (sc - *per scamna* / str - *per strigas*)

A		B	C	D	E	F	G	H	I	J
WILDERNESS PLANTATION										
E		1	0			1			PP	str
DUNTOCHER										
L		1	0	+?		1			PP	str
OUTERWARDS										
Primary	W	1	6?	+?	+	1			SS	str
	E	1	0?		+	1			SS	str
Secondary	W,E	2	0			1			SS	str
DURISDEER										
L		1				3?			PP	str
TASSIESHOLM										
L	Pd 1	1							PT	str
	Pd 2	1	B	+?	-?	1			PP	str

A	B	C	D	E	F	G	H	I	J
BARBURGH MILL									
W	1	G	+	+	1	a	a	PT	str
E	1	H			1	a	c	PT	str
W+E	*1*	*G*	*+*	*+*	*1*	*a*	*c*	*PT*	*str*
GATEHOUSE OF FLEET									
L 1	1	O			1			PT	sc
2,3	2	O			2			PT	sc
4	1	S			1			PT	sc
Bk	1	B	+	-	1	a	a	PT	str
R Bk	1	J		-	1	a	a	PT	str
5	1	R			1			PT	sc
6	1	R			1			PT	str
LBk+RBk	*1*	*B*	*+*	*-*	*1*	*a*	*a*	*PT*	*str*
CHAPEL HOUSE									
Pd I L	1	O			1			PP	str
Pds I,II R	1	W	+		1			SS	str
Pd II	1	O			1			SS	str
SEWINGSHIELDS									
Phs 1,2 R BI	1	O		-	1			SS	str
Phs 2,3 L BIII	1	O		-	1			SS	str
R BII	1	O		-	1			SS	str
HOUSESTEADS									
L	1	O			1			T?	str
R	1	H			3			SS	str
CASTLE NICK									
L	1	O			1			SS	str
R C	1	O			1			SS	sc
D	1	S			1			SS	sc
E	1				1			SS	sc
POLTROSS BURN									
Pd 1 W,E	2	H	+?		1	a	a	SS/T	str
Pd 2 W,E	2	H	+		1	b	c	SS/T	str
Pd 1 W+E	*1*	*H*	*+*		*1*	*a*	*a*	*SS/T*	*str*
Pd 2 W+E	*1*	*H*	*+*		*1*	*a*	*c*	*SS/T*	*str*

A	B	C	D	E	F	G	H	I	J
HIGH HOUSE									
Pd I W,E	2							T	
Pd II W	1	H			3?			SS	str
E	1	O			1			SS	str
HIGH HOUSE (Turf Wall)									
R	1	W	+	-	1			PT	str
BANKSHEAD									
N-E Quarter	1							SS	
RANDYLANDS									
L	1	W	+		1			SS	str
PEN LLYSTYN									
L I	2	O			1			SB	sc
VIA	1	O/S?			1			SB	sc
MARTINHOE									
W Phs 1,2	1	G	+	-	1	a	a	PT/SB	str
E	1	G	+?	-	1	a	a	PT	str
S	1	H			1			PT	sc
W+E	*1*	*G*	*+*	*-*	*1*	*a*	*j*	*PT/SB*	*str*
VALKENBURG									
L	1	X(H)		+	1	a	a	PT	str
R	1	X(H)		+	1	a	a	PT	str
Rear	1	X(U)		+	1			PT	sc
L+R+Rear	*1*	*X*		*+*	*1*	*a*	*a*	*PT*	
WERTHAUSEN									
N,S	2	J		+	1	a	a	PP	str
HEIDENBURG									
N,W,E Pd 1	1	X						PP	
Pd 2	1	X			3			PP	

A	B	C	D	E	F	G	H	I	J
KEMEL (Ältere Schanze)									
N-W,S-E	2	X(H)	+	-	1	a	a	PT	str
KEMEL (Jüngere Schanze)									
R	1	X(H)	+	+	1	a	a	PT	str
L+R	*/*	*H*	*+*	*+*	*/*	*a*	*a*	*PT*	*str*
SAALBURG									
S-E Corner	1	J		+	1			PT	str
DEGERFELD									
EL Phs 1,1a W,E	1	X(B)	+	+	1	a	a	PT	str
W+E	*/*	*B*	*+*	*+*	*/*	*a*	*g*	*PT*	*str*
SK E Bk	1	Jx						SS	str
E	1	0						SS	str
NEUWIRTSHAUS									
R	*/*	*X(J)*	*+*	*+*	*/*			*PT*	*str*
L	1	X(Jx)	+	+	1			PT	str
WAGBACHKASTELL									
W	1							PT	
HASELBURG									
N-E Corner	1	Q			1			PT	sc
L Pd 1	1	J		+?	1	a	a	PT	str
Pd 2	1	J		+?	1	a	c	PT	str
R	1	A	+	+?	1	a	a	PT	str
L+R Pd 1	*/*	*A*	*+*	*+*	*/*	*a*	*a*	*PT*	*str*
MAINHARDT									
								PT/PP	
RÖTELSEE									
L,R,	1	X(H)		+	1			SB	str
Rear	*/*	*X(H)*		*+*	*/*			*SB*	*sc*
L+R+Rear	*/*	*X(H)*		*+*	*/*			*SB*	

A	B	C	D	E	F	G	H	I	J
NERSINGEN									
S-W	1	B	+		1	b	a	PP	str
N-E	1	0			1			PP	str
WEINBERG									
Kaserne II	1	Q?			1			SS/T	
BOLJETIN									
L	2	0			1			SS	str
R a	1	0			1			SS	str
b	1	0			1			SS	sc
Rear	1	0			1			SS	sc

A - Subject of entry
B - Overall
C - Officers' Quarters
D - Men's Quarters
E - Width of space (when present) between officers' and men's quarters
F - Total number of *contubernia* (details of special *contubernia*)

A		B		C		D		E	F
WILDERNESS PLANTATION									
E		*6,50*	*6,10*						
DUNTOCHER									
		10,97	10,57						
OUTERWARDS									
Primary	W	10,75	10,25	4,10	3,60	6,65	5,75		1
	E	*10,50*	*10,00*						
Secondary	W,E	10,50	10,00						
DURISDEER									
L		21,33	21,03						
TASSIESHOLM									
Pd 2		28,35	28,05	4,27	3,97	24,08			
BARBURGH MILL									
L		24,50	24,10	9,20	8,80	15,30			4
R		23,00	22,60						6
L+R		*47,10*		*9,20*	*8,80*	*37,90*			*10*
GATEHOUSE OF FLEET									
L	1,2	8,00	7,70						
	3	5,50	5,20						
	4	8,00	7,70						
	Bk	28,30	28,00	14,00	13,70	14,30			5

A		B		C		D	E	F	
R	Bk	25,00	24,70					7	
	5	8,40	8,30						
LBk+RBk		*53,30*	*52,70*	*14,00*	*13,70*	*39,30*		*12*	
CHAPEL HOUSE									
Pd I	L	7,32	7,02						
	R	7,32	6,62						
Pd II	R	7,32	6,62						
SEWINGSHIELDS									
Phs 1,2	R B I	7,45	6,75						
Phs 3,4	L B III	14,50	13,80						
	R B II	8,50	7,80						
HOUSESTEADS									
R		12,19						2	
CASTLE NICK									
L		*12,40*	*11,70*						
R	C	4,20	3,50						
	D	6,00	5,30						
	E	5,50	4,80					2	
POLTROSS BURN									
Pd 1	E	17,15	16,45	*4,70*	*4,00*	*12,45*		3	
	W	16,45	15,84	*4,45*	*3,75*	*12,09*		3	
Pd 2	E	17,15	16,45	6,20	5,50	10,95		2	(FC,EC)
	W	16,54	15,84	6,50	5,80	10,04		2	(FC,EC)
Pd 1	*E+W*	*33,69*	*32,29*	*9,15*	*7,75*	*24,54*		*6*	
Pd 2	*E+W*	*33,69*	*32,29*	*12,70*	*11,30*	*20,99*		*4*	
HIGH HOUSE									
Pd II	W	20,42	19,72						
	E	6,02	5,32						
HIGH HOUSE (Turf Wall)									
R		10,36	10,06	3,35	3,05	7,01		1	

A	B		C		D		E	F
RANDYLANDS								
L	9,45	8,75						
PEN LLYSTYN								
L I	20,50	20,20						
R VIA	15,00	14,70						
MARTINHOE								
W Bk Ph 1	15,00	14,70	6,00	5,70	9,00			3
Ph 2	17,20	16,90	8,20	7,90	9,00			3
E Bk	15,50	15,20	*6,25*	*5,95*	*9,25*			3
S	6,40	6,10						
WBk+EBk Ph 1	*30,50*	*29,90*	*6,00*	*5,70*	*24,50*			*7 (EC)*
Ph 2	*32,70*	*32,40*	*8,20*	*7,90*	*24,50*			*7 (EC)*
VALKENBURG								
L,R	21,20	20,80						5
Rear	16,30	15,90						
L+R+Rear	*58,70*	*58,30*	*16,30*	*15,90*	*42,40*			*10*
WERTHAUSEN								
N,S	32,10	31,80						10/11
KEMEL (Ältere Schanze)								
NW	13,50	13,20						3
SE	14,00	13,60						3
Rear	5,50	5,20						
NW+SE	*27,50*	*26,80*						*6*
NW+SE+Rear	*33,00*	*32,00*						*6*
KEMEL (Jüngere Schanze)								
R	25,00	24,60	8,00	7,60	17,00			4
L	*25,00*	*24,60*			*25,00*	*24,60*		*6*
L+R	*50,00*	*49,60*	*8,00*	*7,60*	*42,00*			*10*
SAALBURG								
S-E Corner	10,50	10,10						

A	B		C		D		E	F
DEGERFELD								
EL W Bk	21,00	20,60	6,50	6,10	14,50			4
E Bk	21,00	20,60	8,88	8,48	12,12			3
WBk+EBk	*42,00*	*41,60*	*8,88*	*8,48*	*33,12*	*32,72*		*8 (EC)*
NEUWIRTSHAUS								
R	17,20	16,80						
L	*17,20*	*16,80*						
Rear	*10,00*	*9,60*						
L+R	*34,40*	*34,00*						
L+R+Rear	*44,40*	*43,60*						
HASELBURG								
N-E Pds 1,2	11,60	11,20						3
L Pd 1	22,80	22,40						5
Pd 2	24,80	24,40						6 (EC)
R	29,30	28,90	11,60	11,20	17,70			4
L+R Pd 1	*52,10*	*51,70*	*11,60*	*11,20*	*40,50*			*9*
Pd 2	*54,10*	*53,70*	*11,60*	*11,20*	*42,50*			*10 (EC)*
RÖTELSEE								
R	11,20	10,80	7,40	7,00	3,80			3
L	7,65	7,25			7,65	7,25		2
Rear	10,75	10,35						
L+R	*18,85*	*18,48*	*7,40*	*7,00*	*11,45*			*5*
L+R+Rear	*29,60*	*29,20*	*7,40*	*7,00*	*22,20*			*5*
NERSINGEN								
SW	19,80	19,40	5,80	5,40	14,00			7 (FC)
NE	18,60	18,20						
WEINBERG								
Kaserne II	18,50	17,80						
BOLJETIN								
L	19,75	19,05						
R a	8,50	7,80						
b	21,75	21,05						
Rear	20,75	20,05						

A - Subject of entry
B - Overall
C - Officers' Quarters
D - Men's Quarters
E - Veranda (internal) (Where the veranda is not verified the equivalent measurement is shown in brackets)
F - Building proportions (length divided by width)

A		B		C		D		E	F	
WILDERNESS PLANTATION										
E		4,75	4,35						1,37	1,40
DUNTOCHER										
L		5,49	5,09	5,49	5,09				2,00	2,08
OUTERWARDS										
Primary	W	4,40	3,90	4,40	3,90	3,25	2,75	(0,65)	2,44	2,63
	E	4,50	4,00	4,50	4,00	3,30	2,80	(0,70)	2,33	2,50
Secondary	W,E	4,25	3,75						2,47	2,67
DURISDEER										
L		*6,86*	*5,56*						*3,11*	*3,21*
TASSIESHOLM										
Pd 2	L	6,10	5,80	6,10	5,80	6,10	5,80		4,65	4,84
BARBURGH MILL										
L		9,20	8,80	9,20	8,80	7,40	7,00	1,40	2,66	2,74
R		7,40	7,00			7,40	7,00		3,11	3,23
L+R		*9,20*	*8,80*	*9,20*	*8,80*	*7,40*	*7,00*	*1,40*		
GATEHOUSE OF FLEET										
L	1,2	4,20	3,90						1,90	1,97
	3	4,20	3,90						1,31	1,33
	4	7,20	6,90						1,11	1,12

A	B		C		D		E	F	
L Bk	8,20	7,90	8,20	7,90	8,20	7,90		3,45	3,54
R Bk	7,60	7,30			7,60	7,30		3,29	3,38
5	7,10	6,80						1,18	1,22
6	7,00	6,70							
LBk+RBk	*8,20*	*7,90*	*8,20*	*7,90*	*8,20*	*7,90*		*6,50*	*6,67*
CHAPEL HOUSE									
Pd I L	2,44	2,14						3,00	3,28
R	4,50	3,80						1,63	1,74
Pd II L	3,84	3,14							
R	4,50	3,80						1,63	1,74
SEWINGSHIELDS									
Phs 1,2 R BI	4,25	3,55						1,75	1,90
Phs 3,4 L BIII	5,50	4,80						2,64	2,88
R BII	4,50	3,80.						1,89	2,05
HOUSESTEADS									
R	6,10							2,00	
CASTLE NICK									
L	5,00	4,30						2,48	2,72
R C	3,80	3,10						1,11	1,13
D	4,20	3,50						1,43	1,51
POLTROSS BURN									
Pds 1,2 W	5,18	4,48	5,18	4,48	5,18	4,48	*1,40*	3,19	3,54
E	5,03	4,33	5,03	4,33	5,03	4,33	*1,40*	3,41	3,80
W+E W	*5,18*	*4,48*	*5,18*	*4,48*	*5,18*	*4,48*	*1,40*	*6,50*	*7,21*
HIGH HOUSE									
Pd II W	5,70	5,00						3,58	3,94
E	4,85	4,15						1,24	1,28
HIGH HOUSE (Turf Wall)									
R	4,27	3,97	4,27	3,97	4,27	3,97		2,43	2,53
RANDYLANDS									
L	4,57	3,87						2,07	2,26

A	B		C		D		E	F	
PEN LLYSTYN									
L I	4,50	4,20						4,56	4,81
R VIA	5,00	4,70						3,00	3,13
MARTINHOE									
W Bk Ph 1	5,40	5,10	5,40	5,10	3,80	3,50	(1,30)	2,78	2,88
Ph 2	5,40	5,10	5,40	5,10	3,80	3,50	(1,30)	3,19	3,31
E Bk	6,00	5,70	6,00	5,70	3,50	3,20	(2,20)	2,58	2,67
S Bdng	3,00	2,70						2,13	2,26
WBk+EBk Ph 1	*5,40*	*5,10*	*5,40*	*5,10*	*3,80*	*3,50*	*(1,30)*	*5,65*	*5,86*
Ph 2	*5,40*	*5,10*	*5,40*	*5,10*	*3,80*	*3,50*	*(1,30)*	*6,06*	*6,35*
VALKENBURG									
L,R	6,50	6,10			5,00	4,60	1,10	3,26	3,41
Rear	6,50	6,10	5,00	4,60			1,10	2,51	2,61
L+R+Rear	*6,50*	*6,10*	*5,00*	*4,60*	*5,00*	*4,60*	*1,10*	*9,03*	*9,56*
WERTHAUSEN									
N,S	10,20	9,90			7,50	7,20	2,40	3,15	3,21
HEIDENBURG									
Pd 2	4,00	3,70							
KEMEL (Ältere Schanze)									
NW	4,75	4,35						2,84	3,03
SE	5,50	5,20						2,55	2,62
Rear	5,00	4,70						1,10	1,10
NW+SE	*5,50*	*5,20*						*5,00*	*5,15*
NW+SE+Rear	*5,00*	*4,70*						*6,60*	*6,81*
KEMEL (Jüngere Schanze)									
R	8,25	7,85	6,00	5,60	6,00	5,60	1,85	3,03	3,13
R+L	*8,25*	*7,85*	*6,00*	*5,60*	*6,00*	*5,60*	*1,85*	*6,06*	*6,32*
SAALBURG									
S-E Corner	8,50	8,10			8,50	8,10	1,20	1,24	1,25

A	B		C		D		E	F	
DEGERFELD									
EL W Bk	8,75	8,35	7,25	6,85	7,25	6,85	1,10	2,40	2,47
E Bk	9,00	8,60	7,38	6,98	7,38	6,98	1,22	2,33	2,71
WBk+EBk	*9,00*	*8,60*	*9,00*	*8,60*	*7,38*	*6,98*	*1,22*	*4,67*	*4,84*
SK E	6,00	5,30							
NEUWIRTSHAUS									
R	6,40	6,00	4,40	4,00	4,40	4,00	1,60	2,69	2,80
L,Rear	*6,40*	*6,00*	*4,40*	*4,00*	*4,40*	*4,00*	*1,60*	*2,69*	*2,80*
R+L	*6,40*	*6,00*	*4,40*	*4,00*	*4,40*	*4,00*	*1,60*	*5,38*	*5,67*
R+L+Rear	*6,40*	*6,00*	*4,40*	*4,00*	*4,40*	*4,00*	*1,60*	*8,06*	*8,40*
HASELBURG									
N-E Corner	8,10	7,70						1,36	1,45
L Pd 1	12,60	12,20			8,10	7,70	4,10	1,81	1,84
Pd 2	12,60	12,20			8,10	7,70	4,10	1,97	2,00
R	12,10	11,70	10,80	10,40	8,35	7,95	3,35	2,42	2,09
L+R Pd 1	*12,10*	*11,70*	*10,80*	*10,40*	*8,35*	*7,95*	*3,35*	*4,31*	*4,42*
Pd 2	*12,10*	*11,70*	*10,80*	*10,40*	*8,35*	*7,95*	*3,35*	*4,47*	*4,59*
RÖTELSEE									
L	5,30	4,90			3,75	3,45	1,15	1,44	1,48
R	5,25	4,85			3,65	3,25	1,20	2,13	2,23
Rear	6,00	5,60	3,65	3,25	3,65	3,25	1,95	1,79	1,85
L+R	*5,30*	*4,90*			*3,75*	*3,45*	*1,15*	*3,56*	*3,77*
L+R+Rear	*6,00*	*5,60*	*3,65*	*3,25*	*3,65*	*3,25*	*1,95*	*4,93*	*5,21*
NERSINGEN									
S-W	4,60	4,00	4,60	4,00	4,60	4,00			
N-E	6,40	6,00			4,60	4,00	(1,40)	2,91	3,03
WEINBERG									
Kaserne II	13,50	12,80						1,37	1,39
BOLJETIN									
L	6,00	5,30						3,29	3,59
R a	6,60	5,90						1,29	1,32
b	20,60	19,90						1,06	1,06
Rear	19,75	19,05						1,05	1,05

TABLE XXXI *CONTUBERNIA* / ROOMS

A - Subject of entry
B - Breadth × depth of *papilio* or rear room
C - Breadth × depth of *arma* or front room
D - Breadth × depth of *contubernium* or whole room
E - Area of *papilio* or rear room
F - Area of *arma*
G - Area of *contubernium* or whole room
H - Interval spacing of side walls

Note: Measurements are internal

A	B	C	D	E	F	G	H
OUTERWARDS							
Primary W			5,25x2,50			13,13	5,75
TASSIESHOLM							
Pd 2 L	x2,44	x2,74	x5,49				
BARBURGH MILL							
L,R			3,40x6,60			22,44	3,80
GATEHOUSE OF FLEET							
L Bk	3,10x4,00	3,10x3,20	3,10x7,60	12,40	9,92	23,56	3,40
	2,15x4,00	2,15x3,20	2,15x7,60	8,60	6,88	16,34	2,45
R Bk	3,25x3,80	3,25x2,70	3,25x7,00	12,35	8,78	22,75	3,55
5	x3,75	x2,75	x6,70				
CHAPEL HOUSE							
R Pds I,II	*3,66x3,96*	*3,66x2,13*	*3,66x6,25*	*14,49*	*7,80*	*22,88*	
HOUSESTEADS							
R			5,18x5,18			26,83	5,88
CASTLE NICK							
R C			2,60x2,60			6,76	

A	B	C	D	E	F	G	H
POLTROSS BURN							
Pd 1 W,E			3,60x3,90			14,04	3,80
Pd 2 W,E	See Table XXXII						
HIGH HOUSE							
Pd II W			3,50x5,00			17,50	
			5,00x5,00			25,00	
E			3,75x5,00			18,75	
HIGH HOUSE (Turf Wall)							
R	*3,96x6,40*	*3,96x2,74*	*3,96x9,75*	*25,34*	*10,85*	*38,61*	
RANDYLANDS							
L	*3,66x4,27*	*3,66x3,66*	*3,66x8,38*	*15,63*	*13,40*	*30,67*	
MARTINHOE							
W Bk, E Bk			2,35x3,00			7,05	2,65
S Bdng			2,70x2,50			6,75	
VALKENBURG							
L,R			4,00x4,50			18,00	4,40
WERTHAUSEN							
N,S	2,55x3,60	2,55x2,70	2,55x6,90	9,18	6,89	17,60	2,85
HEIDENBURG							
			x3,20				
KEMEL (Ältere Schanze)							
NW			4,00x4,00			16,00	4,40
SE			4,00x4,50			18,00	4,40
KEMEL (Jüngere Schanze)							
R			3,75x5,25			19,69	4,15

A	B	C	D	E	F	G	H
SAALBURG							
S-E Corner	x4,60	x2,80	x7,80				
DEGERFELD							
EL W Bk	3,06x3,50	3,06x2,38	3,06x6,25	10,71	7,28	19,13	3,46
E Bk	3,00x3,13	3,00x2,88	3,00x6,50	9,39	8,64	19,50	3,40
NEUWIRTSHAUS							
R	x1,20	x1,60	x3,20				
HASELBURG							
Pds 1,2 N-E	x2,90	x2,90	x7,60				
L	4,00x3,40	4,00x4,00	4,00x7,80	13,60	16,00	31,20	4,40
R	4,00x3,00	4,00x4,00	4,00x7,60	12,00	16,00	30,40	4,40
RÖTELSEE							
L			3,40x3,00			10,20	
R			3,50x3,00			10,50	
NERSINGEN							
SW	1,80x2,30	1,80x1,80	1,80x4,50	4,14	3,24	8,10	2,20
NE			12,00x3,80			45,60	
WEINBERG							
Kaserne II	5,50x4,40	5,50x4,40		24,20	24,20		5,70

TABLE XXXII SPECIAL *CONTUBERNIA* FORTLETS

A - Subject of entry
B - First *contubernium*
C - Area
D - End *contubernium*
E - Area
F - End *contubernium* Type 'j' (*Schlußbau*)
G - Area

Note: All measurements are internal and where present the dimensions of the individual rooms are given

A	B	C	D	E	F	G
BARBURGH MILL						
R			2,75x6,60	18,15		
POLTROSS BURN						
Pd 2 W	6,00x3,90	23,40	3,90x3,90	15,21		
E	6,70x3,90	26,13	3,50x3,90	13,65		
MARTINHOE						
E Bk					3,50x3,50	12,25
					3,50x3,50	12,25
					3,50x3,50	12,25
					3,50x3,50	12,25
						49,00
DEGERFELD						
W			2,00x6,25	12,50		
			3,10x3,50	10,85		
			3,10x2,20	6,82		
				30,17		
HASELBURG						
L Pd 2			1,70x4,35	7,40		
			1,70x2,80	4,76		
				12,16		

A	B	C	D	E	F	G
NERSINGEN						
SW	2,80x2,30	6,44				
	2,80x1,80	5,04				
		11,48				

A - Subject of entry
B - Officers' Quarters
C - Men's Quarters
D - Total area of building
E - Living space of *contubernium*
F - Total living space available in men's quarters

A	B		C		D		E	F
WILDERNESS PLANTATION								
E					*30,88*	*26,54*		
DUNTOCHER								
					60,23	53,80		
OUTERWARDS								
Primary W	18,04	14,04	18,69	15,81	36,73	29,85	13,13	13,13
Whole bdng	18,04	14,04	29,26	25,94	47,30	39,98		
E			34,65	28,00				
Whole bdng					47,25			
Secondary W,E					44,63	37,50		
DURISDEER								
L					146,32	137,96		
TASSIESHOLM								
Pd 2 L	24,77	23,03	146,89	139,66	171,66	162,69		
BARBURGH MILL								
L	84,64	77,44	113,22	107,10	197,86	184,54	22,44	89,76
R			170,20	158,20	170,20	158,20	22,44	134,64
L+R	*84,64*	*77,44*	*283,42*	*265,30*	*368,06*	*342,74*	*22,44*	*224,40*

A	B	C	D	E	F
GATEHOUSE OF FLEET					
L 1,2			33,60 30,03		
3			23,10 20,28		
4			57,60 53,13		
Bk	114,80 108,23	117,26 112,97	232,06 221,20	22,32 15,48	97,92
R Bk		190,00 180,31	190,00 180,31	21,13	147,91
5			59,64 56,44		
LBk+RBk	*114,80 108,23*	*307,26 293,28*	*422,06 401,51*		*245,83*
CHAPEL HOUSE					
Pd I L			17,86 15,02		
R			32,94 25,16	*22,29*	22,29
Pd II R			32,94 25,16	*22,29*	22,29
SEWINGSHIELDS					
Phs 1,2 R BI			31,66 23,96		23,96
Phs 3,4 L BIII			79,75 66,24		
R BII			38,25 29,64		
CASTLE NICK					
L			*62,00 50,31*		
R C			15,96 10,85	6,76	6,76
D			25,20 18,55		
POLTROSS BURN					
Pd 1 W	*23,05 16,80*	*62,63 54,16*	85,68 70,96	14,04	*42,12*
E	*23,64 17,32*	*62,62 53,91*	86,26 71,23	14,04	*42,12*
Pd 2 W	*33,67 25,98*	*52,01 44,98*	85,68 70,90		38,61
E	*31,19 23,82*	*55,08 47,41*	86,27 71,23		39,78
Pd 1 W+E	*46,69 34,12*	*125,25 108,07*	*171,94 142,19*	*14,04*	*84,24*
Pd 2 W+E	*64,86 49,80*	*107,09 92,39*	*171,94 142,19*		*78,39*
HIGH HOUSE					
Pd II W			116,39 98,60	17,50 25,00	*92,50*
E			29,20 22,08	18,75	18,75
HIGH HOUSE (Turf Wall)					
R	*14,30 12,11*	*29,93 27,83*	44,23 39,94	36,19	36,19

A	B		C		D		E	F
RANDYLANDS								
L					43,19	33,86	29,03	29,03
PEN LLYSTYN								
L I					92,25	84,84		
R VI					75,00	69,09		
MARTINHOE								
W Bk Ph 1	32,40	29,07	34,20	31,50	66,60	60,57	7,05	21,15
Ph 2	44,28	40,29	34,20	31,50	78,48	71,79	7,05	21,15
E Bk	*37,50*	*33,92*	*32,38*	*29,60*	69,88	63,52	7,05	21,15
S					19,20	16,47	6,75	13,50
WBk+EBk Ph 1	*32,40*	*29,07*	*104,08*	*95,02*	*136,48*	*124,09*	*7,05*	*67,30*
Ph 2	*44,28*	*40,29*	*104,08*	*95,02*	*148,36*	*135,31*	*7,05*	*67,30*
VALKENBURG								
L,R			*106,00*	*95,68*	106,00	95,68	18,00	90,00
Rear	*81,50*	*73,14*			81,50	73,14		
L+R+Rear	*81,50*	*73,14*	*212,00*	*191,36*	*293,50*	*264,50*	*18,00*	*180,00*
WERTHAUSEN								
N,S					240,75	228,96	16,07	*160,70*
KEMEL (Ältere Schanze)								
NW			*64,13*	*57,42*	64,13	57,42	16,00	48,00
SE			*77,00*	*70,72*	77,00	70,72	18,00	54,00
Rear	*27,50*	*24,44*			*27,50*	*24,44*		
NW+SE					*141,13*	*128,14*		*102,00*
NW+SE+Rear	*27,50*	*24,44*	*141,13*	*128,14*	*168,63*	*152,58*		*102,00*
KEMEL (Jüngere Schanze)								
R	*48,00*	*42,56*	*102,00*	*95,20*	150,00	137,76	16,96	*67,84*
L			*150,00*	*137,76*	*150,00*	*137,76*	*16,96*	*101,76*
L+R	*48,00*	*42,56*	*252,00*	*232,96*	*300,00*	*275,52*	*16,96*	*169,60*
SAALBURG								
					89,25	81,81		

A	B		C		D		E	F
DEGERFELD								
EL W Bk	*47,13*	*41,79*	*105,13*	*99,33*	152,26	141,12	17,99	71,96
E Bk	65,53	59,19	89,45	84,60	145,98	143,79	18,03	54,09
WBk+EBk	*65,53*	*59,19*	*241,70*	*225,71*	*307,23*	*284,90*		*160,43*
NEUWIRTSHAUS								
R,L			*75,68*	*67,20*	75,68	67,20		
Rear	*44,00*	*38,40*			*44,00*	*38,40*		
R+L					*151,36*	*134,40*		
R+L+Rear	44,00	38,40	151,36	134,40	195,36	172,80		
HASELBURG								
N-E Pds 1,2					93,96	86,24		
L Pd 1			184,68	175,56	184,68	175,56	29,60	148,00
Pd 2			200,88	190,96	200,88	190,96	29,60	160,16
R Pds 1,2	125,28	116,48	147,80	140,72	273,08	257,20	28,00	112,00
L+R Pd 1	*125,28*	*116,48*	*332,48*	*316,28*	*457,76*	*432,76*		*260,00*
Pd 2	*125,28*	*116,48*	*348,68*	*331,68*	*476,96*	*448,16*		*272,16*
RÖTELSEE								
L			*28,69*	*24,29*	28,69	24,29	10,20	20,40
R			*40,88*	*35,10*	40,88	35,10	10,50	31,50
Rear	*39,24*	*33,64*			39,24	33,64		
L+R					*69,57*	*59,39*		
L+R+Rear	*39,24*	*33,64*	*69,57*	*59,39*	*108,81*	*126,67*		*51,90*
NERSINGEN								
SW	26,68	22,68	64,40	58,80	91,08	81,48	8,10	60,08
NE					85,56	76,44		
WEINBERG								
Kaserne II					249,75	227,84	24,20	145,20
BOLJETIN								
L					118,50	100,97		
R a					56,10	46,02		
b					448,05	418,90		
Rear					409,81	381,95		

TABLE XXXIV PROPORTIONS FORTLETS

A - Subject of entry
B - Percentage of overall length taken by officers' quarters
C - Percentage of overall area (excluding veranda where present) taken by officers' quarters
D - Percentage of *contubernium* living area taken by *papilio*
E - Relative percentages of the overall barrack width taken by the depths of *papilio*, *arma* and veranda
Note: Where a central division of the *contubernium is unverified the relative percentage values of the contubernium* and veranda depths are given; where the veranda is unverified the equivalent measurement is given in brackets

A		B		C		D	E
OUTERWARDS							
Primary	W	38,14	35,12	49,12	47,04		71,58/22,42
	E						76,69/23,31
W+E		*19,29*	*17,35*				
TASSIESHOLM							
Pd 2	L	15,06	14,15	15,06	14,15	47,10	
BARBURGH MILL							
L		37,55	36,51	42,78	41,96		82,49/17,51
L+R		*19,53*	*18,84*	*23,00*	*22,59*		*82,49/17,51*
GATEHOUSE OF FLEET							
L	Bk	49,47	48,93	49,47	48,93	55,56	
R	Bk					58,46	
	5					57,69	
LBk+RBk		*26,27*	*26,00*	*27,20*	*26,96*		
CHAPEL HOUSE							
R	Pds I,II					*65,02*	
POLTROSS BURN							
Pd 1	W	26,90	23,67	26,90	23,67		73,61/26,39
	E	27,41	24,32	27,41	24,32		

A	B		C		D	E
Pd 2 W	39,30	36,62	39,30	36,62		73,61/26,39
E	35,15	33,43	36,15	33,43		
Pd 1 W+E	*27,16*	*24,60*	*27,16*	*24,60*		
Pd 2 W+E	*37,69*	*34,99*	*37,69*	*34,99*		
HIGH HOUSE (Turf Wall)						
R	*32,34*	*30,32*	*32,34*	*30,32*	*70,02*	
RANDYLANDS						
					53,85	
MARTINHOE						
W Bk Ph 1	40,00	38,78	48,65	47,99		69,79/30,21
Ph 2	47,67	46,75	56,52	56,12		69,79/30,21
E Bk	*40,32*	*39,14*	*53,66*	*53,40*		57,63/42,37
WBk+EBk Ph 1	*19,67*	*19,06*	*23,48*	*23,16*		
Ph 2	*25,08*	*24,38*	*29,55*	*29,47*		
VALKENBURG						
L+R+Rear	*27,77*	*27,27*	*27,77*	*27,27*		80,35/19,65
WERTHAUSEN						
N,S					57,14	
KEMEL (Ältere Schanze)						
NW+SE+Rear	*16,67*	*16,25*	*16,31*	*16,02*		
KEMEL (Jüngere Schanze)						
R	32,00	30,89	32,00	30,89		73,96/26,04
L+R	*16,00*	*15,32*	*16,00*	*15,32*		
SAALBURG						
					62,12	53,49/32,54/13,97

A	B		C		D	E
DEGERFELD						
EL W Bk	30,95	29,61	30,95	29,61	59,52	50,16/34,07/15,77
E Bk	42,29	41,17	42,29	41,17	52,08	43,34/39,80/16,86
WBk+EBk	*21,14*	*20,38*	*21,33*	*20,78*		
NEUWIRTSHAUS						
R					42,86	27,28/36,36/36,36
R+L+Rear	*22,52*	*22,02*	*22,52*	*22,02*		
HASELBURG						
N-E Pds 1,2					50,00	
L					45,95	29,54/34,88/35,59
R	39,59	38,75	45,88	45,29	42,86	29,13/38,51/32,36
L+R Pd 1	*22,26*	*21,66*	*27,37*	*26,92*		
Pd 2	*21,44*	*20,86*	*26,27*	*25,99*		
RÖTELSEE						
L						72,30/27,70
R						71,43/28,57
Rear						60,63/39,37
L+R+Rear	*36,32*	*35,44*	*36,06*	*36,16*		
NERSINGEN						
SW	29,29	27,84	29,29	27,84	56,10	
WEINBERG						
					50,00	

A - Subject of entry
B - Barrack group configuration type
C - Length of unit
D - Width of unit
E - Area of unit
F - Distance between facing elements containing officers' quarters
G - Distance between facing men's quarters (excluding veranda if present)

A	B	C	D	E	F	G
WILDERNESS PLANTATION						
	6	6,50				
OUTERWARDS						
Primary	*6*	*10,75*	*12,60*	*135,45*	*3,40*	*3,40*
Secondary	*6*	*10,60*	*12,50*	*132,50*	*4,00*	*4,00*
BARBURGH MILL						
	6	24,50	26,00	637,00	9,00	11,00
GATEHOUSE OF FLEET						
	6	29,00	22,00	638,00	6,20	6,20
CHAPEL HOUSE						
Pd I	*6*	*7,32*	*14,63*	*107,09*	*3,96*	
Pd II	*6*		*13,41*		*5,64*	*5,64*
SEWINGSHIELDS						
Phs 3,4 B III,II	*6*	*14,50*	*14,00*	*203,00*	*4,50*	*4,50*
POLTROSS BURN						
Pds 1,2	6	17,15	17,70	303,56	7,25	7,25
HIGH HOUSE						
Pd II	*6*	*20,42*	*17,50*	*357,35*		

A	B	C	D	E	F	G
MARTINHOE						
	6	17,20	20,25	348,30	8,50	13,00
VALKENBURG						
	10	21,20	26,60	563,92		16,60
WERTHAUSEN						
N,S	6	32,10	2910	934,11	14,10	14,10
KEMEL (Ältere Schanze)						
NW,SE	10	14,00	15,00	210,00		4,75
KEMEL (Jüngere Schanze)						
L,R	*10*	*25,00*	*19,75*	*493,75*	*7,50*	*7,50*
DEGERFELD						
EL	10	21,00	20,80	436,80	6,38	6,38
NEUWIRTSHAUS						
	10	*17,20*	*18,40*	*316,48*		*7,60*
HASELBURG						
Pds 1,2	6	31,50	28,50	897,75	9,50	12,00
MAINHARDT						
	10					
RÖTELSEE						
	10	11,20	13,80	154,56		6,50
NERSINGEN						
	6	22,00	18,60	409,20	8,00	10,60

TABLE XXXVI ROADS AND GATES

A - Subject of entry
B - Width of principal street
C - Width of *via sagularis* a) *praetentura*
D - b) *retentura*
E - c) left side
F - d) right side
G - Width of *intervallum* a) *praetentura*
H - b) *retentura*
I - c) left side
J - d) right side
K - Width of front gate
L - Width of rear gate

Note: Gate dimensions are to the outside edge of the carriageway or carriageways

A	B	C	D	E	F	G	H	I	J	K	L
WILDERNESS PLANTATION											
									2,00	1,65	
DUNTOCHER											
											2,44
OUTERWARDS											
Primary	2,00					1,30	1,80	1,00			2,00
Secondary	2,00					1,50	0,50				1,30
DURISDEER											
										3,35	
TASSIESHOLM											
										3,35	
BARBURGH MILL											
						1,60	1,60	2,00	1,60	2,75	

A	B	C	D	E	F	G	H	I	J	K	L
GATEHOUSE OF FLEET											
						9,00	4,50	1,00	1,50	3,00	3,00
CHAPEL HOUSE											
Pd I							1,00	3,00	0,90		
Pd II								0,75	0,90		
SEWINGSHIELDS											
Phs 1,2							1,40		1,00		2,70
Phs 3,4							2,00	0,20	0,20		1,60
HOUSESTEADS											
						2,59				3,05	2,74
CASTLE NICK											
										2,30	1,20
POLTROSS BURN											
	3,35					1,25	2,00	0,50	0,50	3,00	3,00
HIGH HOUSE											
	3,00									2,60	2,60
HIGH HOUSE (Turf Wall)											
	3,66						0,91		1,22	3,66	3,05
RANDYLANDS											
											2,74
PEN LLYSTYN											
						10,50	11,00	4,00	6,00	2,50	
MARTINHOE											
						4,00	3,50	1,80	2,00	3,66	

A	B	C	D	E	F	G	H	I	J	K	L
VALKENBURG											
										3,00	
WERTHAUSEN											
						4,20	4,20	2,40	2,40	2,40	2,40
KEMEL (Ältere Schanze)											
						5,00	2,50	5,00	4,00		
KEMEL (Jüngere Schanze)											
							3,50		3,50		
SAALBURG											
							3,25		4,00	3,00	3,50
DEGERFELD											
EL	2,75					3,75	2,50	1,25	2,50	2,13	
SK	5,00		4,50	3,00	2,50		8,50		5,50	2,50	
NEUWIRTSHAUS											
	5,60					6,40	3,20	1,60	1,60	2,00	
HASELBURG											
Pd 1	3,00	2,00	2,00	2,00	2,00	2,00	2,00	3,50	3,50	2,00	2,00
Pds 2,3	3,00	2,00	2,00	2,00	2,00	7,00	2,00	3,50	3,50	3,20	2,00
MAINHARDT											
										2,70	
RÖTELSEE											
	3,25					3,00	0,60	0,60	0,60	2,40	
NERSINGEN											
						3,00	1,50	2,00	2,00	1,80	0,50