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A Journal of Scottish Natural History

THE SCOTTISH NATURALIST

Founded 1871

A Journal of Scottish Natural History

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The *Scottish Naturalist*, now published by the Scottish Natural History Library, is an independent journal primarily devoted to the study of Scottish natural history. It was founded in 1871 by Dr. F. Buchanan White, of Perthshire, and in 1988 completed one hundred years of publication. For a summary of the record of publication, see the inside back cover.

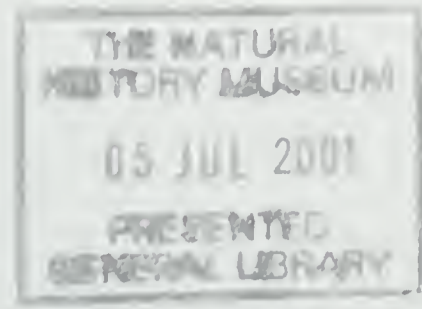
Although the journal's main interests have always centred on the history and distribution of Scottish fauna and flora, it is prepared to publish contributions on the many aspects of Scottish natural science embraced by its title, including Zoology, Botany, Geology, History, Geography, Medicine and the allied sciences, Archaeology, and the Environment.

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Contributions should be clearly written; whenever possible they should be typed, double-spaced, on one side of the paper, with adequate margins, and should try to conform to the general style and arrangement of papers and notes in the current number of the journal. Maps, diagrams and graphs should be drawn in black ink on white unlined paper. Photographs should be on glossy paper. Proofs of all contributions will be sent to authors and should be returned without delay.

Authors of papers, but not of short notes, will receive thirty reprints in covers free of charge. Additional reprints may be ordered, at cost, when the proofs are returned.

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THE SCOTTISH NATURALIST

Founded 1871

A Journal of Scottish Natural History

With which is incorporated *The Annals of Scottish Natural History*
and *The Western Naturalist*

110th Year 1998

CONTENTS

1998 - Part 1

Vertebrate Zoology in the Scottish Naturalist

Part 1: Introduction

By Dr. J.A. Gibson 3-11

The Roman Fort on Whitemoss Farm, Bishopton, Renfrewshire

2: Whitemoss and the Antonine Wall:

The Place of Whitemoss in Roman Scotland

By Mr. Frank Newall 13-43

Notes on the Butterflies of Lady Isle, Ayrshire

By Dr. J.A. Gibson 45-48

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The *Scottish Naturalist* is the national journal of Scottish natural history. It was founded in 1871 by Dr. F. Buchanan White, of Perthshire, and in 1988 completed one hundred years of publication. The journal exists to provide a medium for the publication of original work on all aspects of Scottish natural science. All contributions, however, represent the personal opinions of the authors concerned, and do not necessarily reflect the views of the Editors of the *Scottish Naturalist*.

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VERTEBRATE ZOOLOGY IN THE SCOTTISH NATURALIST

A Classified Index of all Contributions on Vertebrate Zoology
in the *Scottish Naturalist* from its Commencement in 1871
to the end of the Year 2000

Part 1: Introduction

By J.A. GIBSON

*Representative for Scotland,
Society for the History of Natural History*

Just over 125 years ago, in 1871, what was soon to be accepted as our national journal of Scottish natural history, the *Scottish Naturalist*, was founded by Dr. F. Buchanan White, supported by the Perthshire Society of Natural Science, of which society Dr. White was then President.

This immediately filled an obvious gap, since never before had there existed a general journal of natural history covering the whole of Scotland, where interested workers in an emerging science could publish their discoveries and observations, often, at that time, of a very preliminary or exploratory character, and in this respect it is possibly worthwhile considering, very briefly, just what type of Scottish journals had previously been available to budding naturalists of the period.

Royal Physical Society

Certainly the Royal Physical Society of Edinburgh, founded in 1771 and the first-ever recognisable natural history society to be established anywhere in the world, had published its *Proceedings* since 1856, but these *Proceedings* usually contained well-researched papers, often of a highly specialised nature, with an absence, at least in the earlier years, of any type of short notes etc, so necessary in a developing science. In any case, the Royal Physical Society was a very august body and, with the exception of complimentary and exchange copies, distribution of the *Proceedings* was restricted to Fellows of the Royal Physical Society, who had to be elected, and ordinary members of the public could not subscribe.

Other Scottish Journals

The Wernerian Natural History Society published eight volumes of collected natural history papers during some thirty years from 1808, but again there was no section available for short notes or preliminary work, and the published volumes, apart from the usual exchanges (overlooking all the disputes and in-fighting, which do not concern us here), were available only to members of the Society, not to the general public.

The *Edinburgh Philosophical Journal* (established 1819) and the *Edinburgh Journal of Science* (established 1829), plus several others of similar ilk, were all excellent journals in their own way, and were available to any members of the public on payment of the subscription. They were, however, general scientific journals, often heavily slanted towards natural philosophy and chemistry, and did not genuinely cater for, nor did they encourage, the submission of tentative notes on the distribution of Scottish fauna and flora. In any case, all had ceased publication by the time of the establishment of the *Scottish Naturalist*.

Before the *Scottish Naturalist* appeared in 1871, some local natural history societies in Scotland were doing sterling work by producing excellent regular publications, such as Berwickshire (since 1834), Dumfries and Galloway (since 1864), and Glasgow (mainly since 1868), with others not far behind, but all these publications, although they did sometimes publish important papers covering large areas of Scotland, did have the emphasis on local work, and again were usually available only to members.

There were also, of course, some specialised journals, such as *Transactions of the Botanical Society of Edinburgh* (since the 1840s), but these were naturally restricted in their interest and content. Since 1799 the Highland Society (later to become the Royal Highland and Agricultural Society of Scotland) had published in its *Prize Essays and Transactions* many papers of fairly widespread natural history interest, but these were nearly all based on their relationship to agriculture, as one would expect.

It is clear, therefore, that although there were (or had recently been) in existence many relevant journals, all admirable in their own way, in simple terms no single journal existed which one could confidently say would reach and be read by virtually all those in Scotland who were interested in the developing study of natural history in its own right, and which would encourage everyone to put their observations on permanent record.

A National Journal for Scotland

The way had therefore long been clear for the emergence of a general journal of Scottish natural history, of an independent nature, available to all by payment of a simple subscription, and widely circulated to all interested. By providing a forum for the publication of interesting records from all over Scotland, records which might otherwise never have seen the light of day, and would certainly have remained largely unknown to similarly interested persons in other parts of our country, the new journal permitted knowledge of the distribution of our fauna and flora to be built up steadily, and also enabled natural historians in widely scattered parts of Scotland to be put in contact with each other with an ease never before possible; previously two likewise-minded early researchers might hardly have known of each other's existence. Admittedly the pages of the *Zoologist* had been doing excellent work in this direction since its establishment in 1843, but a journal primarily devoted to the country of Scotland was the stimulus and springboard required if research into Scottish natural science was to progress as it deserved.

Spread of Knowledge

In the earliest years of the journal, items on botany and entomology largely filled the pages, which was perhaps understandable since these represented probably the main interests of the founder and first Editor, Dr. Francis Buchanan White, but contributions on other subjects, mainly vertebrate zoology - mammals, birds, reptiles, amphibians and fishes - soon began to make their appearance, since these were clearly some of the more obvious interests (particularly the ever-popular birds) of the general public, and of a new generation of progressively more highly-skilled Scottish naturalists, many of them hard-working men from Scottish heavy industries, who were beginning to discover and make their way into the Scottish countryside for the first time. It is also interesting to note the steady geographical spread of natural history contributions; originally from the countryside immediately surrounding the established towns, as one would expect, but soon beginning to come from much further afield, even the outer islands, and this tendency accelerated as public transport improved.

Over the past one and a quarter centuries, therefore, the pages of the *Scottish Naturalist* give a good indication of the spread of interest in and knowledge of the natural history of Scotland, and in my view the time has now arrived to produce a classified index to the contributions on Scottish vertebrate zoology. A classified index to the entomological contributions has already appeared (Grimshaw, 1939; Gibson, 1997), and for this Index to the contributions on vertebrate zoology it is

proposed to cover the years from 1871, when the journal was first established, to the end of the year 2000, i.e. the end of the 20th century.

Arrangement of Index

After some discussion with interested colleagues, it has been decided to publish the Index in separate progressive parts; firstly an Introduction (this present part), followed by five sections, each covering an approximate quarter-century from 1871 to 2000, with each section having a separate geographical index under the traditional Scottish Faunal Areas, plus a final cumulative Author index.

The sections of the Index are anticipated to be as undernoted:

1. Introduction
2. Contents 1871-1900.
3. Contents 1901-1925.
4. Contents 1926-1950.
5. Contents 1951-1975.
6. Contents 1976-2000.
7. Cumulative Author Index.

A cumulative index of individual species has also been considered, but has been discarded, at least for the present, as being too complex (especially with the name changes over the years) and not merited by the space and effort involved. A cumulative index of families or groups, however, may also ultimately be included. A decision on this will be made later, when the main Index is nearing completion.

Some notes on the above sections are as follows:

- As indicated above, all published items have been grouped under the five separate 'quarter-centuries' of the 125 years of the journal's existence, which seems a useful and logical method of presentation.
- All items in each section are given in their chronological order of publication, and are numbered accordingly.

- A separate set of numbers has been allocated for each quarter-century section.
- The number of items in each quarter-century section is by no means comparable. Over the years, the number of short notes decreased and the number of significant papers increased, so the total number of items decreased. There were also gaps in publication: during the years of the second world war, and later around the 1960s because of financial problems.
- All items are given in standard reference form: author, year, title, name of journal, date and pagination.
- Since the title of a contribution does not always reveal its full content, two sub-headings, for Class and Faunal Area, are given for each reference.
- Entries under Class, contracted to four letters, are self-evident: Mamm, Bird, Rept, Amph, Fish.
- Entries under Faunal Area are contracted to two initial capitals. For details, see later under description of the Scottish Faunal Areas.
- No attempt whatever has been made to assess or indicate the relative importance of any particular items, although the size of every contribution will be obvious from the pagination.
- Following the chronological list for each quarter-century, for each vertebrate Class there is a separate section on geographical distribution, listing all entries under the individual Scottish Faunal Areas. For a detailed description of the Faunal Areas, see later.
- A final cumulative Author index, covering all entries from 1871 to 2000, will be given at the end of the completed Index.

Buchanan White's Natural Divisions of Scotland

The natural divisions of Scotland are now extremely well known to all experienced Scottish naturalists. First described by Dr. F. Buchanan White in 1872, they were later modified by Dr. J.A. Harvie-Brown towards the end of the 19th century for his Vertebrate Fauna series, and soon became widely known as the 'Faunal Areas' of Scotland. With some later up-dating (e.g. St. Kilda, Outer Isles and Fair Isle treated separately, and work on the North Sea largely referred to

Dee), they have formed the basis of all serious vertebrate recording in Scotland ever since.

Being based almost entirely on the main river drainage or other natural areas, their boundaries do not change, unless later research has shown this to be necessary, and as such they remain far superior to all other recording areas which could be selected. Further subdivisions, largely on the basis of the traditional counties (which usually also followed fairly clear natural boundaries), individual islands, etc, are available for more detailed recording.

Like all great ideas, Dr. Buchanan White's pioneer conception of the Faunal Areas was essentially simple, for natural science purposes to record geographical distribution in Scotland on the basis of natural areas, rather than the arbitrary and artificial divisions previously used, but no-one had ever suggested this before. Almost certainly the idea had been steadily formulating in Buchanan White's mind for several years, but in January 1872 - the first part of only the second year of the new journal - he used the Introduction to his proposed comprehensive work on *Insecta Scotica* to set out his ideas on the natural divisions of Scotland.

It is worth recording the exact words of Dr. Buchanan White's pioneer statement; his opening paragraph reads as follows:

"In publishing lists of the Scottish [fauna], it will be advisable to indicate, so far as is practicable, the distribution of each species throughout the country. For this purpose Scotland has been divided into thirteen districts. In selecting these, an attempt has been made to obtain natural divisions (such as those afforded by the basins of the larger rivers), instead of the arbitrary sections heretofore used for similar purposes" (*Scottish Naturalist*, 1872: 161).

In one brief statement of less than one and a half pages, therefore, plus an illustrative map, Buchanan White established the basic principle of the Scottish Faunal Areas for all time. This revolutionised all previous thinking on Scottish natural history, and laid the foundation-stone on which all future serious work was built.

Distribution under the Faunal Areas

All items in this bibliographical Index are numbered (with a separate allocation of numbers for each of the five quarter centuries) and are then indexed under the Faunal Areas for each Class. Apart from some items of a general (Gen) nature,

each numbered item has the relevant Faunal Area listed by two initial capitals, and for ease of reference, the names of the Faunal Areas, the abbreviations used, and the geographical areas covered, are listed below.

There can sometimes be an overlap between adjoining Faunal Areas, to account for more precise description or updating, and not all items give sufficiently detailed localities, especially near boundaries, to permit allocation to one or other Area; in these cases items are listed for both Faunal Areas.

The abbreviations used in the Index, and brief descriptions of the geographical area and boundaries of each Faunal Area, are given below.

Distribution under the Faunal Areas

SO SOLWAY

Dumfriesshire, Kirkcudbrightshire, Wigtonshire.

TW TWEED

Peeblesshire, Selkirkshire, Roxburghshire, Berwickshire.

CL CLYDE

Ayrshire, Renfrewshire, Lanarkshire, Dunbartonshire, West Stirlingshire, South Argyll (Kintyre, Knapdale, Cowal, Upper Loch Fyne), Buteshire (Arran, Bute, Cumbrae).

FO FORTH

West Lothian, Midlothian, East Lothian, East Stirlingshire, South Perthshire, Clackmannanshire, Kinross-shire, South Fife.

TA TAY

Perthshire, North Fife, Angus, South Kincardineshire.

DE DEE

North Kincardineshire, Aberdeenshire.

MO MORAY

Banffshire, Morayshire, Nairnshire, East Inverness-shire, East Ross and Cromarty, South-east Sutherland.

CS CAITHNESS AND SUTHERLAND

Caithness, Sutherland.

NW NORTH-WEST HIGHLANDS

West Sutherland, West Ross and Cromarty, West Inverness-shire.

AG ARGYLL

South Inverness-shire, Argyll mainland.

For Cowal district of Argyll, see Clyde.

For Argyll islands, see Inner Hebrides.

IH INNER HEBRIDES

Argyll: Gigha, Islay, Jura, Scarba, Garvellochs, Colonsay and Oronsay, Skerryvore, Mull, Iona, Staffa, Treshnish, Tiree and Coll, and the smaller isles.

Inverness-shire: Muck, Eigg, Rhum, Canna and Sanday, Skye, Pabay and Scalapay, Raasay, South Rona, and the smaller isles.

OH OUTER HEBRIDES

Lewis, Harris, North Uist, Benbecula, South Uist, Eriskay, Barra, and the smaller isles.

SK ST. KILDA

St. Kilda.

OL OUTLIERS

Rockall, Flannan Islands, Sula Sgeir, North Rona.

OR ORKNEY

Orkney Islands, Sule Stack, Sule Skerry.

SH SHETLAND

Shetland Islands, Foula.

FI FAIR ISLE

Fair Isle.

Summary

The final bibliographical Index should therefore include a complete chronological list, from 1871 to 2000, of all items published on vertebrate zoology, with separate sections for each of the five Classes of vertebrates, with geographical indexes under all of the Scottish Faunal Areas, and a final cumulative Author index. It is therefore hoped that the end result will indicate the development and progress of the study of Scottish vertebrate zoology over the years, and will prove to be a useful working tool for future research work on the subject.

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To be continued

Part 2: 1871-1900

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THE ROMAN FORT ON WHITEMOSS FARM, BISHOPTON, RENFREWSHIRE

Part 2: Whitemoss and the Antonine Wall:

The Place of Whitemoss in Roman Scotland

By FRANK NEWALL

Renfrewshire Natural History Society

Introduction

Assuming that Whitemoss was held initially from 140 A.D. to 155 A.D., the stratigraphical evidence would suggest dating the second period from 158 A.D. to variously 180 A.D., 183 A.D., 194 A.D., and 218 A.D. Modifying this to allow for the period of abandonment observed at Outerwards (Newall, 1976: 117, 122) and tested at Martin Glen (Newall and Newall, 1980: 47-48) we have spans from c. 164 A.D. to 185 A.D., 188 A.D., 199 A.D., and 223 A.D. In neither case is the final date likely to be later than 197 A.D. If, then, we exclude the extreme dates from each sequence, we average 158 A.D. to 188/189 A.D. and 164 A.D. to 194/195 A.D. The apparently lengthy second period of abandonment at Whitemoss would therefore advance the third period to the third century.

Outerwards, a key fortlet, ought to reflect the history of the Antonine Frontier; hence the Antonine Wall was held as an integral frontier on two occasions. It follows that the third period of Whitemoss and Old Kilpatrick did not necessarily involve all the forts but possibly only strategically placed sites, largely as winter quarters, during the campaigns of the third century.

It may be objected that the Martin Glen experiment was not 'controlled', and that it was not established that growth would proceed equally both there and at Outerwards. This is true, but each year has its growing season. At the fortlet we have a cover of vegetation which was seen to indicate three different periods of growth over the primary destruction level, the last being of unknown duration. The time implied would exceed that required to plan the re-occupation of Birrens (R.I.B. 2110) and of Hadrian's Wall (R.I.B. 1550; R.I.B. 1389).

Of Whitemoss, it may be objected that there is no proof that the silt was evenly desposited in the main drain and in ditch B. Again true; but the persistently higher amount of secondary deposition would scarcely allow of the second period being of lesser duration than the first. If we allow an equal length of time, i.e. of some

fourteen years and a gap of only five years, we are stating that the second period lasted until at least 173 A.D. However, to the evidence of silting we may add the greater accumulation of ash in the secondary hearths, the more extensive signs of repair during the second period, and, under each of the heads - sherds, tools, weapons, nails, lead and miscellaneous - the greater number of secondary finds, granted that local secondary scouring will have affected the recovery of some surface finds.

Dating

Considering all the available evidence, historical, epigraphic, ceramic, numismatic and stratigraphic, Macdonald, Miller and Clarke advanced evidence for three Antonine Wall periods. All agreed that A.W.1 be dated c. 142 A.D. - 155 A.D. and that A.W. 2 commenced c. 158 A.D. Miller (1922: 106), hesitating between c. 170 A.D. and c 182-184 A.D. for the close of A.W. 2, finally settled for c.158 A.D. - c. 182/184 A.D. for the A.W. 2 - A.W.3 span, A.W. 3 being a mere episode in the final abandonment (Miller, 1928: 58). He was later to suggest a Severan context for A.W. 3 (1952: 236-39).

Clarke (1933: 87, 89-90), accepting c. 155 A.D. for the close of A.W.1, without discussing the duration of A.W. 2, suggested that A.W. 3 began shortly after 170 A.D. and closed in the early years of Commodus.

Macdonald's summary of the evidence led to his dating of A.W. 1 as 142 to 155 A.D., A.W.2 as 158 to 183 A.D. and A.W. 3 as c. 183-185 A.D., a final short occupation before deliberate evacuation (Macdonald, 1934: 478-482). Bar Hill he firmly excluded from the third period (Macdonald, 1939a: 258).

Steer (1964: 26, 36) accepts this dating for A.W. 1 and A.W. 2, stressing the necessity that A.W. 2 began before the end of the reign of Antoninus Pius, on the grounds that auxiliary building inscriptions from Rough Castle, Castlecary and Bar Hill, erected during his reign, must indicate the beginning of A.W. 2 on the assumption that the initial construction was by the legions. The obvious rejoinder, that while legionnaires performed the bulk of the work on the Wall, auxiliaries possibly assisted with building inside the forts, was given by Breeze and Dobson (1976: 91-92).

In Part 1 (Appendix 3, Cadder) there is instanced a possible association of legionary and auxiliary building during A.W. 1, a situation possibly paralleled at Rough Castle (Hanson and Maxwell, 1983: 107-108). With the knowledge of mile

fortlets and secondary forts along the Wall during A.W. 1, we need no longer insist on an early inception of A.W. 2.

At Bar Hill the early fortlet beneath the Antonine fort faces north-east along the easiest route to the Antonine Wall. If, as at Croy Hill, this structure housed a detachment engaged in constructing a mile fortlet (Keppie, 1985: 51-54), and in view of the situation of the military way there is room for such a fortlet north-east of the known fort, then the latter is clearly secondary as its relationship to the military way suggests, and was constructed by Cohors 1 Baetasiorum. Cohors 1 Hamiorum, which were concluded to be of the longer period of occupation (Keppie, 1985: 73-75), are then of the second period.

It is probable that work recorded by vexillations of the second and twentieth legions was of this period (Macdonald, 1934: 403, No. 23; R.I.B. 2171).

In a different case, apparently, is Castlecary as a primary fort. However, different widths of the Antonine Ditch on either side of the north gate might point to co-operation by legionnaires and auxiliaries.

Of more impact on Wall studies was Steer's conclusion that "the case for a third period of occupation on the Antonine Wall is not proven" (Steer, 1964: 37). Jarrett and Mann, however, (1970: 189-207) cling to the possibility of a third period, arguing for dates of A.W. 1 as 140-158 A.D., A.W. 2 as 184-207 A.D., and A.W. 3 as c. 209-212 A.D. Mann (1989: 133-137) adjusted his dating for A.W. 1 to c. 142 - c. 158 A.D. and for A.W. 2 to c. 184-195 A.D., "leaving out of account the ephemeral third occupation of the Antonine Wall".

The greatest influence on Wall dating was exercised by Brian Hartley (1972), when, having studied the Samian ware from the Scottish forts, he concluded that A.W. 1 and A.W. 2 must both fall entirely before c. 165 A.D. By 1973 John Gillam, who had favoured a later dating on the evidence of the coarse wares, was able to reconcile the difference but felt that there remained difficulties (Gillam, 1973: 60), as at Mumrills where he suggested some third century activity "not amounting to re-occupation" on the basis of a late pottery rim. With this he might have cited the "fairly worn" *As* of Marcus (Robertson, 1963: 134).

Thus Mumrills may be set aside from the Wall forts as Castlecary, where late Samian and an inscription indicate later occupation. So we develop an argument for the gradual withdrawal of the Antonine garrison, as suggested for Crawford by Maxwell (1974: 177-179). Robertson (1975: 286) suggests A.W. 1 as 142-155

A.D., but sees the Wall still running down from 163 to 180 A.D., ending in 180-184 A.D.

Breeze and Dobson (1976: 122-124) acknowledge the late evidence, but opt for the "unanimous" ceramic evidence for abandonment in the late 160s A.D. A possible Severan contact is accepted (1976: 136). Breeze's own review (1976: 68-76) outlines the argument for the ceramic evidence, admitting its subjective nature and reminding us that "the evidence to the contrary cannot be ignored".

By the mid 1970s Hartley's dating has largely prevailed and we find Breeze (1979: 15; 1982: 118-124), MacIvor, Thomas and Breeze (1981: 282) and Keppie (1985: 73; 1986: 16) in general agreement. Hanson and Maxwell (1983: 143) summarise the evidence for dating A.W. 1 to 142 - c. 158 A.D. and A.W. 2 to c. 158 - 164 A.D.

Robertson (1984: 422-426), on numismatic grounds, sounds a cautionary note as previously (Robertson, 1957: 118-121), where she suggests dates c. 155 to 163 A.D. for the close of A.W. 1 and c. 170 A.D. or c. 184 A.D. for the end of A.W. 2, allowing for further occupation until c. 186 A.D. at least. This apart, in view of the conflation involved in the general acceptance of Hartley's evidence, coupled with the tendency always to see rebuilding rather than re-occupation, it was perhaps inevitable that someone should conclude that there was only one Antonine occupation (Hodgson, 1995).

Shotter (1978) and Dunwell and Ralston (1996) have now to be considered. The former suggests that the Wall sites "possibly with a small number of exceptions" were occupied until the 160s A.D. The latter authors, because of the ceramic evidence from Inveravon, find it difficult to accept such dating with certainty.

Allowing, then, for the historical significance of the dates 170 A.D. and 183 - 185 A.D., there is general agreement that A.W. 1 be dated c. 140/142 A.D. to 154/155 A.D. and A.W. 2 more variously from c. 158/164 A.D. to 170/184 A.D. Jarrett and Mann (1970), largely on epigraphic evidence, prefer a later dating. Hartley alone, followed by those who have accepted his argument, is in complete disagreement.

Before considering the evidence we make the following premises:

(a) The Antonine frontier was an integral creation, certainly subject to change but not to dismemberment.

(b) The terminus post quem (t.p.q.) must be the latest securely stratified, preferably sealed, artefact, whether sherd coin or inscription.

The Numismatic Evidence

Some years ago the author exhumed a thickly patinated well-worn penny dated 1900, a convenient t.p.q. However, the condition of the coin would advance the date of loss to between 1930 and 1940, a matter of passing interest since the site is still occupied; but in mid-second century A.D. the difference would have been vital.

At Cadder, Clarke recovered a brass of Marcus Aurelius of 160 A.D., well worn, a condition which would have allowed of its loss during the years of Commodus (Clarke, 1933: 82, 90). Shotter (1978: 82-83, 86, 90) includes it in his "acceptable" group, which contains the silver Lucilla from Old Kilpatrick of 164-169 A.D., described by Robertson (1984: 424) as "fairly worn", but with others (as Breeze, 1976: 71) he prefers to query the evidence of a late coin of Marcus from Mumrills and coins of Commodus from Kirkintilloch and Bar Hill. Thus he concludes that the Antonine occupation "with possible reservations at a few sites" lay between A.D. 143 and the 160s, "coming more closely into line with Hartley's conclusions". In view of the condition of the coins from Cadder and Old Kilpatrick, these findings cannot stand. On the contrary, the coins suggest a dating much later than Hartley's; or on ceramic and numismatic grounds we exclude Balmuildy, Castlecary, Mumrills, Old Kilpatrick and Cadder, apart from Whitemoss.

Robertson (1963: 153) compared the different information provided by coins in hoard and those found on sites. At that time the author, in a weekly preparation for banking school monies, was neatly wrapping bundles of 240 copper pennies, each a hoard. Following a test graph (A) of 378 coins, random graphs (B to E) of 50, 99, 203 and 265 coins were drawn. It was concluded (graph F) that 250 coins gave a fairly accurate picture of a hoard of 1963 pennies. In Figure 4 is presented the envelope formed by five graphs (G, H, I, J, L) drawn between June and September 1963, compared with the mintage graph which it closely follows. Thus the mintage may be inferred from the coin graph.

Due to exceptionally high mintage periods, two peaks appear. We had, perhaps naively, assumed that the coinage totals for the ten year periods represented, if graphed as fractions of the actual mintage, would produce the curve of normal distribution. This was not the case, the graph being biased towards the more recent issues. We must, then, allow for an irretrievable loss of earlier issues. This

does not completely explain the distortion, which may be due to the accelerated withdrawal of selected coins by collectors stimulated by the interest of the crews of the U.S. submarine depot ships stationed in the Holy Loch from 1960. At that time there was an upsurge in demand for earlier coins and for coins from the Kings Norton and Heaton mints.

It is obvious, nonetheless, that the coinage graph reflects the mintage. It follows that the graph of all copper issues found at Silchester, Richborough, Wroxeter etc, produced in envelope, or amassed total form, will emphasise periods of low mintage and stress the fact that the coinage of Marcus Aurelius was in short supply (Robertson, 1984: 426).

Of each group of 250 coins, no more than two or three might be lost in normal circulation. Losses even as high as 24 would tend to fall within the high mintage periods, 1910-20 and 1930-40, granting that the loss of a coin is a random occurrence. The ratio of the coins of the last three years to the whole lies between 1:20 and 1:26. Again allowing for the random factor, in the case of the loss of 24 coins at 23:1 against the loss of a late coin, in twenty years after the loss of some 480 coins, the chance of recovery of the latest coin, which might well have been at least ten years old when lost, would begin at 479:1. In view of the shortage of the relevant late coins in the second century A.D., the chances against loss and recovery of such a coin would be relatively high. If we accept the modern analogy and, on the evidence of the Cadder coin, allow a twenty year span for A.W.2, then with little more than 160 coins recovered from the Antonine Wall, on the assumption that a cohort might well lose 24 coins per annum, we have arrived *ad absurdum*.

Despite the possibility that, after all, the latest coin has been recovered, the hoards obviously present a more accurate picture. Each of our graphed 'hoards' covers c. 60 years plus a few survivals. A hoard amassed over twenty years should cover eighty years. Conversely, if a hoard extends over ninety years the collecting period is possibly thirty years (90-60). While the Briglands hoard, being silver, is not strictly comparable, nevertheless the graph, peaking under Pius, would insist that this hoard concluded, in the reign of Commodus (supporting Robertson, 1984: 424). The long time-base, in view of the high number of first century coins, would have indicated for copper a start c. 146 A.D., but the presence of first century silver in the Antonine period would render a later inception probable.

In handling so much coinage, we noted that coins of the 1940s showed some wear but that those of the 1930s were still in good condition, although the highlights were reduced. Coins of the late 1920s were fairly well worn; those of

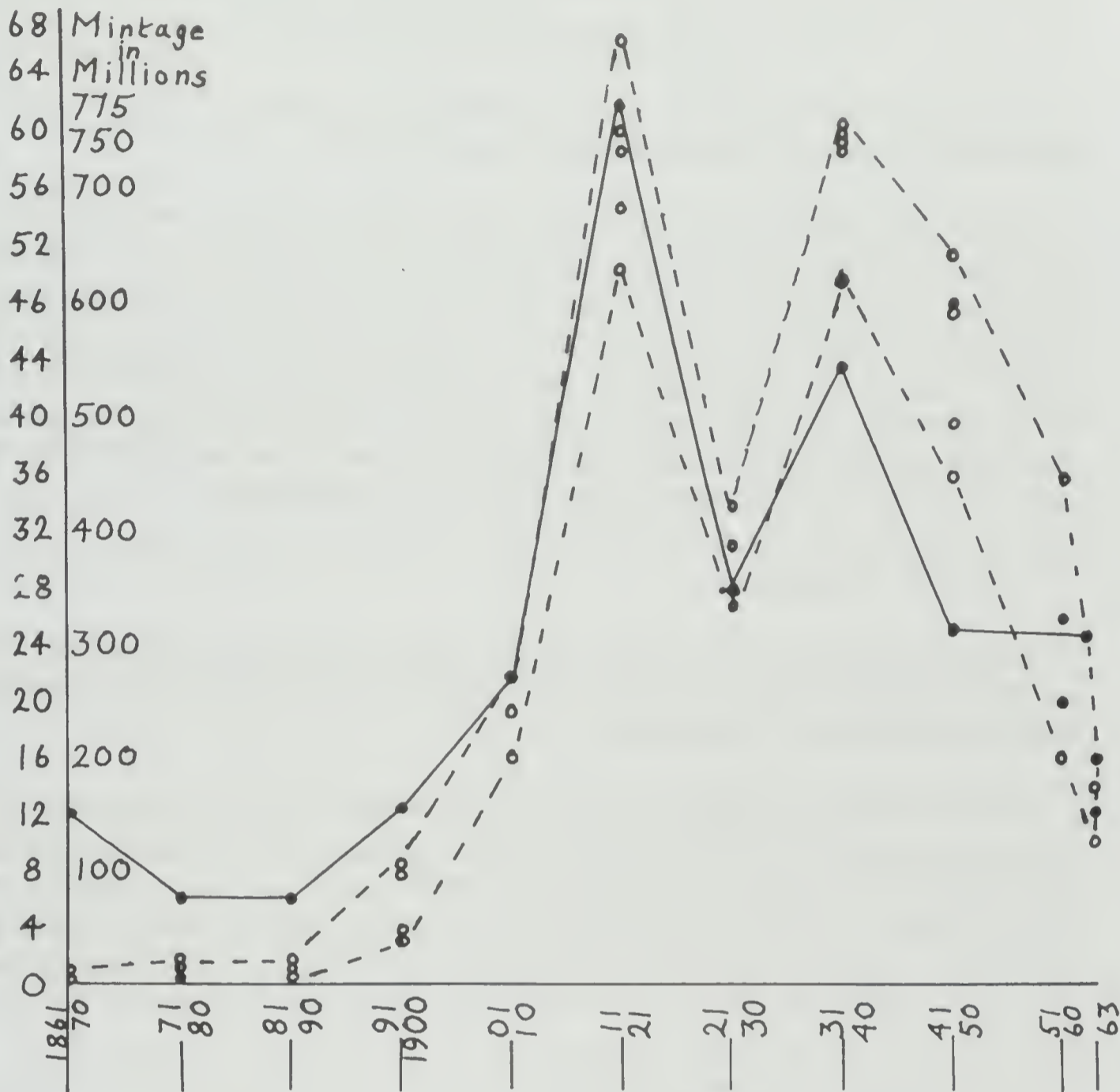


Figure 4

Coinage Current in 1963

Following a series of test graphs of 50 to 378 coins it was concluded that 250 coins presented a fairly accurate graph of the copper pence in circulation in 1963. These graphs were recorded as A to F. From the following group of graphs G to L, K has been omitted as inexplicably aberrant. The envelope illustrated is based on the closely corresponding graphs G, H, I, J and L, of bundles of 250 pennies in circulation in 1963, and is compared with the mintage graph of the coinage.

- Envelope of Coin Graphs
G, H, I, J, L.
- Mintage Graph

the early 1920s well worn. A worn coin was certainly 15-20 years old. A 'fairly well worn' coin should be at least 20 years old, and a 'well worn' coin possibly 30-40 years old. This is a highly subjective assessment, and an expert might offer alternative estimates. What is necessary is that the t.p.q. should be based on such classification, never on the date of the coin (see Macdonald, 1939b: 12).

The As of Marcus of 173-174 A.D. from Mumrills classed as 'fairly worn' (Robertson, 1984: 424) was found in a spot acceptably within the fort's ambit. Its condition would bring its date of loss close to that of the accepted coin of Marcus from Cadder. The one coin carries the other, and the 'fairly worn' coin of Lucilla (164-169 A.D.) from Old Kilpatrick almost certainly carries us well beyond 170 A.D. The coins of Commodus from Kirkintilloch, authenticated but lost, and the less certain Commodus from Bar Hill, might be classed as late second century or early third, although such a late dating is unlikely at the latter site.

The Ceramic Evidence

Breeze and Dobson (1976: 115) acknowledge the subjective nature of the ceramic evidence but are persuaded by its apparent unanimity. This unanimous aspect was at best an accommodation.

Initially Hartley and Gillam differed over the evidence of the Samian ware and the coarse wares. When Gillam (1973) adjusted his dating to correspond with that of Hartley (1972) it was with difficulty. He refers to a sherd of Derbyshire ware from Balmuildy, "a ware absent from second century deposits in England north of Yorkshire", and finds a late bead rim at Mumrills "inexplicable as it first appears in 180 A.D." (Gillam, 1973: 60). It is supported, however, by the coin of 173-174 A.D.

Apart from these exceptional pieces, to conform precisely with Hartley's dating Gillam is obliged to advance the independently dated castor ware beakers. On the strength of such at Crawford, Maxwell (1974: 177-179) felt that the fort could scarcely have been evacuated much before 170 A.D., but suggested a gradual withdrawal of the Scottish garrisons until c. 175 A.D.

In his study of the Samian, Hartley premised a more or less even distribution throughout Britain of Central Gaulish Samian pottery.

It is doubtful, however, that the military in the forward zone could compete with the wealthier towns in their sophisticated demand for a wide choice of the latest styles. At Wroxeter, as Wachter observes (1976: 363) no one potter

predominated among 210 vessels recovered. East Gaulish ware was present, while a nearby stall offered mortaria of the late potter Sennius.

Hartley was confident that the potters represented in this, the Wroxeter Gutter group (W.G. potters), and a later group from shipwreck on the Pudding Pan Rock (P.P.R. potters), could be dated to 165-175 A.D. and 175-200 A.D. respectively (Hartley, 1972: 23), an extremely subjective assessment. He concluded that the lack of W.G. potters and the total absence of P.P.R. potters from Scotland - the W.G. and P.P.R., total being only 8.8% - coupled with the absence of associated decorative styles and contemporary pottery types, all point to Scottish evacuation shortly after 160 A.D., and held that A.W. 1 should date to 140/145 - 155 A.D. and A.W. 2 to 159-163 A.D. This is contrary to the evidence for a longer second period suggested by the Bar Hill garrisons (*supra*), by the upcast from the Antonine Ditch opposite Rough Castle (Macdonald, 1925: 187; 1934: 236, 479), by the relative levels of silting in the 'well' at Croy Hill (Macdonald, 1932: 252) and by the general indications of wear within the same fort (Macdonald, 1937: 71).

The close dating of the two periods was based on Steer's contention that A.W. 2 commenced before 161 A.D. (Steer, 1964: 26-27) and the "compelling evidence from Crawford" (Maxwell, 1974: 153, 178). The former has been considered in Part 1. The latter has been previously rejected (Newall, 1976: 122). We repeat; is it conceivable that a ditch dug in 140/142 A.D. should fail to gather silt by 158 or somewhat later? It was almost certainly cleaned out, as were other ditches at Crawford. This apart, Maxwell's interpretation is apparently belied by the excavations by the same hand at Bothwellhaugh (R.C.A.H.M.S., 1978: 119-120, see below).

We accept that an absence of several years would scarcely be detected in the pottery count (Hartley, 1972: 39). One statement, however, is incomprehensible; that, as Breeze and Dobson put it (1976: 114), 95% of individual die stamps appear on sites on one Wall only (cf. Hartley, 1972: 26, 36). It is quite impossible that in, say, 159 A.D. or at any other time, no potters should be in mid-career, that none should have already produced 30% or 70% of his wares. While the study of the different die stamps provides a fine vernier to the potter's production period, it is blunted when applied to finds due, to the vagaries of distribution, durability and survival, nor are the individual dies themselves precisely dated (Mann, 1989: 132).

If A.W. 1 ceased c. 155 A.D. and A.W. 2 commenced nearer to 170 A.D., potters established before 154 A.D. might complete their output during the interval; those beginning just before 154 A.D. might possibly complete production in A.W. 2, while those working between occupations would be found only in the

A.W. 2 deposits. In such circumstances, in view of the paucity of stamps involved, the 95% to 5% ratio is very possible.

To resolve the difference between the Whitemoss-Outerwards evidence and that of the Samian, many attempts were made by trial and error to determine the probable median date of the change from mid-Antonine to late-Antonine potters. On squared paper, calibrated horizontally in years from 140 to 200 and vertically in ten production units per annum, many straight line graphs were drawn representing replacement spans from ten to twenty-five years. The one controlling factor was that at Corbridge the W.G. proportion at 16% equalled that of the P.P.R. group. While the optimum date lay in the late 170s A.D., this could not be readily advanced due to sheer volume and the imprecision rising from the subjective nature of the 'data'.

On reflection, the evidence of the towns offers a firmer approach. Being occupied throughout the period 140 - 200 A.D. and beyond, they present a closed account. In their case the distribution of the relevant pottery was even and the supply constant in response to demand, and would continue until the last vessel was sold. The percentages of the late potters from 34.3% at Wroxeter, through 38.1% at Silchester, to Leicester's 40.3% indicate the imprecise nature even of this data; nevertheless it is the firmest information we have.

If, then, we accept 40% as the proportion of the late potters, since constant supply implies direct proportion to time, this represents 24 years of the sixty years between 140 and 200 A.D. Thus an equivalent onset date of 176 A.D. is obtained; that is the date on which, if all mid-Antonine potters' sales ceased and all late-Antonine potters production began immediately, the latter would complete their quota by 200 A.D.

Our problem is to convert this equivalent onset date to the sought median date by determining the true onset date of the late-Antonine potters. This defies exactitude, but clearly, to maintain the quota, any advance in the date of the late-Antonine potters must be balanced by an equal prolongation of mid-Antonine production. Thus, if we think that twenty years is a reasonable time to allow one group to replace the other, we must allow ten years on each side of 176 A.D., allowing a 'late' commencement in 166 A.D. and a final date for the earlier potters of 186 A.D., always admitting that the odd potter may exceed these limits. In this case, the late-Antonine potters would have produced approximately 8.6% of the total output by c. 176 A.D. It should be remembered that in 176 A.D., the median date, the late-Antonine potters would produce 50% of the output.

If twenty years appears to be overlong, an overlap period of some ten to twelve years might suffice. If so, the W.G. potters began c. 169 to 170 A.D. If we insist on a beginning in 160 A.D., the mid-Antonine group should continue until approximately 192 A.D. to compensate, and c. 8.6 % of the total production would be reached by the late-Antonine potters c. 173 A.D. In the event of an evacuation from Scotland from 155 A.D. to 170 A.D. (*infra*), 8.6% of total production would have been achieved by the late-Antonine potters between 173 and 174 A.D., had distribution been even throughout the province and the frontier zone. We conclude that it was not.

To return to the Corbridge control; we note that the towns all show a slightly greater proportion of P.P.R. than W.G. potters. If we adjust these to equality, to bring them into line with Corbridge, the temporal shift is only one to three years. Thus with 200 A.D. as the limit, the Corbridge destruction should date c. 197 - 199 A.D.

Apart, then, from the Whitemoss evidence it would seem that the late-Antonine potters have been dated too early. This was becoming apparent, for the compression of all A.W. 1 + A.W. 2 sherds into a relatively short period had not only led to a proliferation of types now being dated at their earliest to c. 160 A.D., but a corresponding hiatus factor had emerged. In this hiatus, sherds dated pre-163 A.D. marked time during the later second century before increasing and developing into the third century. Apart from fumed ware, we may again refer to castor ware and to Samian beakers with 'cut-glass' decoration. The greatest hiatus effect, however, is shown not by pottery but by the altars to Jupiter with I.O.M. inscribed on the capital.

At Rough Castle (MacIvor, Thomas and Breeze, 1981: 282) five sherds were dated later than 160 A.D., including a Samian stamp of Doveccus, a potter then dated 160 - 190 A.D. In rough ware were two plain rim forms, one previously dated to 190 - 340 A.D., and two mortaria rims certainly later than 160 A.D. Of the late rim form (No. 204) it was felt better to advance the date of arrival of the dish rather than to push backwards the date of abandonment of the fort (see below under Abandonment). With the stamp DOVIICCVS we might equate CASVRIVS of Cadder. This stamp DOVIICCVS was already recorded as on form DR 33 at Rough Castle by Macdonald (1931: 436).

At Inveravon (Dunwell and Ralston, 1996) again an earliest stamp appeared, that of the potter Asiaticus, and a mortarium of Bellicus of a type later than expected. Here the excavators felt that the evidence was "insufficient to support a

date for the abandonment of the fort with any confidence", pointing out that "various interpretive models are possible" (Dunwell and Ralston, 1996: 512).

Whitemoss has its castor ware, its platters and bowls with intersecting arc decoration, and its developed ollae rims with neck cordon replacing sinusoidal pattern. Of the third period are two fumed ware sherds with extremely obtuse lattice decoration, one with a flat rim with slight internal kick and a groove between plain zone and decoration (7.57.1956). However, were we to present the usual selection of finds securely referable to, say, A.W. 2, there would remain these other "interpretive models". Further, the recent recognition of locally manufactured pottery might well invalidate the entire 'evidence', for the only purpose in presenting such is diagnostic. Diagnosis depends on recognisable features in a typological sequence. As typology develops by imitation, where there are alternative models, even the possibility of extraneous models (as at Bar Hill), or the possibility of fossilisation in local production but disguised by the presence of a few imported sherds, before any corpus of A.W. pottery may be presented much further examination by modern methods is desirable.

During the Whitemoss excavations all sherds were washed and recorded on the date found, for a wet section allows a clearer comparison than a dry. All fumed ware was classified as black, brown or grey, and under these heads was further differentiated by the thin coating under the burnishing. This ranged from white through grey to black, brown, red-brown and red. The fabric was soft, sandy, gritty, or hard. One ware in particular, which revealed when wet a bright crimson crystalline line beneath highly burnished black fuming, clearly showed several sherds to have a common source. It equally indicated that there were various sources. In this work no thought of local manufacture was entertained, despite the hint at Mumrills (Macdonald, 1929: 527, figure 93). We had hoped that it might help some future student of the southern potteries.

Now not only has local manufacture been shown to have occurred the length of the Antonine Wall, but a start has been made in the scientific analysis which might at length lead to a corpus of Wall sherds (Breeze, 1987: 186-187). To the sites recorded we may add Inveravon (Dunwell and Ralston, 1996) and Westerwood (Keppie, 1996). Among the sites recorded by Breeze is Duntocher (Gawthorpe, 1980). Gillings (1991: Vol 1, 218-232) subjected several of the Duntocher sherds to Neutron Activation and Petro-Textural analyses. It is unfortunate that he was working on the assumption that only one kiln was present. However he did recognise local ware grouping (Na a Group 1), but of another group he was obliged to conclude that it was either from elsewhere or from another batch. It would seem then advisable to mention the Duntocher industry. This is by no

means a full report, but an attempt to clarify for the sake of students the extent of the industry and to indicate where the kilns may be located for those desirous of obtaining signatures.

The Duntocher Industry

In April 1977 the late Mr. Jack Brogan mentioned a section of red material exposed in the face of a cutting into the west foot of Golden Hill, Duntocher, where the ground was being recessed towards the erection of a villa, Goldenlea. This was examined by the author and Mr. Harry Sinclair, who was then assisting in further excavation of the primary fortlet, and some sixty sherds, including wasters, were recovered with a number of pieces of red clay, some having wattle grooves but always on one side only. A single perforated fragment of harder fired clay was included. In section, beneath the 'red material' a thin grass line sealed an occupation level, partly cobbled, which also yielded several sherds. In the upper material Professor Robertson recognised kiln waste, and the author was privileged when asked to conduct excavations of the site on her behalf. The work could not begin until July 1977, by which time the quarry face had receded by several feet.

In all, a batch of four kilns of an unknown number was excavated (Figure 5), while to the north a channelled building at least 28 feet (8.5 m) by 14 feet (4.3 m), perhaps a drying shed, was located. The considerable extent downfield of discarded clay from kiln domes along with sherds suggests that other kilns to the west were already destroyed before the site was recognised, while the very hospitable Mr. Watson of neighbouring Braeside, who assisted in several ways, affirmed that he had encountered the same red clay when deep digging his back garden. Thus it is possible that kilns exist to the south-east and perhaps to the east of those recorded. Of those possibly destroyed on the west, while most of the soil was removed from the site, a dump was formed at the east end of a belt of trees to the north-east. This was not explored, but several sherds were recovered. Possibly from downhill to the west came mortaria rim sherds, one burnt, in cream or white with high standing white grit.

Unlike kilns recorded elsewhere, the Duntocher kilns were of simple hearth-clamp construction, being shallow pits lined with clay and fired from fairly shallow flues. In total they had produced storage jars, buff on grey, red, and orange, but in the final stages were producing fumed ware of almost every type represented on the Antonine Wall. In particular, one overfired fine fumed ware with burnt red patches and a close fine lattice was common enough to be dubbed 'Duntocher ware'. Of this ware were probably nos 37, 39, 41 and 42 from the fort (Robertson, 1957: 84, 86). These apart, it is possible that the majority of the sherds recovered

Figure 5

Opposite; facing page 26.

The Pottery Kilns at Duntocher

DUNTOCHER KILNS 1977



Stone



Red daub



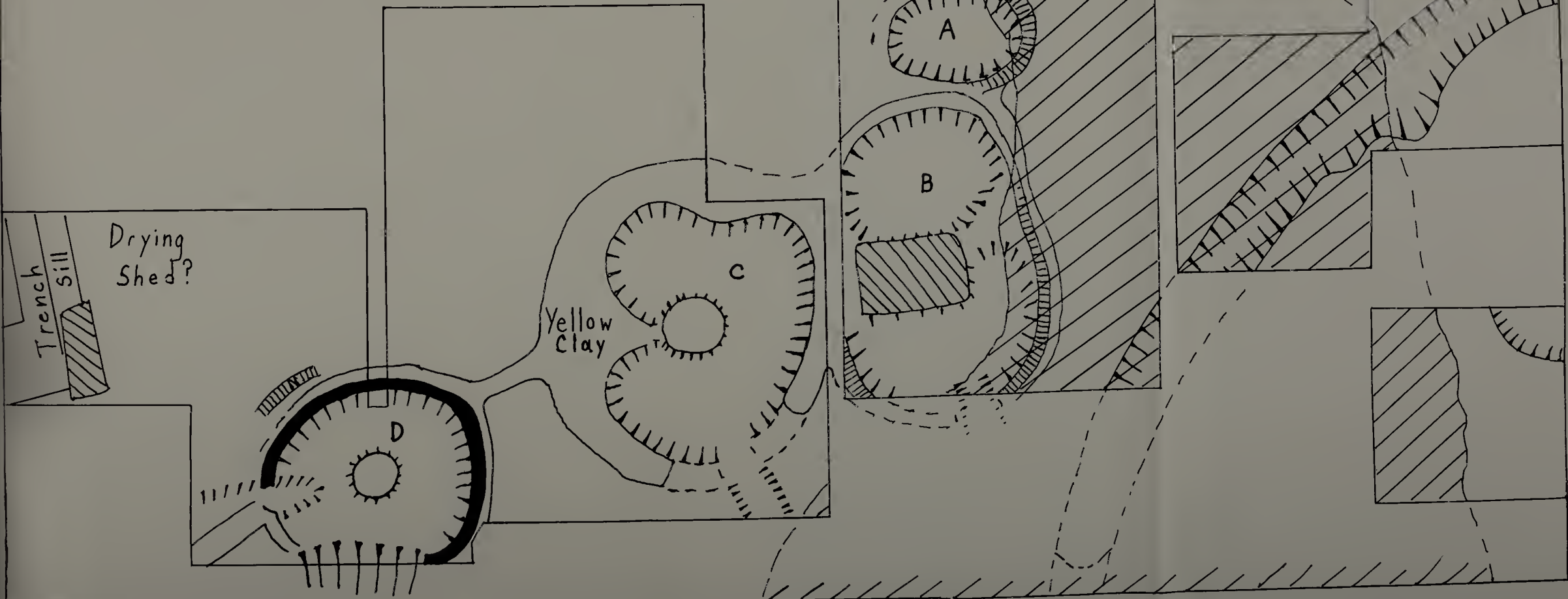
Incinerated daub



Outcast daub/sherds



0 5 10 Ft.



from the fort were locally made. No 41, from the oven, suggests that the ware was of the second period, as hinted at by the stratification of the kiln site, although this might be localised.

The full excavation report, with the classification of the sherds under heads 'primary domestic', 'industrial', 'secondary domestic', was presented to Professor Robertson at the close of 1977, with selected waste for sample, and the bulk of the pottery was handed over for preservation in Clydebank Library.

The Kilns (Figure 5)

Kiln A, the smallest, was a simple bowl lined with some 5.0 cm of yellow clay from which the red dome had risen. It was possibly shallowly flued from the north. Kiln B, an apparently double-bowled structure, was likewise yellow clay lined with, round the edge, the reddened clay remains of the dome. A rectangular stone at centre was possibly secondary, laid as a hearthstone on a yellow clay base, and the kiln content suggested secondary use as a hearth when the potting activity had moved elsewhere. From beside it came a sherd of Dr 37 stamped CINNAMI.

Kilns A and B were removed, except for the lower hollows, as we reduced T 1 completely to remove the underlying grass line and examine the primary patchily cobbled layer, which yielded several domestic sherds.

Secondary also was the kiln at Bar Hill (Keppie, 1985: 73) and one might suggest that the production of sherds of North African type might relate to a recruit to Cohors I Hamiorum. Also secondary were the locally produced wares at Inveravon (Dunwell and Ralston, 1996: 572-573).

Kiln C, edged with yellow clay, had a support boss extended towards the centre from one side. It was flued from the west.

Kiln D had suffered a complete burnout. Two pieces of slag came from the bottom, and the base of the clay dome was incinerated into the side of the bowl. An arc of red clay round the east suggested the remains of an earlier firing. From this kiln possibly came Gillings' Fabric Three. Kiln D had a clay boss at centre. Like C it was left intact but, at the very edge of the quarry face, may have been disturbed since 1977.

To the south of the kilns a V-shaped runnel ran to the west, downhill. Its course, unlike that of a drain, would have taken it past the possible kilns east of Braeside before turning to clear the A - D batch and pass towards others now lost.

Within this channel were several hard fired and grooved red and black brick-like fragments, perhaps kiln furniture waste. The runnel probably supplied water for clay kneading and slip application. Elsewhere such channels have been deemed essential mainly to drain a clay soil (Fulford, 1975: 16) but Thomas supports our conclusion (Thomas, 1989: 161-162).

To the north, beyond the possible drying shed, the area appeared to be bounded by a shallow ditch some 5.0 feet (1.5 m) wide. This was disturbed by later drains laid along it. Farther north lay the depressions noted by McBrien (1996: 657). The possibility of clay pits arises apart from post-Roman activity.

That Duntocher ware reached Whitemoss may be doubtful, but its presence raises the question of local manufacture there. Workshop activity in glass, lead, and perhaps tiles was detected in the north annexe, and betrayed by surface tiles when the field was ploughed, but nowhere else downfield were there suggestive signs. However, the field to the north did show red patches when ploughed.

Siting the Kilns

The datum for the Duntocher excavations was the junction of the north fence of Braeside with the iron fence bounding Golden Hill park on the west. The base line was projected north along the iron fence, and the trenches set at right angles to it on the west. The north-east corner of T 1 is exactly 2.0 feet (0.61 m) from base at 44 feet (13.4 m) north of datum. The centre of Kiln C is 20 feet (6.1 m) from base at 48 feet (14.6 m) north; that of Kiln D is 24 feet (7.3 m) from base at 56 feet (17.1 m) north.

Abandonment

Two periods of abandonment have now to be considered, the first as revealed at Outerwards (Newall, 1976), and the second at Whitemoss. Miller raised the question of the latter when, discussing an altar lying across a wall beneath the final fill of the fort bath house at Balmuildy, he asked if this implied that a long enough interval had elapsed for it to have been forgotten, or if the levelling had been done by troops out of sympathy with the garrison (Miller, 1922: 47). The same applied to the Firmus altars at Achendavy (below).

In general, as at Whitemoss, the A.W. 2 fort plans follow fairly closely the layout of A.W. 1, suggesting similar troop allocations. Had A.W. 3 followed closely, especially if the frontier was to be re-established, a similar restoration might have been expected. Instead, as at Whitemoss, sites were landscaped or

levelled up. Bath houses were filled with clay and cobbles at Balmuildy (Miller, 1922: 44-46) and Cadder (Clarke, 1933: 58). At Old Kilpatrick the 'latrine' suffered a like fate (Miller, 1928: 29). Here we agree with Bailey (1995: 300, 304) that the external bath houses are late and that the Old Kilpatrick latrine was a bath house.

At Cadder (Clarke, 1933: 49-50), as at Whitemoss, the final cobbling was laid on forced earth. Croy Hill, too, was cobbled and there the north-east corner 'well' was filled. This 'well', with the fort, was secondary, hence the large exit from it was probably tunnelled under the Antonine Wall to reach the ditch. We would prefer to consider it a sump like that at Whitemoss, but, because of the underlying rock, requiring to be drained.

What is of interest is the stratification (Macdonald, 1933: 252). The lowest silt-like fill was topped by "three inches of black burnt matter". Above this "a foot of marshy soil interspersed with grey earth" was similarly sealed with burnt matter containing lumps of rock and freestone. This was covered, beneath the final filling, with "a foot or so of grey soil intermingled with black burnt matter". Here is a hint of two periods, each ending in destruction followed by considerable silting, the second rather more than the first and accompanied by the collapse of the east side.

Drain alterations were recorded at different levels at Castlecary (Buchanan, 1903: 320-322, 324, 326) and Balmuildy (Miller, 1922: 41, 46, 108) and at Mumrills involved the rebuilding of the rampart (Macdonald, 1929: 409-410). The implied destruction points to lack of maintenance, improbable during occupation.

Drain levels are not altered during tenure. Drain courses may be altered, but once established they are, when necessary, cleaned out, unblocked etc, but remain. Among the immunes were drainers whose business was to attend to such matters, apart from the fact that drain cleaning was a customary fatigue. They would undoubtedly attend to the maintenance of the Wall conduits, although others would attend to the turf structure.

The considerable repairs required along the Antonine Wall, especially where culverts were possibly, at least partly, responsible for the damage, can only point to a fairly lengthy period of abandonment. This almost certainly followed A.W. 1, for if A.W. 3 is Severan, and certainly short-lived, there would be little time for maintenance during campaigning, except around the forts as at Rough Castle and perhaps Westerwood (Macdonald, 1934: 255).

Repairs which may have initiated A.W. 2 have been recorded at Tollpark, NS 770777, where MacIvar (in Keppie and Breeze, 1982: 231) suggests that they indicate "a drastic rebuilding" of the Wall, adding that the continuity of turf lines inward from a secondary kerb pointed to major destruction or collapse. This secondary kerb ran for fully 98 feet 9 inches (30 m) behind the original, some 5.5 to 12 inches (15 to 30 cm) higher than it, and up to 3.0 feet 4 inches (1.0 m) from it, laid on collapsed turf. Further work by Keppie and Walker (Keppie and Breeze, 1982: 279-240; Keppie and Walker, 1990: 150) showed that for some 295 feet 6 inches (90m) the additional higher kerb was occasionally replaced by a two-course high stone dyke, to the east of which a stone platform 39 feet 6 inches x 5.0 feet 10 inches (12 m x 1.8 m) was added to the south kerb. This may have been an ascensus to allow repairs to the rampart top. To the east, NS772778, a band of stonework overlying tumbled turf and partly overlapping the original kerb suggested "comprehensive reconstruction". Part of the Tollpark work blocked the mouth of a culvert, while a culvert was likewise blocked at Bantaskin, NS873800 (Keppie, 1978a: 69).

A further extensive length of repair, some 350 feet (106.9 m) long, ran uphill from the east side of Nethercroy Road, NS723762 (Keppie, Bailey, Dunwell, McBrien and Spellar, 1996: 648-649). Here, due to the rush of rainwater downhill, regular maintenance would have been required. Other instances of additional kerbing were recorded at Bearsden (Keppie, 1975: 154; Macdonald, 1934: Plate xxxv 1 and 2), Easter Balmuildy, NS581718 (Keppie, 1978a: 67) and Garnhall, NS782780 (Keppie and Breeze, 1982: 235), while refacing of the rampart at Callendar Park is possible (Bailey, 1996a: 581, 587-588).

Apart from the Antonine Wall, extensive repairs were required at the rampart of Bothwellhaugh, NS731578. There, along the north-east side, the front of the rampart south of the gate had been excised and replaced with turf, while to the north the entire rampart front was revetted in clay (Maxwell, 1968: 50) or turf (R.C.A.H.M.S., 1978: 119-121). Fully 5.0 feet (1.8 m) thick at the gate, but diminishing towards the north-west corner, this total cladding parallels that at Outerwards, where the entire collapsed rampart face was encased, and at Whitemoss from the south-east corner northwards.

In the case of normal maintenance, one would expect to find a new facing of turf replaced on the original kerb, possibly with a few higher stones topping it to ensure settling against the old turf.

With the evidence of tumbled turfwork we should include that recorded at Rough Castle (MacIvor, Thomas and Breeze, 1981: 234-235) although little is said

there of Wall repair. Macdonald, however (1934, Plate xxxvii) appears to show clearly-laminated turf extending over the north kerb of the Antonine Wall just possibly to a large stone overlying spread turf, and considers repair (1933: 264-265).

The evidence for rebuilding within the forts is conveniently summarised by Hanson and Maxwell (1983: 138); the evidence for abandonment is not so clear. During some ten to fifteen years, repairs would be required to timber buildings possibly twice, but these would not involve the sill walls or stone foundations where present. Where such were sufficiently robust, secondary timber construction might well be based on them, following scouring, even after a gap of ten years. The re-laying of stone foundations, implying total rebuild, would appear to indicate collapse or destruction and inevitably points to an interval of some duration. Many a mediaeval keep reveals repairs and alterations above foundation level.

Hanson and Maxwell exclude from their summary the evidence from the bath-houses, due to the frequent repairs required there. Admitting the many repairs involved in these buildings, however, we rely on the acumen of the earlier excavators, who best knew their own sites, to record accurately what they observed. Their observations, as our own, are subject to interpretation, but where we are tempted to re-read the evidence we should perhaps exchange the armchair for the spade.

Where major repairs have been carried out to bath-houses, we should consider whether the troops could use part of the building or were required to head for the nearest pool. Assuredly Valerius, Fronto would expedite the restoration of the burnt-out facilities at Bowes (R.I.B. 730). Likewise, in the case of the Praetorium we might inquire whether repairs would have caused some inconvenience to the Camp Commandant, or obliged him to camp out.

It is somewhat of a coincidence that in the case of the Wall forts, as illustrated by Bailey (1995: 302) two bath plans are presented for Balmuildy, Mumrills, Bar Hill and (1995: 311) Old Kilpatrick, although Cadder exhibits three. Numerous repairs were recorded on these sites, but the plans are of major rebuilds. At Balmuildy, despite many repairs (Miller, 1922: 41-47), reconstruction followed almost complete destruction. The bath-house, after a second destruction, was abandoned, to be replaced later by the short-lived annexe building. This might mirror the history of Whitemoss, although there the internal bath building was not located.

That some time had elapsed at Balmuildy after the first disaster is suggested by the apparent amount of make-up between the primary wall footing and the secondary base as illustrated (Miller, 1922: Plate xixb). Support for this evidence may be provided by the position of the later walling in the Principia (Miller, 1922: Plate viiic and 25) which is offset like the final foundations at Old Kilpatrick. There is again a hint that this wall was not laid directly upon the earlier but on some intervening soil.

At Cadder in the bath-house "successive alterations and additions were everywhere apparent" (Clarke, 1933: 54). These were indeed numerous (Clarke, 1933: 53-59); nevertheless Clarke recognised a complete transformation (1933: 89), although the placing of the new structure in the history of the fort might be susceptible of scrutiny and some might query the third 'period', since there was an annexe bath-house.

Occupation

Our review of the numismatic and ceramic evidence would suggest that the Wall was held for much longer than has recently been generally accepted, while the history of the Wall and some of its forts supports the evidence for three periods separated by fairly lengthy intervals. In our introduction we have suggested that the final period fell in the early years of the third century. If so, we should not expect all forts to be re-occupied, and indeed Macdonald states firmly that Bar Hill was held only twice (1939a: 258).

Before considering possible pointers to a Severan occupation, we recall Miller's caution (1952: 237) that "The action of Caracalla has confined within very narrow limits the prospect of finding dated material". On the Wall these limits are c. 208-212 A.D.; but on Hadrian's Wall "Severan associations" are not only later but less closely confined; long enough for definitive pottery types to have found a wider market. Thus on our Wall when a late sherd turns up, which might, as in the case of 'cut-glass' Samian, be classed as Severan farther south, we hesitate over the date, as did Gillam at Newstead (in Richmond, 1952: 36, sherd 18). However, in compiling such evidence as might point to the third century, we are obliged to consider such sherds and several inscriptions.

Late Ceramic Evidence

At Croy Hill a Samian beaker decorated in cut-glass technique found in fragments "against the west wall of the granary underneath the Third Period cobbling" was either dropped at the close of the penultimate period or by those

who were preparing to cobble the area. Similar ware occurred at Castlecary, Old Kilpatrick and Newstead. On the strength of the last, Haverfield suggested a date c. 170 A.D., i.e. as late in the history of the Wall as he then believed possible, although it "occurs more frequently on Hadrian's Wall, usually in Severan association" (Macdonald, 1937: 67-68).

At Silchester the same type "not at present known in any level earlier than the Antonine period in Scotland" (Cotton, 1947: 129) helped date the sequence of defences culminating in the stone wall. Frere states specifically that the pottery used to date the walls at Silchester has itself been dated too early (Frere, 1974: 286).

The latest coin from Newstead, of 180 A.D. (Clarke, 1996 and 1997), brings the occupation beyond that date, while Hartley (1972: 54) not only argues for such occupation but, since a stamp of the Rheinzabern potter *Comitalis* was recovered, suggests activity under Severus. At Croy Hill, then, the sherds may point to the close of A.W.2 or to a Severan occupation.

The late sherd from Mumrills, which Gillam (1973: 61) felt indicated some Severan activity, would date c. 180/190 - 240/280 A.D., nor was it alone. On our revised dating it might just occur in an A.W.2 context. With it, however, we should consider that latest sherd from Rough Castle (MacIvor, Thomas and Breeze, 1981: 247-264). This sherd (No. 204) was from the Antonine Ditch, but was matched by three other sherds from the spoil heaps over the lilia, perhaps all from the same vessel, dated 190-340 A.D. With these, also from the lilia heaps, came Nos. 128 and a similar sherd, 129, 195 (as 194), 196 and 197, all dated 150 - 250 A.D. No. 194 came from the south barracks block. Four sherds similar to 197 came from the west end of the north barracks, as did No. 130 dated 150 - 250 A.D. Not assigned were Nos. 93 (150 - 220 A.D.), 94 (140 - 300 A.D.) and 184 (150 - 210 A.D.).

Regrettably neither the precise find spots nor association of these sherds is published. Taken as a group, they would not be out of place in a Severan context. It might seem reasonable to suggest that the latest sherd, of 190 - 340 A.D. from the spoil heaps, should date those similarly located dated to 150 - 250 A.D., and with them the comparable sherds from the north barracks. If, as previously suggested, the Antonine Ditch was cleaned out at the beginning of a period, then these sherds must be from the close of A.W.2 or were thrown out by those casting up the spoil heap. They are either late Antonine or Severan. If No. 204 dates at least some of them, for it is unlikely to stand alone, and with it we would count the late sherds from Mumrills, we have confirmation of the late close to A.W. 2, or, as

is indicated by the ditch cleaning activity *per se*, we have evidence of Severan activity. The necessity of directing any approach from the north towards the fort gateway may have occasioned the ditch clearance. For the relative dating of the spoil heaps see Macdonald (1933: 285-287).

Apart from the above, the road directed from the north gate towards that which ran north into enemy territory from Watling Lodge ought to have been used during the Severan advance. At Watling Lodge, Bailey (1996b: 626) suggested a Severan date for the final road north.

Inscriptions

In support of the 'cut-glass Samian from Croy Hill is a relief of Dolichenus, similarly dated by Macdonald (1932: 268-276) and Jones and Mattingly (1990: 274), the dating being mainly third century. To this century Miller (1952: 238) considers possible the command of a vexillation of the Sixth Legion by Fabius Liberalis (R.I.B. 2160).

From Croy Hill came a small stone inscribed LEGV (R.I.B. 2162). Dr. Keppie (pers. comm.) suggests that a missing numeral 'I' is indicated by a small notch just below the right hand ansa, and suggested that paint would have made a difference. He offers as a parallel the neatly compressed VIc from Birrens (R.I.B. 2113). R.I.B. 1061 provides a closer parallel in layout, while it is surprising that the LEGV should be so condensed a form of LEG VI compared with the fuller text from the same site (R.I.B. 2161). In each case, as befits small inscriptions, the letters are neatly spaced within the frame. The stone is either a mis-inscribed Sixth Legion tablet or it is of the Fifth Legion Macedonica. If so, it could scarcely have been laid outwith the Severan campaigning period.

At Old Kilpatrick the latest dating is indicated by the third period foundations (Miller, 1928: 22) which should be contemporary with those at Whitemoss, and possibly by an altar inscribed I.O.M. on the capital (Barber, 1971). Such dedications are mainly of the third century, although several are possibly late second century. These include the Old Kilpatrick altar, one set up by Coh V Gallorum at Cramond (R.I.B. 2134) and one by Marcus Cocceius Firmus at Auchendavy (R.I.B. 2176).

While the first might be of the third century on account of the supervision by a centurion of the First Italian Legion and the possibility that Coh I Baetasiorum, for whom it was erected, were at Maryport during A.W.2 (R.I.B. 812) and Bar Hill during A.W.1 (R.I.B. 2169, 2170), the last is of the late second century. One of a

group dedicated by Firmus, it was buried with them, several being damaged, along with a mutilated statue and discarded pile drivers (Macdonald, 1934: 287-288), presumably by a later party "out of sympathy with the garrison". If Davies (1976) is correct, this comprised men of the Second Legion Augusta and an unidentified cavalry unit (R.I.B. 2179), but Keppie (1984: 395) believes that only the Second Legion was involved.

At Castlecary also, where the incised Samian beaker is supported by a sherd of form Walters 79/80 (Hartley, 1972: 29), vexillations of the Second and Sixth Legions were present. Italian and Norican troops of the latter honoured Mercury (R.I.B. 2148). Mann underlines the late dating of the dedication, suggesting reinforcements for the Sixth from the Second Italica to replace losses sustained in 181 A.D. (Jarratt and Mann, 1970: 194). It is just possible that the legions were rebuilding at the beginning of A.W.2, and barely possible that Severan losses were made up by Italian levies. Mann considers brigaded legionary vexillations in general to be of the third century, including those of the Second and Twentieth at Bar Hill (R.I.B. 2171). These, however, might have been rebuilding at the beginning of A.W.2. for, as we have seen, there is no evidence for a third period at Bar Hill. Mann instances, further as brigaded, the combination of the Second Italica and Third Italica at Manchester, the former as at Castlecary being inferred from the presence of Norici (Jarrett and Mann, 1970: 199), but his interpretation is not accepted by E. Birley (R.I.B. 576, note).

Legionary groups working in unison at third century Netherby are cited (Jarrett and Mann, 1970: 209), and Mann would also accept as third century the vexillation of the Twenty-Second Primigenia from near Falkirk (Jarrett and Mann, 1970: 199; R.I.B. 2216), although Macdonald denied the provenance (1934: 406 footnote 3).

At Castlecary (*contra* Davies, 1979) the A.W.1 garrison was Coh I Tungrorum (R.I.B. 2155). At this time Coh I Fida Vardullorum may have been at Corbridge, as they were possibly from 161 to 169 A.D. (R.I.B. 1128). They were almost certainly the A.W.2 garrison of Castlecary, possibly at half strength, for a detachment was serving at Lanchester in 175-178 A.D. (R.I.B. 1072, 1083). A second century detachment was also present at Milecastle 19 on Hadrian's Wall (R.I.B. 1421).

It is improbable that they were at Castlecary during the Severan advance, for they were at High Rochester from c. 216 A.D. (R.I.B. 1272) and perhaps earlier, for one would suppose that the fort would be commissioned in 205-207 A.D. when it was being rebuilt (R.I.B. 1277) as was Risingham, after a long period of abandonment.

Two inscriptions from Jedburgh Abbey indicate the presence of Coh I Fida Vardullorum under a tribune and a vexillation of Raetian Spearmen, part of the third century garrison of Risingham in 213 A.D. (R.I.B. 1235) which Macdonald suggests relieved them (1923: 176). They were possibly operating jointly (Richmond, 1961: 98-99).

Two other inscriptions from Castlecary require comment; (a) H BAT on an altar fragment (R.I.B. 2154), and (b) a reference to BRITTON (ES) on another altar (R.I.B. 2152), accepted by Sibbald as part of an altar which he thought recorded a vexillation of the Twentieth Legion. These were possibly late brigaded units.

H BAT as a reference to Coh I Batavorum was rejected because of the missing numeral (Macdonald, 1934: 414). However the central altar in the Mithraeum at Carrawburgh, set up by the same unit, has the H ligatured with the numeral 1 (R I.B. 1544). As this altar dates to 213-222 A.D. it is possible that the cohort raised it on its return from Scotland. It is also possible that this contingent was billeted with the legion which contained British troops.

If we may be permitted somewhat freer speculation, we suggest that these were possibly raised at Vindolanda, where native-type round houses built by the Romans were neatly arranged in groups of ten. It was suggested that they may have housed prisoners (*Glasgow Herald*, 2.8.97), an improbable luxury. If each house held eight men, the grouping suggests centuries, possibly of Britons in training and in consideration of the accommodation, possibly volunteers. Here we may refer to the oft cited reference to Britunculi from the same fort. Millett (1995: 29) renders this "The Britons are unprotected by armour. There are very many cavalry. The cavalry do not use swords nor do the wretched Britons mount in order to throw javelins". This has all the flavour of a disgruntled centurion's comment on raw recruits. Britons would not have freely discarded the sword for the javelin. In such a context in Britunculi we may detect a faint derisory echo of Latrunculi. The round houses date to the Severan period (*Current Archaeology*, 155: 434. 1997).

Conclusions

The Whitemoss-Outerwards excavations pointed to an average dating for A.W.2 from c. 164 A.D. to c. 197 A.D. at latest.

Our review of the evidence from the Wall would support a fairly lengthy preceding period of abandonment, as revealed by the dilapidation exposed along the Wall itself, while the acceptance of Coh I Fida Vardullorum and Coh I

Hamiorum as A.W.2. garrison forces, neither of which could have moved north before 163 A.D. and possibly 169 A.D., reinforces the belief that the work begun on Hadrian's Wall in 158 A.D., as at Birrens under Julius Verus, was continued by Calpurnius Agricola (162-166 A.D.).

Any immediate move north, if considered in 161-162 A.D., had to be postponed when M Statius Priscus was obliged to return east to face the Parthians.

The evidence for continued building on the southern wall is assembled by Jarrett and Mann (1970: 189-192). Under Julius Verus, work may have been completed at Corbridge (R.I.B. 1132), possibly Carrawburgh (R.I.B. 1550) and certainly on Hadrian's Wall (R.I.B. 1389), at Birrens (R.I.B. 2110) and at Brough-on-Noe (R.I.B. 283). Under Calpurnius Agricola, the second Antonine period at Corbridge began c. 163 A.D. (R.I.B. 1149), and Calpurnius Agricola engaged the enemy successfully. Nevertheless, his inscriptions continue at Carvoran, on two altars by Coh I Hamiorum (R.I.B. 1792; R.I.B. 1809), at Ribchester (R.I.B. 589), at Chesterhold (R.I.B. 1703), possibly at Hardknot (R.I.B. 793) and a dedication to Marcus Aurelius and Lucius Verus (161-169 A.D.) from Ilkley (R.I.B. 636) might also be of his governorship.

The wars which threatened in Britain, Germany and Parthia in 161 A.D. possibly smouldered, but the joint emperors were obliged to face the greatest threat to Rome. From 163 to 166 A.D. Lucius Verus was campaigning in the east. At the same time the German tribes ruptured the Danube frontier and reached Italy. While Verus countered them and finally drove them across the Danube in 168 A.D., thereby gaining a breathing space, matters in Britain had worsened and wars were threatening in 169 A.D. and into the early 170s.

In 169 A.D. Verus died, leaving Marcus with the British problem and an impending continuation of trouble across the Danube (Salway, 1993: 154-155).

It seems probable that Marcus seized his chance to deal promptly. In Britain the troublesome tribes almost certainly came from north of the Forth-Clyde line. To contain them it would be prudent to advance to the much shorter, more closely garrisoned, Antonine Wall. This was probably executed immediately c. 169-170 A.D., but with a backward glance towards the east, for there troops might be required. As a result, the Antonine 2 garrison was by no means as large as that of the first occupation (Hanson and Maxwell, 1983: 148-149). The forts of Carzield, Loudoun Hill, Raeburnfoot, Barburgh Mill, Durisdeer and Chew Green were left empty. Even Newstead, with Cappuck, was left with a reduced garrison without support from Risingham or High Rochester, while on the Wall itself several forts

had reduced units. Strategically placed forts, however, were probably fully manned, as Whitemoss, which with its cavalry attachment had to patrol the Firth of Clyde (Newall and Lonie, 1990 and 1991), and with Old Kilpatrick, which initially had a like garrison, guard the Leven Gap.

In view of the damage which was undoubtedly inflicted during the protracted withdrawal, if not responsible for it, apart from dilapidation due to neglect, the work of renewal would take some time, for it is doubtful if Marcus would employ other than vexillations on the task. The reduced temporary camp at Dullater might be a pointer in this direction (Keppie, 1978b).

The move north, albeit with reduced forces, seems to have ensured peace after a troubled year or two, for there is no threat of hostility until the reign of Commodus. During this time, however, with few supporting road stations it was a long haul for supplies. This may have led to the manufacture of pottery along the Wall and at or near Newstead (Hartley, 1976: 83) and to the general discouragement of civilian traders on a regular basis, especially in the troubled years under Commodus.

The wall which was broken through by the enemy in his reign was almost certainly the Antonine Wall, for the incursion was contained by Ulpian Marcellus with severity and there is no evidence of a withdrawal south. It was perhaps at this time that a cavalry squadron from Carlisle slew a band of marauders (R.I.B. 946). Considering his evidence we agree with Mann (1989: 135-136) that the second Antonine period closed c. 195 A.D.

The amended date for A.W. 2 of c. 169/170 to c. 195 A.D. is satisfactorily close to that suggested by the stratigraphy examined at Whitemoss and Outerwards, which by its nature could not without support claim acceptance.

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NOTES ON THE BUTTERFLIES OF LADY ISLE, AYRSHIRE

By J.A. GIBSON

Scottish Natural History Library

Introduction

Lady Isle, off Troon, Ayrshire has been a nature reserve of the Scottish Society for the Protection of Wild Birds for the past fifty years, and during this time I have visited the island several times each year (and for some years previously), mainly to monitor the seabird colonies.

Although seabirds represented my main interest, I also kept a note of all the butterfly species seen over the years, so these brief notes may be of some interest, since I always consider it to be worthwhile recording the fauna and flora found on any offshore island, even although these may be little different from the species found on the adjacent mainland.

Lady Isle lies in the Firth of Clyde some three and a half miles west-south-west of Troon and five and a half miles north-west of Ayr. It differs little from many of the small offshore Clyde islands, with a rock-bound seaweed-covered shoreline, a peaty soil and vegetation mainly of grass, bracken, and particularly nettles, which in some years can grow in remarkable profusion; many species of wild flowers are also found. The island rises some twenty to thirty feet above sea level and is just over one mile in circumference.

The minimum distance of some three and a half miles from the Ayrshire coast appears to present little difficulty to butterflies, since at least thirteen species have been recorded on the island, and on many occasions I have seen butterflies travelling across the sea between Lady Isle and the mainland. To the best of my knowledge these have always been 'whites' (easily seen even at some distance) and the Small Tortoiseshell, but there may have been others which I was unable to identify in the conditions.

These Lady Isle notes should be read in conjunction with my previous accounts of the butterflies on other Clyde islands (e.g. Gibson, 1952-76, 1982a-1982d, 1990-97). In the following Systematic List the arrangement and nomenclature follow Thomson (1980).

Systematic List

LARGE WHITE *Pieris brassicae*

Seen occasionally; the least common of the whites.

SMALL WHITE *Pieris rapae*

Common and well known in the most parts of the island.

GREEN-VEINED WHITE *Pieris napi*

Seen reasonably regularly, although well behind the Small White in numbers.

ORANGE TIP *Anthocharis cardamines*

I have one isolated record of the Orange Tip - a single specimen seen on 30th May 1997. This species, however, has been steadily increasing in lowland Clyde over the past few years, so it is not unlikely that additional records may be reported from Lady Isle before long. Earlier in 1997 I also recorded my first occurrences of the Orange Tip for the Island of Bute (*Scottish Naturalist*, 109: 40).

SMALL COPPER *Lycaena phlaeas*

Only one or two isolated records over the years.

COMMON BLUE *Polyommatus icarus*

One or two records most years, but erratic.

RED ADMIRAL *Vanessa atalanta*

A few records most years.

PAINTED LADY *Cynthia cardui*

About a dozen records over the last thirty years; all single occurrences.

SMALL TORTOISESHELL *Aglais urticae*

Far and away the commonest butterfly on Lady Isle, and in density can be greater than anywhere else I have experienced in the West of Scotland; presumably because of the great profusion of nettles, a favourite food-plant. Numbers can be variable some years, but usually range from common to abundant; sometimes the butterflies can rise in veritable clouds from the nettles, when disturbed.

Fairly regularly seen over the sea between Troon and Lady Isle, and it is possibly worth recalling one remarkable occurrence (Gibson, 1982d):

"My most remarkable instance was of sailing into a spiralling small cloud of at least thirty Small Tortoiseshells about halfway across from Troon to Lady Isle. The Small Tortoiseshell is very common on Lady Isle, which has an extensive growth of nettles, and some years these butterflies occur on Lady Isle in very considerable numbers indeed. On this occasion we sailed through the butterflies, which were circling some six to twenty feet above the surface of the sea. Several settled on the motor-boat and remained there until we arrived at Lady Isle, when they were disturbed by preparations for landing and flew onto the island".

PEACOCK *Inachis io*

Erratic in occurrence, but isolated records go back to 1950.

GRAYLING *Hipparchia semele*

Fairly common and well-distributed over the island, and around the shore-line; sometimes seen to fly short distances out to sea.

MEADOW BROWN *Maniola jurtina*

Fairly well-known, but more around the centre of the island; occurrences near the shore-line are uncommon.

SMALL HEATH *Coenonympha pamphilus*

Only some half-dozen isolated records over the years.

Summary

All the records in the foregoing Systematic List are entirely personal, made, as already indicated, more or less incidentally during my work on the seabirds, but more intensively recorded during the past fifteen years.

Far and away the commonest butterfly is the Small Tortoiseshell, but others regularly seen are the Small White, Grayling, Meadow Brown, and Green-veined White. All these butterflies can be seen quite easily by anyone visiting the island, but some of the other species have only been seen very occasionally.

My records, therefore, do not reveal anything out of the ordinary, but are probably still worth putting on record in case anyone else can add to the list. Needless to say, I shall be very glad to hear of any additional records.

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CONTENTS

1998 - Part 1

Vertebrate Zoology in the Scottish Naturalist

Part 1: Introduction

By Dr. J.A. Gibson

3-11

The Roman Fort on Whitemoss Farm, Bishopton, Renfrewshire

2: Whitemoss and the Antonine Wall:

The Place of Whitemoss in Roman Scotland

By Mr. Frank Newall

13-43

Notes on the Butterflies of Lady Isle, Ayrshire

By Dr. J.A. Gibson

45-48