Non-ferrous metalworking in Iron Age Scotland c.700BC to AD 800

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Certification of originality:

This is to certify that this thesis has been composed by the author and that the work is the authors own, except for collaborative research indicated in the text. Also, the work has not been submitted for any other degree or professional qualification, except as specified.

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Abstract

This thesis discusses the evidence for non-ferrous metalworking, particularly casting, during the Scottish Iron Age (*circa* 700BC to AD 800). The wider goal is to offer a fuller understanding of the role that the production of bronze, silver and gold objects played in Iron Age society. Following an outline of the theoretical and methodological framework adopted throughout the study the evidence for the different stages involved in non-ferrous metalworking is discussed. Detailed catalogues, descriptions and scientific analysis of the material and its context are given, together with discussion of typology, technology, provenance and chronology. The corpus is then reviewed within three case studies, chronologically divided into the Early, Middle, and Late Iron Age. The aim of each study is to analyse the role and meaning of non-ferrous working, the smiths and the objects in specific regions at different periods. In the process, metalworking is contextualised within wider themes and frameworks for Iron Age society. This study suggests that non-ferrous metalworking was a fundamental concern to important individuals, a prized asset not open to all. The practice played a crucial role in the creation and maintenance of different social and political trajectories at various times and places throughout Iron Age Scotland.

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Foreword

This study aims to offer a fuller understanding of non-ferrous metalworking from *circa* 700BC to AD 800 in Scotland. Using the material evidence as the foundation Chapters 5 to 7 offer interpretations of the role the producers and consumers of bronze, gold and silver objects played in society. The three chapters cover a chronological tripartite division: an earlier Iron Age (*circa* the 8th century to 2nd century BC); the middle Iron Age (*circa* the 2nd century BC to 4th century AD) and a later Iron Age (*circa* 5th century AD to 8th century AD). These chronological divisions are related to major changes in the structural and artefactual record which are, arguably, linked to important socio-political developments.

However, within this thousand-year span there is one notable gap, between *circa* AD300 and AD500. This situation has arisen for two associated reasons:

Firstly, the period between AD300 and AD500 is recurrently avoided by Scottish Iron Age archaeologists. Many scholars studying the Middle Iron Age end their analyses around the end of the 3rd century AD, the time of perceived cessations or changes in social, cultural or political trajectories - for example the Roman departure from Scotland or the fading out of building traditions, for example brochs. Further, many scholars of the later period begin their analyses around the end of the 6th century, the time when historical records begin.

Secondly, few objects can confidently be assigned to the 4th and 5th centuries AD. Although radiocarbon dating is beginning to place some objects within this epoch (see chapter 6), the majority of native finds have been conventionally dated to before or after this period. As much of the native

Iron Age material culture is chronologically undiagnostic dating has relied on associations with exotic material, usually Roman or Mediterranean objects, or art historical narratives. As Roman objects or Mediterranean imports are scarce in the 4th and 5th centuries, dating native objects to this period has been difficult.

The result is that attempting to build a meaningful narrative of society around AD300 and AD500 is difficult (see also Heald 2001). Although the two centuries are alluded to at the end of Chapter 6 the paucity of evidence means that there is a significant gap in the overall narrative presented here.

There are also geographical imbalances within this study. Chapters 5 and 7 deal with the whole of Scotland, whereas Chapter 6 deals only with the Atlantic façade. This is quite deliberate.

As the first case study Chapter 5 attempts to illustrate the issues that were raised in the preceding chapters concerning the social, economic and political relationships of the smith in a broad, yet meaningful, fashion.

Chapter 6 is different, concentrating largely on the Atlantic façade. This is presented as a virtue. Closer analysis of one area allows issues concerning the role of the smith to be scrutinised more fully. Chapter 6, therefore, emphasises the importance of regional trajectories, and how this would have influenced many aspects of life and, in turn, analysis of non-ferrous metalworking. By Chapter 7 the study has come full circle with emphasis on the whole of Scotland, although time is devoted to regional differences.

As outlined in the Introduction the aim of each Chapter is not to give an all-embracing historical narrative for every region and period. Instead, the aim is to stress variability and, more particularly, to study the role of non-ferrous working in the creation and maintenance of social identity, structures and politics in specific regions and periods. Whilst some aspects of the arguments may apply to other regions at various times, it is not the intention to provide one set of global generalisations. The studies are not, therefore, presented as a totalising account for the whole of Scotland.

Introduction

Discussions of non-ferrous metalworking during the Scottish Iron Age (*circa* 700BC to AD 800) are rare. In the recent discussion of the transition from the European Bronze to Iron Ages (Sørensen & Thomas 1989) Scottish material does not feature and in the recent review of British Iron Age production and exchange (Haselgrove 1999, 125-8) discussion of non-ferrous working was restricted to three paragraphs. Archaeologists, then, have little comprehension of the production and consumption of non-ferrous objects. This study aims to address this imbalance by presenting the evidence for Iron Age non-ferrous metalworking within the political boundaries of modern day Scotland. What follows, however, is not a typical study of technology. The approach taken is not entirely about how objects were made or the evidence we have. The wider goal is to study the scale and organisation of non-ferrous metal production during the first millennia BC/AD and its place and meaning within society. Key issues investigated are the people-manufacture relationships embedded within the practice; the social contexts and organisational dynamics structuring and giving meaning to the practice; and the wider social trajectories and transformations emanating from the practice. The aim is to offer a fuller understanding of the role the producers and consumers of bronze, gold and silver objects played in Iron Age society.

The structure of the study is as follows. Chapters 1 and 2 outline the main theoretical and interpretative approaches considered and adopted throughout the thesis. Other methodological, interpretative and practical issues that affect the recovery, reconstruction and interpretation of non-ferrous metalworking evidence are also considered. Chapters 3 and 4 present the surviving evidence for the different stages involved in the non-ferrous metalworking cycle from Iron Age Scotland. Together with Appendices A to D chapters 3 and 4 provide a description of the material and an extensive gazetteer and discussion of all the sites. By way of contextualisation, there is discussion of typology, provenance and chronology of each artefactual group. Aspects of technology are also considered, supported by a programme of scientific analysis on relevant pieces, particularly crucibles.

Chapters 5 to 7 offer interpretations of this varied evidence and take the form of three case studies, chronologically divided into *Early*, *Middle*, and *Late* Iron Ages. The aim of each study is not to give an all-embracing historical narrative for every region and period. Instead, the aim is to stress variability and, more particularly, study the role of non-ferrous working, including the finished objects, in the creation and maintenance of social identity, structures and politics in Iron Age Scotland in specific regions at specific periods. This requires contextualising the production and consumption of non-ferrous objects within wider themes and discussions of Iron Age society. This approach is crucial, as we will never understand the role of the practice if we ignore wider contemporary trajectories. Whilst full reference will be made to all the evidence, and some aspects of the arguments may apply to other regions at various times, it is not the intention to provide one set of global generalisations. Although it is the writer's opinion that the different fragments of evidence converge, they could be open to alternative readings. The studies are not, therefore, presented as a totalising account, but are intended as a contribution to continuing debate. Each of the three studies inevitably includes a degree of historiography; attempting to explain the emergence of current ideas. Yet this historical dimension serves as the basis for critique and a fresh look at the evidence. Although time is spent reviewing and deconstructing previous paradigms, the ultimate intention is to use old and new ideas to arrive at an appropriate interpretation of non-ferrous metalworking at various times during the Iron Age.

The study has two ultimate conclusions: that non-ferrous metalworking was a fundamental concern to important individuals, a prized asset, not open to all and that it played a crucial role in the creation and maintenance of social and political trajectories at different times throughout the Iron Age. This opens the door for future research into Iron Age material culture: if it can be demonstrated that non-ferrous metalworking was integral to wider social trajectories, what of other understudied practices such as bone-, stone- and iron-working? Over the last three decades structures have continued to dominate the Iron Age literature. This study is offered as an attempt to break away from the perception that settlements are the principal forum for social interaction detectable by archaeological means (Armit & Ralston 1997, 170).

Defining the parameters: themes for an insightful approach

Chapter One

Introduction

In one of the most recent discussions of the Scottish Iron Age Richard Hingley (1992, 41) concluded that, '... there is at present very little comprehension of the function of the household and the community in the context of...industrial [iron and bronze] production'. This position is not exclusive to Scotland and can be extended to other parts of Britain and Ireland. Archaeologists, then, are faced with a confusing irony: we have very little understanding of the production and consumption of the very materials that define the periods we endeavour to study. This lack of understanding can be attributed to three related factors. First, there has been no systematic analysis of the present dataset; narratives are usually founded on evidence from one site, resulting in narrow and often contradictory perspectives. Second, many interpretations have been presented as blanket explanations for the whole of Iron Age Britain with little room for geographical, temporal or chronological difference (e.g. Cunliffe 1974, 295-7; Morris 1996, 53-4).

Finally, and perhaps more importantly, many discussions have been written in what Paul Ricoeur (1984) calls 'History-as-Same' where archaeologists employ various forms of universalism, usually analogy or middle range theory, in order to make sense of the evidence. Common in the 1960s and 1970s, palaoeconomists explained subsistence by recourse to presumed laws of behaviour based upon animal ecology (Higgs & Jarman 1975) and others searched for 'chiefdoms' in European prehistory (e.g. Renfrew 1973). Although these approaches had many benefits (see Thomas 1999, 2-6 for wider discussion) one of the major drawbacks was the forcing, intentionally or otherwise, of past activities into modernist categories and classifications. The use of what Thomas (ibid., 5) calls 'ethnocentric and presentist deformations' influenced many interpretations, including non-ferrous metalworking. In particular, discussions were structured within industrialist doctrines often leading to the perception that smiths were engaged mainly in processes of rational and scientific discovery, their products integral only to functional and economic aspects of society. Many early writings concerned with non-ferrous metalworking were dominated by 'industries', 'markets', 'demand' and 'economics' (e.g. Childe 1935a, 226-8; 1940, 163, 215; 1944, 17; 1951, 35). This industrialist doctrine continued apace throughout the processual era with many continuing to view non-ferrous metalworking, and indeed other technologies, as symptomatic of progress; usually of the economic kind (Wertime 1964; 1973; Wheeler & Maddin 1980). Even Howard's (1983) study of bronze casting in southern Britain, while highlighting wider social issues, was still littered with references to 'industry', 'demand' and 'function'. The instrumentality, practicality, rationality and economic worth of object making and use were privileged over the wider social, political and symbolic nature of material endeavours (see Pfaffenberger 1992; Budd & Taylor 1995; Dobres 2000).

These modernist explanations affected wider narratives. Many scholars had particular attitudes about where smiths worked and who controlled them. Childe's (1935a, 4-5) argument that metalworkers were the first full-time specialists, controlled by hillfort elites and supported by social surplus is a pertinent example. Excavation of southern English hillforts in the 1960s and 70s did little to dampen these views and nucleated sites largely continued to be upheld as centres of production, patronage and control (e.g. Cunliffe 1974, 306). Interpretations of non-ferrous metalworking evidence from non-hillfort sites were also couched within industrialist doctrines. For example, itinerant smiths travelled across communities '... seeking markets for their skills' (Childe

1940, 163) and debris from, for example, Gussage All Saints was interpreted as smith's workshop, working close to, but not within, the domicile of some unseen patron (e.g. Howard 1983, 541-3). Production location, then, was perceived to be closely linked to control, economics and demand. This triangle of economics, patronage and high status is echoed in the later Early Historic period with metalworking upheld as a high status activity largely controlled by kings living in nuclear forts (e.g. Nieke & Duncan 1988, 13-4; Foster 1998, 16). Whilst not necessarily disputing or negating these links - as we will see it is now archaeologically and anthropologically commonplace to associate royal rulers with coteries of skilled artisans - this study argues that viewing the practice solely within a paradigm embracing just technology, science, demand and economics provides only a small, albeit useful, window into the role specific metal objects and their creators played in Iron Age society.

In one of the most influential texts of our era, *The Structure of Scientific Revolutions*, Thomas Kuhn (1970) argued that, in seeking to understand and interpret the world that lies before us, we have created habits of thought and practice, or paradigms. Paradigms are essentially ways of looking at a subject that are '... sufficiently unprecedented to attract an enduring group of adherents away from competing modes of scientific activity' and must be '... sufficiently open-ended to leave all sorts of problems for the redefined group of practitioners to resolve'. Paradigms, then, are not permanent and unalterable descriptions of reality; they are working systems of interpretation that endure until they are succeeded by systems that do the job better (ibid., 10). This leads disciplines, or rather their practitioners, to be fertile in their conceptions. There is unlikely to be a final, settled endgame that absolutely establishes everything in some totalistic theory because of our nature to go on in our quest for understanding through time and space. By accepting the Kuhnian approach to meaning, we find ourselves in a state of permanent, but relaxed and expectant uncertainty. Individuals do not make absolute claims for their present position, but allow a basis for discussion until the next set of insights builds on or replaces it. It is crucial to consider a wide range of interpretations and possibilities when building these discussions. It is argued that this is the best approach to the study of Iron Age non-ferrous metalworking.

I would argue, therefore, that while an instrumentalist view of technology is endemic to capitalist modes of production, it is not necessarily appropriate for adequately grasping the technology-society relationship for pre-industrial times, places and productive modes (Ingold 1988; 1993; 1995; Dobres 2000, 10-1). As we will see, using the apparatus of past scholars only allows partial insight into what was undoubtedly a complex relationship. This position is caused by a number of related interpretative issues, issues that will be clarified throughout this study. However, it is pertinent to consider some aspects now as they affect much of what follows.

Meaning in the objects

No matter if the object is a scabbard, a massive armlet, a brooch or a simple pin, it can be argued that non-ferrous Iron Age metalwork was largely non-functional, in the sense of the objects not being essential to everyday subsistence. For example, the large, robust, cumbersome massive and snake armlets found in north-east Scotland (MacGregor 1968; 1976, 106-10) appear to have 'value' well beyond function or economics (Plate 1). Some are so big that they would fall off the average adult's arm; some so small they could not fit the average adult's wrist. Their ornamentation, which includes enamelling, and evidence of repairs, suggests that these were items valued well beyond function or economics. Whilst personal adornment is an obvious possibility, they may have been created more as symbols of regional identity perhaps local manifestations of a reaction to the Romans invasions of the 1st- and 2nd-centuries, where emphasising regional identities was crucial (Hunter *forthcoming b*). In other words, the creation of massive armlets may have as much to do with individual and group identity, reactions, ritual and symbolism as economics and function.

The same is true of other artefacts. Although bronze pins are functional in the sense that they were used for fastening clothes bone pins could have done the job as well (e.g. MacGregor 1985, 113-21; Smith 1998, 171). Bronze pins may have had no added functionality, and we may ask why they were created in different forms, some decorated, others not. Compared against the icons of Celtic Art a ring-headed pin can hardly be argued to be 'worth' (economically) a great deal. Again, function and economics seem only part of the equation and reference to wider social issues seems more appropriate. Numerous studies demonstrate that the manufacture and circulation of objects is essential in, for example, creating alliances, and identities and for maintaining traditions and practices (see Miller 1985, 11; Llamazares 1989, 242; Battaglia 1990; see Chapter 7). Like pins, brooches may have been clothes fasteners, but they may have been made more as insignias for important individuals and groups, a medium through which wider affiliations were constructed and maintained (Nieke 1993; see Chapter 7). Being embedded in social relationships objects may come to have social identities connected with the identities of persons and human groups (Strathern 1988, 176; Munn 1986, 15; Mark 1994; Thomas 1999, 93). Objects can embody and trigger social memory, and their involvement in everyday activities through to ceremonial events can actively and repeatedly remind people of important ideals and accepted modes of conduct. Artefacts can at once be instrumental tools which facilitate the operation of mundane practices, symbols which render these practices meaningful, and mnemonic devices which remind people of how to proceed and act. As Thomas (1999, 93-4) reminds us, '... material culture is part of an apparatus which people use to construct meaningful worlds, rather than simply a jumble of things to be classified'. It is these meanings that we must endeavour to study, using the objects as metaphors, as texts to be read (see Patrik 1985; Hodder 1986; 1988; Buchli 1995; Tilley 1993).

Meaning in creation: smiths, places of production and wider relationships

If it can be suggested that finished objects had more than functional or economic roles to play in Iron Age society it is reasonable to suggest that the actual people who created them were equally important. The smith, therefore, may not have been just another group member. This is a far cry from common depictions of craftspeople in prehistory. Since the 1960s, when the empirical study and replication of ancient manufacturing technologies became a major field of investigation, discussions have focussed more on what was created than on the creators. This is exemplified in reconstructions which have narrowed in on disembodied hands, '... hand severed from social constituted bodies' (Dobres 2000, 21). This is closely linked to the perception that study of ancient technologies should be concerned more with questions of material processing and the delineation of the sequential stages by which different artefact classes were fabricated through time and across space. In other words, what is created is divorced from the creators, where they worked and the wider social milieu.

Yet various studies show that in order to tease out the true meaning of crafts it is necessary to look beyond the product. Numerous ethnographic and anthropological studies of metalworkers in pre-literate societies stress that the smith's work was rooted in trajectories far beyond the economic or what they made (e.g. Wertime 1973; Brown 1980; Howard 1983; Helms 1993). Often immaterial aspects were more important, such as the visible act of creation and ideas of transformation. Transformation is most forcefully expressed in the changes in physical state readily observable in the production cycle. This, Helms (1993) argues, would have set the practice apart from other activities. As their work requires esoteric knowledge to enable them to manipulate the dangerous forces unleashed in the process of transforming shapeless metal into a finished product smiths would have been viewed as powerful figures (see also Hedeager 2001, 486). This perception is linked to the position in non-literate societies where complex procedures often become ritualised; a sequence of procedures that cannot be written down in a scientific manual must be committed to memory as a formulaic 'spell' (Budd & Taylor 1995, 139). In pre-literate societies then smiths are often believed to be involved in communication outwith the confines of normative (traditional) society, and are considered to be acting as intermediaries between human society and a greater realm beyond. The smiths, via their various skills, managed to tap intangible energies and transform them into understood cultural formats (Helms 1993, 15). They were viewed as magical, liminal figures credited with supernatural powers, people who ordered nature for cultural purposes, people who were in some manner or to some degree inevitably associated with exceptional powers. Since such powers originate and exist in cosmological realms outside settled society, so artisans were believed to be associated with these unsettling domains (see Helms 1993, 19, 53). Smiths, therefore, may have been feared, despised, loathed, held in contempt or awe, admired, respected, and honoured. Smiths were judged to be 'different', distinct from ordinary people pursuing the mundane, pragmatic affairs associated with the immediate needs of daily life.

Against this backdrop it is hardly surprising that the ethnographic record illustrates many rituals associated with metalworking. For example, amongst the Nigeria Mbawara tribes, it is the sole responsibility of women to gather ore and it is taboo for a man to observe this activity. The Fauta tribe in Guinea sacrifice animals during mining for ore. Once smelting has been completed the Nigerian Marghi indulge in ritual beer drinking and chicken sacrifice. The night before smithing, the Gwembe Tonga smith in Zambia must refrain from sexual intercourse and the Bakitara smith in Uganda sacrifice a sheep and a fowl when a new anvil is installed (see Brown 1980; Howard 1983).

This relationship between magic, status and power of the smith is not a slight of hand, unrelated to archaeology. It is echoed in early historic Irish texts (MacNeill 1923, 273-81; 1935, 94-5; Williams &

Powell 1942, 26-7; Richards 1954, 41-2; Gillies 1981, 76; Kelly 1998, 9-10, 62-3). An example of this is illustrated in *Cath Maigh Tuired*, where a warrior wishing to enter Tara is asked by the doorkeeper to declare a craft not already possessed by one of the court. He is only allowed to enter when he claims to have skill in several crafts, including non-ferrous metalworking (Scott 1987, 153). Lest there be any doubt of the relationship between metalworking and scared or magico-religious status (ibid., 154) an 8th century hymn asks God for protection from the spells of women, druids and smiths (Kelly 1998, 60).

Archaeologically, we may be seeing the link between smiths, magic and power in the use of symbolic and ancestral places for production. Bradley (2000, 81-96) has highlighted the qualities attached to the use of specific ancestral landscapes for manufacture. Neolithic stone axes were made on remote and dangerous mountain peaks (Bradley 1990; 1999) and ironworking took place inside sacred monuments of earlier periods (Bradley 1999, 156; Hingley 1997). At Loanhead of Daviot, Aberdeenshire Late Bronze Age mould fragments were deposited beside earlier burials (Kilbride-Jones 1936b) and at Dainton, Devon, a Late Bronze Age smith made weaponry on the flanks of an older burial mound (Needham 1980). A similar process occurred at Sarn-y-bryn-Caled (Gibson 1994). These practices have resonance in the Iron Age with non-ferrous metalworking often taking place in liminal locations and ancestral landscapes, such as stone circles, caves and 'ritual' monuments. These examples suggests that places of production may have been as important as the things that were made there; deliberately chosen as places to convey the mystic of the smiths' work. Once we accept this it becomes easier to understand how that objects had no obvious 'practical' function took on significance. As Bradley (1999, 41) suggests, '... production sites may have been studied as evidence of technology and change, but these were probably places that possessed a special significance in their own right'.

This is an important point, and one worth pursuing further: it is essential to keep an open mind when interpreting *any* places where objects were created. Typically in the archaeological literature debris is interpreted in a very economic way, usually as evidence of a workshop, the smith hidden from view. Indeed craftspeople are often pictured slavishly toiling away on wind-swept bluffs or by lakeside shores without other members of the community anywhere in sight (see Dobres 2000, 21). But Iron Age non-ferrous metalworking evidence has been found in a variety of contexts, particularly at the heart of settlements. This suggests that the practice was not asocial: smiths and the places where they created objects were obvious physical presences, perhaps crucial to wider socio-economic and political trajectories. This is shown in the Later Iron Age. As outlined in Chapter 7 non-ferrous metalworking took place on a wider variety of sites than hitherto appreciated, including sites believed to be occupied by people at the lower end, if not the bottom, of the social ladder. The smiths who worked on these sites produced objects that were not mundane, everyday objects, but objects hitherto considered to be manufactured only on higher status sites. They also used precious metals. These findings do not fit within our normative views of non-ferrous metalworking and control during this period where smiths are portrayed as working on enclosed, nucleated, high status sites under the watchful gaze of royal patrons. In contrast, the evidence suggests that smiths were deliberately sent out into society to tie individuals to wider social ideals. Crucially, within this scheme, the physical presence of the smith and the place where they worked were of fundamental importance.

Wider meanings in the practice

Sending out smiths into Iron Age landscapes suggests that in discussions consideration should be given to the qualitative significance attached to the distances smiths often travelled to practise their craft (Helms 1988; 1993; Hedeager 2001, 487). Although the reasons for the smith to travel distances may be varied, ranging to seek patronage or raw materials (Eliade 1962, 5), and the action may be temporary or permanent, voluntary or involuntary, two important points emerge.

Firstly, as the smith may have travelled outwith the confines of most people's everyday landscapes this may have led to the perception that smiths had links to, or even embodied, the qualities of a different, perhaps dangerous world beyond the immediate settlement. As Helms (1988) has shown, in traditional non-western societies this geographical distance can have a significant symbolic component with people from outside realms being respected or feared. In traditional societies geographical distance is often accorded political and ideological qualities virtually identical to those associated with vertical (heaven/underworld) distance and space time. As Helms (1993, 44-9) highlights, although the cosmographies of traditional societies accord diverse interpretations to geographical distance, all basically contrast such realms with whatever qualities are associated with their own heartland. In other words, there is a contrast between the cultural and the natural, the local (well-known, safe) and the distant (unknown, chaotic). For this reason, artisans may be allowed safe passage through areas dangerous to others. In prehistory itinerant workers, including those of metal, would have been one of the most travelled groups and those most personally associated with the qualities of the spatial world. Indeed, these groups are often perceived to be '... between units of settled life' (Helms 1993, 34; Court 1985). Again, this idea is supported in the Irish texts where we are told that early Irish skilled crafters were one of the few groups who could pass freely and safely between groups (Mytum 1992, 212).

Secondly, this travelling component has additional importance: artisans can significantly contribute to recognition and acceptance of political leaders and may, therefore, have been integral to the formulation and maintenance of social ties. As will be argued in Chapter 7 skilled artisans under chiefly or royal patronage were sent outwith power centres into the landscape, into the courts of other peoples and groups. This would have enhanced the spatial range of both their own and their patrons' reputations (see Helms 1993, 34).

The associations of non-ferrous metalworking with non-functionality, transformation, magic and wider politics suggest that if analysis of the Scottish Iron Age data set is to be fruitful then we need to utilise a broad apparatus. It is necessary to move beyond the confines of objects, economies and technologies and into the 'messy social side' (Dobres 2000, 37) with the smith here a central actor. Interpretations will be limited if the association of metalworking and individuals is understood solely as a materialistic phenomenon. The production and consumption of objects always took place within the context of a set of social relationships and to attempt to understand them in abstraction from the particular social rationale that defined the objectives of use is a fruitless task. As Ingold (1981, 120) reminds us, what is consumed by whom is socially defined, and cannot be measured purely in terms of matter and energy. It is crucial then to view the relationship in terms of qualities and values prevailing within a wider social, political and ideological scheme (Giddens 1984, 258-62; Helms 1993, 4; Hedeager 2001, 482). The significance and 'worth' of non-ferrous metalwork may have been grounded in more abstract ideals. This is not to deny that at some points during the Iron Age the production and consumption of non-ferrous objects had economic or functional properties, but they may have been only a part. As Dobres (2000, 165) states:

> Just because most of us necessarily start with the static vagaries of the archaeological record does not mean that their empirical measurable and variant physical properties were more determinant of ancient technological practice than non-preservable social and symbolic factors... To slip conceptually from the factual necessity of working with tangible artefacts to the materialist claim that objective conditions such as resource availability or artefacts physics were the (likely) primary determinants of technological practice... is to succumb to the fallacy of misplaced concreteness. Indeed, to believe that technology preserves better than beliefs or social practices because stone tools and ceramic cooking pots constitute so much of the archaeological record is to accept as unproblematic the view that technology is the hard, utilitarian and 'functional' side of social life.

However, by embracing a wider interpretative framework we should not move too far the other way, where we see ritual and symbolism in every archaeological trace. Explanations suggesting that activities and tools associated with metalworking, '... almost everywhere seem to be symbolically loaded' (Haaland, Haaland & Rijal 2002, 35; see also Prescott 2000) are as difficult to accept as those that give precedence to economics and function. In order to strike a balance and attempt to unravel the complexities of the practice there is a need to contextualise the activity within the dynamics of the society in which the practice took place, in other words, the set of social relations embedded in the practice (Ingold 1980).

Adopting this fluid position allows us to move forward in our understandings of non-ferrous metalworking in Iron Age Scotland. Although different trajectories will be invoked the study has two ultimate conclusions: that non-ferrous metalworking was a fundamental concern to important individuals, a prized asset, not open to all and that it played a crucial role in the creation and maintenance of social and political trajectories at different times throughout the Iron Age. This equation of crafts with influential people is not new (Brumfiel & Earle 1987, 3-4) but it is argued here that often it was not necessarily what the smith made, nor even the control and distribution of the objects that was important but other factors. Often it was the symbolism behind the act of creation. At other times patrons sought contacts with smiths to obtain ritual and political symbols of legitimisation and authority. As Helms (1993, 49-50) states:

> One of the most essential rationales underlying all outside associations, acquisitions and transformations involves questions of political-ideological legitimisation, verification and authenticity. Those who create and/or acquire goods...are not only providing goods and benefits *per se* but also are presenting tangible evidence that they themselves possess or command the unique qualities and ideals generally expected of persons who have ties with distant places of supernatural origins and, therefore, are themselves 'second creators'. Evidence of inalienable connections with places of cosmological origins thus conveys a certain sacrality which readily translates into political-ideological legitimacy and facilitates successful exercise of power. This, in a nutshell, is why in traditional societies seekers or holders of influential political positions must give evidence of distant outside contacts, be they via the vertical realm, the geographical realm, or both.

At times the smith may have been an important factor. By accepting this position it is possible to move forward in our understandings of other aspects. For example, it will be suggested that nucleated roundhouses and hillforts were not just central places or the homes of high status individuals but multifunctional units concerned with economic, social, political, religious, ritual and cosmological practices. They were places with sacred connotations, places where master artisans transformed bars and ingots into symbolic and powerful objects. The patrons called on smiths to transform resources from 'outside', both materially and symbolically, to meet local ideological and political needs (see Chapter 6; Hedeager 2001, 483-5).

The wider theoretical and methodological issues that need to be considered when interpreting the production and consumption of non-ferrous metalworking in Iron Age Scotland have been rehearsed. In the final part of this chapter it is necessary to consider other issues that affect interpretations. In order to understand past societies archaeologists must, of course, begin with the material remnants of that society. Rowlands (1976, 116) defined five categories of evidence which, in an ideal world, should be available for the study of non-ferrous metalworking: the sources of raw material, the production areas, the objects used during the process, the manufacturing tools and the actual finished objects. Needless to say, most of these categories never survive. Even if they did we would still need a sound understanding of other integral components: for example, the date of activity, the context of discovery, how was the material deposited and what effect has time had on the archaeological record. The final part of this chapter explores some of these themes and raises important issues that must be, and have been, considered during this study. Further, relevant parameters within which we can tease out information, particularly concerning context of discovery and chronology, are suggested.

Chronology and definition

The area of study is modern day Scotland. The period of study is the 'Iron Age' but this term has different meanings in different areas. In England it refers to the period between the 8th century BC and Roman conquest. In Scotland it is longer and covers over a millennium. This wide time span has led different scholars to construct different Scottish chronologies. For example, scholars at the Royal Commission of Ancient and Historical Monuments date the Iron Age to between 600BC and AD 400 (RCAHMS 1988); others prefer a date into the 11th century AD (e.g. Clarke 1978, 76). Knowing what to call particular periods within the millennia is also problematic. Some areas of Scotland were more affected by the Roman invasions leading scholars to define 'the Roman Iron Age' in Lowland Scotland (MacInnes 1984). However, in areas where Roman influence was negligible, for example the Outer Hebrides and Shetland, to define the area of study within this framework would be misleading. Confusion is exemplified in the period between AD 400 and AD 800 which has been referred to as the Dark Age, Pictish, sub-Roman, Early Christian, early medieval, post-Roman, and early Historic with different meanings attached to different regions on the whim of individual archaeologists. But, again, such terminology has little meaning in disparate areas of Scotland. That the area of study covers a range of cultural, political and social groups, which do not have a common history, only compounds the problem.

This study follows the terminology outlined by Barrett & Foster (1981, 49-50; fig. 3.1) who define the Iron Age as between *circa* 700BC and a date prior to the Viking incursions, around AD 800. They avoid cultural ascriptions such as 'Pictish' or 'Dalriadic' or meaningless terms such as 'Dark Age' and use terms such as Early, Middle and Late Iron Age. The only difference is that here their Late Iron Age I and II (based on Orkney and Caithness) are amalgamated as their scheme does not have as much validity for the whole of Scotland. This results in the Iron Age here being divided into a tripartite division: an earlier Iron Age (*circa* the 8th century to 2nd century BC); the middle Iron Age (*circa* the 2nd century BC to 4th century AD) and a later Iron Age (*circa* 5th century AD to 8th century AD). Like, Barrett and Foster I believe these chronological divisions to be related to major changes in the structural and artefactual record which are, arguably, linked to important socio-political developments. This will be demonstrated throughout the study.

The context of discovery and recovery

The surviving material for non-ferrous metalworking derives from a diverse range of archaeological contexts, excavated and published with varying degrees of competency. Material ranges from a few pieces to a corpus of hundreds, from secondary dumps to stray finds. Thus, the erratic quantities and qualities of the Scottish archaeological record and attitudes of past excavators to recording and publishing heavily influence any attempts to reconstruct Iron Age non-ferrous metalworking practises.

Preservation plays an important part. Broadly, Scotland can be divided into zones of destruction and zones of survival. These zones often correspond to regions of lowland and upland. The former has endured centuries of agricultural and industrial improvement removing vast quantities of archaeological information, usually leaving only the remnants of cropmarks to be excavated. Highland regions have fared better with many sites still lying relatively undisturbed until excavation. This dichotomy seriously biases the picture in favour of sites in the Atlantic zone. Iron Age building traditions also bias the picture. Buildings of stone could, theoretically, have survived almost unscathed whilst timber constructions rotted away. Re-use is another major problem. While some, mainly Early Historic or Late Iron Age sites, had specific areas set aside for metalworking, such as Mote of Mark, Kirkcudbrightshire and Dunadd, Argyll, much activity appears to have been confined to convenient areas within pre-existing settlements or buildings which were later obliterated during subsequent re-use. Alternatively, metalworking may have been carried out outwith the domestic domain and, therefore, largely outwith the areas where people have excavated. Other issues, such as variability in soil conditions, also play an important part in survival and recovery. For example, bone tools that may have been part of the metalworker's toolkit, will largely not survive in certain areas and soil conditions, particularly eastern or southern Scotland.

Even when metalworking evidence is encountered, understanding the varied contexts from which the material has been found is not straightforward; the large majority being recovered from secondary contexts such as dumps and pits. Until recently interpretation of these contexts was unproblematic. Within the processual doctrine pottery, animal bones and broken tools were taken as indicators of domestic and industrial activities seen as '... directly reflecting the nature, scale, and location of Iron Age domestic organisation, subsistence, exchange and society' (Hill 1994, 4; see also 1995). The analysis of house floor assemblages, for example Clarke's (1972) Glastonbury model, was fuelled by the assumption that the object's context of discovery reflected the location of past activity. There was also a strong belief that variability in floor assemblages, for example similarities or differences in the quality or quantity of pottery sherds, reflected differences in the activities carried out within structures. Such views have been challenged by a number of pioneering studies demonstrating that such correlations are overly simplistic and that numerous social, functional, taphonomic, and recovery processes act to '... obfuscate, blur and bias all archaeological interpretations' of settlement sites and the artefacts recovered, confusing distributions and interpretations (Nash & Petralia 1987, 187).

Allied to this is the appreciation that all sites suffer disturbance in antiquity through various natural and cultural formation processes (Schiffer 1972, 1976, 1987). These problems are particularly prevalent when considering artefacts found in dumps. Often contexts of secondary deposition include artefacts that have become disconnected from the living context of use being subject to re-use, interference, and re-cutting (Schiffer 1987, 281). Similarly, the dichotomy that is often drawn between floor and fill contexts is problematic. Under certain circumstances floors and fills may be created by the same, or related, depositional processes and are often stratigraphically indistinguishable; it is questionable whether analytical privilege should be given to floor assemblages (LaMotta & Schiffer 1999, 24). Recent studies have indicated that primary deposition of objects at their location of use is a rare phenomenon particularly in heavily maintained activity areas, such as house floors. Furthermore, ethnographical and experimental studies have suggested how tiny a proportion of rubbish can be expected to enter the archaeological record, and how scattered and poorly preserved it normally is (Hayden & Cannon 1983). Objects left on house floors are therefore more likely to be the product of abandonment processes or of post-abandonment deposition (LaMotta & Schiffer 1999, 24), perhaps linked to ritual deposition (see Hingley 1990).

A number of studies of southern British evidence have indicated how these factors affect reconstructions of activities and lifestyles. Maltby studied the different factors that contributed to the retrieval and understanding of bone assemblages and concluded that they '... are never a direct reflection of the original composition of the livestock kept in the Iron Age' (Maltby 1985, 4). Studies of the deposition of coins (Haselgrove 1987) and pottery (Lambrick 1984) produced similar findings stressing the importance of understanding how material entered archaeologically recoverable contexts and what may have happened to the material before and after its incorporation. The result, as Hill (1994, 6) states is that:

> We cannot simply assume that the finds we recover are a direct record of the past. As such every use of material recovered from settlements, from simply phasing through the reconstruction of ceramic exchange and animal husbandry regimes to the nature of social organisation, requires a far more critical understanding of how the evidence we are using actually entered the archaeological record. It should demand that we do not take the data from any Iron Age settlement excavation across northern Europe for granted.

These recent works on taphonomy are particularly relevant for our interpretations of material recovered from the many multi-period sites within Iron Age Scotland, where midden dumps are mixed with the structural remains to form mounds of settlement debris, sometimes growing over centuries to many metres in depth. While scientific dating techniques and computerised three-dimensional plotting may allow the complexity of multi-period settlements and their associated material culture to be better untangled (Bond & MacSween 1998, 93) excavated contexts of discovery do not always reflect past activity. This is particularly acute on the myriad of Iron Age structures where many are multi-phased with complex sequences of habitation, abandonment and re-use. Coupled with the recognition that ritual deposition and cleaning was common (Tams 2001; Armit *forthcoming b*) we must critically assess whether non-ferrous metalworking debris is indicative of, for example, working areas, secondary dumping and /or ritual deposition.

Dating: the ladder of inference

Non-ferrous metalworking evidence can only be interpreted if it can be broadly dated. This is far from straightforward for Iron Age Scotland. It is, therefore, essential that a framework, or rather ladder of inference, is constructed. The framework nonetheless must be flexible: in studying Scottish Iron Age material culture it is impossible to avoid the issue that many of the objects were collected prior to scientific dating. We cannot, therefore, rely solely on radiocarbon dating. This requires abandoning the view that material obtained prior to the 1960s should be ignored or that we must wait until more modern excavations take place (e.g. Martlew 1982, 255). In studies of material culture in Iron Age Scotland there are broadly five avenues available: dating the archaeological context from which the object derives using scientific, absolute means; dating the object or the archaeological context from which the object derives by non-scientific, relative means, usually artefactual association; postulating the date (or life span) of the structure from which the artefact derives; carrying out analysis of the object to obtain a *terminus ante quem* - for example the presence of zinc is indicative of a Roman or post-Roman date, at least in Scotland (see below); and finally, 'best fit' analogy.

Dating the object's context by scientific means

The advent of scientific dating (radiocarbon, archaeomagnetic and dendrochronological), and sampling techniques to recover material that can be dated, allows the possibility that the contexts from which material culture derive can be broadly dated. However, whilst the number of excavated sites using such modern techniques has increased markedly over the last three decades there remain numerous difficulties for interpretations of non-ferrous metalworking (see Ashmore 2002 for overview).

The difficulties associated with radiocarbon dating are well known, ranging from problems in the calibration curve; use of low precision counts; laboratory errors etc (Ashmore 1999; 2002). Radiocarbon calibration masks important periods of the Iron Age; apparent gaps may be more a reflection of the rapid fluctuations in the level of C-14 in the atmosphere rather than specific archaeological 'events'. Further, although single entity dating (Ashmore 1999) and other more high precision dating techniques may help in the future this does not help the present study. As noted, the significant proportion of Scottish Iron Age non-ferrous metalworking evidence was excavated prior to the advent of radiocarbon dating. Even when material has been recovered from sites where a scientific programme has been in place the excavators may have been more concerned with dating structural than artefactual sequences. Specific context sampling to collect material that dates the deposition of artefacts or to retrieve a large enough sample to construct a reliable sequence is extremely rare. Thus, often we only know that objects were found in contexts after the building of, for example, a complex Atlantic roundhouse and before the construction of a mid-first millennium AD cellular structure. In addition, many published dates do not have details of the sample and its context, making it difficult to be sure if old or young timber was present in the charcoal sample, or whether charcoal was residual. As will become apparent, most radiocarbon dating gives only broad patterns, often allowing precision no closer than a few centuries. Other dating methods are also problematic. For example, archaeomagnetic dates suffer from a lack of calibrated curve in some periods and are therefore seldom used. Dendrochronological dates obviously require the preservation of timbers (Crone & Mills 2002). There is now fairly abundant evidence that dates from poorly preserved bone can be centuries out and the marine effect, which has been assumed to make all Scottish shell dates 405 years old, may fluctuate (Harkness 1983; Ashmore 2002, 784).

Dating the object's context through artefactual association

As many non-ferrous metalworking finds cannot be independently dated by scientific means discussion often relies on material supposedly associated with the finds (e.g. the crucible beside the E-Ware fragment). However, this approach is also plagued by problems. Prior to absolute dating techniques the construction of Scottish Iron Age chronology was dependent on material culture particularly the more 'datable' objects (e.g. Childe 1935a; MacKie 1965a & b). Yet much of the native material culture, particularly bone and stone is chronologically undiagnostic. Furthermore, significant periods of the Iron Age record, as it occurs on settlement sites, appear artefactually undiagnostic (see Chapter 6).

Although the need for a major re-evaluation of chronological patterns in native material culture has long been recognised (e.g. Lane 1987; Harding 1990; Armit 1991, 198) little has been done to tackle the problem. Pottery in some areas, particularly Atlantic Scotland, is still upheld as a precise chronological indicator but whilst patterns have undoubtedly emerged (Topping 1987; Lane 1990) the reliance on regional cross-dating of object groups through typological comparisons is still inherently dubious. For example, while a general sequence for the Iron Age pottery of the west-coast has been proposed (MacSween 2002; Campbell 2002) assigning dates to the points of change in the sequence is more difficult. Furthermore, the traditional approach of replicating chronological site sequences over wide geographical regions is problematic. Comparison of Western Isle assemblages from sites illustrates that although sites do exhibit overall similarities there are important differences between sites. For example, although the assemblages from Sollas, North Uist (Campbell 1991b), Dun Vulan, South Uist (Parker Pearson & Sharples 1999) and Cnip, Lewis (Armit *forthcoming b*) are similar the sequences cannot be replicated from site to site (A. MacSween pers. comm.). The problems are compounded when dealing with data from multi-period sites. Often pottery sequences are blurred, blended or even inverted. At Cnip, Lewis it was only possible to identify a sequence when 'key' contexts were filtered out and analysed (A. MacSween pers. comm.). The problems of circularity here are self-evident. We cannot, therefore, uncritically, assume that objects from the 'same phase' are reliable indices of chronology.

Against this depressing backdrop it is necessary to fall back on those artefacts perceived to be more chronologically 'diagnostic', or rather, those whose date is presumed to be known more accurately and, therefore, more suitable to sustain discussions. In the Iron Age there are two options: fine metalwork and Roman artefacts. Leaving aside the fact that few of these 'exotic' objects are ever stratigraphically associated with non-ferrous metalworking there are more fundamental problems. Let us consider fine metalwork.

Many such items are stray finds with no archaeological or independent means of dating. This has often led to general confusion in the literature. Although general sequences of brooches and pins have been proposed, based on theories of typological development, different people have different opinions (compare Fowler 1960; 1963; Kilbride-Jones 1937b; Stevenson 1955; 1987; Youngs 1989). Indeed, as Campbell (1991a, 5) illustrates, the same author can change opinion on the date of objects by up to six centuries (see Kilbride-Jones 1937b; 1980a). As will be shown in Chapter 4 recent excavations and re-analysis of assemblages demonstrate that many of our long-held views on the assumed date of metalwork need to be reviewed. A related problem is that of typological change through time. The problems inherent in art historical sequences are obvious. The assumption that objects can be relatively dated by analysis of physical characteristics - the closer the comparison, the closer the date of one object to another - is largely subjective, further compounded by the assumption that the least developed object is the earliest and the most the latest. While this may be true in some instances the emerging mould evidence shows that this is not always the case (see below). Further, this Procrustean method leaves little room for redevelopment, regression, differences in technological advancement, regional diversity, or even the element of choice. Reliance on one object group, without any other form of independent comparison must always remain highly dubious.

There is an added problem. In past studies priority has been given to the more ornate objects. The date of the more prosaic metalwork, such as pins, remains a problem. We have a particular lack of understanding of material in use during the first half of the first millennium AD. When subjected to closer scrutiny the accepted dates of, for example, projecting ring-headed pins and doorknob spearbutts (Heald 2001), begin to falter. Finally, the often complex 'lifecycles' of objects, from production, use, discard, reuse and retention of artefact, e.g. as heirlooms, must be considered. Whilst, for example, it may be acceptable to explain a Roman brooch in an Early Christian context by recourse to heirlooms (Stevenson 1955, 283; Alcock & Alcock 1987, 131), similar explanations are never offered for less 'exotic' objects.

Date (or life span) of the structure from which the artefact derives

A significant proportion of non-ferrous metalworking material from Iron Age Scotland can only be broadly dated by reference to understandings of the date of construction and life span of a particular structural type. As will become clear often we know only that a crucible was found during the excavation of a wheelhouse or broch. This obviously means that only a broad date range can be inferred. However, ascertaining a date, even in this broad sense, is not always straightforward. While the last two decades have been spent discussing the origins, sequence, date and development of many Iron Age structures, particularly Atlantic roundhouses, we are no closer to solving the issue of the chronological range of these types (e.g. MacKie 1970; 1974; 1997; Harding 1990; 1997; 2000; Armit 1992; 1996; Parker-Pearson & Sharples 1999; Ballin Smith 1994; Hedges 1987; Gilmour 2000; see Chapter 6). The dating of duns is equally contentious (compare Nieke 1990, 133; Alcock & Alcock 1987, 131; Harding 1997, 122-33; Gilmour *forthcoming a & b*). Problems are compounded by recognition that many sites were used for many centuries after their original construction. Modern excavations of the Howe, Orkney (Ballin Smith 1994) and Loch na Beirgh, Lewis (Harding & Gilmour 2000) clearly demonstrate the reuse of roundhouses over many centuries and reanalysis of older excavations reveals a similar pattern: most were occupied at numerous times during the mid- to late-first millennium AD. Thus, it is clear that we cannot assign artefacts from earlier excavations to specific periods of occupation and many are probably associated with secondary or tertiary occupation. Dating, therefore, through structural typology can only provide broad patterns (see Armit 1991).

Object analysis and terminus ante quem

A beneficial, yet largely ignored, approach to understanding the date of particular Iron Age objects is the use of various analytical techniques. For example, recent advances in dating techniques, such as AMS, offer the potential to date bone objects such as pins and combs (cf. Bonsall, Tolan-Smith

& Saville 1995; Kitchener & Bonsall 1997). However, the application of this practice to Iron Age material is not widespread. One beneficial approach adopted throughout this study is the analysis of metal composition of metal artefacts or metallic residues on crucibles and moulds to obtain a *terminus ante quem* for the object. This will be expanded on in Chapter 3. Briefly, the occurrence of significant levels of zinc may suggest a Roman or post-Roman date; copper alloys containing zinc are almost entirely absent from pre-Roman copper alloys (Dungworth 1995; 1996, 410-1, 1997a & b). Similarly, the occurrence of significant levels of silver may suggest a date in Scotland no earlier than the late 2nd or 3rd centuries AD.

Analogy and 'best fit'

Finally, it is often necessary to rely on analogy. Many sites were investigated in the 19th century and little, if any, records survive. All we have are the crucibles or moulds in museum drawers. However, the lack of stratigraphical information on many of the sites should not be considered a justification for completely ignoring the artefactual assemblages. When related to patterns emerging from more recently excavated sites of similar nature and stature and new understandings of object types, patterns do emerge (see Chapters 6 & 7).

These five approaches allow non-ferrous metalworking evidence to be assigned to the earlier, middle and later Iron Age. Despairingly, we usually have to rely on criteria at the end of the list, here termed 'best-fit- archaeology. This is obviously not ideal and it is when different criteria overlap that we can begin to be more confident that the most appropriate interpretation of the evidence is that the metalworking activity took place during particular epochs. Future excavations and dating programmes will confirm or negate the suggestions offered here.

Things to come

This introductory chapter has highlighted theoretical and methodological issues that need to be faced in the reconstruction and interpretation of non-ferrous metalworking in Iron Age Scotland. All of these issues have been considered when studying every object and form the basis for what follows: a systematic analysis and interpretation of all of the non-ferrous metalworking evidence from Iron Age Scotland.

Chapters 2 to 4 outline the different stages involved in the non-ferrous metalworking cycle from Iron Age Scotland. Particular focus is on moulds and crucibles, the main evidence with which we have to work. These chapters, in conjunction with Appendices A, B, C & D, provide a description of the material, scientific analysis and an extensive gazetteer and discussion of all the sites. There is discussion of typology, provenance and chronology of each artefactual group. Aspects of technology are considered and supported by a programme of scientific analysis on relevant pieces. It is important to stress that many of the objects have been published before and these form an integral part of the descriptive catalogue (Appendices B & D). However, as many publications (e.g. Curle 1982) have been more concerned with art historical implications rather than issues of technology or alloy type, many previously discussed finds have been re-analysed. Furthermore, working through these collections demonstrates that many salient objects have never been catalogued. Where the material has been adequately published before, for example at Dunadd, Argyll (Lane & Campbell 2000) discussion is brief with full acknowledgement of other authors work. Due to the kindness of Dr. Ewan Campbell and Dr. David Longley unpublished material from Eilean Olabhat, North Uist and Mote of Mark, Kirkcudbrightshire has been made available to the author. The catalogues of this material are largely those of these two scholars. However, the present author has undertaken scientific analyses on some of the material, particularly the crucibles at Olabhat, often leading to re-interpretations. Objects from Roman sites, such as Newstead, Roxburghshire, have not been included.

The remaining finds which form this study fall into two groups. First, the large body of unpublished material now housed in museums scattered across Scotland. Second, the unpublished assemblages recovered from recent excavations, studied for the first time by the author. These include, to varying degrees, the important assemblages from Portmahomack, Ross & Cromarty, Mine Howe, Orkney, Scatness, Shetland and Loch na Beirgh, Lewis. Reference is made to material uncovered in the last few months, for example, Berst Ness, although time has not allowed this material to be catalogued within this study.

This corpus of material is discussed within three case studies, chronologically divided into *Early*, *Middle*, and *Late* Iron Ages (Chapters 5 to 7). The aim of each study is not to give an all-embracing historical narrative for every region from 700BC to AD 800. Instead, the aim is to stress variability and, more particularly, study the role of non-ferrous working and the objects, within the creation and maintenance of social identity, structures and politics in Iron Age Scotland in specific regions at specific periods. This requires contextualising the production and consumption of non-ferrous objects within wider themes and discussions of Iron Age society.

Whilst a thorough examination of the archaeological data is a given, the narrative approach adopted means that the 'hard facts' are presented mostly in the Appendices where the find spot, date and interpretation of every non-ferrous metalworking find is scrutinised. Although these form the cornerstone for the overall study presenting them within the main text would render it cumbersome and impossible to read, as well as masking the wider issues that need to be raised. Although accounts of the period may overlap in ideas, the chronological divisions are presented as a virtue.

The first study (Chapter 5) deals with the Early Iron Age. Our starting point is consideration of the affects ferrous metalworking had on non-ferrous metalworking. A key area is the realisation that as we move from the Late Bronze Age through the earlier Iron Age there is a change in the objects cast in bronze, with high-quality metalwork (axes, swords, spears, etc) giving way to more 'prosaic' casting traditions (pins, ingots). Although this may be purely an issue of archaeological 'visibility' there may be a more relevant social explanation; we may be witnessing the 'marginalisation' or 'redefinition' of non-ferrous metalworking casting practices. Although the actual crucible and mould evidence is slim this model appears to gain credibility when viewed in relation to other processes taking place during this period. The transition from Bronze Age to Iron Age sees the cessation, or at least reduction, in bronze hoarding and a general reduction in the quantity of bronze objects evident in the archaeological record. There was also a shift in attitude to what objects were made and from what material. As we move through the early Iron Age there are more tools and fewer weapons. This takes place alongside an increase in the use of iron and iron 'mimicking' of objects once produced in bronze (e.g. socketed axes, spearheads, sickles). These technological patterns appear to be linked to wider socio-economic changes. There was an increased emphasis on elaboration of the domestic sphere, organisation and exploitation of the agricultural landscape, a movement towards enclosure, and ritual deposition of agricultural objects. We may, therefore, be witnessing an emerging system based on the control of land and agricultural production. This contrasts with the previous Late Bronze Age 'prestige goods' political system that was based on the manipulation of exchange relationships, political alliances and crafts such as metalworking. Thus, whereas in the preceding period bronze was used for the production of objects whose functions were largely concerned with prestige, exchange or ritual, in the following period concern was more with the production of more 'functional' items, such as iron axes for cutting down trees and iron sickles for farming. Importantly, within this new trajectory iron began to take on new importance. The result was as the earlier Iron Age progressed bronze smiths had to re-define their role within new social milieu.

The second study (Chapter 6) is concerned with the Middle Iron Age, here defined as *circa* 200BC to AD300, particularly in Atlantic Scotland. This period saw major changes in the structural record which appear to have been linked to new social trajectories and issues of identity. It is argued that non-ferrous metalworking played a pivotal role in this cycle. However, concern was less with the finished products than with the perceived social use of the smith by emerging power groups who were looking for various forms of legitimisation. This process was inextricably linked to the symbolic and transformational attributes of the smith's work. This resulted in metalworking being confined largely to nucleated roundhouses or hillforts which we can now see not just as central places or the homes of high status individuals but as multifunctional units concerned with economic, social, political, religious, ritual and cosmological practices. The inhabitants were involved in a process by which individuals (smiths) and resources (metal) from 'outside' were brought 'inside' their society, where resources were transformed, both materially and symbolically, in order to meet local ideological needs.

The final study (Chapter 7) is concerned with the later Iron Age, here defined as *circa* AD 500 to AD 800. Non-ferrous metalworking during this period has been better studied but largely confined to material from forts such as Dunadd, Argyll and Mote of Mark, Kirkcudbrightshire. Further, its practice has been used solely as an indicator of status and as an activity controlled by elites. Whilst not disputing this relationship Chapter 7 attempts to tease out wider interpretations from the evidence. One key theme explored is the role of the smith *beyond* the confines of central places and their role in the wider world. The starting position is recognition that particular 'special' objects, such as brooches, and precious materials were being made and used away from royal centres. Two avenues are investigated. First, it is suggested that the act of creation of these objects, and use of precious materials, was a powerful statement, along with the finished artefacts; an insignia through which wider group affiliations were constructed and maintained. The smith was sent to produce objects that tied individuals to wider socio-political landscapes. Within this social transaction the presence of the smiths at the receiving site were as important as the objects they made, being an explicit expression of the wealth and expertise that royalty could control and redistribute. Second, it is suggested that the emerging evidence may be reflecting regional differences in non-ferrous production and that in some areas fine metalworkers were not tied to aristocratic sites. It is suggested that the centralisation on high status sites is a sign of political development and that some areas lay outside the areas under the direct control of both the Pictish and Gaelic royalty. Metalworkers in some areas, particularly the Outer Hebrides, would then be able to work independently, perhaps with itinerant visits to the wealthy patrons of both areas.

This chapter has outlined the main theoretical and methodological issues that need to be considered during analysis of the material. The structure adopted for the rest of the study has also been highlighted. It is argued that this approach leads us towards a fuller account of non-ferrous metalworking in Iron Age Scotland.

The evidence: reconstructing the activity

Chapter Two

Introduction

The manufacture of non-ferrous objects involves a chain of operations, each taking the product of the previous stage as its raw material (Figure 1). Each stage requires a specific set of structures or tools and produces a range of by-products. The first operation in the bronze cycle is ore procurement through mining. Smelting then follows. Having smelted the ores, a metal or alloy of the desired composition is then produced. The metal is then melted in a crucible and cast in a mould, perhaps later to be worked as sheet metal. Though all potentially form part of the archaeological record recycling means that usually only the non-metallic evidence survives.

Smelting

Smelting can take place either in a crucible or a furnace. Copper is smelted when a clay crucible is charged with pure copper mineral and charcoal and heated to a temperature of 1100°C. During this process the charcoal is consumed with excess air and the copper particles agglomerate into globules and masses which liquidate at the bottom of the crucible to be removed when cold. If the minerals are not pure, then a flux must be added to remove inert particles, or gangue, which produces a diagnostic smelting slag. Early smelting furnaces consisted of a small hollow in the ground. This simple bowl furnace contained the heated charcoal and oxidised ore. The copper was reduced from the ore, and dripped into a hollow at the bottom of the bowl (Tylecote 1986, 21). While there is no structural evidence for such activity in Scotland (ibid., 22) there are four copper ingots that suggest copper smelting in the Scottish Iron Age, Edin's Hall, Berwickshire (Plate 2; Dunwell 1999, 338-40), Blackburn Mill, Berwickshire (Curle 1932, fig. 22, no 33), an unpublished ingot from Dundonald, Ayrshire (Piggott 1953, 50) and Carleton, Wigtownshire (Curle 1932, 374). Edin's Hall lies only 1.4km from disused copper mines (Dunwell 1999, 339).

Metal refining

Before precious metals could be melted, cast and smithed to shape they had to be refined and, if necessary, mixed with a controlled amount of base metal to produce an alloy of the desired degree or fineness. Although pure gold was used, most silver contained appreciable amounts of other metals. The processes used to purify precious metals were *cupellation* (the separation of precious metals from base metals) and *parting* (the separation of gold and silver). British evidence for each is rare, and only recently recognised from England in Roman, later Saxon, or Norse material (Bayley 1992a, 747-54; 794-803).

Cupellation

Cupellation involves melting the metal to be refined, usually base silver, with an excess of lead, under oxidising conditions. The lead is changed to litharge (lead oxide) which then acts as an oxidising agent, converting any other base metals within the base silver to oxides. These volatise or dissolve in the litharge and are separated from the silver which is unaffected. The silver is left behind when all the base metals have been oxidised and the litharge is skimmed off, eventually leaving behind a small button of silver (Bayley 1991a, 125-6). Gold is also refined in this way.

In Europe cupellation was used from the first millennium BC onwards but only appears in Britain in the late first millennium BC. Cupellation was carried out both on large and small scales. For large quantities a hearth was used, such as the example from Silchester (Gowland 1900), although this is a rare example. Where smaller amounts of silver were tested for purity shallow dishes or cupels were used and this makes up the majority of evidence for cupellation, together with litharge cakes.

Litharge cakes (Figure 2) are roughly circular in plan, plano-convex in section and usually between 100 and 150mm in diameter and 20-30mm thick. They are often pale grey in colour on the outer surface and the fracture can show a range of colours, red, buff and grey, reflecting the presence of lead compounds. Several have distinct circular depressions in their upper surfaces. Identification relies almost entirely on chemical composition; XRF analysis universally detects lead as the major element present and considerable amounts of copper. Silver is usually only found on the upper surfaces of the cake, which can be related to Pliny's comment (Bk XXXIII, 95) that during cupellation '... the silver floats on top like oil on water (Bailey 1929, 95). Litharge cakes are known from a number of Roman and later sites but have yet to be recognised at other periods (Bayley & Barclay 1990; Bayley 1991a, 126).

Cupels are small shallow vessels used during cupellation, only recently recognised as a specific find, distinct from metal melting crucibles or heating trays with which they are often confused (Figure 3). They vary in size but are typically 30 to 40mm in diameter. Larger versions are known from late Saxon sites in Winchester (Bayley & Barclay 1990). Most show a clear vitrified surface where the precious metal solidified. Traces of both silver and gold are usually detected (Bayley 1992a, 749). The litharge which forms during the process reacts with the fired clay producing a lead-rich vitreous surface on the cupel which is often coloured red by traces of copper which the litharge had removed from the silver. There is often a circular depression near the centre of the vitrified surface of the cupel, which marks the place where the droplet of refined silver solidified. These often conform to the size of discovered litharge cakes as demonstrated by Foley (1981). Most finds date to the Roman or later periods.

Parting

Parting is the separation of gold from silver. The metal to be parted was hammered out into thin sheets and packed into a ceramic vessel interleaved with a 'cement', a mixture of one part weight of common salt and two parts of powdered brick or burnt clay. The vessel was then closed with a clay lid and was dried and heated in a furnace. The silver reacted with the salt mixture and was converted into silver chloride which volatised and was absorbed by the brick dust and walls of the vessel. When the vessel had cooled down the gold was removed, melted and the whole process repeated if necessary. The majority of the extracted silver would be in the brick dust and could be removed (see Notton 1974 for replication experiments; Bayley 1991b for overview).

Parting vessels may be confused with crucibles, yet are usually cuboid in shape, with flat bases, rounded corners and are lightly fired over parts of the outer surface on the base and lower part of the wall (Figure 4). The greenish colour of the vitrified areas is caused by small amounts of iron from the clay fabric. Often the rims have traces of added clay, interpreted as lids. The interiors of most vessel pieces are a pale grey with very pale purplish-maroon patches in places. This purple colouration on the inner surface, in contrast to the orange red of the clay fabric seems to be a hallmark of parting vessels. Analysis detects both gold and silver on the sherds, almost universally silver. Parting vessels have been recognised from Roman contexts in Chichester and Exeter and from Anglo-Scandinavian contexts in York and Lincoln (Bayley 1991a, 128).

Cementation

While other copper alloys could be made by melting the copper and then adding another metal such as tin to make bronze, the production of brass, an alloy of copper and zinc, could not be done in this way as metallic zinc was virtually unknown in antiquity. Instead, brass was made by the *cementation* process which remained the standard European Method of manufacture up until the beginning of the 19th century (Bayley 1990a, 9).

Cementation involves heating finely divided copper metal together with zinc oxide or carbonate (calamine) and charcoal in closed crucibles (Figure 5). The zinc ore is reduced to metallic zinc vapour, which diffuses into the copper, forming brass. At the end of the process the crucible contents are melted to homogenise the alloy. Some of the earliest finds of brass making crucibles in Britain are from Colchester dated to AD 43 to 55 (Bayley 1984a & b). These finds have a distinctive fabric quite unlike that of any other crucible. This fabric is very friable, contains little mineral temper and is deeply vitrified. These vessels are also analytically distinct with zinc levels appreciably higher than for other melting crucibles.

Melting

Crucibles, ceramic vessels used to contain metal to be melted, are the most common indicator of non-ferrous metalworking. The function of a crucible is to contain the metal being melted, protecting it from loss and contamination, and to provide a means of transport so that the molten metal can be poured into a mould. All crucibles share certain properties; the most important are strength and the ability to withstand high temperatures up to 1200°C. The production of crucibles was a skilled business; modern attempts to replicate and used crucibles in casting experiments resulted in the crucibles disintegrating before the bronze (P. Reynolds pers. comm.).

During the Iron Age a variety of shapes and sizes were used (Figure 6; see Chapter 4). Some are open-topped, others have integral lids to stop heat loss. Some are triangular, others are semi-hemispherical, and the volumes vary from thimble sized to more than a pint. The many different sizes and shapes may suggest similarities or differences in date, what was made and wider metalworking practices across regions. Where multiple types co-exist there may be a correlation between crucible form and the composition of the metal melted in it (Bayley 1990b, 3). For example, precious metals, particularly gold, were often melted in smaller crucibles than base metals. The increased number of types during particular periods, such as the Late Iron Age, may be related to the greater range of metals and alloys cast. Bronze was cast in the Iron Age, and this was augmented later on by brass, silver lead and gold, all with different requirements; zinc, for example, tends to evaporate more rapidly from molten brass unless there is some covering such as a lid (Craddock 1989, 171).

Casting finished objects

Casting could be achieved either in a one piece mould, such as that typified in England at Gussage All Saints (Wainwright 1979) and Weelsby Avenue (Foster 1995), or two piece moulds which make up the overwhelming majority of the Scottish evidence. The technology and processes involved have been adequately discussed in numerous studies (e.g. Coghlan 1951; Tylecote 1986; Curle 1982; Lane & Campbell 2000) and only a few salient points need be discussed here.

One piece moulds

One piece - or investment - moulds were made by modelling the object to be cast in wax and coating it thickly in clay. The mould was then fired, the wax melted or burnt out, and the molten metal poured in. This lost wax, or *cire perdue*, technique was in general use in the southern British Iron Age but was normally used at later periods only for larger, complex castings. The moulds had to be broken to remove the castings so fragments are usually small and have broken edges all around (Bayley 1995). There is no definite evidence of one piece moulds, except for ingots, in Iron Age Scotland.

Two piece moulds

This technique entails registering two mould halves together and pouring in molten metal through an opening at the top or bottom (Figure 7). Two piece moulds were used, not so that the actual moulds could be reused, but more that the pattern used to create the original mould could be reused. Most moulds are for single objects although small objects, like pins, were cast several at a time.

To begin the operation, the first half of the mould is created by pressing a bone or wood pattern or object similar to the one being cast into the clay, thus creating a master pattern. Patterns are generally made of wood, lead or bone A funnel shaped former is then placed above the object to form the ingate for the mould. A keying arrangement is also made to enable registration of the two mould pieces. After drying, the second half of the mould is made by allowing the clay to penetrate into the set pattern and keymark depressions. This ensures patterning and accurate registration of the two half moulds when they are reassembled for casting (Tylecote 1986, 83). After drying, the pattern and former are extracted. When the mould is reassembled for use, a thin strip of clay often seals the two pieces and this is sufficient to hold the two pieces tightly together for the duration of the casting process.

Casting pits were often used to support the moulds as they received the molten bronze (Leahy 1977). After cooling, the cast objects are extracted from their moulds and any excess metal such as casting flashes, runners or headers removed, perhaps with saws or files. The objects may then be subjected to a range of post-casting techniques executed with a variety of tools (see below).

Casting ingots

Ingot moulds are open, one piece moulds in which bars or discs were cast for subsequent working into rod, wire or sheet; most have more than one cavity cut into them, thus often more than one side of the mould has a casting template (Plate 3; Figure 8). They are usually made of stone or clay and capable of repeated use; some, however, are made from re-used brick or fired clay. Some are quite coarse textured, but this does not matter as surface finish is not critical as the resulting ingot or blank will be heavily worked so any surface irregularities will disappear (Bayley 1992a, 767).

Ingot moulds from England are generally found on sites in the second half of the first millennium AD, such as Late Anglo-Saxon, Norse or Anglo-Scandinavian. Local stone was most commonly used but imported stone, particularly soapstone, appear in the areas under Scandinavian influence (Bayley 1991c, 118).

Wrought working

There is a limit to the variety of objects that can be produced by casting, and many objects were created by wrought working and/or assembled out of various pieces of metal. Wrought sheet metal is essentially a two-stage process: first, the beating of cast metal into sheets or wire; second, these part manufactured sheets were made into objects and decorated. Vessels such as cauldrons and bowls were produced in this way and other copper-alloy objects had wrought metal added to a casting, for example the pin on a cast brooch or the chape on a scabbard. Precious metals were often wrought rather than cast as less metal was required which made it more economical.

The ingots produced in the moulds were often used as the starting point of wrought metalworking. The ingots worked by hammer were either smithed down to bars, rods, sheets or strip. Soldering, riveting, or folding could also join sheet metal. Working of sheet changes the external shape and the internal stresses of the metal. If the metal is to be worked beyond a certain point the internal stresses have to be relieved by annealing (heating to above the metal's recrystallization temperature – about 400°C for brass and bronze and 200°C for copper and silver). Tin, lead and pewter recrystallize at room temperature and so do not have to be annealed, but these are normally cast and not wrought.

Although wrought working involves a variety of hammers, chisels, awls, punches and files the most commonly found archaeological evidence of this process is scrap metal in the form of sheet metal offcuts or bars and wires. Some may represent offcuts, discarded pieces unsuitable for further working or perfectly sound pieces that were accidentally lost or mislaid. Finishing tools, such as burnishers and polishers, are also found. However, many of the tools used in wrought working are used in many other trades, and it is only when a toolkit is found together or with scrap metal that direct associations with non-ferrous metalworking can be suggested.

Decorating

It is clear from surviving mould fragments that decoration could either be added during or after casting (Craddock 1998). Decoration was also applied on sheet objects, either as engraving, embossing or chasing metal. Engraving involves using a 'graver', which is pushed along the surface of the metal thereby removing a small sliver of metal. Chasing involves creating a design by hammering a small chisel, a 'tracer', into metal. Metal plating is another decorative technique that has left some evidence other than finished objects in the archaeological record. Tinning was often applied to iron objects, either for decoration or as a corrosion-resisting coating. Gilding was often applied as a gold-mercury amalgam (Oddy 1980). Designs could also be built up from many components, often held together by rivets or bolts; coral and enamelling was also used.

Although numerous small tools must have been used to decorate and manipulate bronze items only a small number survive from Iron Age Scotland. For example, the compasses from Fairy Knowe, Stirlingshire is the only known Scottish find (Hunter 1998, 359-1, fig. 29, no. 394). No doubt the intrinsic value, the vulnerability to corrosion and the failure of excavators to recognise their remains have all played a part. Therefore, it is the actual finished object that gives direct evidence for the technological background and design, such as repoussé.

Waste material

When molten metal is being cast, droplets and larger irregularly shaped flows of metals ('spillages') can form. While material of this sort may have been collected and recycled, this material is among the commoner finds on southern British archaeological sites where non-ferrous metals were being worked (Bayley 1992a, 779). However, it is important to appreciate that metal waste of this kind can form any time a scrap of metal comes into contact with a fire hot enough to melt it; thus, on its own it is not evidence of metalworking. Evidence of waste material from Iron Age Scotland is rare.

A second type of metal waste is that which solidifies in a closed mould but is not part of the finished object(s) being cast. This includes runners and sprues. Runners are the metal which solidifies in channels in the mould leading to the object matrix. A sprue is metal which solidifies in the funnel shaped opening where the metal was poured, as well as the flashes which form between the valves of a piece mould. Both runners and sprues are removed from the casting during the finishing process. A failed casting is another form of waste. Runners are usually thin and rectangular and often have traces of a casting flash. Sprues are usually funnel shaped or of various amorphous shapes, often with traces of further runners attached (see Bayley 1992a, 779). The sprue form can indicate how many objects were being cast in a single mould.

Metalworkers' tools

Metalworkers' tools are useful for recognising past non-ferrous metalworking. However few survive or have been identified. For example, the conventional use of such terms as 'awl' may lead to archaeologists actually blinding themselves to the real nature, use, and significance of such tools. These 'awls' may equally have been used as a punch for incising patterns on metalwork. Small repoussé work tools may also have been made from pieces of hard wood, bone or bronze. Also, there is often a misunderstanding of what particular tools would be suitable for decorating. For example, a copper or a bronze tool would not be sufficiently hard to engrave bronze or gold. It would be suitable, however, for tracing.

Here then are the different stages in the non-ferrous metalworking cycle and the evidence we may expect to find in the archaeological record. However, evidence of wrought working, waste and metalworkers' tools are rare in the Scottish Iron Age. While aspects are alluded to throughout this study, concern is more with the evidence for casting, in the form of moulds and crucibles.

Crucibles

Chapter Three

Introduction

Iron Age crucibles from Scotland known to the author are catalogued in Appendices B & C. This chapter discusses the different types; within each section technological aspects are highlighted. As way of contextualisation similar examples from other regions are often outlined.

Terminology

Analysis of the material concentrated on areas shown to be relevant in similar studies (e.g. Bayley 1992a; Lane & Campbell 2000, 134-147): form, fabric, vitrification, metal traces, and condition.

Form

That there was a proliferation of crucible types in use during the Iron Age is well known (Tylecote 1986; Bayley 1991c, 116; 1992b). However, as recently as 1987 Alcock (1987, 125) concluded that '... even now, it cannot be said that we have enough well-published examples to enable us to establish the typology of crucibles'. Only Tylecote (1962, 1986, table 58, fig. 50) has attempted to form a British crucible typology; most other discussions have been site or period specific. It should be noted, however, that Tylecote's study was based largely on English material. Briefly, Tylecote believes that the small, pinched, three-sided crucible is the most common in the Iron Age, although they can be of varying depth. Smaller cylindrical or globular types are also known. With a few exceptions, Roman period crucibles, at least in England, are circular in plan and hemispherical or conical. Native sites outwith Roman influence continued to use the triangular type. During the second half of the first millennium AD, the larger circular crucible seems to have made its appearance as well as lidded crucibles. In the early Anglo Saxon period in England crucibles were small and handmade as well as half pear shaped with knobbed lids (Bayley 1991c, 117).

It has been suggest that the different sizes and shapes used may be related to similarities or differences in date or metalworking practice across regions. Where multiple types co-exist there may be a correlation between crucible form and the composition of the metal melted in it (e.g. Bayley 1995). The increased number of types during this period may be related to the greater range of metals and alloys cast: bronze was cast in the Iron Age, and this was augmented later on by brass, silver lead and gold, all with different requirements; zinc, for example, tends to evaporate more rapidly from molten brass unless there is some covering such as a lid (Craddock 1989, 171).

Fabric

Analysis of fabric is still seen as an important area of study (e.g. Howard 1983; Crew & Rehren 2002; 88-90). Crucible fabrics must be strong and refractory and choosing the correct fabric is vital. High concentrations of oxides and alkalis in certain clays can reduce the temperature at which the fabric softens whereas high silica can greatly improve the refractoriness. Most crucibles were made of sand-tempered clay which is not very resistant to the heat of the melting hearths, especially since some charcoal contains fluxing compounds which lowers the clay's melting point dramatically. This can be overcome by tempering the clay with large quantities of sand or ground quartz (Lamm 1973; 1980). Although too high a proportion may cause the crucibles to crack. Quartz has a high melting point, at about 1700°C. Despite this, even the quartz grains' surfaces often melt when heated. Experimental work by Söderberg (pers. comm.) shows that while added temper makes the crucible more usable, there is still a difficult balancing between the alloy's ideal casting temperature and the clay's melting point. This has bearing on discussions of specialism as too often studies have assumed that metalworking could be carried out by non-specialists. However, experiments have shown that, if the fabric is not correct, the crucible is easily misshapen and collapses during heating (P. Reynolds pers. comm.).

Work by Howard (1980; 1983) drew attention to the potential for crucible fabric studies, specifically using macroscopic analysis and petrology and thin section analysis. Using a normal microscope (x10) it is possible to distinguish fabric groups by texture and by the size and quantity of quartz sand inclusions. Fabric differences can be seen in texture, density of different sized quartz grains, inclusions, and porosity. Petrological examination can provide a ready assessment of the mineralogical composition of a given artefact, thereby allowing the possibility of source determination, thin sectioning can at the same time reveal details of technology (cf. Howard 1983, 169-85 for discussion of technique). Raw clays, addition of temper, forming techniques, firing conditions and temperature can all be revealed under the petrological microscope.

Fabric was considered when studying the Scottish crucibles. However, unlike other areas, such as at Ribe (Lamm 1980), there were no great differences across space and time and destructive analysis was deemed inappropriate and unnecessary. Like much of the pottery from certain areas in Scotland, fabric analysis of the crucibles showed little variation.

Vitrification and relining

All used crucibles are reduced fired grey or black as metals must be melted under reducing conditions to prevent them from being oxidised and lost into a massive crucible slag. The crucibles would have sit in or on the fire while the more open forms would have had the molten metal covered with a layer of charcoal to prevent oxidation. Experimental work by the East Sussex Archaeology and Museums Project demonstrated that an effective way of heating lumps of recycled or scrap bronze is by placing them in the charcoal directly above the crucible. When molten, the bronze flows down into the bottom of the crucible. Where the metal is heated primarily through the side wall of the crucible this obviously requires greater refractory capacity in the ceramic than when the heat is concentrated in the area immediately above the crucible (Bareham 1994, 113). The temperatures involved were high: a minimum of 1000 and 1100 degrees was needed to melt the copper alloys but the temperatures would have been higher to prevent rapid cooling. Thus, used crucibles are vitrified to a greater or lesser extent. Sometimes there is just a slight glaze, alternatively the fabric can be vitrified all through and appear bloated and spongy, creating a vesicular structure. This can result in the crucible having a thin surface glaze or, in more extreme cases, the whole of the thickness of the fabric losing its normal shape and structure and developing a vesicular, spongy texture. The degree of vitrification depends on the temperature to which the crucible is heated, how refractory the fabric is, and by the fluxing of the surface by the ash in the fire (Bayley 1985). Study of the vitrified area can indicate different heating traditions and use. For example, Iron Age crucibles in England are often heated from above (suggested by the most intensive vitrification being around the rim) whereas Scottish examples are often heated from the bottom (Bayley 1988, 198; Tylecote 1986, 97; Lane 1987, 55-7).

Some crucibles often have an added layer of less refractory clay, which are often deeply vitrified, and are evidence of re-use. In some cases, the outside of crucibles can appear unused because the added clay layer has broken off, leaving no vitrification. No specific reason is attributable for adding this layer, yet it may be related to two factors. It would protect the crucible proper from the fire so that its strength would not be reduced by the dissolution of the fabric by fluxing and vitrification. It would also increase the thermal capacity of the crucible which would be vital in giving the craftsman a slightly longer time in which to pour the metal before it resolidified (Tylecote 1982 quotes a time of 2-5 seconds).

Metal traces

When a crucible is used for melting or alloying small quantities of metal often become chemically bound in the vitrified surface of the crucible, or physically trapped as droplets. On pouring, some of the contents will drip down the outside, leading to localised slagging during re-heating for a further melt (Tylecote 1986, 97). Vitrification on the inner surface is called 'crucible slag', which is formed by the reaction of metal oxides from the melt with some fuel ash and the crucible fabric (Tylecote 1982). Visual examination, with the naked eye, or under low magnification, can often indicate the metal used. Copper and its alloys can be seen as a green corrosion product or as a bright red patch where it is chemically bound in the vitrified surface of the crucible. Silver is visible as dark brownish-black areas often with associated pale purplish powder corrosion deposits. Gold is unaltered, though is usually only present as tiny droplets. Crucibles used to melt silver and gold often have copper-red areas on them as the precious metals usually contained enough copper to produce this colour. Lead and tin have low melting points and were not usually melted in crucibles (Bayley 1995). Metal-rich deposits on crucibles are never uniformly distributed because less reducing conditions and the proximity of metal oxides and fluxes which favour their production tend to occur at the surface of the melt and around the lip as the melt is poured. It is thus possible for a single vessel to have some areas with massive metal-rich deposits and other areas where little or no traces of metal survives (Bayley 1992a, 757-58). As many crucibles are little more than small sherds, it is unsurprising that metals are not often detected.

Chemical analysis of the slag layer or the metal droplets can indicate the broad composition of the metal being melted (Figure 9; Howard 1983; Bayley 1992a, 757-46; 817; Lane & Campbell 2000, 205-7). If interpreted correctly, non-destructive analysis using Energy Dispersive X-ray fluorescence (EDXRF) is extremely beneficial. EDXRF has been used to study archaeological materials for over 30 years, and has proved a reliable and quick method for determining chemical composition (see Hall, Banks & Stern 1964; Hall & Schweizer 1973; Dungworth 1996; Bayley 1989; Wilthew, Bayley & Linton 1991 for outline of technique and application).

However, the interpretation of EDXRF spectra is problematic (see Barnes 1983; Dungworth 2000). Different elements of the melted alloy react differently during melting due to reduction, oxidisation, volatility, and melting temperature. High temperatures also increase the volatility of some metals and so their transfer to the mould or crucible fabric. Furthermore, the more oxidising the conditions within the crucible, the more likely the metallic elements will oxidise and react with the crucible fabric. Thus, zinc and lead are more likely to become entrapped in the ceramic than, for example, tin and silver. It is also clear that the elements do not survive in a uniform way or area on ceramics. Thus, while visible droplets may survive most information is usually within the actual ceramic matrix. Therefore, different areas of the ceramic produce better signatures than others. Random processes, texture, and type of material also affect the retention, or loss of, elements from crucibles. The absence of a particular element in a crucible may be related to the particular thermo-chemical conditions rather than because the element was not present in the original alloy. Crucibles were often re-used (Bayley 1992a, 755) with a range of different alloys melted in the same crucible; analysis by EDXRF will not be able to distinguish between such repeated use. Finally, during long periods of burial metal tends to corrode and some elements may be depleted or enriched at the surface.

Despite these problems EDXRF is well suited to determine, non-destructively, whether crucibles were used in the manufacture of precious or base metals. However, caution must be taken when interpreting the results. Where only base metals are detected it is much harder to determine the exact nature of the alloy that was melted. The four principal metallic elements present in copper alloys (from around the Roman Iron Age - zinc, tin, lead and copper) have very different physical and chemical properties and during melting they will be absorbed by the crucible in varying degrees depending on the melting conditions. Thus, reconstruction of copper alloy type from the analysis of the mould or crucible alone is difficult (Dungworth 2000). However, the technique does allow identification between those crucibles used for base and precious metals. If significant levels of other copper alloys exist, these can also be instructive (see below).

As part of the study pertinent crucibles were analysed by EDXRF in the National Museums of Scotland. Approximately 900 analyses were undertaken. Due to financial constraints it was not possible to analyse all of the material. However, together with Bayley's analysis of the recent finds from Dunadd, there are now 1000 analyses of Scottish Iron Age crucibles (summary results in Appendix C). This represents a significant majority of the total crucibles. More particularly, almost every site with evidence for non-ferrous metalworking from Scotland has had part or all of its crucible assemblage analysed. The result is the first thorough geographical and chronological study of its kind in Europe. The results are incorporated into the following discussions. Wider aspects are discussed at the end of the chapter and in subsequent chapters.

Taphonomy, stratigraphy and chronology

It is important to study the condition of the objects as this may illustrate the various taphonomic processes through which the object has been subjected to since use. Before we can do this we need to understand how the fragments were likely to have been produced. First, we have to be sure that the crucible was actually used for metalworking; it could easily have been broken during manufacture and firing. Second, it is extremely difficult to successfully melt non-ferrous material without the actual crucible melting first. Many crucibles have evidence of relining, thus showing reuse. However, it is equally likely that many were discarded after one melt. Larger, more robust crucibles are also more likely to survive than small fragile ones. After use various processes will have affected the condition of the crucibles. One helpful approach is to see if any of the mould or crucible fragments join, or whether any pairs of upper or lower valves join. Similarities in texture, thickness, and colour may also be instructive.

Summary

Here, then, are the areas deemed important for analysis of crucibles. Past studies of crucibles have illustrated that although function may remain the same through time, differences in crucible type, alloys and heating practices may indicate different metalworking traditions between areas and time periods.

Typology

The large majority of crucibles from Iron Age Scotland are broken and fragmentary. The problems in constructing typologies from fragmentary pieces are well known (Alcock 1963, 140-5; Tylecote 1986, table 58, fig. 50; Lane & Campbell 2000, 134). In particular, where only body sherds survive differentiation between types is extremely difficult and many crucibles can only be classified to type if the majority of the object survives. As outlined in Appendix B many examples are very small and it has not been possible to reconstruct the original form: ideally not less than a quarter of the circumference and shape is needed to attain a reasonable degree of certainty. This causes problems for the creation of typologies. For example, types 1 & 2 crucibles are sub-triangular in shape; similarly type 8 have a pear or sub-triangular body but with an added lid. Unless the lid survives, or evidence of the luting, it is difficult to be sure what type the crucible conforms to. Similarly, the bodies of type 5, simple tall cylindrical crucibles with no handles are similar to type 7, tall cylindrical crucibles with handles. This results in many crucibles being classed as, for example, type 5/7 or, more usually, miscellaneous. The outlined typology, therefore, is presented more as a guide for the different types present. It is not a quantitative account of all types.

The crucibles have been divided into 10 types, 1-10, with Types 1, 2, 7 & 9 being subdivided (Table 1). Types 1 - 8 are certainly crucibles for melting metals, but Type 9 are functionally distinct and may have been used for other parts of the metalworking process. Type 10 are classified as 'crucibles' in past literature but, in the author's opinion, show no signs of every being used in the metalworking process. While it may have been possible to determine further subdivisions within the general groups it was felt that this would lead to a complexity, which was more a reflection of present day thinking and crucible survival than a reflection of past human activities. These should be regarded merely as minor variations within the general themes.

Type	Classification	Plan	Vertical section	Tylecote (1986)	Lane & Campbell (2000
1A	Pyramidal (thin walled)	Triangular	V-shaped	A2	Not represented
1B	Pyramidal (thick walled)	Triangular	V-shaped	A2	Not represented
1C	Pyramidal (deep)	Triangular	V-shaped	Not represented	Not represented
1D	Triangular/sub cylindrical crucible with rounded base.	Triangular	Sub-cylindrical	Not represented	Not represented
1E	Pyramidal with flat base	Sub-triangular	V-shaped	Not represented	Not represented
2A	Conical (small)	Circular	V-shaped	B3	Not represented
2B	Conical (large)	Circular	V-shaped	Not represented	Not represented
2C	Conical (with base)	Circular	V-shaped with flat base	Not represented	Not represented
3	Oval	Pear shaped	Semi-circular	J1	Not represented
4	Simple semi-spherical bowls / globular	Circular	Semi-spherical	Not represented	E
5	Simple tall cylindrical crucibles with rounded bases (no handle)	Circular	Cylindrical	B1	A
6	Large crucible with lug and pouring lip	Circular	Cylindrical	D1	Not represented
7A	Side lugged (pinched horizontally) / handle from bottom	Circular with lug	Cylindrical	D1	D
7B	Side lugged (pinched vertically) / handle from bottom	Circular with lug	Cylindrical	D1	Not represented
7C	Side lugged from side (not bottom); tear-shaped after Duncan	Circular with lug	Cylindrical	D1	D
8	Lidded & vertical handle	Pear	Triangular	E1	C
9A	'dog-bowl' crucibles	Circular	Sub rectangular / flat bottomed	B2	B1
9B	A large thick dish or plate with low walls	Circular	Sub rectangular / flat bottomed	B2	B2
9C	A large thick dish or plate with low walls with in turned walls	Circular	Sub rectangular / flat bottomed	B2	B3
9D	High-walled variant of B1 with slightly in-turned walls and flat base.	Circular	Sub rectangular / flat bottomed	B2	B4
9E	large tall, straight-sided crucibles which may have had flat bottoms	Circular	Sub rectangular / flat bottomed	B2	B5
10	Not crucibles / globular	Circular	Hemi-spherical	B4	Not represented

Table 1: Typology of Scottish Iron Age crucibles

For ease of comparison an attempt was made to relate the following typology to previous studies, particularly Tylecote (1986) and Lane & Campbell (2000, 134-47).

Type 1

Type 1 are the triangular / pyramidal type common throughout the British Iron Age (Plate 4; Figure 10; Tylecote 1986; Lane 1987), the equivalent of Tylecote's A2 – with the possible exception of the crucible from Birnie, Moray, none of Tylecote's A1 type (shallow, triangular crucibles) are known in Scotland. Type 1 crucibles are typified by being triangular in plan and V-shaped in section, often asymmetric and angular combining to make a pyramidal shape. Complete examples often show a slight asymmetry in plan, with one side being more convex than the other two, which tend to form a more or less defined spout in their angle. Alternatively, others have a pouring spout created by pinching two sides of the crucible together. Occasionally the spout is accentuated by further pinching. The bases are either pointed or slightly rounded with the sides rising to the typical triangular shape.

The triangular crucibles share a common fabric and appearance. The fabric is usually coarse clay with abundant gneiss or quartz fragments. The exteriors of the crucibles usually show signs of intense heating under reducing conditions. Bubbly vitrification often accumulates either on the base or the rim, illustrating different heating practices. Many have highly glazed areas, often with red copper oxide deposits, and occasionally cracking, as at Bac Mhic Connain, North Uist. The interiors are often oxidised at least in the upper part. Many have slaggy insides, which occasionally show charcoal or green cupriferous deposits. The only other feature visible is occasional distortions of the walls, which in a few cases can be made out to be the result of the crucible being grasped with tongs used when pouring out the molten metal, for example at Eilean Olabhat, North Uist and Bac Mhic Connain, North Uist. Re-lining or multiple layers of the crucible wall is very rare. Nevertheless, it is likely that each crucible was used a number of times, and a few instances of vitrification covering cracks proves repeated use.

The type can be subdivided on base of height and thickness, which may have related to melting conditions, capacity and objects produced. It is important to note that differentiating between these types, particularly when only fragments survive, is difficult.

Type 1A is the most common. Other sherds classed as Type 1 or '?' in Appendix B that cannot be identified to shape should probably be referred to this general group. Complete examples show that the height of this type is generally between 35mm and 45mm. However, there are exceptions. For example, the crucible from Keiss Harbour (NMS X.GA 501) is very small, only 24mm in height.

This type is the most common crucible found throughout the Scottish Iron Age, used throughout all periods. For example, they were found in the Early Iron Age sites of Balloch Hill, Argyll and Dunagoil, Bute and used until the end of the 8th century AD, as shown by examples from Brough of Birsay, Orkney. Non-Scottish parallels are also common from Lagore, Co. Meath (Hencken 1950, 235 and fig. 117, 1312) and Moynagh Lough, Co. Meath , dated to the 7th-8th century AD (Bradley 1983, 24). They were also the most common type at Garranes, Co. Cork (Ó Ríordáin 1941-2, 134-9). Although most were used for melting copper alloys others, for example from Loch na Berigh, Lewis, Traprain Law, East Lothian, and Tarbat, Ross and Cromarty were used for melting silver alloys. Analysis of Irish material, undertaken at the beginning of the last century, illustrated a similar pattern; although many were used for melting of copper alloys others, for example at Clogher, Co. Tyrone were used for gold and silver working (Craddock pers. comm.).

Type 1B are larger triangular crucibles. These crucibles fall into a general height around 60-70mm. Examples for Scotland are rare, and rely on the crucible being largely intact, as for example at Fisher's Row East, East Lothian. Although of a slightly different shape, and obviously different date, parallels are known from Moynagh Lough, Co. Meath and dated to the 7th-8th century AD (Bradley 1983, 24) and Garranes, Co. Cork (Ó Ríordáin 1942, 134-9). Type 1C are slightly deeper pyramidal triangular crucible, as shown at Bac Mhic Connain. Type 1D are triangular/sub cylindrical crucibles with more rounded bases as shown, for example at Brough of Birsay, Orkney. Type 1E are triangular crucibles, yet with distinct flat bases, as for example, at Airelloand, Ayrshire.

Type 2

Type 2 is similar to Type 1 yet is (sub)circular in plan and V-shaped in section, often asymmetric and angular, combining to make a conical shape (Plate 5; Figure 11). Many have a pouring spout created by pinching. These are comparable to Tylecote's B3. It is important to stress that many of the body fragments classed as Type 1 in the catalogue may be Type 2: without the surviving top it is impossible to differentiate between the two. Type 2 shares a common fabric and appearance, similar to type 1. The fabric is usually coarse clay with abundant gneiss rock fragments and minerals derived from the weathering of gneiss. The exteriors of the crucibles usually show signs of intense heating under reducing conditions. Bubbly vitrification often accumulates either on the base or the rim.

Surviving complete examples suggest that the type can be sub-divided further, perhaps into three separate groups. Again, it is important to note that differentiating between these types, particularly when only fragments survive, is very difficult.

Type 2A and 2B are similar, differing only in size. Type 2A, for example from Sollas, North Uist, are 40mm in height. Type 2B, as seen at Fairy Knowe, Stirlingshire, are larger 70mm in height. Type 2C differs as it has a base, as seen at Gurness, Orkney and Mine Howe, Orkney. This is the only known Scottish crucible that has a base, presumably for resting on the surface prior to being covered by charcoal for heating. That both examples are from Orkney may suggest regional patterning.

EDXRF analysis shows that Type 2 crucibles were used for copper alloy working, most with inclusions of zinc, lead and tin, perhaps suggesting that leaded gunmetals were melted.

Type 3

Type 3 crucibles are characterised by their pear-shaped plan and semi-spherical section, and pronounced pouring spout (Figure 12). They are the equivalent of Tylecote's Type J1. Examples are known, for example, from Bu, Orkney and Howe, Orkney. While Ballin Smith (1994, 257-8) believes that the Howe example was used for smelting copper alloys this is incorrect. Analysis of the Bu crucible suggests that the type was used for copper alloy melting. The fabric is the typical composition and the exterior and pouring spout of the Bu example is vitrified with a cupriferous slag. The size of the type 3 crucibles fall into a general height range between 30mm high and 45 to 70mm in length.

Type 4

Type 4 crucibles are simple hemispherical bowls characterised by their circular plans and semi-spherical vertical cross sections (Figure 13). These are not represented on Tylecote's typology, yet some are the equivalent of Lane & Campbell's Type E.

Where dateable, they are most common on Late Iron Age sites. The exteriors tend to be highly vitrified as do at least the upper part of the interiors. The round bases and lack of pouring lip would appear to be disadvantageous in use, as would the proportionately large surface area (see Lane & Campbell 2000, 141). Tong-marks on one example from Dunadd (1665/1) suggest that it was grasped by the body and not by the rim. Although falling into the general open class of crucible it is different from the triangular type.

EDXRF analysis shows that these open crucibles were used exclusively for copper alloys. In discussing the crucibles from Dunadd Lane & Campbell (2000, 207) suggest that it is perhaps significant that many of the finds from the recent excavations, when analysed, have almost no zinc. This may be related to the volatile zinc vapour being trapped in the enclosed crucibles, and being driven off in the open crucibles, rather than a difference in the original melt composition. It does raise the possibility however, that the open form was being used to drive off volatile elements such as zinc in order to purify a melt of mixed types of copper alloy.

As Lane & Campbell (2000, 141) illustrate the exact form is difficult to parallel on other British sites, the closest being a much thicker example from Garryduff, Co. Cork (O'Kelly 1963, 109, fig. 21). Lane & Campbell (2000, 141) may well be correct in suggesting that the type may be a local variant peculiar to Dunadd. The other suggested Type 4 crucibles are very fragmentary and can only be tentatively placed within this group.

Type 5

Type 5 crucibles are tall cylindrical crucibles with rounded bases (Figure 14). The equivalent of Lane & Campbell's Type A. Unless a large part of the body is preserved it is difficult to distinguish this type from Type 7, which also has a cylindrical body shape. The tall shape would may the molten metal difficult to pour although the long thin shape would prevent oxidation by exposing little surface area.

Although common at Dunadd, examples are known from other, arguably Late Iron Age sites, such as Brough of Birsay, Orkney and Portmahomack, Ross & Cromarty. This date seems to fit with non-Scottish examples. Examples are known from Scandinavia with examples from Ribe, Helgo, Birka, Hedeby and Fyrkat (Madsen 1984, 26, Type 1), dating to the 8th century and later. Surviving examples from Dunadd suggest a capacity around 1.5cc

In discussing the finds from the recent excavations at Dunadd Lane & Campbell (2000, 206) noted that although there were too few analyses to be sure of the function, the type seemed to have been associated with silverworking. This is supported by analysis of other possible examples of type 5 crucibles, such as from Portmahomack, Ross & Cromarty.

Type 6

This crucible is represented by only one example, from Cullykhan, Banffshire (Figure 15). It is a large, thick crucible with pouring lip and gripping lug. Although Tylecote (1986) groups this within his type D1 the large construction and general appearance of the Cullykhan example means that type 6 should be kept separate. Analysis shows that it was used for melting tin bronze.

Type 7

These generally small crucibles are formed by wrapping a thin disc of clay around a finger or thumb and pinching the overlapping fold into a handle (Plate 6; Figure 16). They are the equivalent of Lane & Campbell's Type D (2000, 141). Differences are slight, the handles could be set low, high or half way up the crucible. Crucibles of this type can either be vertically pinched (O'Riordain 1949, fig. 20, 509) or horizontally pinched, such as Dunadd. This denotes the difference between type 7A (horizontally pinched) and type 7B (vertically pinched) outlined in Appendix B. Another type 7C is related to the other two, where the handle appears to be made from the side, the equivalent of Duncan's (1982, fig. 38, no. 14) 'tear-shaped' crucible. This is seen at, for example, Dunadd, Argyll (NMS X.GP 223). Due to the fragmentary nature of many of the pieces, it is often only possible to classify the crucibles as Type 7, with no subdivisions.

The crucibles are generally deep. The bases are usually rounded, but can be flat as shown in examples from Brough of Birsay, Orkney (397 and 398). These crucibles are usually vitrified on the exterior. Analysis of the crucibles from the most recent excavations at Dunadd, suggest that Type 7 were used mainly for precious metals, probably mainly gold and silver (Lane & Campbell 2000, 206). This suggestion is supported by analysis of crucibles from Portmahomack, Ross & Cromarty and Brough of Birsay, Orkney. However, it appears that the crucibles were not always used for precious metalworking. Examples from the earlier excavations at Dunadd suggested that these crucibles were used for copper alloy working as do other examples from, Portmahomack, Ross & Cromarty and Brough of Birsay, Orkney.

Type 8

This type has a pear-shaped or sub-triangular body, with a separate lid of clay luted to the rim, one corner being left open for pouring (Figure 1). This is the equivalent of Lane & Campbell's (2000, 134) Type C. In appearance they resemble a pear which has been cut in half along its long axis. The lid has a central vertical handle or lug usually rectangular in section and the axis of the knob is always at right angles to the pouring axis. Size seems variable with measurements across the lids varying from about 30 mm to 70mm. The shape of the body usually starts rounded and rises to being triangular at the mouth. The lids sometimes show signs of being re-attached - they may have been removed to recharge the crucible. This may explain why the body and lid from Loch Glashan, Argyll were found detached. The lids of Type 8 would protect the metal melt from oxidation, exclude impurities, and retain heat.

The exterior of the body is almost always heavily vitrified, the interior usually not. The lids, especially the larger ones, are rarely highly fired, and some have the appearance of the mould fabric. The lids are luted onto the body with a layer of clay which can easily be mistaken for an added layer. Crucibles from Dinas Powys were used for copper-alloy working although traces of gold were found in one (Alcock 1987, 124-5). Half-pear shaped crucibles with knobbed lids were found at Church Close, Hartlepool, Cleveland, dated to c.AD 700, had been used to melt silver

(Bayley pers. comm..). A crucible of this type from Ribe also showed use for silver melting (Madsen 1984, table 1, D6798).

Analysis of Scottish examples shows that the type was principally used for silver though some show only copper alloy traces. It is possible that similar crucibles were used for similar base silver mixtures and that those with low silver content do not appear on the XRF results due to the poor fluorescing properties of silver.

As noted, the type is widely distributed throughout Early Christian Britain and Ireland. These dates concur with the Scottish evidence: all appear on Late Iron Age sites. That said, the discovery of lidded crucibles on many Roman sites throughout the Western Empire may suggest that the type may have been a Roman introduction (Alcock 1963, 143).

Type 9

This type occurs in a wide variety of shapes and sizes (Figure 18). All are characterised by being flat-bottomed and rarely reduced-fired. In some cases, examples look very much like ingot moulds. Most pieces are fragmentary making it only possible to label examples Type 9. Types 9B and 9E are known only from Dunadd, and have been discussed by Lane & Campbell (2000, 134-5).

Type 9A

Type 9A, often referred to as 'dog-bowl' crucibles, tend to be small, shallow, flat-bottomed bowls with vertical sides. Examples are not normally well-fired having the same appearance as the moulds. Examples are known, for example, from Brough of Birsay, Orkney and Clatchard Craig, Fife. Non-Scottish examples are known Lagore, Co. Meath dated to the 7th and 8th centuries

(Hencken 1950, fig. 117, 237); at Garranes, Co. Cork in the ?6th to 7th centuries (O'Kelly 1963, 97). Scandinavian examples are dated to the 6th century (Lamm 1980, fig. 2).

It is difficult to be sure precisely what the function of these vessels were. Similar examples from Helgo were used for goldworking (Lamm 1980, 103). Analysis of Scottish examples is ambiguous. Examples from Portmahomack, Ross & Cromarty, Clatchard Craig, Fife and Brough of Birsay show no evidence of precious metalworking, only copper alloy working. Many have significantly high lead readings.

Type 9B

Type 9B are larger thick dishes or plates with low walls. It is possible that this is a loose-fitting lid for a large crucible. One example is known, from Dunadd Argyll.

Type 9C

Type 9C is similar to 9A but with in turned walls and a white oxidised fabric. Again, there is only one example from Scotland, from Dunadd, Argyll.

Type 9D

Type 9D is a high-walled variant of 9A with slightly in-turned walls. Two examples are known from Dunadd (221/465). An almost identical example comes from Moynagh Lough crannog (Bradley 1983, fig. 5, no. 150) from an 8th-century context.

Type 9E

Type 9E comprises large tall, straight-sided crucibles which may have had flat bottoms. One example from recent excavations at Dunadd (220) and one complete example from the old excavations, however, has a rounded bottom and copper alloy deposits (NMS X.GP 226), so some of these may be merely large type 10 crucibles.

Type 10

Type 10 crucibles are semi-spherical round-bottomed vessels characterised by their round plan and semi-circular vertical cross-section (Figure 19). Many, such as the examples from Dunagoil, Bute have a very gritty coarse fabric with large inclusions up to 5mm and are orange-brown in colour with no signs of vitrification or general extensive heating. Grey staining on the inside of the vessel suggests reducing conditions of some material, perhaps wax or oil for use in a lamp. Many are very cracked and damaged. Most examples are round bottomed, although some have flat bases. All are round or elliptical in plan and most semi-circular in cross-section. They are much heavier and thicker than other crucibles.

Importantly, no examples have any signs of vitrification or signs of extensive heating. They also have no functional attributes (pouring spout, shape) characteristic of a crucible. All are impractical for heating, pouring and preventing oxidation of the alloy. There are also no visible metallic residues, nor any shown by X-radiography. XRF analysis shows no evidence of metallic residues suggesting that Type 10 were not crucibles, not acting as melting vessels during non-ferrous metalworking process (the minute traces of zinc detected on some vessels are small traces in the original clay material (K. Eremin pers. comm.)).

While it is possible that metallic traces may not have been detected during XRF analysis we still would expect to see some functional attributes and characteristics typical of the metalworking process on these objects during visual and X-ray analysis. Taken together it is suggested that these objects played no part in the metalworking process and should be discounted as crucibles. This removes a notable total of artefacts, until now, thought to be indicative of non-ferrous metalworking. In the Western Isles alone this potentially removes 25% of sites from discussion, particularly those believed to date to the first few centuries AD, such as Foshigarry, North Uist and Dun Bharabhat, Lewis. These findings also raise the possibility that a large number of other non-Scottish sites that have produced supposed 'crucibles' require restudy. In particular, the Irish site of Garranes, Co. Cork has a large number of vessels, some made of stone, which have been termed crucibles (O'Riordain 1942, 136-9, fig. 24)[i].

Discussion

The time periods in which the different types were in use have been alluded to above. The alloys melted in the crucibles have also been outlined (more fully catalogued in Appendices B & C). Wider discussion of crucible types with only a few examples, such as type 2, 5 and 6 are, of limited value. There is too small a corpus to draw any meaningful conclusions. Type 1 were certainly used throughout the Scottish Iron Age. Although at first used for copper alloy working, in the Late Iron Age examples were also used for precious metalworking. Types 7, 8 & 9 were used exclusively in the Late Iron Age are are linked to a rise in different metals, particularly silverworking. Some Type 9 vessels may also have played a role in precious metalworking. This Late Iron Age crucible diversity is paralleled on other contemporaneous sites, for example Moynagh Lough, Co. Antrim (Bradley 1993). That said, it is clear that some sites, such as Eilean Olabhat, used one type of crucible for melting different alloys and metals.

A few sites have produced stratified examples of more than one type, for example Dunadd, Argyll, Portmahomack, Ross & Cromarty, Mote of Mark, Kirkcudbrightshire and Brough of Birsay, Orkney. Importantly, from the first three sites examples of different crucibles appear to have come from contemporaneous deposits. This suggests that there is no chronological differences between the different crucible types and that all were in use at the same period, roughly the 7th and 8th centuries AD.

An important aspect of the study has been the analysis of a wide range and number of crucibles. Wider implications are discussed in subsequent chapters. However, it is pertinent to tease out some issues now, concerning alloy type.

The non-ferrous alloys we would hope to recognise from analysis of crucibles are Copper (Cu) with varying amounts of Zinc (Zn), Tin (Sn) and Lead (Pb). The other notable alloys are Silver (Ag) and Gold (Au). As noted, EDXRF can identify different metals which have diffused into the crucible fabric during the melting of the metal. Although it cannot give a quantitative assay of the various metals used, it does provide a useful guide.

As copper alloys of the pre-Roman Iron Age in Britain are almost exclusively tin bronzes (Dungworth 1996), zinc should not be detected in Early Iron Age crucibles. This is the case for Scottish material. With the exception of one crucible from Dunagoil, Bute (AT 280), none of the other Early Iron Age crucibles show zinc above trace level. This may suggest that Mann (1925) was incorrect in believing that activity at Dunagoil dated solely to the pre-Roman period. This pre-Roman pattern is supported by analysis of material argued to date to the Late Bronze Age or Early Iron Age periods. Late Bronze Age crucibles from Kintore (Cowie & Hunter 2000, 51-3) and Eildon Hill (Spearman 1992, 46-7) found no zinc peaks during analysis. Ongoing work by the author on crucibles from similar dated sites from Eigg and Cladh Hallan, South Uist suggests a similar pattern (Heald in prep.).

It is possible to push the results further. While the absence of zinc cannot be taken to indicate a pre-Roman Iron Age date, scholars have suggested that significant traces of zinc in crucibles may provide a broad *terminus post quem* for the metalworking activity (e.g. Bayley 1992a), that is during or after the Roman period. However, Dungworth (2000) has recently noted a word of caution, illustrating the dangers in interpreting zinc peaks from EDXRF spectra. The chemical and physical properties of zinc, the effects of melting temperature and conditions all encourage the diffusion of zinc into the ceramic, making it more likely to be recorded during EDXRF analysis. This has been demonstrated by a number of other studies. Barnes noted the high volatility of zinc during casting experiments of mould residues (Barnes 1983). Barnes noted that when casting copper alloys with known but varying levels of zinc (1, 2, 3, 4, and 5%) subsequent EDXRF analysis of the moulds in which they were cast all produced very strong zinc peaks. Thus, a zinc alloy containing 1% produced a similar reading to one with 5%. There was no way of differentiating between different percentages of zinc percentages. Similarly, zinc was detected in 24 out of 37 moulds and 8 out of 11 crucibles from the Iron Age site at Kelk, East Yorkshire (Bowstead-Stallybrass 1999) even though it has not been detected in contemporary metalwork from the region (Dungworth 1996).

Despite these notes of caution analysis of the Scottish material suggests that significant traces of zinc do accord well with chronology. In other words significant traces of zinc only appear in crucibles that have been independently dated to the Roman or post-Roman period. Analysis, therefore, suggests that significant traces of zinc may well provide a fairly secure *terminus post quem* for metalworking activity. This is important as, as will be shown in Chapter 6, this allows material excavated in the 19th century to now be dated more securely.

Analysis of the Scottish dataset has also allowed another pseudo-dating tool; that is the presence of silver. Analysis clearly shows that the melting of silver and gold does not start before the Late Iron Age. Many of the crucibles with evidence of silverworking also have evidence of melting quaternary copper alloys. There are two possibilities: either that two separate melts were carried out or, more likely, the smiths were debasing silver. This recognition of silver is important in itself (see Chapter 7). However, like zinc, it also allows previously undated material to be confidently assigned to between c.AD 300 onwards.

Moulds

Chapter Four

Introduction

This chapter discusses Iron Age moulds known to the author. As with the crucibles, the basic catalogue is contained within Appendix D. This chapter is organised by mould type (one piece; two piece) and by what was made in the mould. As way of contextualisation a brief overview of the objects produced (date, origin, distribution etc) is outlined. The results of EDXRF analysis are not discussed. At the beginning of the study over a hundred moulds were subjected to analysis (outlined in Appendix D). However, unlike crucibles, moulds rarely have surviving metal droplets either visible or within the clay matrix. EDXRF analysis results were generally poor, resulting in very low readings. For reasons alluded to in Chapter Three, limited readings on EDXRF spectra are difficult to interpret and generally can not be related to the metals being melted in the moulds. For this reason no further EDXRF analysis of moulds was undertaken.

Terminology

The general processes for casting in two-piece moulds has been outlined by numerous scholars (e.g. Curle 1982, 35-9; Lane & Campbell 2000, 201-2; and discussed in Chapter Two). The diagnostic features of moulds are funnel-shaped ingates or sprue cups, runners (channels the molten metal ran through) and the matrix for the object being cast (Figure 7). Often the sprue cups may be made separately and then joined to the mould (Foster 1980; 1995). All these components are usually reduced fired (grey or black), especially where they have been in contact with the molten metal. The remainder of the mould is often oxidised and coloured red or brown.

Like the crucibles, the terminology used here attempts to embrace past studies (e.g. Lane & Campbell 2000) to allow easier cross comparison. However, this is not always straightforward. For example, at Brough of Birsay, Orkney and Clatchard Craig, Fife the front of the object is usually on the upper valve; however at Dunadd, Argyll the front of the object is either on the upper or lower valve. Similarly, although many sites have evidence of similar keying, there are variations, particularly as to whether negative keying is on the upper or lower valve. Furthermore, at a single site smiths may have used numerous keying techniques, not restricted to particular objects being cast; as at Mote of Mark, Kirkcudbrightshire (D. Longley pers. comm.). Despite these variations Lane & Campbell's (2000, 202) terminology has been followed, where possible (Table 2). However, recognising and differentiating between 'upper' and 'lower' valves on many sites is difficult. Where it is not possible, they are not listed as such.

	Upper Valve	Lower valve
outer edges	Convex	angled
section	plano-convex	rectangular
keying	Positive	negative
ingate section	Semicircular	flat
thickness	Thinner	thicker
object	back (normally)	front (normally)

Table 2: Terminology followed in mould classification (after Lane & Campbell 2000)

As is the case with crucibles, taphonomy and preservation play an important part in discussions. In a two-piece mould it is necessary to break the moulds to extract the object. The upper valve is more likely to break as it is generally thinner than the lower valve; the object would tend to be left in the lower valve where it is usually more deeply embedded. Lower valves also often have breaks caused by levering the object out of the mould; although this is not true for all moulds. Following use, many mould fragments become very abraded and small, because of, for example, subsequent trampling or erosion by water. Even if the mould does survive, often the casting surface is lost making what was made in the mould very difficult. The descriptions of the material are outlined in Appendix D. Salient points are discussed in this Chapter. It should be noted that Appendix D is attempted as a checklist of all known Iron Age moulds. Further, a large number of ingot moulds without provenance or date have been left out. In the National Museums of Scotland there is a corpus of such material which may date to the Bronze Age through to the Medieval period. Only the material which can be argued to date to the Iron Age has been included here.

Is should be noted that many of the mould types, or rather the objects cast in them, have been discussed before, particularly the brooches and discussion is based on many past studies. Many studies have been concerned with art history and this cannot be ignored here. Where applicable, full reference is made to others work.

Ingots

In terms of number of sites, ingot moulds are the most recovered evidence for non-ferrous metalworking from Iron Age Scotland. They are found on Early, Middle and Late Iron Age sites and across much of Scotland. They are made from a variety of materials, for example, clay, sandstone and steatite (Plate 3). They are often made from re-used objects, for example quernstones. The ingots produced are also varied. Often the mould is for the production of one ingot, for example at Bac Mhic Connain, North Uist. Other moulds are more complex. They can either be for the production of numerous ingots, for example as at Dun Beag, Skye or Brough of Birsay, Orkney. Alternatively, they can be for a variety of, often obscure, shapes, as, for example at Ardifuir, Argyll.

Knobbed spearbutts

Knobbed spearbutts have an important place in British and Irish Iron Age archaeology. They are claimed to be the second largest category of La Tène finds in Ireland (Raftery 1982, 75) and the most extensive indication of interaction between Ireland and Scotland in the first three centuries AD (Raftery *forthcoming*). Two decades ago Barry Raftery isolated two sub types that could be attributed to two distinct regions- *Lisnacrogher* spearbutts associated with Co. Antrim, and *Doorknob* spearbutts found west of the Shannon. Raftery suggested both originated and developed in Ireland. Recent research has suggested that the doorknob type date slightly later to the 3rd to 5th centuries AD (see below). There is no secure dating of the Lisnacrogher type although associations with Lisnacrogher scabbards has led scholars to suggest a date in the last two centuries BC (Raftery 1982).

One site, Dunagoil, Bute, has produced evidence for the manufacture of a Lisnacrogher knobbed spearbutt (Figure 20). The object produced in the Dunagoil mould is, however, larger than any other extant Lisnacrogher spearbutt, being twice as large as examples found in Ireland. The type of keying used at Dunagoil is complex and varied. Unlike the other three moulds from the site (which rather than having keys to hold the mould together, have convex keys which would have slotted into corresponding dished areas on the lower valve. Once keyed the two pieces would have been held together by a lining of clay) the mould for the Lisnacrogher spearbutt is more complex. First, a set of circular keys down the left and right side of the object to be cast keyed the two parts together. One mould had positive circular keys that would have fitted into corresponding negative ones on the other mould. Two negative triangular notches on the right hand side of the mould, one of which is partly filled by clay, suggests either that there was a need for another keying mechanism, or that they held some form of binding which held the two halves together. The third keying mechanism is two notches that go round the circumference of the back of the surviving mould. Similar notches would be on the other mould creating a full circular notch that held binding that secured the two moulds together. The keying mechanism was completed by coating the two mould valves with clay. This complexity has not yet been recognised on any other Iron Age examples. The in-gates are sub-circular in section, part of the original mould design.

Five sites have produced evidence for the manufacture of doorknob spearbutts: Traprain Law, East Lothian; Gurness, Orkney; Loch na Beirgh, Lewis; Dun Mor Vaul, Tiree and Mine Howe, Orkney.

Although the actual spearbutts produced show a remarkable uniformity in shape and size the moulds in which they were produced varied across regions and indeed sites. For example, the spearbutt moulds from Loch na Beirgh, Lewis (Figure 21) have differing keymarks. One has a V-shaped negative keymark as seen, for example, at Traprain Law, East Lothian, while other moulds were joined by means of an oblong ridge, thus negating the use of V-shaped keymarks. In contrast, the Dun Mor Vaul spearbutts have flat keying faces. It appears that the two flat faces of the upper and lower valves were placed together and then bound with a layer of clay. The mould has no remains of keying slots or notches.

Pins

Pins remain the chief material expression (in metal) of the Atlantic Province culture. Interest has traditionally been with the examination of stylistic developments through time or as an indicator of cultural traits. Smith (1905, 1913) was the first to endeavour to trace '... a special and local development of the bronze pin over ten centuries' and many have followed since (Dunning 1934; Stevenson 1955; 1966; Kilbride-Jones 1980a; Foster 1990). Stevenson (1955) undertook the first systematic study of Iron Age Scottish pins demonstrating that several different ring-headed pins were prevalent during the first half of the first millennium AD and that many were post-Roman date, considerably later than the broch sites on which they were found.

There is now a generally accepted sequence: the ring-headed pin is ancestral to projecting ring-headed pins which could either be wire or cast. The cast projecting series then became more elaborate, perhaps around the 3rd and 4th centuries AD (Kilbride-Jones 1980a), resulting in rosette headed pins, ibex-headed pins, and proto-handpins. From this final group emerged the hand pin, probably around the late 5th or 6th centuries AD, continuing into the 8th and 9th centuries in an altered form (Foster 1990).

Explaining these developments has been more problematic. Smith (1905, 344) was in little doubt that while the ring headed prototypes were of continental origin the sequence was confined to the British Isles. While Dunning (1934) was suggesting that the ring-headed series was a southern British insular development derived from the Halstatt 'swans neck' pins Simpson & Simpson (1968) were illustrating the 'multiple ancestry' of the Scottish examples; Fowler (1960, 163) meanwhile suggested derivation from southern English involuted pins. Derivation from Late Bronze Age sunflower pins for projecting ring-headed pins was then suggested by MacKie (1969) and immediately rejected by Clarke (1971, 29). Kilbride-Jones on the other hand suggested that the Votadini of Traprain Law provided the '... only credible background to pin development' (Kilbride-Jones 1980a, 191-2).

Certain pin forms have also been central to wider chronological or cultural discussions. MacKie (1965a, 114; 117) included bent wire ring headed pins as marking an early spread of Iron Age B elements into the far north and north-west to form the 'Atlantic 2nd b' cultures. This has been challenged ever since (Clarke 1971; Lane 1987; Topping 1987; Armit 1991 but see MacKie 1971a; 1974; 1997 for rejoinder). Foster (1990) adopted a new approach. Although still concerned with stylistic or chronological traits Foster illustrated how pins could be classified and dated by material and form. For example, copper alloy was used in the manufacture of pins from the Middle Iron Age until the Norse period while the use of antler was confined, with a few exceptions, to the Norse Period. However, focus was primarily on the Late Iron Age (Pictish and Norse) and with Caithness and Orkney.

There remain great problems, none more so than our lack of chronological control. Chronological flexibility has made possible three conflicting interpretations of the development of projecting ring-headed pins (Clarke 1971, 30) and despite the recent finds from Dun Mor Vaul, Tiree (MacKie 1974), Howe, Orkney (Ballin Smith 1994) and Scalloway, Shetland (Sharples 1998) we are still no closer to a resolution.

Projecting Ring-Headed pins

Projecting ring-headed pins (Figure 22) supposedly derive from ring-headed pins (see Dunning 1934; Simpson & Simpson 1964; Foster 1989a). There are two types of plain projecting ring-headed pins: those made from wire or those cast. The origin and chronology of both is a matter of debate

(Stevenson 1955; MacKie 1969; Clarke 1971). Both MacKie and Stevenson agree that cast pins are of a later date than simple bent wire pins, which MacKie claims are the normal type found on brochs and wheelhouses (MacKie 1974, 129). Few well-dated examples have been found. Although Stevenson (1966, 20-2) suggested a date between the 2nd to 3rd centuries AD recent excavations at Scalloway, Shetland suggests that the type may have survived into the 5th century AD (Sharples 1998, 185).

Moulds for the manufacture of plain projecting ring-headed pins have been found at Sollas, North Uist; Traprain Law, East Lothian; Gurness, Orkney; Berigh, Lewis and Mine Howe, Orkney. It is important to note that other fragmentary moulds appear to have been for the manufacture of projecting ring-headed pins although it is difficult to be sure whether they are for the manufacture of plain or more complex projecting pinheads. The moulds from Lingro, Orkney, Reay, Caithness and Cnip, Lewis are relevant examples.

Corrugated pins

Decoration consists solely of corrugation, either on the whole body or the upper or lower half only (Figure 23). Examples of full body corrugated pins come from Gurness, Orkney (Hedges 1987, fig. 2.39, no 235). Lower corrugated pins are known from the same site (Kilbride-Jones 1980a, fig. 59, no. 1), Keady, Co Armagh (ibid., fig. 59, no. 2) and Duston (unpublished *c.f.* PSA London 1901-03, see Fowler 1963, fig. 7, no. 2). Examples of the upper corrugated pins are known from Bowermadden, Caithness, and Lydney (ibid., fig. 60, 1, 6). Although Smith (1905, 348) suggests the type may date to the 1st or 2nd century AD, using the Lydney example Stevenson (1955, 291) suggests that they date to the 4th or 5th centuries AD. This fits well with the date for the mould for their production, from Mine Howe, Orkney.

Rosette-headed pins

Rosette-headed pins (Figure 24) are one of a variety of cast projecting ring-head pins developed during the first half of the first millennium AD (see Stevenson 1955; Kilbride-Jones 1980a; Foster 1989a; 1990; Fowler 1963, Stevenson & Emery 1964, 206-9). The rosette type pin has a ring head decorated with either small or large beads on the circumference, those with large beads constituting the 'rosette' pin proper. Conventional understanding, based mainly on the Traprain Law, East Lothian sequence places them in the 2nd and 3rd / 4th centuries AD (Stevenson 1955, 193; Kilbride-Jones 1980a, 193; Laing 1975b, 323). According to Laing (1975b, 323) the small beaded ring pins are earlier than the larger. Stevenson argues that after the re-occupation of Traprain in the 3rd century the number of beads was reduced to five, then four and finally to three beads. Once the number was reduced to three, the stage was set for the three-fingered hand pin.

Manufacturing evidence for this pin type is known only from Traprain Law, East Lothian (Plate 7).

Beaded and corrugated pins (including ibex-headed pins)

This type is characterised by having a beaded lower portion; the top can either be plain or corrugated (Figure 25). Examples are known from Covesea, Moray (Benton 1931) and Haddington (BM Guide 1925, fig. 111). The type has been dated to the 2nd to 4th centuries AD (Stevenson 1955, Fowler 1963, 123). Differentiating between this type and the true ibex-headed pin is difficult. This type is similar to the beaded and corrugated pin but is distinguished by having concave sided-projecting side heads, like ears. In more evolved examples the lower beading may be replaced by a plate, but they also have side projections giving the overall impression of an ibex head.

Smith (1905, 350) originally dated ibex-headed pins to the 1st century BC on the insecure strength of an association at Sandy, Bedfordshire. However, examples from Covesea, Moray (Benton 1931) led

Stevenson (1955, 291) to suggest a date in the 4th century AD. An example from Bruthacha Tuath (PPS XVIII, 184) is termed a 'degenerate' ibex-headed pin. Although Stevenson (ibid.) suggests that the type may be of Scottish origin distribution covers England and Ireland (*contra* Smith 1905, 350).

Manufacturing evidence for this pin type is found only at Gurness, Orkney. The mould shows no signs of the corrugated upper part, suggesting that the corrugation may be post-casting.

Proto-handpins

A proto handpin has three or more beads above a crescentic plate (Figure 26). Stevenson (1955), Fowler (1963), and Laing (1993, 35-7) have discussed the development of the type. Most scholars agree that the proto-handpin is ancestral to the handpin, although when or how this development occurred is a matter of debate. Kilbride-Jones (1980a, 193) argues that the reduction in beads to three led to the emergence of the three fingered handpin, probably at Traprain Law under the Votadini. The proto-handpin is distinguished from the rosette pin in that it has from three to six beads round the upper part of the ring only. Examples are found in silver and copper alloy.

Most are of silver and enamelled, unlike other contemporary ornaments. The Scottish finds included a number from Traprain Law, East Lothian as well as those from two hoards of silver from Gaulcross and Norrie's Law, Fife. To the south there is a group of silver pins from Romano-British contexts at Tripontium, Warwickshire, Oldcroft, Gloucestershire, St Albans, Hertfordshire (Laing 1993, nos. 112, 113 & 118) and Atworth villa, Wiltshire. The Oldcroft pin was found with mid-4th century coins, providing one of the few fixed dates for the whole series (Ó Floinn 2001). In Ireland there are three provenanced pins of this type, all silver. One from Newtownbond, Co. Longford (unpublished, NMI 1944:95; Ó Floinn 2001, 5, fig. 1.3) and two from Castletown, Kilpatrick, Co. Meath (Youngs 1989, Ó Floinn 2001, 5, fig. 1.4). Interestingly, the proto-handpins from the latter site were also found with a developed handpin. Ó Floinn (2001, 5) concluded that, '... it is difficult to believe current art-historical arguments that these two handpins can be dated 200 years apart. The close similarity between the smaller proto-handpin from Castletown and Oldcroft led Ó Floinn (2001, 5) to suggest that all these silver handpins must be earlier in date than the 6th or 7th century normally attributed to them on the basis of the Scottish Gaulcross and Norrie's Law associations. He concludes that the silver handpins may have originated in southern Britain, and that '... the possibility that the pins from Gaulcross and Norrie's Law as well as those from Castletown Kilpatrick – all from hoards – represent imports from southern Britain must now be seriously entertained, given the absence of other Scottish enamelled objects of this date' (ibid.). This earlier date for handpins is supported by mould evidence for the manufacture of these pins, at least at Loch na Berigh, Lewis (see below).

Two sites, Traprain Law, East Lothian, and Mine Howe, Orkney have evidence for the manufacture of proto-handpins. The Traprain examples are for the manufacture of pinheads with six and three beads respectively.

Handpins

There is a consensus that the handpin developed from the proto-handpin. It evolved when the lower part of the ring had developed into a crescentic plate and the upper part of the ring, which consisted of beading, had straightened out into a row of projecting fingers, making a pin head that resembles a fist with the fingers bent forward (Figure 27). Examples are found throughout Ireland, Scotland and western England, and are believed to derive from Romano-British proto-handpins (Youngs 1989, 22-7). The usual cultural affinities are Irish and Pictish. In the absence of stratified examples art historical analysis conventionally dictates a 5th to 7th century date. Several are parts of well-known metalwork hoards, such as the Gaulcross (Stevenson 1963) and Norrie's Law (Graham-

Campbell 1991) hoards, although they have been found as stray finds. However, the recovery of a mould for a handpin from Loch na Berigh, Lewis (Harding & Gilmour 2000; Heald 2001) from a 3rd to 5th century AD suggests that the type may have been made earlier. This is supported by the assemblage from Castletown, Kilpatrick, Co. Meath where handpins were associated with proto-handpins (Youngs 1989, Ó Floinn 2001, 5, fig. 1.4).

Evidence for the production of handpins is known from Loch na Beirgh, Lewis; Eilean Olabhat, North Uist; Scalloway, Shetland; Gurness, Orkney and Scatness, Shetland. The moulds illustrate that different types of handpins were being made. For example, the smith at Eilean Olabhat made a pin with 4 fingers, whereas at Scalloway and Gurness the handpins had three fingers. The presence of more than three fingers may be significant, perhaps indicative of later date in the generally accepted sequence (Youngs 1989, 25-7). However, new radiocarbon date suggest that the sequence may need revised. The Scalloway mould is assigned to the 6th or 7th century AD (Sharples 1998, 171) whereas the Beirgh mould is radiocarbon dated to the 3rd to 5th centuries AD (see Heald 2001).

These moulds are important in showing that handpins were manufactured in the Western and Northern Isles. It is strange that the only evidence for manufacture should come from areas far removed from the findspots of most handpins, and is reminiscent of the situation with hanging bowl escutcheons which are common in Anglo-Saxon contexts, but only known to have been manufactured in Pictland at Craig Phadraig near Inverness (see below).

Stick pins

The ancestry and development of stick pins been discussed by numerous scholars (e.g. Stevenson 1955; Foster 1989a; O' Rhially 1998). Stick pins were made in metal or bone and represent a common Late Iron Age type. Bone pins may have served as models for moulds, as at Brough of Birsay, Orkney (Curle 1982), and Mote of Mark, Kirkcudbrightshire (Curle 1931). Creating a type series is difficult as many types are known only from single examples (see Foster 1989a, 73-93).

Various sites have produced evidence for the production of various stick pins: Dunollie, Argyll; Dundurn, Perthshire; Whithorn, Galloway; Dunadd, Argyll; Mote of Mark, Kirkcudbrightshire; Clatchard Craig, Fife; Skaill, Orkney and Brough of Birsay, Orkney. These can be divided into sub-groups.

Nail-headed pins

Nail-headed pins (Figure 28) are common throughout the Atlantic Province and may be derived from a Roman influence (Stevenson 1955, 285-6; Laing 1975b, 326; MacGregor 1985, 117-8; Foster 1989a, 80-2). Metal examples are rarely from dated contexts although those that are suggest a date in the first half of the millennium AD. The find from the Clickhimin wheelhouse may be an early example and the five metal examples from Traprain Law presumably date to somewhere between the second to first half of the 5th century AD (Foster 1989a, 80). The example from Crosskirk came from the horizon of a Samian sherd and a fragment of Roman glass although it '... may have been lost during casual use of the site in Early Christian times' (Fairhurst 1984, 116-7). That said, the majority have been recovered from Late Iron Age contexts such as Buiston, Ayrshire (Munro 1882a, figs. 242-3) and Burrian, Orkney (MacGregor 1974), suggesting that although bone and metal examples occur widely the type cluster around the 7th and 9th centuries AD (Foster 1989a, 99-100).

Four sites have produced evidence for the production of nail-headed pins: Dunadd, Argyll; Dunollie, Argyll; Mote of Mark, Wigtownshire and Whithorn, Galloway. Both the Dunadd and Mote of Mark examples are associated with E-Ware pottery, providing a general horizon in the late 6th and 8th centuries AD. The finds from Whithorn originated in deposits pertaining to the earlier 6th century AD. Both bone pins and moulds were found at Dunadd and Mote of Mark (Stevenson 1955, 286).

More than one nail-headed pin was often cast, as seen at Whithorn where one mould was used for casting five or six pins, similar to three copper alloy pins from the site. This, perhaps, suggests a considerable volume of production. Surviving moulds also demonstrate that different objects were made alongside nail-headed pins in the same mould. For example, at Mote of Mark, the smith also made a knobbed pin. At Dunollie, the smith used the same mould to make a ring.

Thistle- headed pin

This is a very long-lived type and occurs on Late Iron Age sites, such as Buiston, Ayrshire and Burrian, Orkney and in Norse contexts from Jarlshof, Shetland (Figure 29). Two sites have produced evidence for their production, Mote of Mark, Kirkcudbrightshire and Dunadd, Argyll. No comparable thistle-headed pins are known from Scotland, though a pin from North Ronaldsay, Orkney (NMS X. FC 181) is relatively similar. A thistle-headed pin very similar to that which was made at the Mote of Mark is represented at Lough Faughan crannog, Co Down a site which had produced no material later than the 9th century (D. Longley pers. comm.).

Stick pins with ball heads

This group has been discussed by Foster (1989a, 77-8, group 6a) who differentiates between 'ball heads' and 'ball heads with flat tops' (Figure 30). Although the type appears to have Roman origins, around the late 3rd and 4th centuries, Foster (1989a, 77-8) argues that, at least in Scotland, the type gained wide popularity during the Late Iron Age, found in 7th and 8th centuries AD, as well as Norse, contexts. Bone examples are known from the Late Iron Age horizons at the Orcadian sites at

Brough of Birsay, Pool, and Buckquoy. However, that the type may be in use slightly earlier is shown by metal examples from Traprain Law, East Lothian.

Sites with evidence for the production of stick pins with ball-heads are Dunadd, Argyll; Dunollie, Argyll; Brough of Birsay, Orkney; and Mote of Mark, Kirkcudbrightshire. The Dunadd examples were radiocarbon dated to the 7th century and the Dunollie example was dated to around the 7th and 10th centuries AD. A mould from Mote of Mark only the shank survives of the left hand pin, but the right has a doorknob head with a shank between it and the shaft. The 'doorknob' headed pin from Mote of Mark is without ready parallel in the Celtic areas of Britain and Ireland, though the type is generally similar to various bone pins, and a bone variant is found in an Anglo-Saxon context at Whitby, Yorkshire (Peers & Radford, 1943, fig. 21).

Stick pins with collared ball or elliptical heads

These are collared variations of ball-headed stick pins (Figure 31). Elliptical headed versions occur in metal from the Western Isles and bone at Freswick Links (discussed by Foster 1989a, 98, group 26). Five sites have produced evidence for their manufacture, from Brough of Birsay, Orkney, Clatchard Craig, Fife, Mote of Mark, Kirkcudbrightshire; Skaill, Orkney and Dunollie, Argyll. Brough of Birsay has produced a mould for the manufacture of a stick pin with a collared elliptical head.

Stick pins with disc-heads (some with collars)

These pins have been discussed by numerous scholars. Stevenson (1955) claimed a Roman origin for this type, though has been challenged (MacGregor 1985, 119; Foster 1989a, 83-4, group 9a). Two sites have produced moulds for their manufacture: Mote of Mark, Kirkcudbrightshire and Dunadd, Argyll. Two of the disc-heads from Mote of Mark (NMS X.HH 155; 169) are for disc-headed pin with a domical collar. Similar pins have been found at Lagore, Co. Meath (Hencken 1950, fig. 16,

226) - the Lagore pin has a setting in the head, which was possibly the case with an example from Mote of Mark (Figure 32).

Stick pin with domed-head

This is a metal, bone and antler form occurring in Late Iron Age and Norse levels (summarised in Foster 1989a, 95, group 25). This group seems to encompass several similar but chronologically distinct types. For example, there are several examples from Traprain yet also examples from later levels at Brough of Birsay. The only evidence of manufacture is at Dunadd, Argyll.

'Hippocamp' stick pin

A mould from Mote of Mark, Kirkcudbrightshire has a pair of confronted hippocamp-like creatures on either side of a boss, with some decoration, possibly interlaced (Figure 33; Curle 1914, fig. 14, 3; HH 154). Laing (1993, 35) sees these recalling the S-dragons of Pictish sculpture, as on the class II stone from Skinnet, Caithness (Thomas 1961, fig. 13, no 17) or perhaps the Quoit brooch style strap distributor from Croydon (Evison 1965, fig. 30, e). Longley (pers. comm.) suggests the closest parallel can be found in Anglo-Saxon England. A garnet inlaid pin with a pair of confronted bird heads comes from Wingham (Smith 1923, fig. 63).

'Pictish' pin

A pin mould from the recent excavations at Dunadd, Argyll (1804) is intriguing (Figure 34). As Lane and Campbell (2000, 125) comment, the head is broken but its splaying convex sides suggest that it was originally fan- or axe-shaped. Comparing the pin mould to a pin from Machrihanish, Kintyre Batey (1990) has suggested an 8th century date. Other lozenge headed pins are found in Viking contexts at Brough of Birsay (Curle 1982, fig. 39, nos. 425, 428), Birka (ibid., 84) and York (Waterman 1959, fig. 11, 15) although a simple mould for an undecorated version was found at

Armagh, and with radiocarbon dates showing a pre-Viking date (Brown & Harper 1984, 91, fig. 17). There are also Anglo-Saxon pins which do have expanding heads of the same shape as the Dunadd mould including one from Wingham, Kent (Smith 1923, fig. 63).

More ornate stick pins

Sites, such as Brough of Birsay, Orkney, have produced evidence for the manufacture of more ornate pins. For example, a mould from Dundurn, Perthshire was for casting a stick pin with an ornate head in the form of a central oval with four projecting bosses in a square array (Figure 35). A broadly similar ornament is seen on the head of a gilt bronze pin from 8th century Coileagan an Udail (Crawford & Switsur 1977, 131, pl. 14a). Alcock, Alcock & Driscoll (1989; microfiche) notes that the mould comes from the remnants of hearth sweeping, which dates to around AD 600 to 700. Although unparalleled as a dress pin this design would not look out of place in an assemblage of late Iron Age metalwork (Foster 1989a, 104).

Mounts and fittings

Sites, for example, Bac Mhic Connain, North Uist, Traprain Law, East Lothian and Dirleton Crag Fort, East Lothian, have produced evidence of ambiguous objects that find no ready parallel. They appear to be decorative mounts or fittings (Plate 8).

Dress Fasteners

One site, Traprain Law, East Lothian, has produced definitive evidence for an object that can be legitimately classed as a dress fastener (Plate 9; Figure 36). The fastener is of the button-and-loop type discussed by Wild (1970). The type are generally date to the Middle Iron Age, there being no evidence for their manufacture after the 2nd century AD (ibid., 146).

Tacks, studs or rivets

Tacks may have been used to attach items to leatherwork or simply to decorate or strengthen the surface of leatherwork (Figure 37). Two sites have produced evidence for the manufacture of tacks or rivets, Mote of Mark, Kirkcudbrightshire and Brough of Birsay, Orkney (38). At both sites tacks or rivets were cast in multiple strips, to be separated and trimmed for individual use. The head size ranges from between 6 and 10mm in diameter. The average shaft length is 8mm. They may have been used to attach items to leatherwork or simply to decorate or strengthen the surface of leatherwork.

Discs

Decorated

Two sites, Dunadd, Argyll and Eilean Olabhat, South Uist have produced evidence for the manufacture of decorative discs, which were presumably mounts of some kind (Figure 38). The decorative large disc from Eilean Olabhat is damaged but enough remains to show that the flat disc had a border containing three bosses decorated with spiral patterns which flare out across the flat field between the bosses and probably formed a triskele pattern. The Olabhat disc was probably meant to be attached to a flat surface and there are examples of similar simple discs with raised decoration on the Copenhagen house shrine (Youngs 1989, no.131), though the Olabhat disc need not necessarily have been attached to an ecclesiastic item, as most of these mounts seem to have more complex decoration (E. Campbell pers. comm.). Although the Olabhat disc recalls Early Iron

Age examples the Olabhat disc can be paralleled closely with the one from the 7th century context at Dunadd, Argyll. There is little other typological evidence for the date of the Olabhat disc, except for the Dunadd parallel and the fact that most flat disks seem to be of 6th to 8th-century date (E. Campbell pers. comm.).

Perhaps three moulds from Dunadd, Argyll were for the production of decorative discs. The most elaborate (453) has been discussed by Campbell and Lane (1993b, 59-60, fig. 6.11) and Lane and Campbell (2000, 128, 130, illus. 4.34). The disc has three snail bosses around a central boss surrounded by trumpet spirals. The disc mould is dated to the 7th century.

Plain

Moulds for the manufacture of plain discs have been found at Dunadd, Argyll, both from the old and more recent excavations (e.g. Lane & Campbell 2000, nos. 223, 673, 1196, and 1293). Some are similar to the large disc enclosing the basal escutcheon on the Garton Station hanging bowl (Youngs 1989, no.32). Other, possible, plain discs are also known from Clatchard Craig, Fife and Dunollie, Oban.

Penannular brooches

Understandings of penannular brooches owe a great deal to the seminal works of Kilbride-Jones (1936a; 1937b; 1980) and Fowler (1960; 1963). Kilbride-Jones (1936a; 1937b) discussed 'zoomorphic' penannular brooches; Fowler devised a scheme for all penannular brooches, both of the Iron Age (1960) and the post-Roman period (1963), the majority of Early Historic brooches confined to E, F, G & H (with a few survivors of A5, D7 and B3). Work since has refined these larger groups, particularly Kilbride-Jones' (1980b), Graham-Campbell's (1991) and Newman's (1989; 1990) work on type E and F and Graham-Campbell's (1976) and Dickinson's (1982) scheme for type G. The scheme set out by Fowler (1960; 1963 & Laing 1993) is largely followed here, with subsequent revisions and subdivisions taken into account.

Type D7

Type D7 penannular brooches have squared terminals with castellations or ribs (Figure 39). The type is believed to be of Romano-British origin, developing in the late 4th century AD in southern England and subsequently spread west to Scotland and Ireland (Fowler 1963, 113). Like many other brooches it appears to have had a long life lasting until the 7th century AD (Duncan 1982, 134). The only Scottish mould for the production of such a brooch is from Dunadd, Argyll.

Type F / G / H?

A mould from Gurness, Orkney has been described as a mould for the production of the barrel-pinhead of brooch of Fowler's (1963, 105-6) Class F2 (Figure 40). There is no generally accepted typology or dating for such brooches at present. Kilbride-Jones (1936a, 133) suggested a date in the late 2nd century AD. Fowler (1963, 103-5) suggests a later date around the 4th century AD, a date with which Longley (1975, 8) concurs. Close-Brooks (1987) suggests the Gurness mould dates to around the later 5th, 6th or 7th centuries AD. Penannular brooches with barrel-shaped terminals are the largest sub-type of penannular brooches with 'zoomorphic terminals'. However barrel-shaped pins also occur on F brooches with elaborately decorated terminals (Kilbride-Jones 1937b, figs. 18-20), on a F3 example from Ballinderry (Newman 1990, 8; fig. 1) and on Class H brooches (Fowler 1963, fig. 5, 1), No example of the decorated F2 type is known from Scotland, though there are several simpler Class F brooches, including that from Gurness itself (Hedges 1987, 218; fig 2.39) and from Pinhoulland, Shetland (Kilbride-Jones 1936a, fig 2, 5). The find spots of F2 brooches are almost entirely confined to Ireland with an almost complete absence from western Scotland and Wales.

Type F3

A mould from the earlier excavations at Dunadd was for the production of a type F3 penannular brooch. Newman (1989; 1990) suggests that this type dates to the late 6th or early 7th century and is perhaps an Irish type diffused to Scotland (Figure 41).

Type G

Type G pennanular brooches form the largest mainland group (Savory 1956; Fowler 1960; 1963; Dickinson 1982, 41). Broadly speaking their terminals are squared or faceted with a central dot or diamond containing four dots (Fowler 1963; Laing 1975, 306). Savory and Fowler highlighted the wide currency of the type, both geographically and chronologically, with a strong clustering in Wales, the West Country and the Midlands, in contexts ranging from the late to post-Roman period through to the Anglo-Saxon and later periods. There appeared to be little changes in the brooch's design over this half millennium.

This apparent inconsistency of an extended production period unmarked by typological change has led many to challenge the original schemes and subsequently led to a heated debate, of which there is still no consensus. This was stoked, in part, by Fowler's original scheme where she did not define her brooch types precisely and brought together superficially similar brooches from throughout Britain and Ireland and treated them as one contemporaneous group. Laing (1975a) and Longley (1975) argue for contemporaneous production in Scotland and England, with a starting date around the 5th century AD. However, neither Laing nor Longley seriously examined the assumption that type G was a single compact group by returning to the raw data, leading to criticisms by Graham-Campbell (1976a; 1976b). Graham-Campbell subsequently argued that at least four groups could be recognised and suggested that nearly all those found in northern Ireland and western Scotland could be seen as developments of a later period, around the 7th to 9th centuries AD. This left those brooches concentrated in Wales, the West Country and West Midlands as an earlier, late and sub-Roman group.

The typological baton was picked up by Dickinson (1982) who also distinguished four main groups of G brooches, but with a series of 8 sub-types within class G1. Dickson disagreed with Graham-Campbell's classifications on a number of points (ibid., 44-6). That said, she believed that clear distinctions of type in date and distribution could be confirmed, notably between those from Scotland and northern Ireland (7th to 9th centuries) and those from further south (4th? to 6th centuries AD). However, her classification has not met with complete approval particularly as several of her sub-groups comprise one brooch only (Groups G1.2, G1.3) or two (G1.4, G1.7, and G1.8). This classification was then challenged by Laing (1993, 15-6) who argued that the subgroups of G1 were not meaningful statistically, and also disputed her grouping. In the same study it was proposed that a simpler scheme should be followed for the G penannulars, with four groups re-defined as Ga, b, c, and d. Of these the Ga brooches (Dickinson's G1) are not represented at, for example, Mote of Mark, and appear to have been late Roman types which survived into the 5th century. Of Laing's 1993 scheme neither Gb (most of Dickinson's G3) nor Gd (variants of the G3 group) are represented at the Mote of Mark. All in all, these discussions have led to a perplexing range of classifications (Table 3).

Graham-Campbell (1976)	Dickinson (1982)	Laing (1993)
G1	G1 (and sub groups)	Ga
G2	G2	Gc
G3	G3	Gb
G4	G4	Gc

Table 3: Different typologies of Class G penannular brooches

It is important to realise that classifications are generally based on complete finished objects, that is, the brooches. It is difficult to apply to moulds, where only one side of the cast surface survives (see Lane & Campbell 2000, 111). Graham-Campbell's (1976a) and Dickinson's (1982) classifications are followed here.

Type G1 (Laing's Ga)

Graham-Campbell (1976a, 279) defines type G1 brooches as having *squared* terminals, faceted on the upper face only containing a sunken hole or impressed with one to four small circles; the hoop is generally ribbed, and the pin short, not more than x1.5 the hoop diameter (Figure 42). Dickinson (1982) on the other hand concentrated on 8 variables. Laing (1993, 16) views two facets as being of particular importance: terminals *square* or *rectangular* in basic profile and cross-section and *faceting* of either all eight or only the upper four corners of the terminals which 'produces lozenge-shaped planes on respectively either top, bottom and three exterior sides, or on the top alone' (Dickinson 1982, 46). Dickinson has reviewed the dating of these brooches and reached the conclusion that they may begin before the 5th century, possibly in Wales, but did not become common in England before the 6th century AD.

Although these classifications are useful they are not important here, there are no known moulds for the manufacture of this type of brooch from Scotland (Dickinson 1982, 59, fig 1).

Type G2 (Laing's Gc)

Graham-Campbell (op. cit.) defines Type G2 brooches as having *lozenge* shaped terminals (*unfaceted*), containing four raised dots in a field with a raised border, probably designed to take enamel (Figure 43). Dating evidence is sparse and relies on the only site with moulds for their manufacture, Mote of Mark, Kirkcudbrightshire. The moulds were associated with E ware pottery and continental white-trailed glass indicative of a date between the late 6th and 7th centuries AD (see Appendix A; Duncan 1982, 134). These moulds belong to a quite different group made at Dunadd (G3; see below). Whether this relates to a difference between 'British' and 'Irish' areas is conjectural, but the only other brooch from a north British area, Castle Hill, also lacks transverse ribs. At present, this type does not occur in Ireland.

Type G3 (Laing's Gb)

Dickinson (1982) defines Type G3 brooches as having *squared* terminals, faceted on upper face only with a central sunken lozenge containing four raised pellets. A common feature is the *presence of a rib at one or both ends of the terminals* and the *hoops are always undecorated*. The pin may be twice, or more, of the hoop diameter (Figure 44). Regards actual brooches, two examples have been found at Dunadd, Argyll and three further Scottish examples are known from Balevullin, North Uist, and Skye. The most famous example is from Trewhiddle, Cornwall. There are three unprovenanced examples in the Ulster Museum (Dickinson 1982, 58, no 43-5) and one from Ballynass Bay, Cloghaneely, Co Donegal dates to around the 7th to 12th centuries AD (Dickinson 1982, 44).

Lane and Campbell (2000, 106-112) have discussed this type at length and their account need not be repeated in full here. Thirty fragments of type G moulds and one which may be type G or type H were recorded from the recent excavations. The brooches produced have affinities with Type G3 brooches (Lane & Campbell 2000, 106). There is therefore a minimum of 16 and maximum of 34 Type G brooches represented. Comparison of the valves indicates that the true number is towards the top of the range, perhaps 25 brooches. In addition there are 4 or 5 from the previous excavations. This total of around 30 brooches is twice as many as previously recorded by Dickinson for all the later 'non-G1' brooches. The brooches fall into two main size groups, one with diameters from 18-25mm, the others with diameters of 30-36 mm. The hoop widths correspond to the two size groups, the smaller hoops being 2-3 mm. wide, the larger 4-6 mm. Both size groups lie outside Dickinson's definition of the G3 type - which are between 36mm and 43mm in hoop diameter, though the 'G3 related' brooches are within the Dunadd group (ibid., 44-6). The hoops are always undecorated, in contrast to many earlier G1 brooches.

The terminals are always square-ended, but the shape varies from trapezoidal to sub-pentagonal depending on the sharpness of the faceting on the outer face. There is always a central lozenge, outlined by the four sloping corner facets of varying sharpness. (perhaps originally a cross) on the surface of a lozenge which is not sunken. The only other decorative feature found on these brooches is an interlaced knot on the facets of 915. Interlace decoration is not found on any other Type G brooch, and it is surely no coincidence that 915 is much larger than the other Dunadd type G brooches.

The recent excavations at Dunadd, Argyll have important implications for understandings of Type G brooches. Stratigraphically and spatially the Dunadd Type G moulds form a close-knit group of objects and the implication is that they are a contemporary collection of moulds. If this is the case, and the general similarity of the overall form strongly supports this view, then the wide variation of types of decoration illustrates the dangers of using such features as chronological or typological indicators. The excavations illustrate that these variant G types were being produced during the 7th century AD.

Furthermore, there is a problem with their perceived date. Graham-Campbell (1976b, 279) suggests that the Trewhiddle brooch and the assumed associations with the coin hoard (deposited AD 872-5) and Irish parallels indicates that G3 brooches fit well in a 9th century context. However, the supposed coin dating of the hoard is by no means secure, nor is the G brooch necessarily associated with the coins (Webster & Backhouse 1991, 272). Two other sites have now produced evidence of production of G3 brooches: Dooey (O' Ríordáin & Rynne 1961 fig. 7; Youngs 1989, no.180) and Moynagh Lough crannog (Youngs 1989, no.164; Bradley 1993, 78, fig. 8.4 no 1209). Both are related to the Dunadd moulds. One mould from Moynagh Lough, like the Dunadd moulds, dates to the late 6th/7th century AD, refined to Phase X, c 720-748 (Bradley 1993, 76-80).

Type G4

These brooches have squared terminals, faceted to leave a plain lozenge one each face; the hoop is plain. There are no moulds from Scotland.

Type H

Three sites - Clatchard Craig, Fife, Brough of Birsay, Orkney and Dunadd, Argyll - have produced evidence for the manufacture of Type H brooches (Figure 46). Laing (1993, 47, no 18; NMS X.HC 118) suggested that a mould from Mote of Mark may have been for a Class H. This is not a brooch mould, but a mould for a decorative panel. Two types of moulds are apparent; those for the production of large and small brooches (Figures 45 & 46).

Many of the moulds for larger brooches show empty cells which presumably would have been filled with decorative filigree, granular ornament, or stamped foil. Large highly decorated penannular brooches were produced in both Pictish and Irish areas are conventionally dated to the 8th and 9th centuries. As Close-Brooks (1986, 162-3) highlights the larger brooch fragments (47-9) from Clatchard Craig have features relating them to brooches in the St. Ninian's Isle hoard. Penannular brooches with larger triangular terminals are found in the later Pictish series described by Wilson (1973). The outline of the pattern on the large terminals from Clatchard Craig is similar to an example from Cluny Castle (Wilson 1973). All the brooches with applied filigree so far known are of silver, so the find of the silver ingot in the same general context as the large brooch moulds from Clatchard Craig may be significant (Close-Brooks 1986, 163).

Stevenson (1974, 36-8) has commented on the development in the 8th to 9th centuries of pseudo-penannular brooches in Ireland and penannular brooches in Scotland, after the examples of Tara and Hunterston, which he dates to around AD 700. As the first millennium AD progressed terminal shapes other than triangular became popular; only a few larger brooches have triangular terminals for example from the St. Ninian's Isle hoard (Wilson 1973, pls. 31 33c), Croy (ibid., pl. 38b), Aberdeenshire (ibid. pl. 44c), near Perth (ibid., pl. 43) and Canterbury, Kent (ibid., pl. 44d). The Clatchard moulds do not seem to be for the latest brooches in the series, such as the new brooch from Aldclune Perthshire (Stevenson 1985), but cannot otherwise be more closely dated than to the 8th century AD.

Once again, the recent work at Dunadd, Argyll has important bearing on discussion of typology, chronology and provenance. As Lane & Campbell (2000, 118-9) illustrate the Dunadd moulds show characteristics of both the 'Pictish' and 'Irish' series. One mould (1636) has a cusped terminal end, a series of cells surrounded by a border and a central circular setting. This arrangement closely resembles the aforementioned mould from Clatchard Craig. Stratigraphically it is certain that these large brooches were being produced at Dunadd in the 7th century AD. This places the Dunadd moulds earlier than the generally accepted starting point for the large decorated brooches.

The moulds for the production of smaller type H brooches with triangular terminals, for example from Clatchard Craig, Fife and Brough of Birsay, Orkney are generally similar to a small brooch with triangular terminals from North Uist (Close-Brooks & Maxwell 1974, fig. 1, no. 959). Close-Brooks (1986, 162) has suggested that these small brooches are probably contemporary and cheaper versions of large brooches with more elaborate triangular terminals. The skein pattern on two of the moulds from Clatchard Craig is a simple motif, found only occasionally on metalwork, such as Co. Cavan brooch (Cone 1977, 141-2, no 41) or on an Anglo-Saxon disc from White Low, Derbyshire (Ozanne 1962, 27, fig. 11). A comparable Brough of Birsay brooch also had a simple raised motif, a triple loop (Curle 1982, fig. 11, no 305).

Analysis of the moulds shows that there are notable variations across sites. For example the triangular terminals of the small brooches on Clatchard Craig and the large brooch do not flare inwards like those on the two brooches from the St. Ninian's Isle hoard and the small brooches on the Brough of Birsay moulds.

The moulds also suggest casting differences of the small brooches. At Clatchard Craig more than one brooch was often made in one mould. Often, the ingate was at the top of the brooch; other times it was at the bottom. Keying on the moulds were small V-shaped nicks on the sides. In contrast, the surviving moulds at Birsay, Orkney suggest that only one brooch was cast at a time with the ingate always at the top of the brooch. Keying was different from those at Clatchard Craig, being pronounced stab marks.

Type Ja

Fowler (1963, 109) defined all brooches with expanded, flattened terminals as class H. Laing (1993, 18-9) re-defined this group as two separate traditions, Class H (with flaring terminals) and Class J (with rounded terminals). Only one site has produced evidence for the manufacture of a Type Ja brooch: Mote of Mark, Kirkcudbrightshire (Figure 47). A mould from Dunadd, Argyll was classed by Laing (1993, 58, no. 50) as being for the production of a Type Ja brooch. Although it bears a strong resemblance to small Ja brooches it is different and not classed by Lane & Campbell (2000, 120-1; fig. 4.24, no. 774) as a Type Ja brooch.

All of the Mote of Mark brooch moulds with rounded terminals belong with Class J. There are two certain moulds for class Ja. One (1131) has a terminal which is decorated with four pellets within a ring and the other (1121) has an inner circle containing a pellet and a simple cusp separating terminal and hoop. Both these seem to be related to two surviving brooches, one from Walls, Shetland (NMS X. HD 446) which originally contained red enamel (Laing, 1993, 42), and one from Kildonan, Argyll (Fairhurst, 1939, 224; fig. 10), the latter dated by the excavator to the 7th century AD.

Type Jb

Class Jb brooches differ from Type Ja, having more elaborately decorated terminals (Figure 48). One site, Clatchard Craig, Fife, has evidence for the manufacture of Type Jb brooches. It is possible that a mould from Mote of Mark (1116) may also be part of this group, though the mould is too incomplete to make identification certain. The Clatchard Craig moulds are related to brooches from the 9th century Croy hoard and Ervey Crannog, Co Meath (Wilson 1973, pls. 38a, 42e). Stevenson (1974, 36) sees these brooches, with their disc-ended terminals, as coming late in the Pictish series. A silver terminal from Jarlshof, Shetland (NMS X.HSA 4163A), probably of the Viking, may be part of this series (Laing 1993, no.53).

Type Jc

These brooches have terminals in which the central element is circular and distinctive lobes (Figure 49). Some examples have stylised bird heads pointing inwards on the lobed terminals Classic examples come from the St. Ninian's Isle hoard (Wilson 1973).

Wilson (1973, 87-8) has argued that the distribution, most commonly found in north-east Scotland and the northern Isles, particularly St. Ninian's Isle, suggests that the series should be labelled 'Pictish'. While this seems reasonable the find from Cnoc a' Comdhalach shows that the type was after all being produced outwith the traditional 'Pictish' heartland. That this should be so is little surprise, actual examples having been found in Machrins, Colonsay (Anderson 1907, 441, fig. 5); Loch Glashlan, Argyll (Wilson 1973, 89), Valtos, Lewis: pin only (Gibson 1934, 430) as well as 3 finds from Ireland (Wilson 1973, 90).

The type is usually dated to around the 8th century AD, based largely on the work by Wilson (1973). Wilson's arguments are based on two assumptions. First, that other 'Pictish' hoards can be used as analogous dating tools, particularly the Croy hoard which contained the fragmentary remains of three, possibly four, brooches as well as two coins, one dated to AD 796-805 and the other AD 843-8 (Wilson 1973, 98). Typology and art-history also plays and important role, particularly comparisons with Northumbrian and Anglian metalwork of the 8th century (ibid., 97-102). Wilson believes that the Tara and Hunterston brooches are earlier and that they influenced the later 'Pictish' series (ibid., 85-6).

Two sites have produced evidence for the production of Type Jc brooches, Cnoc a Comdhalach, North Uist and Brough of Birsay, Orkney. The latter sites also produced a brooch of the same type (Curle 1982, 28, fig. 15, no. 452). The object produced at the Cnoc a' Comdhalach is similar to the find from Machrins, Colonsay (Wilson 1973, pl. 46b). Although the Brough of Birsay mould is often quoted as being of the 'St Ninian type' (Wilson 1973; Curle 1982) the brooch that would have been produced is far smaller than any of the known Pictish brooches with lobed terminals. That said, the connection with the St. Ninian's Isle Treasure seems quite secure, as demonstrated by another mould (Curle 1982, 27, no 300) which is for the production of an object similar to one of the sword chapes, albeit smaller (Curle 1982, fig. 15, no 452).

Laing (1993, 64, no. 73) has suggested that a mould from the recent excavations at Dunadd, Argyll (Lane & Campbell 2000, 119-120; fig. 4.24, no. 1594) may be for the production of a type Jc penannular brooch . This suggestion is rejected by Lane & Campbell (2000, 119-20). The similarity is only superficial as the Dunadd brooch terminals are tear-shaped rather than circular, and have a cusp at the junction of the hoop and terminal. Members of the Pictish group also always have concentric rings within the terminal, often with beaded decoration, while the Dunadd brooch terminal has a sunken interior, as if for enamel.

Bird-headed brooches (including Type Kb)

This class of brooch comprises brooches with confronted bird's heads where the terminals are so designed that the wearer of the brooch looking down on it would get the correct view (Figure 50). These are known in Britain, not from actual brooches, but from moulds from Dunadd, Argyll and Brough of Birsay. Although Laing (1993, 64-6) discusses these objects as one group (Kb) there are clear differences between types, particularly those made at Dunadd and Brough of Birsay. These have been well rehearsed by Lane & Campbell (2000, 114-8). The important difference is that on the

Dunadd moulds, only one half of the bird's beak is visible (as if the beak was closed), while on the Brough of Birsay moulds two beaks are visible (as if the beak was open).

There are four, possibly five, broch moulds from Brough of Birsay where the terminal is formed from a single bird or animal head. Each terminal was modelled on the head of a large-eyed crested young bird with wide-open beak confronting that of the other. The base of each head forms a cusp at its junction with the hoop and each bird's eye forms the central setting of the terminal. Although the bird-headed motifs is fairly common in Pictish brooches, for example at Rogart, (Wilson 1973, pl 36) there are no particularly close comparisons.

There are seven moulds for bird-headed brooches from Dunadd. These have been discussed by Lane & Campbell (2000, 114-118) and the following discussion is based on their study. The moulds, like the rest of the assemblage, date to the later 7th century AD. The brooches show two types of bird head. In one, the eye fills the entire head (653, 455, 2215) and may have been intended to take an inset of amber, glass or stone. In the second type (1098, 752) the eye is of natural dimensions and die head is separated from the hoop by a transverse rib. The beaks are hooked in typical raptor fashion and almost certainly represent eagles. This motif is clearly derived from Germanic Style II ornamentation, where such bird heads are a common feature (Speake 1980, 82). Amongst the surviving Irish and Scottish metalwork only a brooch from Clogh, Co. Antrim is close to the Dunadd moulds (Smith 1923, fig. 174; Youngs 1989, no.182). More distantly related is a brooch reputedly from Lagore, Co. Meath which has long incurving beaks, not raptor shaped, and a small eye (Hencken 1950, fig. l0a) and a similar form from Moynagh Lough crannog (Bradley pers. comm.).

In considering the origins of the Dunadd bird heads, Stevenson's (1974) discussion of the Hunterston brooch is crucial. The following is adapted from Lane & Campbell (2000, 116-7, 245-6). Stevenson recognised that the four eagle heads in the central design of the terminals were of classic Style II affinities, sharing the right angled line behind the head which often denotes the body in disassociated heads (Stevenson 1974., 30). He believed that the use of the motif illustrated that the maker of the Hunterston brooch was trained in an Anglo-Saxon tradition. Stevenson believed that the motif then disappeared from Celtic metalwork and accounts for the Clogh brooch as a 9th-century '... unconnected reappearance as modified disc terminals' (ibid., 35 no.57). Graham-Campbell (1974, 55) also saw the Clogh brooch as being derived from Pictish discoidal terminal brooches of the 9th century.

These conclusions have to be modified in the light of the new Dunadd evidence. The presence of the two types of bird headed moulds at Dunadd, in apparently contemporary 7th-century deposits, shows that the bird head terminal is not an adaptation of a disc terminal. The large eye forms may represent a fusion between an unknown type of Dalriadic disc ended brooch and an eagle motif, but one mould (1098) shows that Style II-related eagle-heads were being produced on the site. Style II bird heads are fairly common on Anglo-Saxon metalwork and include both small- and large-eyed types, often, but not always, with the right-angled line defining the head (Speake 1980, figs. 1-17). Some of the mounts illustrated by Speake seem very close to the Dunadd large-eyed form (ibid., fig. 17c, j). The most significant parallel to the Dunadd brooches is provided by three brooches from Yorkshire, two from Occaney Beck (Speake 1980, fig. 11m & o) and one in silver from Sewerby (Hirst 1985, fig. 41). The Sewerby brooch is dated on stylistic grounds to the first half of the 7th century or later (ibid., 57). Indeed, the Sewerby brooch in particular is so close to one mould from Dunadd (1098) that it is reasonable to assume that a similar type of brooch acted as the model, though adapted by a craftsman working in the Celtic penannular brooch tradition.

It seems clear that bird headed brooches of forms immediately antecedent to the Dunadd brooches were in use in Northumbria in the 7th century. Given the presence of undoubted fragments of 7th-century Anglo-Saxon metalwork and buckle moulds of Anglo-Saxon form in the same deposits as the bird headed brooch moulds, this connection does not seem unreasonable. The 7th century date, then, for the bird headed brooches implies that Celtic metalworkers were incorporating Anglo-Saxon motifs and techniques in their repertoire before Stevenson's date of C. AD 700 for the Hunterston brooch (see Campbell & Lane 1993b; Lane & Campbell 2000, 243-247)

Miscellaneous

There are a number of mould fragments, particularly from Brough of Birsay, Orkney, Dunadd, Argyll and Mote of Mark, Kirkcudbrightshire where not enough survives to be sure of the original brooch form, or aspects of the surviving mould suggest the manufacture of brooches which are not easily paralleled.

For example, one mould, from Dunadd, Argyll (454) is for the manufacture of a brooch with triangular bossed terminals which has no close parallels (Figure 51). In some ways it is similar to the brooch from Rogart (see Graham-Campbell 1975, pl. 57b, 35-6) although the Dunadd mould is different in that it has triangular terminals with the apices pointing towards each other. This shape of terminal is unique amongst penannulars, as is the linking motif between the bosses. The Dunadd mould may also be similar to a mould from Mote of Mark, Kirkcudbrightshire (Lane & Campbell 2000, 121).

Another mould from Dunadd, Argyll (Lane & Campbell 2000, 119-120, fig. 4.24, no. 1594) is also noteworthy. As argued above while there may be some connection between the Dunadd brooch and the Pictish series it is not a close one. The St. Ninian's Isle members of the series are dated to the second half of the 8th century (ibid., 95). The Dunadd brooch, with its simpler form may well be earlier than these. Similar lunate cusps are present on a hanging bowl mount from Whitby Abbey (Youngs 1989, no.49). The only other brooch with sunken tear-shaped terminals is from Moylarg crannog, Antrim (Buick 1894, 319). This brooch does have enamel in the terminals and has a simple bent-over pin. The hoop section is round and there is no hoop panel, two characteristics it shares with the mould from Dunadd.

Brooches or rings

Sites with evidence for the production of penannular brooches often have broken moulds where only part of a ring survives, for example at Clatchard Craig, Fife and Dunadd, Argyll. Some of these are likely to be part of brooch hoops. Other sites, where there is no evidence for the manufacture of brooches, also have evidence of moulds with parts of rings where it is impossible to be sure what was made. This accounts for a large proportion of the assemblage from Mine Howe, Orkney and a few examples from Portmahomack, Ross & Cromarty and Traprain Law, East Lothian.

When the ring is almost complete it is possible to distinguish actual rings from brooches (Figure 52). There are possible examples from Dunadd, Argyll (301, 307, 315, 960, 1816/6, 1522) showing production of rings in a variety of sizes. Some may have been for loose-ringed pins (Lane & Campbell 2000, 130-3). Moulds for the manufacture of finger rings are also known from Brough of Birsay, Orkney.

Decorative plates and bosses

A great number of moulds from Mote of Mark, Kirkcudbrightshire were employed in the manufacture of decorative objects (Figure 53). These are currently being prepared for publication by Laing & Longley, who have kindly sent me a draft of their manuscript on which the following discussion and catalogue is based.

Seventy-nine moulds may be broadly classified as being for the manufacture of decorative plates, the plain backs of such objects, and related items. A further eight moulds were used to cast bosses. The precise nature of the majority of these objects cannot now be determined because of the fragmentary condition of the moulds. Nevertheless, the character of the decoration is generally clear enough and, in some instances, the objects themselves may be reconstructed. Certain of the objects cast in these moulds were certainly roundels and others were axe-blade plates; Horse 'brasses' are one, but not the only, interpretation of the roundels and axe-blade plates (Carver 1998, 110-113, pl. 5). One rectangular panel with pelta and circle decoration in a cruciform arrangement could be for the manufacture of an applied decoration for the cover of a reliquary or gospel book. On the other hand, the plate may have been intended to take enamel - enamelled buckles are known from Ireland, for example from Rathtinaun, Lough Gara, Co. Sligo (Laing 1975, 333). At least two moulds would appear to be intended to cast components of crosses with arcs at the junction of the arms. A mount-mould with single-strand interlace which is clearly for a cross is represented in the assemblage of material from Hartlepool, Tyne and Wear, a Northumbrian monastery, and there dated to the 7th or 8th century (Cramp & Daniels 1987; Webster & Backhouse 1991, fig. 106a). The centre of the cross had a beaded ring, again reminiscent of the ring on one of the moulds from Mote of Mark (1103).

The predominant decoration is a tight, regular, interlace, often three-stranded and apparently symmetrical. A number of the pieces were bordered with running scrolls, pellet and tramlines, plait and rope-work or a combination of these motifs. Both curvilinear and straight edges to the designs are represented. Other motifs which occur, but less frequently, include palmettes and related 'late Celtic' designs.

Fifty-two moulds for curvilinear panels were recorded, of which thirty-six are decorated. Interlace, occurs on twenty-two moulds. Both triple and single strand interlace is represented. Four of the interlace decorated moulds have rows of pellets as an associated decorative motif. In three instances the pellets are constrained by a 'tramline' bands as a border. Two of these moulds have single cable ropework as an additional bordering zone. One mould uses cabling in combination with plaitwork-between-tramlines as a border. There are fourteen moulds for curvilinear panels bearing miscellaneous decorative features other than interlace.

Twenty-three moulds for rectilinear panels were recorded, of which twelve are decorated and nine are plain. Two are insufficiently clear to allow determination. Eight of the decorated moulds carry interlace which, in common with the moulds for curvilinear panels, is predominantly tight. Three of these moulds have clear three-strand interlace although the same caveat applies with regard to abrasion of the casting surface as was noted in respect of the curvilinear panels.

Eight moulds for casting bosses were recorded. The sizes range between 12mm and 18mm diameter. Four are decorated. One fragmentary mould (1206) carries a tight, three-strand interlace on what would appear to be intended as a domed boss. Another mould (1136) has the impression of two domed bosses, one of which carries a running scroll border. The remaining two decorated boss moulds may be components of more complex object moulds. One (1116) has a design of concentric ribbing around an inner ring of pellets which encloses a circular raised setting, perhaps for a precious stone. There is just a hint of a second circular component adjacent to the first. Item 1221 is very fragmentary. The design would appear to comprise a stepped circular boss with a perpendicular herringbone projection. The plain boss moulds include one stepped boss, two domed bosses (one with a small oval notch or inset) and a very abraded mould for a pair of flattened domes. Where valves can be differentiated, all the boss moulds would seem to be primary valves.

The majority of the moulds for curvilinear and rectilinear panels were recovered during the 1913 season of excavations and it is now difficult to assign a precise context to them. Nevertheless, Curle observed that '... all the pieces of moulds for the richest ornaments', including the axe-blade plates (1094 & 1104) and the roundel (1103), '... crosses, and other ornaments richly decorated with patterns in Celtic art, came from the front or west side of the building represented by the clay floor and the stone foundation, and especially towards its north end' (Curle 1914, 141-144). Comparable, though generally less elaborate, moulds were recorded in pockets of intact stratigraphy in 1973 and 1979 and it is possible to demonstrate that curvilinear and rectilinear decorative panels were in production on site prior to the final phase of metalworking and abandonment (D. Longley pers. comm.).

Among the categories of artefact cast in the decorated moulds from the Mote of Mark were roundels and axe-blade plates. Many are too fragmentary for precise and confident interpretation, nevertheless, item 1103 is clearly a roundel mould, as is 2273 and possibly 1094. Item 1104 is indisputably an axe-blade plate; 1093, 1101 and 1096 may possibly be. Speake has illustrated a variety of objects on which interlace decoration occupies an axe-blade shape, including mould 1104, in the context of re-used axe-blade foils on the Anglo-Saxon satchel from Swallowcliffe Down (Speake 1989, 76-80). To this list we can add an elaborately decorated horse harness, accompanying the burial of a young man and, in an adjacent pit, his horse, under mound 17 at Sutton Hoo (Carver 1998, 110-3; 183).

The distribution of interlace decorated axe-blades, with the exception of the Mote of Mark moulds, appears to be predominantly Anglo-Saxon and south-eastern. The principal points of comparison and differences between the Anglo-Saxon artefacts and the metalwork cast in the clay moulds have been discussed by Laing & Longley (*forthcoming*).

Points of comparison are: The regular association of axe-blade plates and roundels in the Anglo-Saxon repertoire on the one hand and the significant component of axe-blade plates and roundels in the artefacts produced at the Mote of Mark. The high quality, aristocratic character of these artefacts. The predominance of tight, three-strand interlace in both sets of material. The identification of certain of the Anglo-Saxon pieces as horse bridle gear on the one hand, and the presence of buckles, strap fittings and roundels designed to operate as strap connectors at the Mote of Mark, on the other hand.

The significant differences between the two groups of material are: The predominantly zoomorphic character and Style II associations of the Anglo-Saxon material on the one hand, in contrast to the almost complete absence of any indication of such features on the Mote of Mark roundels and axe-blade plates. The single exception is the possibility that the terminations of the interlaced strands on mould 1103 are intended to represent animal heads and tails. The nature of the evidence – as moulds at the Mote of Mark - and as finished artefacts in use, repaired and re-used in the Anglo-Saxon areas.

Laing & Longley (*forthcoming*) argue that some items of the metalworking repertoire at the Mote of Mark, particularly the axe-blade plates and associated roundels, are influenced by, or owe their inspiration to, contemporary artefacts current in the Anglo-Saxon areas. These items have a particularly aristocratic quality and some, at least are associated with prestigious horse bridle sets.

Hanging bowls

Hanging bowls are thin copper alloy vessels designed exclusively for suspension from three or four hooks with decorative mounts attached to the outside below the rim. These have been studied by numerous scholars (Kendrick 1932; Henry 1936; Kilbride-Jones 1937a; Fowler 1968; Longley 1975; Bruce-Mitford 1983; Brenan 1988). While rim forms and bowl profiles indicate a relative chronology, different types of ornament have proved less amenable to objective analysis (Youngs 1989, 22). Stevenson (1972, 50) believed that in Roman techniques and motifs so permeated later centuries that they are unsafe guides to date. Furthermore, the variety of hanging-bowls implies that they were made in more than one district so that variants in technique and decoration do not all need to be spread out but several could be simultaneous.

A general indication of date is given by the recovery of most hanging bowls from furnished pagan Anglo-Saxon burials in eastern and southern Britain, in contexts broadly dateable within AD 550-650 (Youngs 1989, 22). Two more or less complete bowls with 2-pelta openwork, and also enamelled, escutcheon have been found in 7th century Anglo-Saxon graves in Warwickshire and Cambridgeshire, and there are also single escutcheons found stray, a plain one in Leicestershire and an enamelled one in County Londonderry. A related bowl with 4-pelta escutcheons comes from Tummel Bridge in Perthshire, to which one from Wiltshire may be compared, neither enamelled.

The largest and finest of all the bowls was discovered at Sutton Hoo, repaired before burial around AD 630 (ibid.). One of the smallest is from the St. Ninian's Isle Treasure.

Regards what they were used for it has been suggested that they were secular or ecclesiastical hand-basins or water bowls, held not by chains or cords but on a triangular stand. The tendency to give solely ecclesiastical interpretations (forgetting that kings and chiefs patronised craftsmen for their own benefit more than for that of the Church) gets no support from the recovery of a the mould from Craig Phadraig, Inverness-shire which is not a monastic site.

The mould from Craig Phadraig is the only mould for a mount for a hanging-bowl from the British Isles (Stevenson 1972, 49). It was one half of a two-piece clay mould used to cast a circular, slightly dished, escutcheon. Two opposed slightly raised 'pelta' shapes with a similar diamond shape between then made an openwork pattern. The mould may be part of Group A hanging bowls (see Longley 1975, 15-39; Stevenson & Wilthew 2000, 137). Included within this group are three bowls from Castle Tioram, Moidart, Tummel Bridge, Perthshire and Buiston, Ayrshire. The Castle Tiroam bowl retains one out of perhaps three suspension-rings each held close to the rim by a hook, shaped as an animal head and neck, fastened to the side of the bowl by an escutcheon. A depression in the edge of the Craig Phadraig mould puts the identification beyond doubt, because it contains lentoid hollows corresponding to the bosses on the fan-shaped attachment of the Castle Tioram hook (Stevenson 1972, 49). A similar plain two-pelta escutcheon comes from Eastwell, Lanarkshire (Stevenson & Wilthew 2000, 137).

Buckles and strap fittings

Two sites, Dunadd, Argyll (Lane & Campbell 2000) and Mote of Mark, Kirkcudbrightshire (Curle 1914; Longley 2001; Laing & Longley *forthcoming*) have evidence for the manufacture of buckles (Figure 54). Examples of denuded, broken moulds from Brough of Birsay, Orkney may also be for making buckles although not enough survives to be certain.

Again, the buckles recovered from Dunadd, Argyll and Mote of Mark, Kirkcudbrightshire have been well-discussed before (Campbell & Lane 1993b; Lane & Campbell 2000, 127-129; Laing & Longley *forthcoming*). One of the Dunadd moulds (298) is for an integrated buckle plate and tongue, a type of object characteristic of Germanic and Anglo-Saxon dress. This can be closely paralleled at Broadstairs, Kent found in a 7th-century grave (Lane & Campbell 2000, 127) while a silver buckle from Tostock, Suffolk (Bruce-Mitford 1956, 6, pl. 16) also has scalloped corners to a rectangular plate, and a large garnet-inlaid buckle from Gilton, Kent (Brown 1915, pl.. 71,no.4). Buckles of this form appear to be late derivatives of the scutiform or 'violin-shaped' buckles and date to the 7th century (Bruce-Mitford 1956, 321) and possibly later. Another mould from Dunadd (298) may be a copy of a 7th-century Anglo-Saxon buckle manufactured at Dunadd for a person of some status who followed Saxon dress fashion. Another mould from Dunadd (1432) is for the manufacture of a buckle hoop of Germanic type (Lane & Campbell 2000, 129).

Eighteen moulds from Mote of Mark were used to cast buckles, now represented by the fragmentary survival of the impressions of ten buckle loops (five decorated, five plain backs) and eight buckle plates (four decorated, four plain and probably backs). The distinguishing characteristic of the buckles is their small size (between 200mm and 250mm in diameter at the hoop) and that they were cast in one piece with their plate and not hinged. They must have operated on very narrow straps or have been set in pairs or some other multiple arrangement on wider straps, as is the case with modern harness and saddlery (Longley 2001, 80). The openings of the loops on surviving examples appear to represent two strap thicknesses, at least at the narrow tongue end of straps.

The upper faces of the loops were decorated with a pellet and tramline motif. A third loop bore sinuous linear decoration. On one of the buckles, the pellet and tramline motif terminated in the heads of two confronted, open-mouthed beasts. The plates of at least three buckles were decorated with serpentines in relief within a recessed panel. One plate has linear interlaced decoration and may be related to the linear decorated loop. The backs of all buckles are plain (Longley 2001, 80-1, fig. 7.6, nos. 1112, 1113, 1122).

The technical detail of loop and buckle plate cast in one is a feature of some late Roman buckles (e.g. Hawkes' & Dunning's Class IIb 1961, 57) but not the most commonly encountered in the post-Roman period, where the buckle loop is usually hinged on to the plate. This is the case, for example, with most Anglo-Saxon buckles (e.g. the Kentish examples discussed by Aberg 1923, 116-128) and the moulds for buckles from Dunadd (see above), as well as with most of the later (Viking-age) buckles from Celtic Britain (Laing 1993, nos 158-161), and the various buckles from Ireland (Laing 1975a, 333-4). In contrast, at the Mote of Mark, the pin seems to have been attached by looping round a bar formed between the loop and a hole in the plate just below the hoop.

Those buckles that are decorated display two types of ornament, interlaced and traditional Romano-Celtic. The Mote of Mark buckles stand at an interesting intermediary stage between the confronted animals of late Roman buckles and the confronted animals of some later penannular brooches, exemplified in the moulds from Brough of Birsay, Orkney (Curle 1982, 111; fig. 13) or the dragon brooches from Freswick Links, Caithness (Batey 1987, 106, pl. 20) and the St. Ninian's Isle Treasure

(Wilson 1973, 79, no. 28). The confronted animal motif is commonly represented in a series of late Roman buckles that have sometimes been found in Anglo-Saxon graves (Hawkes & Dunning 1961). There are no buckles from Celtic Britain or Ireland that are similar to the Mote of Mark examples, but two confronted animals in the opposite position (where the buckle loop met the plate) can be seen on a buckle-loop from Orkney in the National Museum of Antiquities of Scotland (NMS X. FC 157).

Fittings on leather belts or straps

A number of moulds from Mote of Mark represent items which may have been used as fittings on leather belts or straps, apart from the aforementioned buckles (Figure 55). Seven moulds appear to have been for strengthening plates or strap ends. In the latter category, four objects would have had blunt or pointed blade shapes. In addition there are five shanked objects which appear to have been designed for attachment to organic components by means of an integral spike or rivet. One mould (1171) may be for a tapering strap end with bulbous terminal secured by a rivet or, alternatively, for a tapering or triangular buckle plate. Two moulds (1187, 2761) are both for circular plates secured at the centre by a long spike or rivet.

Glass studs

Excavations on two Monastic sites, at Iona and Portmahomack, Ross & Cromarty, have recovered moulds for the manufacture of glass studs (Figure 56). Time has not allowed fully study of the Portmahomack mould, although it is related to the Iona example.

The pattern on the Iona moulds is unlike that on many other known moulds or studs in being curvilinear rather than rectilinear in design, although their close relationship is not in doubt and they may be considered together. A close parallel is a mould from Garryduff, Co. Cork and Lagore, Co. Meath (O' Kelly 1963, 72-4).

The ornamental metalwork on glass studs has been variously illustrated and discussed (Hencken 1950, 1301; Mahr & Raftery, 1941; Henry 1965). The studs are generally agreed to be of 7th and 8th century date, although small studs continue to be used into the 9th century (Stevenson 1974, 16-42 re-dates the Co. Westmeath brooch to the late 8th/9th century). The large mould/stud from Lagore, Co. Meath is from Period lb (as were six other smaller examples) which also produced E ware pottery, as have the relevant contexts at both Garryduff, Co. Cork and Iona. O'Kelly (1963, 119) placed the occupation of the Garryduff, Co. Cork ringfort within the century AD 650 - 750, but others extend the period to 800. The Iona pattern is closely paralleled by a roundel on f.29r in the Book of Kells (Henry 1974, pls. 22 and 104). The occurrence of the mould with E ware pottery, the general dating of the metalwork on which related class studs are found, and the nature of the Iona interlace pattern, suggests a date around the mid-7th to 8th century date far the Iona moulds.

Reece (1981, 23) sees the common use of such studs on Irish metalwork of this period, together with their rarity outside Ireland, where they tend to occur as isolated examples (Meaney & Hawkes 1970, 48-9, pl. 5, to suggest that they are a hallmark of the Irish metalworker of the period (op. cit., 24).

Miscellaneous objects

A significant proportion of moulds from Scottish Iron Age sites cannot be attributed to any objects and are best classed as miscellaneous. In some senses, this is frustrating. As discussed above, many mould fragments preserve only part of a ring, making it impossible to differentiate between a ring, a brooch or a terret. A significant proportion of the moulds from Mine Howe fall into this group. Similarly, a mould from Eilean Olabhat, North Uist (168) may be for a small terret.

As Lane & Campbell (2000, 130) illustrate numerous examples from Dunadd are intriguing. One mould (222) has a number of characteristics of some of the Pictish brooches from the St. Ninian's Isle hoard, though it is not certain that it is from a brooch. Many of the fragments from Brough of Birsay, Orkney (e.g. 370, 376) are intriguing, yet unrecognisable.

Non-ferrous metalworking in the Early Iron Age: landscapes, politics, food, iron and redefinition

Chapter Five

Introduction

The Early Iron Age, here defined as *circa* 700BC to 200BC, could be described as the bridesmaid of Scottish Iron Age studies. Although scholars have attempted to produce a coherent picture of society and economy (Childe 1935a; Piggott 1966; MacKie 1970; Ralston 1979) until recently the few excavated settlements meant that explanatory frameworks were largely reliant on extrapolation from areas to the south and individual site sequences, such as Hownam Rings, Roxburghshire (Piggott 1948), and Jarlshof, Shetland (Hamilton 1956). Analysis of economy was largely based on analysis of the more exotic material, particularly metalwork (Stevenson 1966). The last three decades have heralded three notable advances that allow discussions to move forward.

The increased number of isometric dates centred on the first millennium BC is a major step forward. From 70, when the Appendix of Megaw & Simpson (1979) was compiled, the number has increased steadily to approximately 175 by 1988, and is now in excess of 200 (Ralston 1996, 133; P. Ashmore pers. comm.). These dates indicate that various structural traditions were under development around the 7th century BC broadening the range of Early Iron Age site categories markedly (see Ralston 1996, 134-7 for review). Recent excavations and dating programmes have also changed perceptions particularly that certain settlement characteristics, such as enclosure boundaries, do not have as much chronological or regional significance as once thought. Palisaded enclosures do not form a distinct chronological horizon and can date between the late Bronze Age and the early Medieval period (Hill 1982a, 4-7). Also in certain areas, such as East Lothian and the Borders, they can no longer be thought of as early in date replaced later by earthwork-defined sites or stone-wall enclosures. Similarly, vitrified forts were built and used over a long time period, well into the medieval period (Sanderson, Placido & Tate 1988) and timber-framed / vitrified ramparts and palisades appear now not to be characteristic of any particular region (Hingley 1992, 30).

The second major advance has been the increase in the recognition, excavation and publication of Early Iron Age sites across Scotland expanding the structural, economic and artefactual corpus. Aerial photographic reconnaissance and ground-perspective area survey have increased site detection, particularly in favour of unenclosed and lightly-enclosed settlement. This has, in turn, affected excavation priorities since the mid-1980s (Ralston 1996, 133). There has also been an increase in the number of publications. Although Atlantic Scotland has continued as an important area (e.g. Sharples 1984; Hedges 1987; Gilmour 2002), other areas have also been targeted, particularly the Lothian Plain (Harding 1982; Alexander & Watkins 1998; Haselgrove & McCullagh 2000; Triscott 1982); the south Central region (Barclay 1983), the south west and central (Cowley 2000; Banks 2002; Alexander 2000) the north-east (Shepherd 1983; Ralston 1978; 1987; Ralston, Sabine & Watt 1983) and the north of Scotland (McCullagh & Tipping 1998).

The third major development has been the increase in land-use and environmental studies providing new insights to changes in landscape use and the place of settlements within their natural and cultural environment (e.g. Halliday 1982; Reynolds 1982; Tipping 1994; Armit & Ralston 1997, 188-93; McCullagh & Tipping 1998; see below).

These developments have allowed a broader framework in which to interpret Early Iron Age Scotland. It is now clear that societies shared traits with southern Britain, Ireland and, in some cases, continental Europe. Such traits include a preponderance of roundhouses in domestic architecture and, at least, intermittently, a preference for enclosed and indeed fortified settlement units. High status objects, decorated in styles termed 'Early Celtic Art' also bear witness to external contacts, doubtless of varying kinds (MacGregor 1976; Megaw & Megaw 1994; see Armit & Ralston 1997, 169).

While the importance of the work over the last three decades cannot be gainsaid it is fair to say that material culture has made little contribution to new interpretations; overall study of the Scottish Early Iron Age remains substantially focussed on the settlement record (Ralston 1996, 133). In general, artefact studies continue to be concerned with the La Tène or immediately pre-Roman metalwork (Stevenson 1966; MacGregor 1976) and with the possible exception of Cool (1982) there has been little study of the more 'prosaic' materials. More confusingly, there has been little analysis of the materials that define the period archaeologists endeavour to study, namely the transition from the Bronze Age to the Iron Age, with Euan MacKie (1971b; 1979) an exception. Studies of non-ferrous metalworking have been extremely cursory. Childe (1946, 91) concluded that '... crucibles for melting it [copper alloy], stone moulds for bars, and clay moulds for pins or spear-butts are found in most types of settlement'. MacKie (1971b; 1979) saw the introduction of ferrous and non-ferrous metalworking as being stimulated by English migrants (see Clarke 1971; Lane 1987 for criticism). Since MacKie's work there has been no study of metal production. This marginalisation is demonstrated by reference to recent publications. In the 1989 monograph devoted to the transition from the European Bronze to Iron Ages (Sørensen & Thomas 1989) Scottish material does not feature. In a recent review of British Iron Age production and exchange (Haselgrove 1999, 128) discussion of non-ferrous working was restricted to three paragraphs. In Hingley's review of Scottish society between 700BC and AD 200, evidence for non-ferrous metalworking in Atlantic Scotland was not discussed. The southern, central and eastern Scottish material faired little better. While acknowledging the lack of discussion on the topic, Hingley concluded that there was only evidence for small-scale metalworking, concluding that it was common on most Iron Age settlements (Hingley 1992, 20-3; 35).

This chapter considers the evidence for non-ferrous metalworking in the Early Iron Age. It is suggested that the practice was largely confined to enclosed settlements, particularly sites that are argued to have some importance to the surrounding area. While this is a useful starting point concern moves to consideration of the role that the production and consumption of non-ferrous objects played in society. A particular concern is with analysing the effects, if any, that ferrous metalworking had on non-ferrous metalworking and the relationship between the two practices. This requires the contextualisation of metalworking within current thoughts about the settlement, economic and landscape record. There are indications that as the first millennium BC progressed there were changes in the production and consumption of bronze objects: weapons and tools (e.g. axes, swords, and spears) gave way to smaller, arguably more prosaic, casting traditions (e.g. pins, ingots). These changes were associated with a cessation, or at least reduction, in bronze hoarding and a general reduction in the quantity of bronze objects evident in the archaeological record. This coincided with the appearance of the first iron objects which often mimicked objects once made in bronze.

Importantly, when iron objects were first produced on settlements this often took place alongside bronze-working, suggesting that iron did not usurp bronze. Instead, it appears that as the first millennium BC progressed, non-ferrous metalworking had to *re-define* itself within an increasing craft milieu. However, this need for re-definition should not be seen as a casual effect of the introduction of ironworking. Rather, it may also have been related to other socio-economic processes taking place. During the Early Iron Age there are indications that groups became increasingly concerned with the organisation and exploitation of the agricultural landscape with a general movement towards enclosure and concern with the use and elaboration of the domestic sphere. At least in some areas of Scotland, particularly the south and east, concern with the environment, control of land and agricultural production took on added significance in everyday life and ritual activities. Indeed, these attributes may have been the new basis for new political systems. These political systems, although having its origins at the beginning of the first millennium BC, contrast with the previous Late Bronze Age one which was based more on the manipulation of exchange relationships, prestige goods and maintaining political alliances. Crucially, whilst bronze production was central to these Late Bronze Age trajectories it appears to have played a different, but not necessarily marginal, role in the Early Iron Age. It is possible that other aspects of life (settlement, food, land) were more fundamental and that other materials (stone, wood and iron) took on added importance, closely linked both functionally, economically and ritually to the new socio-economic political system. This chapter argues that a new emerging social environment, instigated by changes in attitude to landscape, politics, food and iron, led bronze smiths to re-define their role in society in ways that were to last for a thousand years.

The evidence

Excavation and survey demonstrate that a wide range of sites were constructed and occupied during the Early Iron Age. These included crannogs (Dixon 1982; 1984), ring-ditch houses (Kendrick 1982), hut circles (Fairhurst & Taylor 1971) thick-walled stone roundhouses (Sharples 1984; Hedges 1987) and hillforts (Hill 1982b; Greig 1971; 1972). Table 4 summarises the evidence for non-ferrous metalworking from excavated examples, in the form of crucibles and moulds (site details in Appendix A).

Four points emerge. First, the overall evidence for non-ferrous metalworking is extremely sparse: although there may be over 200 sites of arguable Early Iron Age date only 11 or 12 have evidence for non-ferrous metalworking. Many sites with evidence for the craft either date to earlier or later periods or have no secure dating to be placed within the Early Iron Age. Second, the evidence is scattered across Scotland. Third, the evidence is largely confined to crucibles; moulds show only the manufacture of Lisnacrogher spearbutts and ingots, but little else. The scarcity of the mould evidence means that we have to consider the finished bronze objects circulating during this period. These objects, like the moulds, suggest that the archetypal Late Bronze Age icons of swords, spearheads and axes were no longer manufactured, replaced with simple ingots, rings and pins. The iconic pieces of the La Tène metalwork of this period, such as the Torrs Pony Cap (Atkinson & Piggott 1955; Harding 2002) were imported. Fourth, and finally, the majority of evidence comes from enclosed settlements, particularly hillforts.

	Crucible 1	Crucible 3	Crucible 6	Crucible 10	Crucible mis	Ingot	Spearbutt	Pin
Forts								
Clickhimin, Shetland	X							
Balloch Hill, Argyll	X							
Dunagoil, Bute	X			X			X	
Cullykhan, Banffshire	X		X		X			
Finavon, Angus				X		X		
Craigmarloch Wood, Roxburghshire					X			X?
Broxmouth, East Lothian						*X*		
Enclosed settlements								
Fisher's Row East, East Lothian	X							
Crannog								
Oakbank, Perthshire					X			
Open settlements								
Bu, Orkney		X						
Mavis Grind, Shetland					X			
Villages								
Jarlshof, Shetland	X				X			

Table 4: Non-ferrous metalworking in Early Iron Age Scotland (Sites in italics may date to a later period).

Interpreting the patterns

Constructing narratives on little more than 10 assemblages from different site types from disparate areas is a hazardous undertaking, but must be attempted. In order to begin to interpret this evidence it is logical to start with the area that has received the most attention in Early Iron Age studies: the settlements in which non-ferrous metalworking evidence was recovered.

Survey and excavation of a range of sites has provided the impetus for a number of important publications on the Scottish settlement record. As we have seen while Atlantic Scotland has received much attention progress has been made in other areas, particularly east Central Scotland, the south-west and west of Scotland and areas of northern Scotland. However, many publications have been class or site specific and, while valuable, there has been a tendency to analyse these at the expense of any wider integrated narrative. That said, there have been notable attempts to produce a synthetic picture (e.g. Ralston 1996; Armit & Ralston 1997; Hingley 1992). These remain the key texts for current interpretations. Recent scholars have analysed the evidence within key themes particularly the organisation of the household, the community and the nature of production and consumption, exchange and deposition. Settlements form a significant body of Hingley's interpretations. He concentrates on three main groups: enclosed sites, substantial houses, and open settlements. Using these key texts as a basis it is possible to progress with analysis of non-ferrous metalworking in Early Iron Age Scotland.

Enclosed sites and communities

The majority of evidence for non-ferrous metalworking in Early Iron Age Scotland has been recovered from enclosed sites, notably hillforts (Figure 57). Indeed, in non-Atlantic areas only two other settlement sites - Fisher's Row East, East Lothian and Oakbank crannog, Perthshire - have produced evidence for the practice. Although taking a variety of forms, and appearing at different times in different areas, enclosed settlements are characteristic of the first millennium BC across large areas of Britain, contrasting with the predominantly open settlements of the fourth to second millennium BC (Thomas 1997, 211; Haselgrove 1999, 115-22). Assessing the role of these sites, particularly hillforts, in Early Iron Age society is difficult. In 1979 Ralston highlighted that archaeologists have over-indulged in the excavation of smaller sites, probably the lower-class element in a highly stratified society. Only by large-scale excavations of the interior of at least one of the major hillforts, coupled with an investigation of its agricultural and economic hinterland, may archaeology begin to understand the role of the upper echelons of society (Ralston 1979, 493). Despite investigations at, for example, Broxmouth, East Lothian (Hill 1982b) and Green Castle, Moray (Ralston 1978; 1987) the sentiment remains valid. That these sites are scattered across wide geographies, are of differing size[ii], nature (vitrified or otherwise), and probably stature and function, further highlights the danger in forging ahead with blanket explanations for the whole of Scotland (see Ralston 1996, 145; Hingley 1992, 30).

Despite these problems there is a recurrent opinion, if not consensus, that enclosed areas, particularly hillforts, were important foci for groups and individuals during the Early Iron Age. Until recently these sites were seen as the permanent homes of individuals who controlled important stock such as agricultural surplus with groups protected behind well-build defences. In recognising an increasingly hierarchical Early Iron Age society, these places were seen by scholars as a good candidate for associations with the upper echelons. However, the actual evidence, save the sheer area some of the walls enclose, to support this claim is limited. There is certainly no evidence that some of the larger forts possessed urban features comparable to continental Oppida (Collis 1984) and the material culture is often uninformative with regard to the role of these sites in the wider economy and society. In the absence of excavated data a recent trend has been to reconsider the function of enclosed areas and the meaning behind their construction and use. In particular, there has been a reaction, if not rejection, of the long-established view that the practice of enclosing settlements within a ditch and bank, a palisade or a wall was driven by functional explanations; the need for defence, or the need to keep out wild animals or straying domestic stock. Recent commentators have suggested that many of the ramparts, banks, and ditches are not particularly substantial and defendable and have offered alternative explanations. Particular consideration has been given to the social and symbolic significance of enclosure, as an indicator of social boundaries, status or ritual activity (e.g. Bowden & McOmish 1987; Hingley 1984; 1990; 1992, 33; Hill 1995; Armit 1990b & c; 1997; Thomas 1997).

In the absence of large scale excavation issues of function and the like will remain in question. However, what is more important for this present study is recognition that in the literature there is a consensus that enclosed areas were important foci for Early Iron Age communities. Probably associated with power and people of high status, the enclosure served to define households of a certain social and economic standing and project their identity to the outside world. Thus, even though the enclosure may never have been used for defence and may have instead symbolised social isolation, it nonetheless demonstrates the power of some group, resident or otherwise (see for example Hingley's discussion 1992, 30-2; Haselgrove & McCullagh 2000, 186). There can be little doubt that these sites played a pivotal role in an undoubtedly increasingly complex, hierarchical society. If not the homes of the elite, the communal investment in the construction of the enclosure surely suggests some form of importance attached to the site even if we cannot tell if the manpower was voluntary or otherwise.

It is worth considering the context and role of enclosed sites and communities within their wider landscapes a little further. Again, Ralston's (1979, 488) conclusion that much remains to be done before it is possible to talk, other than speculatively, on the role of larger enclosed settlements with regard to other settlement units in their environs must be heeded, but should not be an excuse for ending speculation. Regional differences have to be considered: during the Early Iron Age not every area saw the construction of large-scale enclosures. A number of authors have defined a regional contrast delimited by the Firth of Forth. While enclosed settlements are common to the south of the Forth, open settlements predominate to the north in Fife and Tayside (Macinnes 1982; Maxwell 1983; Hanson & Maxwell 1983; Halliday 1985)[iii]. This may indicate two contrasting types of social organisation in neighbouring regions, which may have characterised two distinct social groups reflected by differing traditions of land-tenure and degrees of political centralisation (Hanson & Maxwell 1983, 15) or identity (Maxwell 1983).

The area south of the Forth is a useful case study. Both Hill (1982a, 5) and Hingley (1992) argue that the model of a dense distribution of enclosed sites, at least in East Lothian, is over simplistic and that more variety occurs in the evidence for the area. Excavation of a number of enclosed sites indicates one or more open phases during the occupation. Furthermore, in certain areas of the Borders, the distribution of enclosed and open settlements are complementary and this may reflect differing local preferences and requirements rather than chronological development (Hill 1982a, 20). This distribution has been taken to indicate a complex and dense pattern of enclosed and unenclosed sites forming a hierarchical pattern with communities in large enclosed areas, such as Traprain Law, dominating subservient communities in less substantial enclosed settlements and open settlements (see Hill 1982a, 17, fig. 5). At least in this area, this would suggest that enclosed settlements formed a central place in a hierarchical system of settlement. A similar pattern may also exist in Dumfries & Galloway with perhaps Burnswark having an eminent social position. The evidence for the area surrounding Eildon Hill, Roxburghshire may indicate a further area of hierarchical pattern of settlement (Jones 1990; Hingley 1992, 34). Peltenburg (1982, 143) has argued the resident community at Balloch Hill, Argyll might have been larger in scale than the households represented by the duns of Kintyre. These regional hierarchical models appear to follow Haselgrove's (1989, 16) suggestion that:

> ... both settlement evidence and material culture suggest that the basic social and political matrix of Britain was made up of relatively small-scale corporate groups, each headed by an elite, but retaining a strong emphasis on the communal control of resources within the collective territory. These basic units were also loosely linked together in wide, culturally differentiated, configurations by ties of clientage and shared ancestry... but everywhere their capacity for common action was... weak and political authority transitory.

While there are problems - lack of detailed survey and excavation in many areas that make testing of the assumptions problematic, and that, as demonstrated in Wessex, central place models may simplify a complex situation (Hingley 1992, 34) - the available evidence does indicate that significant centralised social and political groupings may have occurred at a local scale in areas across Scotland with large enclosed settlements playing a pivotal role (see Hingley (1992, 34). With this in mind it is worth re-iterating that non-ferrous metalworking in areas of southern and eastern Scotland is largely confined to enclosed settlements, specifically hillforts.

Whilst this may be a result of recovery or excavation priorities a review of excavated examples suggests otherwise. Open settlements, defined by the absence of any form of enclosing boundary, are common in many eastern areas of Scotland, extending from Fife and Tayside into Grampian (Ralston, Sabine & Watt 1982), Sutherland and Caithness (Fairhurst & Taylor 1971, 65-7). Though few have been excavated, and some are clearly Bronze Age, a number of excavated examples do show construction and/or activity in the first millennium BC. These include Kilpheder, Sutherland; Tulloch Wood, Moray; Romancampgate, Moray; Douglasmuir, Angus; Dalladies, Kincardine & Deeside; Newmill, Perthshire; Dryburn Bridge, East Lothian (phase 2) and the late phase at Broxmouth, East Lothian. Hingley (1992, 33) suggests that in many areas open settlements may have made up the majority of the settlements and may indicate communities in which there is no clear division between the constituent households. The individual roundhouses may have been scattered across the landscape with no physical or social boundaries between domestic groups. These open settlements may represent sites at a lower level in a hierarchy of settlements (see also Hingley 1984, 1988; 1992, 33). Not one open settlement has produced evidence for non-ferrous metalworking.

Against the emerging association of non-ferrous metalworking and significant enclosed spaces it is worth considering the other sites with evidence for non-ferrous metalworking in Early Iron Age Scotland. Do they suggest sites of some importance?

Interpreting the evidence from Oakbank crannog is problematic as the site has never been published and there has been little work produced on crannogs of this period. As argued for later periods (Chapter 7) the amount of timber used in the construction of these sites and their overall form suggests that their inhabitants were likely to have been of some importance. The crucible from Fisher's Row East, East Lothian is more informative. The site can again be classed as an enclosed site and comprised two principal enclosures, the eastern of which is double ditched. The whole complex is substantially of one phase constructed to a pre-determined layout. Four foci of domestic and related occupation were excavated in part or in whole and these included a large circular stake-built structure. Associated fence lines and post-hole structures, and a possible midden base, indicate a wide range of activities took place close to the dwelling. The ephemeral remains of three other circular buildings were located and a number of both internal and external areas may reflect weaving, carcass processing and other industrial activities associated with these structures. Importantly, in another area of the site three gullies appear to have been constructed as wind breaks for industrial activity. The crucible fragments suggests that the area was used for non-ferrous metalworking. The excavator interprets the enclosure complex at Fisher's Road East as a defended homestead of some social and economic status. This may explain the recovery of decorative stone revetments in the ditches suggesting an impressive original appearance of partly defensive, partly symbolic form (see Haselgrove & McCullagh 2000, 187-8).

Bu, Orkney is a thick-walled substantial stone roundhouse – often called a simple Atlantic Roundhouse (Figure 58). Early to mid-first millennium BC northern Scotland is marked by the construction of these monuments with other examples known from Orkney (Sharples 1984; Renfrew 1979, Lowe 1998) and Caithness (Mercer 1996). In Argyll there is a suggestion that similar sites may exist among the poorly-defined mass of heterogenic 'duns', with Rahoy perhaps an example (Gilmour 2002, 56). Scholars have suggested that these sites may be the home of important individuals with the substantial houses projecting high status and the isolation of the resident household from the broader community and from nature (e.g. Hingley 1992, 39). Gilmour (2002, 56) suggests that '... in view of the lack of evidence to the contrary these simple walled roundhouses are generally considered to be single storey buildings and may represent the development of distinct social hierarchies'. Recent work in the Outer Hebrides suggests that different structures without outward monumentality, such as Choile a' Chasgain, Skye (Armit 1996, 104) and Eilean Olabhat, North Uist (Armit 1996), may be broadly contemporary with the northern simple Atlantic roundhouses (Figure 59; summarised in Gilmour 2002). None of these sites have produced evidence for non-ferrous metalworking.

Where Mavis Grind, Shetland fits within all this is more confusing. Re-use of the site destroyed much of the original structure and we can only guess at its original shape (Cracknell & Smith 1985, 89). The economy of the settlement was diverse. As well as practising fishing and farming the inhabitants traded for pottery, steatite and shale and to a lesser extent iron and glass. Although the crucible is only recorded as coming from within the settlement area and is impossible to assign the find to any phase the excavators believe that the find is '... best interpreted as the only trace of the visit of an itinerant craftsman' and small scale industrial activity (Cracknell & Smith 1983, 35; 1985, 93). The interior was partitioned by upright slabs yet these did not appear to act as roof supports as vertical posts were employed (Cracknell & Smith 1983, 26). The occupation deposits within the structure were thick in places and could not be distinguished between the earlier phase II deposits. This was taken to indicate that '... the use of the building was only briefly interrupted during the rebuilding' (ibid., 19). In one sense, the structure is comparable to the wheelhouse structures that form the body of the Early Iron Age Village at Jarlshof, Shetland.

Excavations of the multi-phased site at Jarlshof, Shetland (Hamilton 1956) produced evidence of two pre-broch villages. Both were excavated by Curle and divided by Hamilton (1956, 18-38; fig. 10 for overview) into two general groups: an earlier Village I and a later Village II. Both were assigned to the late Bronze Age. However, re-interpretation suggests that Village II dates to the Early Iron Age (Figure 60; Piggott 1966, 8; Stevenson 1966, 19; MacKie 2002, 64-5 for full review). The Late Bronze Age mould from one of these dwellings is likely to have been pulled up from underlying deposits and does not date this phase to the Late Bronze Age. The complete contrast between the material cultures, particularly the pottery, between Villages I and II support this interpretation and also the belief that there was no continuity between the two settlements (MacKie 2002, 64). The Early Iron Age village consisted of three round stone huts two of which had underground cellars or souterrains attached and two of which had their interiors at least partly divided up by radial stone piers, as at Mavis Grind. Dwelling IVb underwent various modifications and was interpreted as a workshop (Curle 1934, 236-7; Hamilton 1956, 32). At a later stage the same dwelling had a new circular hearth built in it with a kiln and furnace close to it (MacKie 2002, 64). Crucibles were found within this dwelling. Two crucibles also came from other parts of the village (see Appendix A). Despite the many reviews of Early Iron Age society in Scotland there is little discussion of where the Early Iron Age village complex at Jarlshof fits into wider Iron Age studies. Using analogy from the later Hebridean wheelhouses it could be argued that the internally divided complexes have an internal monumentality (e.g. Armit 1990c, 441-3; *forthcoming*). At the very least, the complex suggests a community, presumably of some importance in the area.

Summary

Here then is the evidence for non-ferrous metalworking in Early Iron Age Scotland. The majority was recovered during excavations of substantial enclosed areas, particularly hillforts and/or 'villages'. Contemporary sites, such as open settlements in eastern and southern Scotland and 'non-monumental structures' (*sensu* Gilmour 2002, 57) in the Atlantic West have not produced evidence for the practice. It has been suggested that, although difficult to delineate a precise function, enclosed sites played pivotal roles in Early Iron Age society, politics and daily life. Perhaps they were the abodes of the upper echelons of society, perhaps they were symbolic and/or iconic places. Moreover, there is a broad consensus that these enclosures defined peoples or groups of a certain social and economic standing, serving to project their identity to the outside world.

This apparent association with non-ferrous metalworking and substantial enclosed areas, perhaps homes of elites, is not entirely new in the archaeological literature. As stressed throughout this study the association of non-ferrous metalworking and other crafts with important people is not a new idea. Discussion could, therefore, end here with a suggestion that during the Early Iron Age non-ferrous metalworking was controlled by important individuals. However, it is crucial to push the data further. In particular it is important to consider an issue long ignored in the current literature – what happened to non-ferrous metalworking when ironworking was first introduced.

The 'transition' from bronze to iron

With the exception of Euan MacKie (1971b; 1979) few scholars have approached the question of how and why ironworking skills first came to Scotland and what the wider consequences were. More perplexing is the lack of interrogation of the effect this had on the consumption and production of bronze-working. The problems in approaching this, admittedly difficult subject, have been summarised by MacKie (1979, 295) yet are worth repeating. Most of the extensively explored Early Iron Age sites usually date to the final centuries of the first millennium BC, although the situation is better now than when MacKie was writing. An obvious but notable problem is that iron objects do not survive well. In discussions two areas are generally used to consider the origins of ironworking: the earliest sites with evidence for iron-working, particularly Jarlshof, Shetland (MacKie 1979, 296-7); and the earliest iron objects, particularly the ring from the hoard from Balmashanner, Angus (Anderson 1892) and the handful of socketed axes (Childe 1935a, 249-50; Stevenson 1966; fig. 1; Manning & Saunders 1972).

These groups form the basis for what follows. However, by taking a broader perspective than has been done in the past, it is suggested that new patterns can be teased out that help us to begin to understand crafts in the Early Iron Age. If archaeologists are ever to understand the objects and practices of the past they need to contextualise the material within wider trajectories taking place within society at the time. In a Scottish context, this has been sadly lacking in studies of craftsmanship. Whilst MacKie (1971b; 1979) did offer some insight into why and how ironworking was adopted it was explained by recourse to migrants (MacKie 1979, 297). Furthermore, the impact of iron on bronze manufacture was written in a decidedly modern way, the iron smiths having to '... break into the bronze smiths' market' (ibid., 298). Concern was more with when the 'event' occurred as opposed to the more interesting question of what the effects were.

Early iron-working evidence in Early Iron Age Scotland: Bronze to iron, an uneasy relationship?

Iron was found sporadically across Europe in the early first millennium BC (Champion 1980). However, recognising the first example of ironworking in Britain and Ireland is problematic; Thomas (1989, 275-6) concluded that the widespread adoption of iron in southern Britain might well post-date the end of the Ewart Part phase, around the 8th century BC. Finding well-dated examples of iron-working from Scotland is difficult particularly as much of the material was unlikely to have been recognised or kept until recently. There are also still precious few iron objects of demonstrably Early Iron Age date. It is, therefore, more beneficial not to be constrained by searching for a definitive list but to concentrate on teasing out wider patterns.

It is instructive that sites with evidence for arguably the earliest iron-working evidence in Scotland also have evidence for contemporaneous non-ferrous metalworking. It is well documented that ironworking slag was scattered throughout the Early Iron Age village at Jarlshof, Shetland, particularly in the houses and the souterrains (MacKie 1971b; 1979; 2002, 64-5). However, what is seldom reported is that several crucibles were also found here, some deriving from the same structures as the slag (see Curle 1934, 276, 303; Hamilton 1956, 33, 38; see Appendix A). This association with non-ferrous and ferrous metalworking is mirrored at Cullykan, Banffshire. Here, attached to a rectangular house was an industrial area with evidence of iron- and bronze-working suggesting that both materials were being worked side-by-side around the 5th century BC (Greig 1971, 230). That iron- and bronze-working debris was recovered from Oakbank only adds to the emerging pattern.

The recovery of both iron- and bronze-working debris from settlements suggests that, in certain areas of Scotland, the first manufacture of iron objects took place while bronze-smiths still plied their craft. This suggests that ironworking did not suddenly or completely usurp bronze-working, that iron was suddenly more abundant that bronze, or that demand for bronze objects immediately fell away. As Champion (1989, 293) reminds us the transition to an iron-using economy would be easier to understand if it was possible to show that iron was either in plentiful use or technologically superior to bronze immediately after the decline of bronze. But a decline in the use of bronze and an uptake of iron is difficult, if not impossible, to demonstrate for Early Iron Age Scotland. Although there was a change in what was made in bronze (discussed below) this is not proof of a *decline* in bronze. The evidence for an increase in iron is equally tenuous. The number of iron objects from secure Early Iron Age contexts is still extremely small and while taphonomy and preservation may be masking wider issues it is fairly clear that iron does not enter the archaeological record in great numbers until the Middle Iron Age. Although being increasingly recognised, the evidence of iron manufacture also remains largely elusive. It is unwise, therefore, to suggest that the Early Iron Age was a period in which bronze-working declined and iron-working increased. Scott's (1981) suggestion that around the 7th century BC there was a collapse of the Irish society and economy, with a contemporaneous decline in the bronze industry, from which recovery was long and slow, cannot be used as an analogy for the Scottish evidence. The archaeological evidence suggests another interpretative route: instead of seeing these crafts in opposition it may be more useful to investigate why the occupants of some Early Iron Age enclosures found it necessary to have objects made both from bronze *and* iron.

Beyond economics and practice: wider developments in Early Iron Age society

Although it is difficult to pinpoint when in the first millennium BC it happened, there is evidence that as the period progressed the repertoire of the bronze-smith changed. No longer did smiths manufacture the icons of the Late Bronze Age - the spearheads, axes and swords - instead, they manufactured a different suite of objects, usually simple rings, pins and ingots. This tradition, using the same two-piece technology as before, continued well into the first millennium AD. Around the same time it appears that iron was used to manufacture a new range of objects and tools once cast in bronze. This is shown in the handful of iron socketed axes from England and Scotland first cast in bronze and imitated by iron smiths (see Childe 1935a, 249; Stevenson 1966, fig. 1; Manning & Saunders 1972). With the association of non-ferrous metalworking and enclosed sites it may be significant that the two axes which are not stray finds, from Traprain Law, East Lothian and Rahoy, Argyll, come from enclosed sites. What appears to be happening in the first millennium BC is that iron and bronze-working continued simultaneously, if not side-by-side. The most notable change was not the wholesale usurpation of bronze by iron, but an alteration in what was made and from what materials.

It is worthwhile to consider the Scottish material within a wider British and European framework. Recent accounts of Early Iron Age metal production and society have stressed the need to review past interpretations. Firstly, ideas founded on assumed technological evolution are no longer accepted, nor are suggestions that the cessation of the use of bronze was causally and directly linked to the adoption of iron. In other words, the introduction of iron did not 'cause' the end of the Bronze Age (e.g. Burgess 1979; see Thomas 1989, 275). Secondly, the idea that the functionality of iron influenced its adoption – it is harder and more durable than bronze and easier to work - are also being removed from interpretations (see Champion 1975, 141-2). Finally, the belief that iron was adopted because the raw material was more widespread and more abundant than the ores needed for bronze is also doubtful. For example, the very time that iron was adopted coincided in southern Britain with a considerable reduction in the amount of metal of any kind consumed. Even allowing for the low recovery rates of iron, it seems inescapable that there was a large reduction in the consumption of any metalwork between the Late Bronze Age and the Early Iron Age. Hoarding and votive deposition cease almost entirely at, or just after, the adoption of iron (Thomas 1989, 276-7).

Out of these rejections have flourished new positions. At the forefront is the realisation that explanations need to consider other aspects than technology or function. As Thomas (1989, 280) states, '... the problem of the end of the Bronze Age becomes a social question, not a technological or material one'. Particular concern has been focussed with analysis of settlements, economy, agriculture, food and gender (see the numerous examples in Sørensen & Thomas 1989). All have relevance to understandings of the emerging Scottish picture.

Analysis of settlements and environment has suggested that there was an increased emphasis on the organisation and exploitation of the agricultural landscape, particularly arable, in the first half of the first millennium BC. In many parts of southern Britain the move to enclosed settlements, such as those described above, coincided with an intensification in agriculture (Thomas 1997, 213). This was marked by the introduction of new crops, increased clearance and the extension of agriculture onto heavier soils, and the introduction of iron-tipped ard shares. This model finds parallels in eastern and southern Scotland where there is less evidence for environmentally induced economic stress and where greater potential existed for economies more reliant on agriculture. In the Lowlands there is extensive evidence for highly organised patterns of landscape division, although these are difficult to date and to relate to specific classes of settlement site (see Halliday 1982; 1986; Armit & Ralston 1997, 188-9; Hingley 1992, 37-9). Indeed, the identification of patches of cord rig in upland areas suggest that arable farming must have been fairly extensive. Environmental evidence from various areas of mainland Argyll suggest possible woodland management around the mid- to late-first millennium BC (Nichols 1967; Rhodes *et. al.* 1992). Although this model cannot be used as a blanket explanation for the whole of Britain - analysis of the Scottish material suggests that economic strategies varied dependent on soils, topography, climate and the inheritance from Bronze Age patterns of exploitation (see Armit & Ralston 1997, 188-93)[iv] - research has, at the very least, banished the idea of 'Celtic cowboys' (Piggott 1958) and stressed the importance of changes and developments in the agricultural cycle to any interpretations of the Early Scottish Iron Age. Indeed, the agricultural cycle is viewed as the central symbolic metaphor for social relations (e.g. Hingley 1992, 37-39), suggesting that issues such as enclosure and agricultural practices should be central to any study.

These agricultural developments appear to be related to other aspects of society. As the Early Iron Age appears to coincide with the cessation of the use of bronze for tools and weapons and its replacement by iron, along with the apparent dissolution of the long-distance exchange networks, the period is now viewed as one in which the direct control of land and agricultural production was important. In other words, control of the exchange networks through which exotic and prestigious artefacts were obtained, no longer was the main basis for social power (Thomas 1989; 1997; Cunliffe 1990). This increased emphasis on agriculture and managing the landscape may explain the ritual deposition of objects associated with agriculture in certain parts of Britain. Hingley (1992, 23-4) has suggested that concepts of fertility and the arable cycle were drawn upon to establish and maintain social distinctions between Iron Age communities and the ritual deposition of objects associated with these acts may have played a fundamental role. In Scotland, a number of ard-shares and plough-shares of different materials have been found in house walls and pits, from the second millennium BC through to the first millennium AD (see Hingley 1992, 38). The ploughing of land prior to the building of houses may also be important. Off-site deposition also took place, shown by the wooden ard from the Virdifield, Shetland peat bog and an iron ard-share from a wetland deposit in Swordale, Sutherland. Similar finds from elsewhere in Europe are often interpreted as ritual in nature linked to the concept of agricultural fertility (Glob 1969; Bradley 1990). As Hingley (1992, 23) reminds us, in areas where a more diverse economy seems to have been adopted, such as Atlantic Scotland, ritual activity associated with hunting, fishing and pastoralism suggests the activities and associated tools, were still given central roles in everyday life and rituals, even though they may not be as archaeologically visible as other practices. A useful example may be the discovery of the wooden female figure from Ballachulish, Lochaber which may be seen as a 'fertility goddess', dated to 728-524BC (Coles 1990). Linked to the pastoral cycle, the deposition of 'bog-butter', found in a number of mires in western Scotland, was made during the first millennia BC and AD

(Earwood 1991). The burying of animals and humans in pits, for example at Cladh Hallan and Hornish point, may be linked to this.

Recent Early Iron Age studies, then, suggest that, in certain parts of Britain during the first half of the first millennium BC, a system based on the control of land and agricultural production emerged, a system that contrasts with the previous Late Bronze Age 'prestige goods' political system based on the manipulation of exchange relationships, political alliances and crafts such as metalworking. At least in some parts of Scotland similar trajectories may have been taking place with an increased emphasis on management and control of the natural environment, shown in the creation of enclosure and agricultural boundaries. However, many scholars (e.g. Thomas 1989) believe that these patterns may explain why bronze-working declined in many parts of Britain and Europe. A Late Bronze Age prestige economy, in which bronze objects were paramount, gave way to a system based on land, where bronze had little, if any role. While this may have some truth it still falls short of explaining the Scottish situation. We have seen that bronze-working did not *stop* (as indeed was the case in southern England) – it changed. We, therefore, have to continue asking why this occurred.

The impact of the new socio-economic lifestyle

It is possible to argue that the increased emphasis on agriculture and enclosure may be linked to, indeed explain, the changes in objects and tools manufactured during the first millennium BC. As the early Iron Age progressed there were undoubtedly fewer weapons (swords, spearheads) deposited in the archaeological record. This appears to be paralleled by the increase in number of tools appearing, many of which were made of iron. The explanation may, therefore, be a straightforward one. As the new socio-economic lifestyle of agriculture, enclosure, and field boundaries took hold and became the new basis for power, the need for objects once made in bronze was markedly reduced. This new lifestyle would obviously have required tools (chopping down trees, ploughing the land).

While we know that stone and wooden ards were used in the Iron Age it is not unreasonable to suggest that metal tools would also have been used. However, and this is a crucial point, what the evidence seems to be suggesting is that, as the first millennium BC progressed, many of these tools associated with this new socio-economic lifestyle were made in iron, not bronze. This is not, however, to return to purely functional explanations. We have seen that certain iron tools, such as axes, reaping hooks (sickles), knives, shares, used in agricultural labour, had a role beyond the purely economic. They may have been viewed as 'symbols of fertility' deposited in settlements and across landscapes (see Barrett 1989, esp. 315; Hingley 1990; 1992, 23-4). Nor is this a return to the ideas of the superiority of iron, where an iron reaping hook is 'better' than a bronze one, but an attempt to understand the economic, social and political factors that affected the consumption and production of iron and bronze in the first millennium BC. During the Early Iron Age two things may have happened to bronze. First, the importance of bronze metalwork to evolving political systems was replaced by control of landscape and, more specifically, agriculture. Second, that, for whatever reason, the objects central to the creation and maintenance of this new regime did not require bronze, using instead other materials such as stone, wood and, no doubt, iron. The result is that, as the archaeological record tells us, bronze was now used for largely non-functional objects. As there was no need for swords and spears as symbolic expressions of status, bronze manufacture turned more to the manufacture of ornaments, a practice that was to continue for the next thousand years.

Conclusion: back to Balmashanner

It has been suggested that during the Early Iron Age, at least in Scotland, iron did not suddenly usurp bronze. On the contrary, the evidence suggests that on some sites the earliest ironworking took place alongside bronze-working. Further, iron did not suddenly replace bronze because it was technically superior or more readily available. While these may be factors they are, at present, difficult to test.

Instead, it is better to see iron and bronze in the first millennium BC as two parts of a wider metal package taking on different roles in a society that was changing from a Late Bronze Age 'prestige' system into one which was based on land and agriculture. The evidence suggests that materials other than bronze were more integral to this new socio-economic regime. The production and consumption of iron, however, was not purely functional. Objects may have been manufactured for non-functional purposes and used in ritual activities. In a way, this mirrors the manufacture and deposition of bronze objects in the Late Bronze Age. Conversely, it appears that the bronze smith no longer made weapons and tools but instead manufactured pins, ingots and spearbutts. The concern of the bronzesmith was now primarily with the manufacture of ornaments. The role of these objects no doubt played important parts in Early Iron Age society: the imported metalwork of this era undoubtedly shows that bronze objects were important, but mainly for ornamentation. The key point is that non-ferrous metalworking had to redefine its role as the first millennium BC progressed.

It is worth considering a final point. It has been suggested that other materials, including iron, played a more significant role in emerging Early Iron Age political systems than bronze. This suggestion may be supported by looking afresh at a piece of archaeological material that has been central to discussions of the Scottish bronze to iron transition for decades, the Late Bronze Age hoard from Balmashanner, Angus. Recovered in 1892 the hoard consisted of a local pot, containing a mixture of objects from across Europe. These included a mis-cast bronze bowl, a broken socketed axe; penannular armlets of gold, hair-rings of cast bronze wrapped in thin beaten gold; an amber and jet necklace penannular ornaments and a broken iron ring. The bowl, which was probably a 'waster', and the armlets are Late Urnfield types from the Middle Rhine area, and form part of the Covesea phase of north-east Scotland, from c. 700 BC (Anderson 1892; Beck and Shennan 1991; Coles 1962; Eogan 1969; Schmidt and Burgess 1981; Sheridan & Davis 2002).

Discussion of the hoard, at least in Iron Age terms, usually revolves around the iron ring - argued to be one of the earliest iron objects from Scotland (e.g. MacKie 1971a; 1979). However, seldom are the bronze bowl and the axe considered. These are the most obviously damaged or disfigured objects in the hoard. In particular, only the top of the socketed axe survives. If the suggestion that during the Early Iron Age iron was associated more with an emerging socio-economic lifestyle based on agriculture and landscape is accepted and that bronze played little part it is possible to see the socketed axe in a new light. The socketed axe is the only object in the hoard that could have played a role, functional, symbolic or otherwise, in the new agricultural regime, yet it has been broken in half. Although it is impossible to be sure how it was broken it is reasonable to suggest that it was deliberately broken, perhaps symbolically killed. Perhaps its disfigurement was a gesture that bronze was no longer part of the mainstream socio-economic trajectories. Is it a coincidence that arguably the first iron object in Scotland is associated with two damaged bronze objects? That the other objects, which are all associated with ornamentation, were left undamaged, is surely instructive. This suggestion perhaps makes it easier to understand the other earliest iron objects from Scotland; the iron axes mimicking forms once made in bronze. Perhaps this was part of the same symbolic trajectory that led to a redefinition of the production and consumption of bronze-working during the first millennium BC, a re-definition that was to last, and have repercussions, for the next thousand years.

Non-ferrous metalworking in Middle Atlantic Iron Age Scotland: creating and maintaining identity and the role of the smith

Chapter Six

Introduction

The Middle Iron Age of Atlantic Scotland, here defined as between 200BC and AD 300, saw major changes in the structural record that appear to have been linked to new social trajectories, power struggles and issues of identity. This chapter argues that non-ferrous metalworking played an important role in these developments. Although the objects themselves would have been important, concern may have been more with the immaterial aspects of the craft, particularly the perceived social utility of the smith to emerging power groups who were looking for various forms of legitimisation to create, express and maintain their social positions. As a result non-ferrous metalworking was confined largely to nucleated settlements. Recognition of this relationship allows us to see these sites not just as central places or the homes of high status individuals but as multi-functional units concerned with economic, social, political, religious, ritual and cosmological practices. The inhabitants were involved in a process by which individuals, (e.g. smiths) and resources (e.g. metal, expertise) from 'outside' were brought 'inside' their society, where they were transformed, both materially and symbolically, in order to meet local ideological needs. The role of the smith in the creation and maintenance of these social trajectories was pivotal.

Structures, artefacts and crafts in Middle Iron Age Atlantic society

Recent discussions of the Atlantic Scottish Iron Age have been dominated by settlement studies. Particular concern has been with the various drystone structures. Once called brochs and duns, it is now commonplace to study these distinctive structures within the confines of *Atlantic roundhouse* terminology (see Armit 1992, 22-51; 1996, 109-36 for overview). Research over the last century has illuminated the development of particular structures over the first millennia BC/AD. Briefly, simple Atlantic roundhouses, such as Bu, Orkney (Hedges 1987), were built in the first half of the first millennium BC. As the first millennium BC progressed drystone structures became more elaborate, resulting in the construction of complex Atlantic roundhouses, structures that included hollow wall construction and inter-mural galleries. Often, enclosures were built around the roundhouses, as well as some outbuildings. These patterns culminated in the construction of broch towers, as at Gurness and Howe, Orkney (Figures 61 & 63; Hedges 1987; Ballin Smith 1994). Importantly, around this time nucleated villages appeared, surrounding the complex Atlantic roundhouses and broch towers, in Orkney and Caithness (see Armit 1990c, 438-40; Foster 1989b). Although many of these sites continued in use into later periods, the construction of complex Atlantic roundhouses appears to cease around AD 200 (see below). These developments were not paralleled everywhere. In the Western Isles, there are no nucleated settlements and isolated complex Atlantic roundhouses are the norm. This regional variation is shown by another distinctive structural type, the wheelhouse, which developed in the Western Isles but was absent in Orkney and Caithness (but see Crawford 2002).

These patterns and developments have been the foundation for many interpretations and social models (e.g. Armit 1990b, c & d; Harding 2000; Sharples & Parker Pearson 1997; Sharples *forthcoming*). The extended chronology for the roundhouses (Hedges 1987; Ballin Smith 1994) and changes in theoretical positions (Clarke 1971) has led explanations away from external stimuli, such as southern English migrants (e.g. MacKie 1965a & b), to consideration of internal reasons for development. One consistent theme is the belief that any account of these structural developments must be formulated within an awareness of the social and political trajectories that were occurring across Atlantic Scotland at the time. For example as simple Atlantic roundhouses appear to be the Orcadian settlement norm for the first half of the first millennium BC, and were isolated buildings, these are believed to have been the homes of households of varying status. Although some may have included elements of display to make apparent their inhabitant's power and territorial control, this would have only been at a very localised level (see Sharples 1984; Armit 1990c, 441). In contrast, as we progress through the millennium brochs or complex Atlantic roundhouses may relate to the emergence of, and competition between, lineage groups. In the later period this power distribution, based on a pattern of largely autonomous Atlantic roundhouse settlements may have been replaced by authorities whose influence encompassed larger regions with Shetland and the Western Isles integrated into these more extensive power groups (Armit 1990c, 442-3; d, 207-8)[v]. Assuming the village is contemporary with the roundhouse, the nucleated villages of Orkney and Caithness are considered to represent the outcome of these processes of competition and display, representing increasing centralisation and control by fewer, more powerful households (e.g. Barrett 1981, 210-7; Foster 1989b, 44-5; Armit & Ralston 1997, 187).

A key component in these discussions is the view that material culture, in this case architecture, acted as a powerful symbol in the continual re-negotiation and legitimisation of power relations (e.g. Barrett 1981; Foster 1989b). Many authors (e.g. Armit 1990c, 440-3; Sharples & Parker Pearson 1997) convincingly argue that the centrality of roundhouse architecture, with its daily presence in the experience of all levels of society, lent it powerful symbolising potential and makes it an ideal arena for the display, and the attempted legitimisation, of control over people and resources. Similarly, the monumentality of the clustered villages, with broch towers at their centre, are viewed as a legitimisation of the nature of emerging power structures:

> For those who partook in the building of the broch at Gurness, those who helped maintain it, those who lived within the walls of the site or in the immediate area, and especially for those who were born and grew up there, the tower would be the most powerful, dominant and enduring symbol of power in their lives (Armit 1990d, 200-1).

The construction of complex Atlantic roundhouses may also be linked to the wider landscape and the need for display and territorial control (e.g. Hedges 1987, 38; Armit 1990c, 440-1; 1990d, 197-201; Sharples & Parker Pearson 1997, 262-4; Sharples *forthcoming*). These symbolic trajectories continue into the post-broch period where later written records hint at the emergence of an advanced political structure in Orkney and Caithness, linked to kingship structure (see Armit 1990c, 441). Roundhouses are abandoned and cellular villages, which have no substantial roundhouse at their centre, form the core of the settlement type. This movement from monumental broch to cellular, non-monumental architecture suggests that the imposing architecture of the brochs was no longer an appropriate, or necessary way to convey status (Armit 1990c, 441; Armit & Ralston 1997, 187). Broch towers may have become symbolically redundant with power relations focussed on non-structural symbols: '...personal ornament could communicate, far more easily than domestic architecture, the subtleties of power, legitimacy and dependency in the emerging kingdoms of the first millennium AD' (Armit 1990d, 209; see also Sharples *forthcoming*).

Thus, the creation, maintenance and decline of different structural types and nucleated roundhouse villages, therefore, are closely linked to wider social developments that took place during the Middle Iron Age. Material culture, in this case architecture, was used by emerging power groups as a statement of power to legitimise control over people and resources among competing groups (Armit 1990d, 209). It is only when power is consolidated and the legitimisation of the elites firmly established that monumental architecture, and all the symbols they embrace, cease to be built.

Estimating the role of artefacts within these schemes has been more problematic. With a few exceptions (e.g. MacKie 2000a; 2000b; Hunter 2001; *forthcoming a*; Sharples 1998; *forthcoming*) artefacts have been marginalised in discussions. There is nothing of the magnitude of Scott's (1948) and MacKie's (1965a) earlier work and despite calls for wider study (e.g. Clarke 1971) much remains to be done. This lack of study is undoubtedly related to the way the material is perceived. The situation is summed up Niall Sharples (*forthcoming*) who suggests that the Middle Iron Age is typified by '...few artefacts... and few personal ornaments such as pins and brooches'. He suggests that there is an inverse relationship between monumental architecture and material culture, concluding that '...the material culture associated with structures is generally impoverished consisting of a variety of prosaic functional tools largely undecorated and seldom deriving from outside the locality'. This may be, as Sharples (ibid.) argues, because that during this time it was architecture, or more specifically, the household that represented and symbolised the community. The acquisition of artefacts from other areas may not only have been unnecessary but may have potentially undermined the relationship between the broch household and the local community. The artefacts of the Atlantic Middle Iron Age then are considered objects best described as prosaic, with only the faintest trickle of Roman artefacts and local trinkets raising the range above the mundane.

At face value it is difficult to argue with these comments that, at least on many Middle Iron Age Atlantic sites the artefact repertoire is prosaic. However, it could be argued that archaeologists are underplaying the role of some artefact groups. For example, although we must question the presence of Roman finds as invariable status indicators (Hunter 2001) this should not mean that we must ignore their admittedly infrequent occurrence on Atlantic sites. The same is true of other objects, including non-ferrous metalworking debris. On the one hand, a few crucibles scraps have been central to discussions of Hebridean wheelhouses (e.g. Parker Pearson & Sharples 1999, 17). On the other hand, non-ferrous metalworking evidence is seen as unproblematic - a practice open to all (e.g. Scott 1948, 79). At other times the evidence is ignored. It is hardly surprising then that in the most recent discussion of Middle Iron Age society Richard Hingley (1992, 41) concluded that, '... there is at present very little comprehension of the function of the household and the community in the context of...industrial production'.

This chapter argues that non-ferrous metalworking in Middle Iron Age Scotland was restricted to a small number of sites, integral to the strategy of emerging power groups. Although the finished objects were important, concern was more with the *immaterial* aspects of practice, particularly the crafts and craftspeople. This was linked to a number of factors, including the symbolic attributes of the smith's work and the perception that smiths were mediators within and between a greater cosmological realm. Non-ferrous metalworking, then, was used by competing groups to create a conscious statement of power, to legitimise control over people, resources, nature and culture., rather than what they actually produced. Sharples (*forthcoming*) is, therefore, correct in the sense that the objects produced and consumed in Middle Iron Age Atlantic Scotland were largely prosaic, but this may have been of secondary importance.

Getting the evidence: the date of non-ferrous metalworking to the Middle Iron Age

Our starting position is the evidence for non-ferrous metalworking in Middle Iron Age Atlantic Scotland (refer to Appendices A – D for discussion of each find). At the outset we have to ensure that the evidence actually dates to the Middle Iron Age. Compared with the Later Iron Age (Chapter 7) this is far from straightforward. The objects themselves are largely chronologically undiagnostic. The majority of crucibles are triangular, common in the Early and Later Iron Ages. The moulds are equally ambiguous. Unlike the Later Iron Age where the objects cast often allow some form of coarse dating bracket, there is precious little of this in the Middle Iron Age. In the absence of chronologically diagnostic objects, dating relies either on radiocarbon or artefactual dating or, more usually, understandings of the sites from where the metalworking evidence has been recovered.

Radiocarbon and / or artefactual dated sites

There is not a single radiocarbon date obtained from a context with metalworking evidence attributable to the Middle Iron Age. Nor are there dateable artefactual associations. We, therefore, have to turn to radiocarbon or artefactual dates from contexts above or below the metalworking evidence to give a *terminus post* or *ante quem*. This is far from ideal as many dates come from contexts far removed from the metalworking evidence and only provide a broad picture of the date for the construction and abandonment of the relevant structure. Only a handful of Altantic sites: Crosskirk, Caithness; Howe, Orkney; Gurness, Orkney; Scatness, Shetland; Cnip, Lewis; Sollas, South Uist, Dun Mor Vaul, Tiree & Dun Ardtreck, Skye have radiometric and/or artefactual evidence to suggest that non-ferrous metalworking took place in the Middle Iron Age (for specific details refer to Appendix A).

Dating through structural association

From here we are left with non-ferrous metalworking evidence recovered during antiquarian investigations or immediately after the Second World War. The material comes from complex Atlantic roundhouses, nucleated villages and wheelhouses. In the absence of contextual or stratigraphical information or independent absolute or relative dating we are usually left only with the scant knowledge that metalworking evidence was found during excavation of one of these sites, usually from an unspecified area. This means that the find can only be broadly dated to the construction and use of particular buildings. This creates many problems. Long gone are the days of a tight chronological bracket for broch architecture, destroyed by the extended chronology established by more reliable dating. Indeed, it is now extremely '...dangerous to use structural typology as a means of dating' (Armit 1991, 201).

This is borne out in a critical review of the chronology of Iron Age structures. Despite Atlantic roundhouses being subjected to detailed analyses and critiques on numerous occasions (e.g. Armit 1996; Hedges 1987; MacKie 1994; Sharples & Parker Pearson 1997; Gilmour 2000; 2002) there remain key problems in understanding date. Firstly, there is still a distinct lack of excavated primary deposits. Secondly, the multi-phased nature of many of the sites, together with problems of re-deposition and re-use makes it difficult to associate finds accurately with specific phases of use and notoriously difficult to reconstruct the nature and status of these sites in their original form. For example, there is still no consensus when brochs or complex Atlantic roundhouses were built. Gilmour (*forthcoming a*) suggests that complex Atlantic roundhouses date to *circa* 400calBC and *circa* 1st century BC. Others argue that complex Atlantic Roundhouses were only beginning to be built in the 1st century BC and continued to be built at least into the 1st century AD possibly into the 3rd and 4th centuries AD (MacKie 1989; 1994; 2000b; Parker-Pearson & Sharples 1999, 355-60). Finally, others adopt a more liberal position, arguing for a concentration between 'the 2nd centuries BC and

AD' (Foster 1989b, 35). The dating issue remains unresolved (see Gilmour and Cook 1998; Harding & Gilmour 2000; Parker Pearson & Sharples 1999, 355-60)[vi].

Understandings of the date of nucleated settlements fare little better. Hedges (1987) argues that at Gurness, Orkney, the broch and external settlement were built in the 1st century AD whereas Hingley (1992, 18-9) suggests an earlier date, the site spanning the 1st century BC to the 1st/2nd century AD, with the possibility that it may begin earlier. Armit (1992, 197; Armit & Ralston 1997, 185) prefers an even earlier date, perhaps as early as the 3rd to 2nd centuries BC, the Roman finds being the result of continued occupation into the later centuries. Further confusion is added by doubts whether the external settlements or 'villages' were contemporary with the roundhouses they enclose. Because the organisation at some, for example, Gurness and Howe, Orkney is particularly systematic and almost radial in form, many believe this indicates contemporary planning and construction (Hedges 1987; 1990; Foster 1989b; Barrett & Foster 1991; Ballin Smith 1994). Others, however, argue that sequence is more complicated, with some of the outbuildings perhaps related to secondary occupation of the roundhouse perhaps even after it had been substantially altered (MacKie 1994; Gilmour 2000).

Further problems affect the roundhouse complexes with smaller external settlements in, for example, Caithness, which fall into Foster's (1989b, 36) 'non-radial' class. Foster argues that these sites may have arisen earlier in the roundhouse development scheme, as at Crosskirk, Caithness (Fairhurst 1982) where outbuildings may predate the 1st / 2nd centuries AD. Regionality plays an important part: such a tradition may be peculiar to Caithness (Foster 1989b, 36). Amidst this confusion it is hardly surprising that many believe that '...it is virtually impossible to assess the date of many of the sub-circular and sub-rectangular buildings which surround the brochs' (Foster 1989b, 36; see also Hedges 1987). This position explains the lack of agreement when different scholars return to older excavations (for example, compare the interpretations of Callander & Grant 1934; Hedges 1987; Foster 1989b; MacKie 1994 of the sequence at Midhowe, Orkney). A further complication is that many sites, such as Howe and Gurness, Orkney, continued to be a foci for occupation well into the second half of the first millennium AD, apparently well after the monumentality of the central roundhouse became redundant (see Chapter 7). The fact that such divergent views can be put forward continues to cause difficulties for Middle Iron Age studies

Similar problems arise in consideration of wheelhouses. Although MacKie (2000b, 371) argues that '... all of the published Hebridean wheelhouses have... essentially the same pottery and artefacts inside them as the nearby brochs – in other words they can be firmly assigned to the Middle Iron Age' this is questionable. First, the chronology of the emergence of wheelhouses is still a matter of dispute (Armit 1996, 145-8). A series of radiocarbon dates from Sollas, North Uist wheelhouse has been argued to date the construction of the site to the late 1st to early 3rd centuries AD (Campbell 1991b, 139-41). However, analysis of the Cnip, Lewis material suggests an earlier construction date, perhaps starting around the mid-first millennium BC, with the building decaying and losing its original form around the 1st century AD (Armit 1996, 146; *forthcoming b*). This appears to be supported by excavations at Hornish Point: a series of radiocarbon dates obtained on seashells appear to show that deposits on top of the wheelhouse were accumulating as early as this 3rd century BC if not before (but see Armit 1992, 212 for problems of dating seashells). Although there are problems with pinpointing the initial floruit of construction, it can be suggested that wheelhouse construction appears, at least in the Western Isles to begin around the 1st or 2nd century BC with many wheelhouses declining, although not necessarily being abandoned, in the first two centuries AD (Armit 1996, 148).

Wheelhouses show re-use over considerable periods, often incorporating cellular structures comparable to those that make use of secondary buildings inside complex Atlantic roundhouses (Armit 1996; Gilmour 2000, 5). Again, this longevity is mirrored in the material culture. For example, every wheelhouse in the Vallay Strand, North Uist, except Sollas produced, Later Iron Age pottery (Lane 1983, fig. 26). This is important because the poor recording of many finds from wheelhouse sites makes discussion of context and date notoriously difficult. Nevertheless, analysis shows that a considerable amount of non-ferrous metalworking evidence from wheelhouse dates to later periods and cannot be subsumed into the Middle Iron Age. For example, Young's work on the wheelhouse at A' Cheardach Mhor, South Uist showed that Late Iron Age material was recovered from sand several feet above the floor of the ruined wheelhouse (Young & Richardson 1960, figs. 10, 11 & 13).

Best fit approach

With all this in mind it is difficult to be sure that the non-ferrous metalworking, much of which is derived from antiquarian investigations, dates to the Middle Iron Age. I would argue that perhaps no more than 15 sites in addition to those previously mentioned saw non-ferrous metalworking activity during the Atlantic Middle Iron Age (Table 5; see Appendix A for individual site reviews). The material discussed in the remainder of this chapter has been assigned to the Middle Iron Age for two main reasons.

First, it appears that, around the 4th or 5th century AD, on many sites complex Atlantic roundhouses and the nucleated settlements were abandoned, at least in their original form. In their place were located free-standing, late Iron Age or 'Pictish' cellular structures, built outside the roundhouses as at Gurness, Orkney (Hedges 1987) and Scalloway, Shetland (Sharples 1998). These are related, at least morphologically, to the structures at Buckquoy, Orkney (Ritchie 1977), Traigh Bostadh, Lewis

(Neighbour *forthcoming*) and the Udal, South Uist (Crawford 1966) and those built into roundhouses, for example at Loch na Berigh, Lewis (Harding & Gilmour 2000). Although the vagaries of excavation and publication may be masking important issues, it is possible to suggest that on those Middle Iron Age sites that *lack* these diagnostic later Iron Age structures the metalworking evidence recovered is more likely to date to the Middle Iron Age, unless proven otherwise. This is, obviously, not ideal as there is the possibility that later cellular structures may have been destroyed and not recorded in the antiquarian hunt for the earlier roundhouse and settlement. Where sites have conclusive evidence for this and an association with the metalworking debris can be demonstrated, the metalworking is assigned to the Later Iron Age (Chapter 7). Importantly, where this is the case there is usually evidence for a change in what smiths made during the Middle Iron Age and Late Iron Age. For example, at Gurness, Orkney the Late Iron Age smith no longer made simple pins instead they made handpins. Similarly, at the end of the Middle Iron Age at Loch na Beirgh, Lewis the smith made handpins and spearbutts within a cellular building within a re-used roundhouse.

Material culture is helpful. MacKie (1965a; 1974; 2000b) and Sharples (*forthcoming*) have suggested divisions of material culture for the Early, Middle and Late Iron Age[vii]. Using his recent excavations at Dun Vulan, Scalloway and Bornais, Sharples (*forthcoming*) has constructed a scheme for material culture from the Middle through to the Late Iron Age. At Dun Vulan most of the material recovered dated to the period from the 1st century AD to the 4th century AD (the Middle Iron Age). Although in quantity terms the assemblage is sizeable, the range is limited. Most of the bone pieces were simple tools, the range of bone artefacts restricted to quern handles and simple points. The only imported objects were a small blue glass bead and a ring-headed pin. Sharples notes that '... the assemblage is directly comparable to other assemblages dating to the beginning of the first millennium AD excavated on the Western Isles'. From these, he concludes that on many Middle Iron Age sites bone and stone objects are largely prosaic: needles are the most distinctive bone objects; stone objects are confined to pounders, hammerstones and querns; metal objects are rare. The absence of Roman finds '...indicates that though contacts with the Romanised areas of southern Britain were established in the 2nd and 3rd centuries AD this seems to have had little effect on the material culture of the region' (ibid.). He concludes that on these Middle Iron Age sites tools were largely prosaic and functional and could be produced locally. More elaborate and complex artefacts, probably requiring specialist craftsmen and access to resources outside the region, were simply not required (ibid.).

In contrast at the end of the Middle Iron Age, around the 4th century AD, the range and type of objects appears to change. Using his finds from Bornais, South Uist, particularly deposits dating to the end of the Middle Iron Age and to the Late Iron Age (4th- and 6th-centuries AD) Sharples argues that more distinctive forms appear, indicating significant changes. These include the appearance of weaving combs, weaving tablets, parallelopiped bone dice, a decorated astragulus and a finger ring. The last three were associated with the floor of the house, radiocarbon dated to AD 260 and 560 (Sharples 2000, 25). Sharples interprets some of these objects as relating to the production of finely woven braids to decorate clothing, the use of personal artefacts to decorate the body and identify individuals and divination using gaming pieces. Accepting Sharple's model is not straightforward, as he admits; weaving combs, for examples from other sites, have been dated to the Middle Iron Age (e.g. Ballin Smith 1994, 178). Most other comparable objects from Atlantic Scotland are unstratified and from old excavations and it is difficult to be certain if the Bornais dates are typical. However, Sharple's suggestion that this time period sees the rise in accoutrements associated with weaponry, such as sword pommels and spearbutts, is particularly appealing. Perhaps to Sharple's list we can add, amongst others, proto-handpins; ibex-headed pins and certain brooches, such as zoomorphic brooches.

		Crucible 1	Crucible 2	Crucible 3	Crucible 4	Crucible mis	Ingot	Rings	Pin	Miscellaneous
Atlantic north										
Gurness, Orkney	CAR village	X	X						X	
Midhowe, Orkney	CAR village	X	X?			X		X		X
Howe, Orkney	CAR village			X						
Broch of Lingro, Orkney	CAR village					X			X	
Nybster, Caithness	CAR village					X?	X?			
Stywick Bay, Orkney	*CAR?*	*X*								
Knowe of Taft, Orkney	CAR only					X				
St Boniface, Orkney	*Roundhouse complex*									*X*
Clickhimin, Shetland	Wheelhouse					X				
Crosskirk, Caithness	CAR and complex					X				
Keiss Harbour, Caithness	CAR and complex	X					X			
Keiss Road, Caithness	CAR ?village						X			
Carn Liath, Sutherland	CAR and complex					X				
Dunphail, Sutherland	CAR and complex	X								
Cinn Trolla, Sutherland	CAR and complex	X								
Atlantic west										
Cnip, Lewis	Wheelhouse								X	
Garry Iochdrach, North Uist	Wheelhouse	X	X							
Sollas, North Uist	Wheelhouse		X						X	
Dun Mor Vaul, Tiree	CAR and complex	X					X	X		
Dun Ardtreck, Skye	Dun				X					
Dun Bharabhat, Lewis	CAR and annex	X								
Clettraval, North Uist	*Wheelhouse*					*X*				
Allasdale, South Uist	*Wheelhouse*									*X*

Table 5: Sites with non-ferrous metalworking during the Middle Iron Age in Atlantic Scotland (sites in italics may be part of and earlier or later group: CAR: Complex Atlantic Roundhouse)

This progression towards more elaborate objects from the Middle Iron Age into the Late Iron Age is mirrored at Scalloway, Shetland. In Early Phase 3, roughly AD 500-650, there is a dramatic increase in weapons and various categories of tools (notably metalworking tools and crop processing tools). Later, in late Phase 3, roughly AD 650-900, gaming pieces, items of personal adornment and leather and textile working tools become increasingly common. This period coincides with MacKie's (2000b) time of composite combs and pins and an increase in brooch types also occurs around this time. Importantly, Sharples relates these artefactual patterns to developments in the structural record. Accompanying his Middle Iron Age assemblage are roundhouses and wheelhouses; accompanying his Late Iron Age are 'Pictish' cellular buildings. This suggests that, at least on a crude level, certain artefact groups can be related to certain structures.

MacKie (2000b, 367) has also studied Middle and Late Iron Age assemblages. Like Sharples, MacKie believes that the building of late Iron Age or 'Pictish' cellular buildings was accompanied by distinctive changes in some aspects of the material culture. His *Late Iron Age* material culture includes ornamental-headed bone pins, composite bone combs, and pottery later called Dun Cuier Ware (see also Stevenson 1955; Foster 1989a; 1990, fig. 9.3). MacKie found it more difficult to define Middle Iron Age material culture, dividing it into three stages: Middle Iron Age I (200BC to 100BC), Middle Iron Age II (100BC-AD 200) and Middle Iron Age III (AD 200-500). Importantly, the last two phases relate to the primary and subsequent use of roundhouses with the transition between the Middle and following Late Iron Ages defined by the appearance of cellular buildings. Like Sharples, from the 1st century BC to the end of the Middle Iron Age, MacKie (2000b, 366) sees little obvious evolution in the various material cultures whilst noting that certain artefacts, such as spearbutts, appear right at the end of Middle Iron Age levels, probably around the 4th century AD.

This work suggests that we can begin to tease out chronological patterns in the material culture throughout the first millennium AD (summarised in Table 6). The divisions are, of course, not ideal. Leaving aside whether composite combs really can be assigned such a tight chronological range, under this scheme we are still left with a considerable chasm between the 4th and 6th centuries AD with ill-dated metal objects filling the gap. Further, there are still precious few well-excavated sequences on which to formulate and test these suggested chronological packages. However, what is perhaps more important for present arguments is the recognition that some artefacts – composite combs, certain brooches etc – are more than likely to date to the Late Iron Age. Furthermore, some objects – certain pins and spearbutts - appear to date to the Middle / Late Iron Age transition (see below).

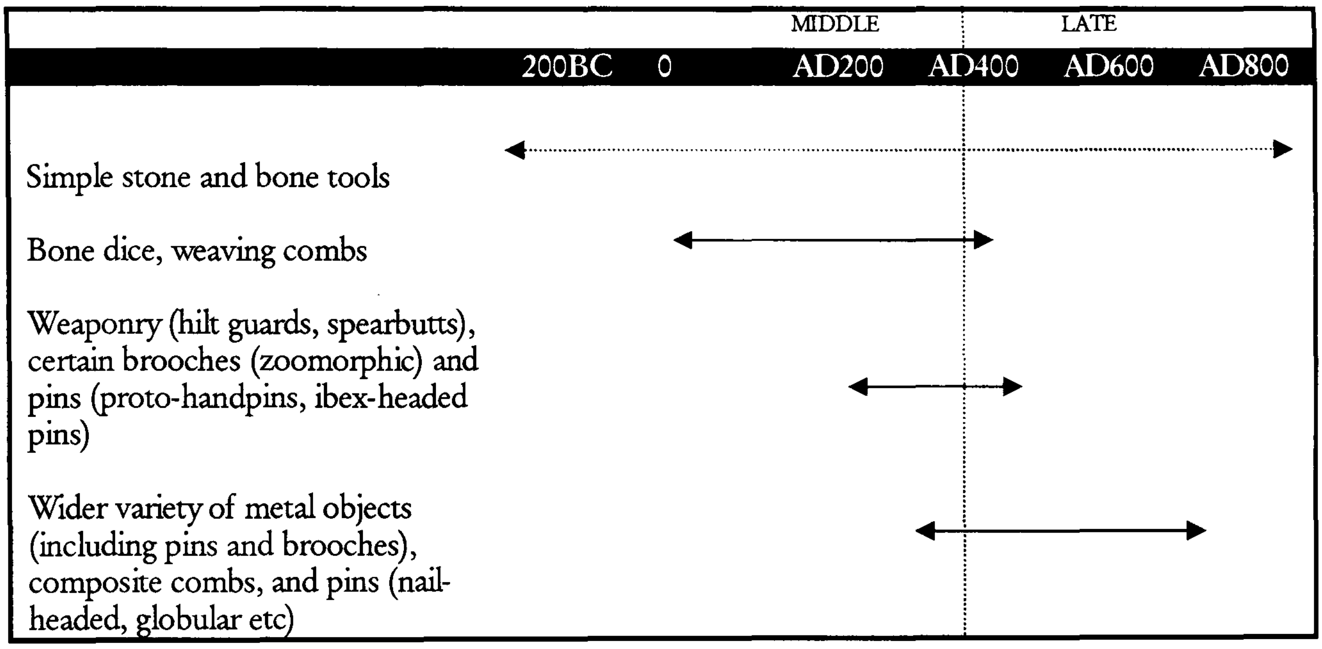

Table 6: Schematic material cultures for Middle and Late Iron Age Atlantic Scotland

Using these structural and artefactual patterns it is possible to suggest that the best interpretation of the evidence is that perhaps only perhaps only 22 sites, perhaps a few more, have evidence for non-ferrous metalworking attributable to the Middle Iron Age. The number may also be smaller: the 'crucibles' from Dun Ardtreck showe no signs of heat or vitrification and the crucibles from Dun

Bharabhat may date to the Late Iron Age. The evidence is undoubtedly varied and problematic and the reservation that some of the material may not date to our period of concern should be considered. Others may prefer to place the evidence outwith the Middle Iron Age. However, the more crucial focus is not the definitive number of sites with evidence but the collective patterns that are emerging, supported by the more recently excavated, and better-dated, material.

Accepting this, three main points emerge. First, the majority of Middle Iron Age non-ferrous metalworking in the north Atlantic province comes from roundhouse sites with contemporary external settlements, many of which can be classed as 'villages' (Table 7; Figure 61). Although the lack of metalworking evidence from other sites with recognised external settlements may seem to dilute this pattern closer analysis illustrates that on many of these sites the external settlements were not fully investigated, making the lack of objects from external areas hardly surprising. Conversely, when external settlements have been fully excavated, for example as at Gurness, Howe, Midhowe, Orkney and Nybster, Caithness, all have produced non-ferrous metalworking, in each case arguably of Middle Iron Age date. Second, in the west the majority of evidence comes from wheelhouses.

Finally, with the exception of one site, across the whole of Atlantic Scotland, isolated roundhouse sites, on present understandings, did not appear to witness non-ferrous metalworking during the Middle Iron Age. Within this suggestion we must consider whether the *lack* of external settlement on these sites is actually real: were certain roundhouses really isolated?

Site name	Year excavated	Main site	Metalworking
Roundhouse main component			
Dingy's Howe, Orkney	1878	Roundhouse	-
Eves Howe, Orkney	1883	Roundhouse	-
Wester, Caithness	1890-1	Roundhouse	-
Skirza, Caithness	1897	Roundhouse	-
Yarrows, Caithness	1867	Roundhouse	-
Dunbeath, Caithness	1866	Roundhouse	-
Ousedale, Caithness	1891	Roundhouse	-
Hillhead, Caithness	1901	Roundhouse	-
Skitten, Caithness	1904 & 1940	Roundhouse	-
Howe of Hoxa, Orkney	1848	Roundhouse	-
Knowe of Skogar, Orkney	1859	Roundhouse	-
Knowe of Redland,. Orkney	1866	Roundhouse	-
Broch of Burgar, Orkney	1825; 1845	Roundhouse	-
Whitegate, Caithness	1892-3	Roundhouse (external settlement later?)	-
Broch of Burrian, Orkney	1870-1	Roundhouse (secondary occupation inside broch and outside; later Christian activity evidenced by finds)	-
Oxtro, Orkney	1847	Roundhouse	-
Knowe of Taft, Orkney	1868	Roundhouse	X
Everley, Caithness	1897	Roundhouse	-
Roundhouse and external settlement			
Lingro, Orkney	1870	Broch village	X
Gurness, Orkney	1930	Broch village	X
Mid Howe, Orkney	1930-3	Broch village	X
Howe, Orkney	1978-82	Broch village	X
Nybster, Caithness	1895-6	Broch village	X
Keiss Road, Caithness	1890-3	Broch ?village	X
Broch of Borthwick, Orkney	1881	Broch village	-
Harray, Orkney	1866	Broch (exterior not examined but evidence of external structures)	X
Keiss Harbour, Caithness	1893-5	Broch and complex	X
Ness, Caithness	1898	Broch and complex	X
Crosskirk, Caithness	1966-72	Broch and complex	X
Possible external settlement but not excavated			
East Broch of Burray, Orkney	1851	Broch; maybe outbuildings but not investigated	-
Berstane, Orkney	19th century	Broch excavated, maybe external structures but not excavated	-
Cemetery, Stromness	19th century	Broch and external settlements; broch excavated; unclear if the external buildings were excavated	-
Broch of Redland, Orkney	1856; 1858	Broch village?; broch tower investigated and external settlement only partly investigated- inner wall of external buildings suggests village (Hedges 1987, 14).	-
Hillock of Burroughston, Orkney	1862	Broch and external buildings; all partly excavated; classed by Hedges as a 'certain example of brochs with contemporary outbuildings'.	-
Netlater, Orkney	1865	Broch; 'number of cells' found on the outside; classed by Hedges as a 'certain example of brochs with contemporary outbuildings'.	-
Ingshowe,Orkney	1866	Broch village? only broch excavated; exterior not examined- inner wall of external buildings suggests village (Hedges 1987, 14).	-
Broch of Wasso, Orkney	1868	Broch interior excavated; external buildings but not sure if they are excavated	-
Loch of Ayre, Orkney	1901; 1909	Broch; external constructions 'not seriously looked at'; classed by Hedges as a 'certain example of brochs with contemporary outbuildings'.	-
Castle of Bothikan, Orkney	19th century	Broch; external constructions not seriously looked at; classed by Hedges as a 'certain example of brochs with contemporary outbuildings'.	-

Table 7: Examples of excavated Atlantic roundhouses in Orkney and Caithness

(Please note that this is not a definitive list; many of the excavated brochs in Caithness are excluded due to lack of sufficient excavation)

Many of the sites with no or little external settlement were excavated in the 19th century where concern may have been more with the Atlantic roundhouse. Using survey and re-analysis of old plans, Hedges (1987, 14) argues that many of the apparently isolated brochs did have some form of settlement around them. Indeed, he suggests that 20 out of the 52 brochs in Orkney have 'well-ordered' (nucleated) settlements. Foster concurs (1989b, 36) arguing that '... any isolated broch probably did not stand isolated for long'. Furthermore, it is unclear whether all the external settlements, even if they existed, would still survive today (Ballin Smith 1994, 276).

The existence or otherwise of external settlement is something that can only be demonstrated by geophysical survey or excavation (Hedges 1987, 13). Of the sites that have been excavated it is pertinent that some undoubtedly have no outbuildings. For example, although the site of Oxtro, Orkney was almost totally levelled no external settlement was recovered. Furthermore, many earlier excavations did involve trial trenching around the roundhouse. Often no external structures were commented on. Finally, recent excavations have suggested that external buildings and the presence of a 'broch mound' or outbuildings need not necessarily reflect a nucleated settlement or external occupation contemporary with the broch. While it is possible to argue that the majority of roundhouses were associated with external settlement Hedges (1987, 14) still believes that more than 50% of Orcadian roundhouses had no external buildings. It seems, on balance then, that there were roundhouses that stood alone even though we can never be sure of the exact number. Of these northern Atlantic sites only one, Knowe of Taft, Orkney, has produced evidence for non-ferrous metalworking.

Patterns of recovery must also be considered. Many sites were excavated in the 19th century and non-ferrous metalworking may simply have not been recognised or collected. Taking excavated Orcadian roundhouses as an example antiquarian excavators appear remarkably proficient in recovering small artefacts, such as beads; although we can never be sure of their exact retrieval strategies. Antiquarians were also interested in a wide range of material culture, collecting numerous prosaic bone and stone objects. In many cases, it appears unlikely that a bias against the debris of metalworking debris can be postulated on the basis of retrieval strategies. Indeed, Table 7 shows that a significant majority of the non-ferrous metalworking evidence was recovered in the 19th century, albeit without secure chronological or contextual information. On balance then, correlation of non-ferrous metalworking evidence with Atlantic roundhouses with external settlements, many of which can be classed as 'villages', still seems strong.

Did non-ferrous metalworking take place on other Middle Iron Age Atlantic structures?

With all the problems in using Middle Iron Age material, it is understandable if we are still left with the uneasy feeling that taphonomy and recovery may be playing a large part in these patterns. This cannot be discounted. One way of putting ourselves on a surer footing is to see whether there were other, different Middle Iron Age sites that had access to smiths; if there were, this would weaken the observed patterns. Recent work has shown that less substantial houses were being used across Middle Iron Age Atlantic Scotland. Beneficially, many were excavated in the last two decades providing radiometric dates and more accurate recording of artefactual contexts.

Although Gelling's work at Skaill, Orkney could have offered insight into non-broch settlement there are problems. The building may have been abandoned during part of the Middle Iron Age with settlement nucleated around a nearby broch (Buteux 1997, 256). Furthermore, although there is conclusive evidence to show that Skaill was occupied again in the second quarter of the first millennium AD, there is little evidence for earlier occupation. Buteux (ibid.) concludes that, '... there is insufficient evidence to determine whether or not Skaill represents an 'alternative trajectory' in settlement development to that represented by the brochs'. Although Calf of Eday (Calder 1939) seems to have Middle Iron Age buildings, they may be Early Iron Age.

Only a handful of possible Middle Iron Age unfortified sites have been published on Shetland (Fojut 1985, 74-5, 83, fig. 200) and few have been excavated. The remains at Underhoull (Small 1966) were fragmentary, destroyed in part by the later Norse activity. On the basis of pottery the site was argued to date to the earlier Iron Age and Middle Iron Age (broch) period (but see Fojut 1985, 68). Fragmentary remains under the St. Ninian's Isle church and cemetery may also date to this period (Owen & Lowe 1999, 287).

At Kebister, Shetland there is good evidence that non-broch like structures were used during the Middle Iron Age (Owen & Lowe 1999). Structurally, this was defined by Structure 5, an amorphous oval building, internally made up of linked cells forming a 'cellular complex'. A hearth sealed beneath the wall is dated to cal 15 BC to AD 120 and the earliest floor level dates to cal 5 BC and AD 235 (ibid., 276-7)[viii]. No evidence for non-ferrous metalworking was identified, the excavators stating that '... there is no evidence to suggest that any of the units were used for anything other than domestic occupation' (ibid., 277). Importantly, Owen & Lowe (op. cit., 279) argue that the best structural parallels for Kebister are the outbuildings found on Orcadian brochs, from where much of the metalworking comes. In the words of the excavators 'the middle Iron Age settlement at Kebister is therefore the first adequately excavated settlement of this type in Shetland, and perhaps in the north of Scotland (Owen & Lowe 1999, 287).

Away from Orkney and Shetland there are examples of less substantial, non-broch Middle Iron Age sites. Roundhouses appearing in open clusters are known in Caithness and Sutherland and some areas of the west coast (e.g. Mercer 1980; 1981; 1985). Some have been excavated, such as at Cnoc Stanger, Caithness (Mercer 1996) and Lairg, Sutherland (McCullagh & Tipping 1988), although not all can be shown to be in use during the Middle Iron Age.

Recent work in Lewis is helpful. During excavations at Guinnerso, Uig two main phases of occupation have been identified, one a cellular complex of probable Middle Iron Age (Gilmour 2002, 59-60). Near to the site is An Dunan, an islet site. The main phase of use consists of an elaborate central hearth with multiple ash levels, some of which contained human bone. Radiocarbon dates indicate use between 400BC and 100BC (Gilmour 2000, 59). Whether this site is domestic, however, is debatable; initial interpretation highlights its specific role as a ceremonial site for human cremation. Recent survey work in South Uist also demonstrates the complexity of the Middle Iron Age landscape and the likelihood of occupation away from broch settlements (Parker-Pearson & Sharples 1999, 14-6). Earlier, non-broch structures within the first millennium BC are also increasingly being recognised (see Gilmour 2000, 2002, *forthcoming a & b*).

There is increasing evidence that different houses were being used during the Middle Iron Age. None of these recently excavated sites have produced evidence for non-ferrous metalworking during the Middle Iron Age.

Building up the picture: Contemporary sites or evolution?

The, admittedly hazy, picture emerging is that in northern Scotland non-ferrous metalworking took place largely within the confines of nucleated settlements. At contemporary non-broch like structures, like Kebister, it was absent. In the Atlantic West the activity was a little more widespread taking place in two duns and perhaps five wheelhouses. In order to progress it is pertinent to consider the relationship between these sites. If, for example, isolated roundhouses were earlier than nucleated settlements and non-broch like structures, this would obviously require a different interpretation than if all were contemporary. Again we are left with more questions than answers.

As we have seen there is no consensus when complex Atlantic roundhouses (isolated or otherwise) or nucleated settlements were built, used or ceased to be inhabited. Although not ideal, the artefactual record hints that sites, both isolated and nucleated, were used at the same time, although whether in their original form or for how long is impossible to tell. Using Roman finds as a coarse dating guide we can see that different sites were used at the same time during the 1st / 2nd century AD. As table 8 illustrates many of the apparently isolated roundhouses have produced finds of a 1st / 2nd century AD, Roman Iron Age, date. Similarly, 2nd-century Roman objects appear on many nucleated examples, for example at Mid Howe (Callander and Grant 1934, fig. 44.4-5, fig. 45), Gurness (Hedges 1987; Fitzpatrick 1989, 26), Howe (Ballin Smith 1994, 250) and Lingro (PSAS 1983). No matter if we call the central building at, for example, Midhowe a 'broch' (after Callander & Grant 1934), or whether we believe it to be a re-used shell of one (after Gilmour 2000), the key fact is that an extensive settlement was in use at Midhowe, and many other sites, during the first few centuries AD.

In these discussions, wheelhouses must be considered. As demonstrated earlier the relationship between Atlantic roundhouses and wheelhouses is bedevilled by the problems of chronology. As we have seen Armit and Gilmour are in little doubt that (at least the Hebridean) Atlantic roundhouses date to between 400BC and 100BC with wheelhouses built later. Hence, Armit & Ralston (1997,

185) suggest that in the Hebrides, and possibly Shetland brochs, were bring abandoned and replaced by wheelhouses at the end of the first millennium BC.

This transition may have happened whilst the Orcadian nucleated settlements were perhaps reaching their floruit. Armit (1997, 250) suggests that 'they [wheelhouses] seem, in a Hebridean context, to post-date the construction of Atlantic roundhouses' (see also Armit *forthcoming a*). This seems convincing when we consider that many wheelhouses are built into existing Atlantic roundhouses, for example at Cnoc a Comdhalach, North Uist and Garry Iochdrach, North Uist and Allt Chrisal, Barra (Beveridge 1911, Beveridge & Callander 1932, Foster & Pouncett 2000a). Conversely, others (e.g. Sharples & Parker-Pearson 1999; MacKie 2000b) believe complex Atlantic roundhouses and wheelhouses were largely contemporary. This view is based mainly on their reading of the radiocarbon dates from Cnip and the early dates once espoused by Armit (1996; see above). Parker-Pearson & Sharples (1999, 3) state that it appears that '... wheelhouses were probably constructed between the 4th and 1st centuries BC, going out of use in the 1st and 2nd centuries AD and ... thus brochs and wheelhouses were contemporary features of the Iron Age landscape'.

What is perhaps more important is recognition that at some point in some areas nucleated villages, isolated complex Atlantic roundhouses, non-broch structures and wheelhouses were used at the same time. Such a position is wholly tenable when archaeologists stop being overly concerned with the issue of dating construction episodes. For example, that Dun Bharabhat was built before the 2nd century BC is perhaps less important than recognition that the site underwent significant secondary occupation, following major structural failure around the 1st and 2nd centuries BC (Harding & Armit 1990, Harding & Dixon 2000). This would make it broadly contemporary with nearby Cnip, Lewis. Clearly, as Armit (*forthcoming a*) highlights the transition from broch to wheelhouse (if it happened) would not have taken place overnight and there must have been a period during which wheelhouse

Site name	Area excavated	Roman finds	Metalworking
Dingy's Howe, Orkney	Broch only	-	-
Eves Howe, Orkney	Broch only	-	-
Wester, Caithness	Broch only	-	-
Skirza, Caithness	Broch only	-	-
Howe of Hoxa, Orkney	Broch only	-	-
Knowe of Skogar, Orkney	Broch only	-	-
Knowe of Redland,. Orkney	Broch only	-	-
Whitegate	Broch only (later external settlement)	-	-
Broch of Burgar, Orkney	Broch only	-	-
Broch of Burrian	Broch only (secondary occupation inside broch and outside; later Christian activity evidenced by finds)	-	-
Oxtro, Orkney	Broch only	X	-
Everley	Broch only	X	-
Knowe of Taft, Orkney	Broch only	X	X
Harray, Orkney	Broch (exterior not examined but evidence of external structures)	-	X
Lingro, Orkney	Broch village	X	X
Gurness, Orkney	Broch village	X	X
Mid Howe, Orkney	Broch village	X	X
Howe, Orkney	Broch village	X	X
Nybster, Caithness	Broch village	X	X
Keiss Road, Caithness	Broch village	X	X
Keiss Harbour, Caithness	Broch and complex	X	X
Crosskirk, Caithness	Broch and complez	X	X
Ness, Caithness	Broch and complex	-	X
Broch of Borthwick, Orkney	Broch village although excavations concentrated mainly on the tower; part excavation of secondary buildings; 'covered with outbuildings' – inner wall of external buildings suggests village (Hedges 1987, 14). ; classed by Hedges as a 'certain example of brochs with contemporary outbuildings'.	?X	-
East Broch of Burray, Orkney	Broch; maybe outbuildings but not investigated	X	-
Berstane, Orkney	Broch; maybe outbuildings but not investigated	-	-
Cemetery, Stromness, Orkney	Broch; maybe outbuildings but not investigated	-	-
Broch of Redland, Orkney	Broch village?; broch tower investigated and external settlement only partly investigated– inner wall of external buildings suggests village (Hedges 1987, 14).	-	-
Hillock of Burroughston, Orkney	Broch and external buildings; all partly excavated; classed by Hedges as a 'certain example of brochs with contemporary outbuildings'.	-	-
Netlater, Orkney	Broch; 'number of cells' found on the outside; classed by Hedges as a 'certain example of brochs with contemporary outbuildings'.	-	-
Ingshowe,Orkney	Broch village? only broch excavated; exterior not examined– inner wall of external buildings suggests village (Hedges 1987, 14).	-	-
Broch of Wasso, Orkney	Broch interior excavated; external buildings but not sure if they are excavated	-	-
Loch of Ayre, Orkney	Broch; external constructions 'not seriously looked at'; classed by Hedges as a 'certain example of brochs with contemporary outbuildings'.	-	-
Castle of Bothikan, Orkney	Broch; external constructions not seriously looked at; classed by Hedges as a 'certain example of brochs with contemporary outbuildings'.		

Table 8: Roman finds from Orkney & Caithness

construction began within landscapes where Atlantic roundhouses were still the standard form of domestic settlement. This is surely the reason why Armit (*forthcoming a*) can suggest that '... that is not to say, however, that some Atlantic roundhouses, and particularly some of the most elaborate broch towers, may not have overlapped chronologically with wheelhouses'. The minimalist position is that it is unsustainable on present evidence to argue for a meaningful gap between the collapse of complex Atlantic roundhouses and the buildings of wheelhouses.

In summary, although shrouded in problems of terminology and chronology there does seem to be evidence that different Iron Age structures were in contemporary use at some point during the Middle Iron Age. This range includes nucleated settlements, isolated roundhouses, wheelhouses and less substantial houses, although these may not have been in the same form or date as the original building or point of construction at the site.

The objects produced and the alloys used

The surviving mould evidence suggest that only a small number of objects were made in Atlantic Scotland. They are for casting pins, rings and ingots (Figure 62; Table 7). Many objects previously assumed to belong to the pre-4th century AD, such as doorknob spearbutts, are now better seen being manufactured after the nucleated settlements and roundhouses were reused for the construction of cellular buildings (see below).

The mould evidence does not fit well with common perceptions of metalwork in use during this period that are influenced by Celtic art (see MacGregor 1976; Hunter 1997; 2001; *forthcoming b*). The lack of Celtic art objects is partly understandable. Many of the objects in circulation in Middle Iron Age Britain were not made by casting, but by sheetworking: for example, cauldrons. Certainly from the archaeological evidence the production of these objects rarely leaves evidence of manufacture and we have little idea where these objects were made. The few examples we have come from, for example, Howe, Orkney (Ballin Smith 1994, 226). Within this light the undated material from Cnip, Lewis (Armit & Dunwell 1992, 145-6) and sheet offcuts from, for example, Foshigarry, North Uist (Beveridge & Callander 1931) and Garry Iochdrach North Uist (Beveridge & Callander 1932) may be of note. The paltry evidence for sheetworking is a barrier to further discussions of craftsmanship, exemplified by the, still unresolved, debate of where and when the Torrs Pony Cap was made (Atkinson & Piggot 1955; Harding 2002).

Turning to the cast objects, we have no mould evidence at all for any of the Celtic art cast objects outlined by MacGregor (1976) and Hunter (1997). This may be connected to the way in which these objects were made and subsequent archaeological recovery and recognition. For example, in the case of massive armlets (following MacGregor 1968) the mould would have been broken into many pieces in order to remove the object so it is hardly surprising that we have no evidence for their production in the mould record. Further, it is likely that, even if the mould fragments survived, only the terminals would be instantly recognisable.

However, it is worth questioning whether we should expect to find evidence for the manufacture of any of these objects in Atlantic Scotland. Of the objects that fall under the 'Celtic Art' umbrella, the overwhelming majority are confined to southern Scotland (see MacGregor 1976; figs. 1-22) with only the 'massive' metalwork of the north-east redressing this geographical imbalance (Stevenson 1966, 31-5; MacGregor 1976; figs. 11, 16; Hunter *forthcoming b*). There is a distinct lack of find spots of Celtic art across the rest of Scotland, particularly the western seaboard.

It is worth asking then: is this geographical pattern a question of taphonomy and recovery, or a true representation of past reality? At present, it is hard to tell. Celtic art objects have been found in Atlantic Scotland. The recent armlet find from Lismore, Argyll and in Orkney (T. Cowie pers. comm.) shows this as do the massive terrets from Shetland (MacGregor 1976, no 124) and the cauldron from Kyleakin, Skye (Anderson 1885, 311-2; fig. 1; MacGregor 1976, no 306). The bone mirror handle from Bac Mhic Connain, North Uist (MacGregor 1976; no 271) also shows that the inhabitants were aware of wider Celtic traditions, even if they chose not to work in bronze. As Hunter (1997) suggests the apparent lack of Celtic art in the area may be related to issues of deposition and hoarding.

In this light, it is difficult to be sure whether the distributions of Celtic art outlined by MacGregor (1976) are more a question of recovery than a realistic insight into past traditions. The distribution of Late Bronze Age objects furnishes a note of caution. As in the Middle Iron Age there is a distinct lack of finds in the north and west (Coles 1960, maps 1-9). Although the Jarlshof assemblage (Hamilton 1956) suggested otherwise these distributions were taken to be indicative of the main areas where these objects circulated. However, the recovery of moulds for the manufacture of Late Bronze Age objects from Eigg (Cowie pers. comm.) and Cladh Hallan, South Uist (Heald in prep.) highlight that other areas, not shown by actual finished objects, were an integral component of wider Bronze Age production and consumption networks. Distribution maps, therefore, may be misleading without explanation. That many Celtic art objects throughout Scotland have been found during agricultural improvements may also be biasing our picture.

However, there is a case that the distributions as presently known do reflect past traditions. A useful starting point is Hunter's (1997; *forthcoming b*) recent analysis of the massive metalwork of north-east Scotland. This suggested that non-ferrous objects were made and used within specific, confined localities, the practice defined by local needs and trajectories. This demonstrates that, in certain areas, the production and consumption of metalwork was regionally specific, stimulated by local needs, and the patterns we have do represent past actions and cannot be explained by recourse simply to patterns of recovery (see Hunter 1997; 115). Analysis of the lifestyle of Atlantic Iron Age peoples (as shown through the artefactual and ecofactual record) demonstrates that the archetypal Celtic art paraphernalia, may not have been essential to everyday life. As Parker Pearson & Sharples (1999, 348) point out one of the continuing mysteries to excavators of Scottish Atlantic Middle Iron Age structures has been the lack of impressive finds to go along with the monumental architecture. The majority of finds from, for example, roundhouses and wheelhouses are mundane. Many settlements lack spectacular finds; the vast majority consists of pottery or bone and stone tools. Indeed, roundhouses are rarely associated with any status goods such as weaponry, long-distance imports, or prestigious metalwork (Parker Pearson & Sharples 1999, 348; Sharples *forthcoming*). Only the odd Roman find seems to suggest that the inhabitants of some areas, particularly Orkney and Caithness, were able to get their hands on things outwith the norm. Others, such as those living in the Western Isles, clearly were not (see Hunter 2001, 297-8). In other words, the material used in everyday life in Atlantic Scotland could legitimately be labelled 'prosaic'. The situation is succinctly summed up the most recent review of Middle Iron Age society where only two levels of exchange and production could be inferred from the material remains (Hingley 1992, 22-3). First, subsistence goods such as pottery, iron tools, crops, animals and querns were believed to have formed one level, the exchange of these objects taking place locally and frequently. Another level of exchange involved the longer-distance transportation of exotic objects and new ideas, largely made up of imported goods, such as Roman objects, exotica and items of native metalwork.

That bone, stone and pottery were important to the inhabitants of Atlantic Scotland is shown in the use of these objects within house foundations and other 'ritual' deposits, both within the domus and the landscape. Importantly, these suggest a concern more with fertility and the agricultural cycle, rather than ornamentation and the deposition of metalwork (also see Hunter 1997). The context of the plough-share from a peripheral area of the wheelhouse at A'Cheardach Beag, South Uist may indicate ritual deposition within the house (Hingley 1992, 23) and the numerous pits at Sollas, North Uist (Campbell 1991b) can also be seen in this light. The wooden ard from a peat bog at Virdifield, Shetland and the iron ard-share from a wetland deposit in Swordale, Sutherland further demonstrates the ritual deposition of agriculturally associated objects in the landscape (Hingley 1992, 23). The deposition of bog-butter found in a number of mosses in western Scotland (Ritchie 1941; Earwood 1991), was also a long-lived tradition. These deposits from floor deposits, wall foundations, peat bogs and other wetland deposits are important as they demonstrate that the objects we may term 'prosaic' (pottery, ards, shares, animals bones) actually had strong utilitarian and ritualistic importance in Atlantic Scotland. Thus, material culture was stimulated by local needs.

In this light Celtic art objects may not have been important to the inhabitants of Atlantic Scotland, not fitting into their normative view of life where emphasis was on fertility and the agricultural cycle. If they were, surely more than a century of investigations, often including the largest scales of excavation seen in Scotland, across the Inner and Outer Hebrides, Orkney, Shetland and Caithness, would have produced more finds. Off-site activities, such as ploughing and peat-cutting, would also have been expected to increase the recovery of said finds. Of the 353 Celtic art objects listed by MacGregor (1976) only 6 have been found within the confines of Atlantic Scotland. This is not to say, however, that metal finds were unimportant to the inhabitants of Atlantic Scotland. Many copper alloy objects have been found (Table 9). However, they only support the argument that the production and consumption of metalwork was defined by local trajectories. The finds found across Atlantic Scotland correspond closely to the production evidence we have.

These regional differences in copper alloy objects leads to the question of whether smiths working in Atlantic Scotland, were at the lower end of the metalworking spectrum, lagging behind their more efficient southern counterparts. Were they unable to manufacture distinct symbols of power or unable to gain access to enough material or expertise?

Site	Copper alloy finds
Knowe of Skogar, Orkney	-
Knowe of Taft, Orkney	-
Oxtro, Orkney	Bronze ring
Eves Howe, Orkney	-
Broch of Burgar, Orkney	Miscellaneous 'bronze objects'
Netlater, Orkney	Bronze bracelet
Loch of Ayre, Orkney	Bronze pin; bronze ring; globular pins
Dingy's Howe, Orkney	-
Cemetery, Stromness	'Celtic' bronze mount inlaid with gold; Terminal of a Celtic bronze penannular brooch
Knowe of Redland,. Orkney	-
East Broch of Burray, Orkney	*Disc headed bronze pin*
Howe of Hoxa, Orkney	-
Broch of Wasso, Orkney	-
Hillock of Burroughston, Orkney	-
Berstane, Orkney	-
Broch of Burrian	Bronze pins, two decorated; bronze brooch fragments
Everley	Bronze mounts; one Roman
Wester	-
Ness	Projecting ring-headed pin; bronze rings; small chain links
Skirza	-
Keiss Harbour	Composite shears
Whitegate	-
Nybster	-
Lingro, Orkney	Bronze sheet; bronze chain
Gurness, Orkney	Finger ring; five spiral finger rings; bronze wire; chain; needle; ring-headed pins; strip of bronze; sheet; bronze tube; other miscellaneous lumps.
Broch of Redland, Orkney	-
Ingshowe,Orkney	-
Broch of Borthwick, Orkney	-
Mid Howe, Orkney	Bronze projecting ring-headed pins; bronze ear-rings; bronze bracelet; sheet bronze
Howe, Orkney	Bronze; rings; chain-link and coils; projecting ring-headed pins; pins and points; tweezers; bodkins; wire; metal sheeting
Keiss Road	Bronze ring

Table 9: Non-ferrous metalwork from Orkney and Caithness, 200BC to AD 200 (Italics suggest the object may not or does not date to the Middle Iron Age)

It does not follow that the inhabitants of Atlantic Scotland were of a lower social status because they did not make, for example, massive armlets. The lack of production of massive armlets in southern Scotland has never been taken as indicative of a 'backward' society so why should the north and west be perceived in such a way? Furthermore, the recovery of the armlets from Lismore and Orkney demonstrates that, if they did not produce them, the inhabitants of areas of Atlantic Scotland were at least able to obtain them. The cauldron from Duntulm, Skye (MacGregor 1976, no 215) should also be seen in this light. More importantly, as Hunter (1997; *forthcoming b*) illustrates the consumption of metalwork in Middle Iron Age Scotland followed regional trajectories and dynamics. It is to the *local* context that we must turn if we are to understand the evidence. That there was regional variety is hardly surprising. In contrasting the north and west to the north-east Hunter (forthcoming) reminds us that, the broch-dominated landscapes of the north and west represent a different form of society from that of the north-east. There is no reason to expect that the same metalworking traditions would span such different zones (also see Chapter 7). In summary, the metalworking evidence for pins, ingots and rings from Atlantic Scotland appears to be a likely representation of past practices in the area. It is within the confines of this proposition that we must progress.

Creating and maintaining identities in Middle Iron Age Atlantic Scotland: the role of the smith

Non-ferrous metalworking evidence from Atlantic Scotland appears to have been restricted to a fairly small number and type of settlements, particularly complex Atlantic roundhouses with notable external settlements. At least in the north there is little evidence for non-ferrous metalworking on isolated roundhouses or on non-roundhouse structures. At face value this may seem unsurprising. In some areas, particularly Orkney and Caithness complex Atlantic roundhouses, especially those with associated external settlements, have been argued to represent the pinnacle of a hierarchical structure (Barrett & Foster 1991; see above).

The relationship between high status people and artisans is well attested in the archaeological and anthropological record. However, I want to suggest that the relationship between the smith and the inhabitants of nucleated sites went well beyond patronage for the manufacture of metal objects. Unlike other periods, for example the Late Bronze Age, objects appear not to have been produced and consumed for their non-functional attributes. Numerous studies have convincingly argued that the Late Bronze Age was based on a 'prestige goods' political system founded on the manipulation of exchange relationships, political alliances and crafts such as metalworking. During this period bronze was used for the production of objects whose purposes were largely concerned with prestige, exchange or ritual (see Champion 1999, 106-8 for review). It is more difficult to import this model into the Atlantic Middle Iron Age. We have seen that smiths made pins, rings and ingots. The lack of ornament and size of these objects would have restricted their use as obvious symbols of power or identity and there is no evidence for the hoarding or structured deposition of these objects.

I wish to suggest that the importance of non-ferrous metalworking in Atlantic Middle Iron Age Scotland lies in the significance attached to the *creation* of the object, the *creator* and the *place* of creation. In other words, non-ferrous metalworking *was* grounded more in the symbolic than the functional but it was not the iconography of the finished object that was important: it was the iconography of the smith.

Emerging from the Early Iron Age

In order to investigate this it is necessary to look back to the Early Iron Age. In the previous chapter it was suggested that during the Early Iron Age a 'redefinition' of non-ferrous metalworking took place. As the Late Bronze Age merged into the Iron Age there appear to be numerous changes in metal traditions. The increased use of iron is an obvious starting point. There is a change in the objects cast in bronze, with high-quality metalwork such as axes, swords and spears giving way to more 'prosaic' casting traditions such as pins, rings and ingots. Generally there is a shift in what objects were made: there are more tools and fewer weapons. There is also a reduction in bronze hoarding and in the number of bronze objects entering the archaeological record. The re-definition of bronze is perhaps best seen in the Balmashanner hoard and the 'mimicking' of objects once produced in bronze, such as axes. This re-definition is likely to be associated with wider changes taking place during the first millennium BC. There is an increased emphasis on the domestic sphere, a movement towards enclosure and the organisation and exploitation of the agricultural landscape. This contrasts with the previous Late Bronze Age 'prestige goods' system that was largely based on the manipulation of exchange relationships, political alliances and crafts such as metalworking. Thus, whereas in the preceding period bronze was used for the production of objects whose functions were largely concerned with prestige, exchange or ritual, the Early Iron Age may have been more concerned with the production of more 'functional' items associated with the agricultural cycle and organisation of the landscape. Within this perhaps other materials, including iron, began to take on new importance.

Earlier, it was highlighted that, as the first millennium BC progressed and entered the Middle Iron Age, Atlantic Scotland saw major changes in the way society was organised and structured, and how groups created and maintained power and identities. It was highlighted how important groups and individuals were trying to obtain as many symbols of authority and legitimisation as possible. It was stressed that architecture played an active role in these trajectories where monumental structures were 'legitimising tools', symbolic arenas for the creation and constructions of power. Equally relevant are the suggestions that locations and the structures themselves were consciously used to emphasise differences between those inside and those outside of this level of society. This explained why roundhouses were often built in liminal locations. It was also argued that nucleated villages are considered to represent the outcome of these processes representing increased centralisation and control by fewer, more powerful households. I would argue that these trajectories set the scene for the re-emergence of non-ferrous metalworking, at least in Atlantic Scotland.

Beyond the product: symbolism and transformation

I wish to suggest that during the Middle Iron Age non-ferrous smiths were a valuable commodity, their use going far beyond what they created.

Across Middle Iron Age Scotland there is evidence that smiths worked in landscapes believed to be symbolically or ritually charged, such as ancestral monuments or in liminal locations. Two pertinent examples are Pict's Knowe, Dumfries-shire and Moncrieffe, Perthshire. Excavations at Pict's Knowe, Dumfries-shire revealed a penannular earthwork monument, identified as a probable Neolithic henge monument (Thomas 1994; 1998; 2000). On the northern side of the enclosure bank metalworking debris was recovered radiocarbon dated to the early centuries AD. Analysis of the crucible revealed very high levels of zinc and copper, giving a secure *terminus post quem* for the metalworking activity, of the Roman period, and confirming the assumed sequence of the site.

The Neolithic stone circle at Moncrieffe, Perthshire was also re-used for metalworking in the Iron Age, with a pile of turf and stone settings between two stones interpreted as a shelter belt for a metalworker (Stewart 1985, 137). A stone lined hearth and a 'bowl furnace' was also found within the central area together with pieces of molten bronze and iron slag. Adjacent to the hearth was a second clay-lined pit with six small stake holes interpreted by the excavators as support for tuyeres. Other stake holes may also have afforded some form of protection. The hearth gave an impression of '... a makeshift structure which had probably not seen much use'. Nearby were found several pieces of clay crucible and a broken bronze chisel of leaded bronze (Stewart 1985, 137-9). There is some confusion over the date of the metalworking activity. The excavator assigns the activity to the Late Bronze Age (phase 4) through association with a bronze tanged chisel. Similar chisels are dated to the 7th or 6th centuries BC (Roth 1974; Burgess, Coombs & Davies 1972, 217-8). McKerrell on the other hand suggests an Iron Age or Roman date for the bronze casting activity (quoted in Stewart 1985, 148). This later date is supported by analysis of the crucible that demonstrates that it was used for melting silver, suggesting a date no earlier than the 2nd century AD[ix]. Therefore, again, we have evidence for the reuse of a Neolithic monument for non-ferrous metalworking during the Middle Iron Age (see also Hingley 1999; Petts 2002).

It is surely implausible that Middle Iron Age smiths inadvertently stumbled on these ritual landscapes as convenient places to carry out their crafts. It appears that smiths actively chose to work in these symbolically charged places. This suggests that non-ferrous metalworking had a strong non-economic component to it. If a smith only needed to create a finished product it seems unnecessary to walk out into an open, exposed landscape. I would suggest that smiths chose to work in these ancestral places as it created, imbued and highlighted the symbolic and powerful attributes of their work. In this light it becomes easier to understand how objects that had no obvious 'practical' function took on significance. Concern may have been less with what was created but with the act of creation and the smith as a powerful image, a symbolic icon.

Consideration of other Middle Iron Age areas may be relevant. The association of souterrain in parts of southern and eastern Scotland with substantial houses may indicate the existence of dominant households within nucleated settlements (Hingley 1992, 30). Many of these substantial houses that projected high status are isolated households separate from the broader community and from nature (Hingley 1992, 39). Furthermore, Armit (1999) has suggested that some souterrains may have been deliberately, indeed, symbolically filled in during the Middle Iron Age. Material used in this action often included Roman objects and material, argued to be symbols of power circulating at the time. In this light, it may be noteworthy that non-ferrous metalworking has also been found in the deliberate infilling of souterrains, such as at Carlungie, Angus (Wainwright 1963, 80-106) and Shanzie, Perthshire (Coleman & Hunter 2002). The two copper ingots found within the broch settlement at Edin's Hall, Berwickshire are also of note. Found two feet below the floor of the southern intramural cell, near the base of the stair the ingot may have been a deliberate, votive offering. While the suggestion that the ingot may be a reflection of the wealth which enabled the building of an elaborate structure (Dunwell 1999, 340) is a possibility the 'wealth' may have equally arisen through non-economic means. Clearly, the places where non-ferrous metals, and the tools involved in their manufacture, were produced and deposited went beyond functional considerations.

With this it is pertinent to return to the recent ethnographic and anthropological work which illuminates how smiths are perceived in pre-literate societies and their role in wider social and political trajectories. In an exhaustive review Mary Helms (1993) draws a clear link between non-ferrous metalworking and socio-symbolic ideas of transformation, magic and outside worlds (Helms 1993). There is a strong case that smiths would have been viewed as powerful as their work requires an esoteric kind of knowledge to enable them to manipulate the dangerous forces unleashed in the process of transforming shapeless metal into a finished product. In other words, artisans were often believed to be involved in communication outwith the confines of normative traditional society, acting as an intermediary between human society on the one hand, and a cosmological realm beyond. Importantly, this equation of metalworking with areas 'outside' society is strongly linked to the ancestors (see Helms 1993, 7-9; 28-32), links shown in the Middle Iron Age. Smiths in many societies, therefore, tend to be viewed as magical, liminal figures credited with supernatural powers[x], people who ordered nature for cultural purposes, people who were in some manner or to some degree associated with exceptional powers (also see Howard 1983 for overview).

These studies suggest that in non-industrial societies non-ferrous metalworking involved far more than technical expertise but also important social and symbolic trajectories. This suggests that an understanding of the significance of acquisition and production of non-ferrous metalwork in the Middle Iron Age will never be fully acquired if accounts begin and end with how many pins the smith made and what alloys he used. As Hedeager (2001, 469) argues, archaeologists constrain themselves by merely equating metalworking with expressions of '... the practicalities of power, or as a simple reflection of economic activities, including production and/or trade'. The variety of social contexts within which demand for bronze artefacts takes place, coupled with the complexities of their production and consumption, preclude the formulation of discussions solely on the basis of technology or economy.

This position is bolstered further by reference to later historic texts. Although not directly related to the Middle Iron Age they do, at the very least, provide a useful analogy. Issues arising from study of the Irish and Welsh law tracts are outlined more fully in the next chapter but it is pertinent to refer to them now. These law tracts tell us that the workers of metals and smiths were potentially ennobling with some enjoying the privilege of free status. The texts also tell us that smiths may have obtained their status not through control of land or people but as a product of their perceived superior knowledge, skill and links to the supernatural world. This seems to be a recurrent theme in the definition of status (see Chapter 7).

This importance of the smith may explain another emerging pattern: the curation of smith's tools. It has already been highlighted how ritual acts and deposition were important to the inhabitants of

Atlantic Scotland. These deliberate acts perhaps provide a metaphor for wider understandings of social beliefs concerned with non-ferrous metalworking. The intact crucible from Sollas was found in a pit (4) in Cell 9 of the wheelhouse, during period B1 (Figure 64). This is one of a number of pits that were dug into the floor of the wheelhouse, most of which contained animal bones. These pits indicate a strong ritual element in the occupation of the wheelhouse and a lengthy act of consecration of a new house by the inhabitants (Campbell 1991b, 147). Pit 4 was a 'tiny pit' which not only contained the crucible but also large mica plates and a 1st- to 2nd-century AD glass bead (Guido 1978, Class 8). Both artefacts were placed on a bed of quartz and could indicate some form of propitiation with metal-working (ibid., 144). There were 21 other pits within Cell 9, at least 12 of which contained votive offerings. For example, pit 12 contained an almost complete, though smashed, vessel along with the headless remains of a sheep and a lamb. In the words of the excavator, '... this cell, therefore, was marked out as being special in some way' (ibid., 132). Importantly, these pits appear to have been built between the construction of the wheelhouse and the start of what appears to be a normal domestic occupation. Campbell (1991b, 147) interprets these pit burials as votive foundation deposits connected with the intended function of the wheelhouse. Although we have no way of proving whether, for example, Cell 9 was used for non-ferrous metalworking, the strong association between non-ferrous metalworking and ritual acts is clear.

This association between wheelhouse architecture, the use of social space, ritual deposits and metalworking has been commented on before (Parker Pearson & Sharples 1999, 16-21). The recovery of the crucibles and moulds from the rock-hewn stair, the main entrance route to the nucleated site of Mid Howe (Figure 65; Callander and Grant 1934, 508), may be part of this tradition. Although there is no tradition of metal hoarding in Atlantic Scotland, comparable to other regions (Hunter 1997), the recovery of the pin from Sasaig, Skye (MacGregor 1976, no. 266) from a peat bog may be giving further clues to social attitudes about copper alloy objects in Atlantic Scotland. Of relevance too may be the recovery of two moulds from a cist at Golspie, Sutherland. Although difficult to date Woodham (1957, 237) suggested the cist dated to the Iron Age. If the date is true the deposition of moulds suggests that the tools of the bronzesmith were curated in some way, integral to the burial of the individual, perhaps even the smith.

The association of non-ferrous metalworking with ancestral places, liminal locations, structured deposits and death, together with the perspectives provided by ethnographic studies and historical texts, suggest that the smith's work would have been set apart from other Middle Iron Age activities: non-ferrous metalworking may have been different. It can be suggested that smiths were perhaps feared, despised, loathed, held in contempt or awe, admired, respected, or honoured but never regarded as 'just another' group member. Middle Iron Age smiths may have been judged to be 'different', distinct from ordinary people pursuing the pragmatic affairs associated with the immediate needs of daily life.

These suggestions fit into prevailing thoughts on the structure of production and consumption of material culture circulating in Middle Iron Age Scotland. Hingley (1992, 22-3) recognised two levels that could be inferred from the material remains. Firstly, subsistence goods such as pottery, iron tools, crops, animals and querns may have formed one level of a largely local exchange. Such finds occurred on most settlements throughout the Iron Age and that the exchange of these objects at a local level may have been a common occurrence. Secondly, another level of exchange involved the longer-distance transportation of exotic objects and new ideas, largely made up of Roman goods, and items of native metalwork, such as pins. These views may be summarised as follows:

native	:	foreign
natural	:	cultural
subsistence	:	exotic
inside	:	outside
functional	:	symbolic
necessary	:	expedient
near	:	distant

The second category easily accommodates non-ferrous metalworking.

The importance of place and creation

It has been suggested that smiths deliberately chose places, often with ancestral links, to carry out their crafts. This appears to be linked to wider symbolic and social trajectories. It also suggests that they themselves, and the places where they created objects, were obvious physical presences. In other words, non-ferrous metalworking was not asocial. This is a crucial point. Typically in the archaeological literature places of production are interpreted in an economic way, usually as evidence of a workshop, the smith hidden away creating objects for some unseen patron. Often craftspeople are pictured slavishly toiling away on lakeside shores without other members of the community in sight (see Dobres 2000, 21). However, I suggest that the places were the smiths worked were as central as the things made. As Bradley (1999, 41) suggests, '... production sites may have been studied as evidence of technology and change, but these were probably places that possessed a special significance in their own right'.

In this light, the recovery of non-ferrous metalworking from nucleated settlements begins to make more sense. It has been suggested that the development of specific architectural types was related to the emergence of, and competition between, lineage groups. Groups used material culture, particularly structures, as powerful symbols and as arenas for the re-negotiation and legitimisation of power relations (e.g. Barrett 1981; Foster 1989b). Nucleated villages are considered to be the ultimate outcome of these processes of competition and display, representing increasing centralisation and control by fewer, more powerful households (e.g. Barrett 1981; Foster 1989b; Armit & Ralston 1997, 187). The monumentality of the clustered villages, with broch towers at their centre, was the symbolic legitimisation of the nature of the emerging power structure (Armit 1990d, 200-1).

Central to this are the ways people used locations, structures and material culture to emphasise boundaries and distinctions between the inhabitants of the settlement and those outside[xi]. Emphasis is now not on status as power but 'separate status' defined by liminality, marginality and isolation. Indeed, the creation of elaborate boundaries in various forms provides the key to the establishment of local hierarchies in the Northern and Western Isles (Sharples & Parker Pearson 1997, 264-5)[xii]. For example, location studies demonstrate that brochs are often in liminal locations: peripheral and marginal to cultivated ground; further isolated from the community by their frequent locations on islets within freshwater lochs, reached on foot by stone causeways (Sharples & Parker Pearson 1997, 263; Parker Pearson & Sharples 1999, 363). Indeed, we now view brochs with 'water', 'liminal', 'marginal', 'exploitative' locations set apart from other settlement areas with the inhabitants using locations to emphasise or create a distance between the occupants and the wider community (ibid.). Such views are also supported by the links with ancestral places with several roundhouses sited on top of chambered tombs. They may be places where the inhabitants used links to the ancestors and ritual components to construct a place of isolation and independence, rather than one of status and power (Hingley 1992, 15).

Monumental houses, therefore, express more than just emerging power groups: they also create and reflect a social distancing through domestic isolation, and a hierarchical structuring of social relations. Furthermore, these sites served, not simply as places to live, but as embodiments of myth, places of worship, calendars, and generally guides to the cosmic order (Parker Pearson and Sharples

1999, 350-2). In a similar vein nucleated villages may be marking control over territory and landscapes, again perhaps linked to issues of isolation and marginality (N. Sharples pers. comm.). We can view the substantial houses at the centre of the settlement as a symbol of the identity or status of a single household within the community whereas the enclosure of the 'village' reflected the identity or status of the whole community (Hingley 1992, 19; Armit 1997, 266). These family groups may have been related to each other by birth, but with one leading family living within the substantial house (1992, 19)[xiii].

In this light, the role of non-ferrous metalworking in these social trajectories becomes more apparent. The symbolic nature of the smith's work would have fitted perfectly within these wider schemes. This also explains why, at least in large parts of Atlantic Scotland, non-ferrous metalworking was not available to everyone. If these sites represented control by fewer, more powerful households it would have been appropriate for the inhabitants to encourage smiths to work only under their patronage. Through the smith honour, power and perhaps even fear would have been conferred onto the patrons. Indeed, this may be the period when we see metalworking first being controlled by elites.

Using this as a catalyst we can now begin to move forward in our interpretations of Iron Age structures and society. Recent research has suggested ways that architecture and landscapes played pivotal roles in wider social politics in the Middle Iron Age. As Sharples (*forthcoming*) states:

> The physicality of the broch indicates in a very practical way the social relationships that support this household. A considerable expenditure of resources was required to construct a broch. It would necessitate a commitment by the surrounding community that this was a desirable and important structure that had to be built. The construction process would involve the acquisition and consumption of scarce resources. The stone chosen would have to be the best available in the locality... the labour requirements would have been considerable. The community would have to acquire the stone, transport it to the desired location and then erect the structure... All of this effort requires a communal investment in the broch and indicate that though it might define and enclose a household, the household must in some respect represent and symbolise the community.

Nucleated areas in the Middle Iron Age, be they roundhouse settlements or hillforts, would have functioned as important places for political, social and economic transactions. However, we can also now view these central places or arenas as sacred or symbolically constructed places where specific cosmological issues were played out and where specific emotionally charged crafts were used as a statement of power to legitimise control over people and resources among competing groups. These were essential pre-requisites as during the time of the nucleated settlements it is the nature of the power structure itself which requires to be established through symbolic communication using material culture.

Such a trajectory is paralleled on other first millennium sites. In an innovative analysis of Gudme, Denmark Hedeager (2001) argues that central places are more than defended sites or places of 'trade' or 'power'. Instead, by analysing the role of ancestors, hoarding in the landscape and the rich crafts and objects from these sites, Hedeager suggests that such centres were multi-functional involving economic, social, political, religious, ritual and cosmological practices. They were more than centres for strictly economic or political purposes. These central places may have represented the whole universe in symbolic forms; indeed, some may have been so sharply differentiated from the profane world surrounding it that we may call them 'centres of the universe' (Hedeager 2001, 494-7). In this light, our interpretations of Atlantic nucleated settlements do not seem out of place.

At present, these suggestions may seem largely unsubstantiated. Yet I would argue that this is to do with the reluctance to ask such questions of the structural and artefactual record. Earlier, it was argued that in Atlantic Scotland there were two modes of exchange and trade. The first was dependent on locally made or 'inside' goods, the other was the acquisition of exotic goods from 'outside', particularly Roman goods. I wish to finish this chapter by arguing that Roman objects, and the way they were used by native smiths, bolsters the suggestion that important individuals used smiths, both materially and symbolically, to meet local ideological and political needs.

Non-ferrous metalworking, Roman finds and Middle Iron Age society

Table 8 demonstrates that, at least in Orkney and Caithness, a large proportion of sites with evidence of metalworking also have produced Roman finds. Importantly, of those that can be classed as roundhouses with extensive settlement, often nucleated and classed as villages all have both Roman finds and non-ferrous metalworking. As has been argued before, there is good evidence to suggest that, some isolated roundhouses and nucleated settlements were used contemporaneously during the Roman period and, taken at face value, the patterns of Roman finds, like the metalworking evidence, could suggest important inter-site differences.

However, once again issues of taphonomy and recovery must be considered. It is true that of the sites that have *not* produced evidence of Roman finds, exotica or metalworking evidence only one was not excavated in the 19th century. As we have seen, these antiquarian investigations were very piecemeal with the excavators not investigating all of the sites. It could, therefore, be argued that the absence of Roman finds is purely down to taphonomic and recovery issues. We can, however, turn this argument on its head.

Many of the nucleated settlement sites with Roman finds were excavated in the 19th century; to use antiquarian field practices as an excuse is, therefore, entirely unconvincing. Furthermore, reanalysis of antiquarian excavations from Scotland has demonstrated that artefactual information can highlight important inter-site differences reflecting social differences between groups living contemporaneously (Hunter *forthcoming a*). In this light it may well be the case that the distribution we have, and the relationship between Roman finds and non-ferrous metalworking, is indicative of differential status between sites of apparent similar stature and nature.

Whilst the simplistic equation of Roman finds as invariable status indicators is being questioned, particularly in Lowland Scotland (Hunter 2001), there is a long held belief that Roman finds were objects of some status in Atlantic Scotland (Robertson 1970). Thus, in the past the assumption that nucleated settlements were lived in by important figures made it unsurprising that these people could obtain status items such as Roman goods. Although wider analysis of the find spots of Roman material across Atlantic Scotland suggests that certain sites had preferential access (Hunter 2001) it is possible, like non-ferrous metalworking, these finds tell us far more about the way objects and crafts helped create and maintain identity in the Middle Iron Age. It has been hypothesised that nucleated roundhouses were not just central places or the homes of high status individuals but places where symbolic and powerful objects were acquired and transformed. It has been suggested that these sites were magnets for important practices circulating at the time, which were as much symbolic as they were economic. It is possible that Roman objects acted in a similar way. With few exceptions (e.g. Hunter 2001) the question of why Roman objects ended up in Atlantic Scotland is rarely asked. What was their role in the local cultural system? Various suggestions may be suggested, such as 'trade', 'economy', 'prestige-goods', 'bribes' or 'war booty' but in the light of what has been said before perhaps an alternative can be suggested.

Helms (1993) and Hedeager (2001, 482-3) highlight that it is unlikely that any prehistoric society ever saw activities and goods associated with remote distances or peoples in a neutral light. Whether crafted or uncrafted they all had to pass through the boundary between the unfamiliar world (outside) into the familiar world (inside) of a given society. Helms argues that places 'out there' are represented by two closely related axes: a horizontal one (the geographical distance) and a vertical one (the cosmological distance). The central point is that objects acquired from beyond the confines of everyday society are fixed in both of these distances which combine to make symbolically charged objects, powerful objects to whoever acquires them. In other words, that you could get these objects at all may have been more important than for what they were used. In this light the acquisition of objects from afar represents more than unequal access to objects of economic worth; they embody the ability to garner information about strange places, peoples and things. As in the words of Hedeager (2001, 483):

> In order to comprehend how a Roman vessel – or a cowrie shell – may become a more powerful object than a locally made iron spear, we have to regard power not merely as a function exercised by people, but also an entity or quality that may be acquired or accumulated, and as an existential reality that may be connected to wealth or weapons, but also to other objects. In this sense power is a spiritual energy enabling an individual to interact with the forces of the natural and supernatural world. Objects obtained from 'outside' tend to channel and concentrate such energy, and the individual in possession of such goods will become associated with the power with which these objects are infused.

This perspective obviously has a strong correlation with the arguments set out for non-ferrous metalworking, where smiths are liminal figures credited with supernatural powers, the practice is an act of creation, involving communication with components outside the normative areas of everyday life. The association of exotic goods and non-ferrous metalworking on nucleated settlements begins to make sense beyond economic arguments. Again, concern here is not with disputing the relationship between Roman finds and/or metalworking with individuals of high status. Rather it is with emphasising that by obtaining such goods and services the individual groups were involved in a process by which resources from 'outside', either in a geographical or cosmological sense, were brought into their society, where they were used to legitimise local politics.

Interestingly, there is a further link between Roman goods and metalworking. Analysis of the crucibles and moulds of the Middle Iron Age demonstrates that many of the crucibles have very high readings of zinc when analysed. While there are problems with interpreting EDXRF spectra (see Chapter 3) it is none-the-less clear that where significant amounts of zinc are present the metal is more than likely to have originated from metal ultimately from the Roman metal pool (Dungworth 1996, 410-411). While it is impossible to be sure what form this material took, or indeed, how many times it had been re-cycled and re-used, the suggestion that native smiths used metal of Roman origin is supported by the consistent recovery of other Roman material on sites where they worked. With this in mind, it is worth returning to the discussion of Allasdale, South Uist. A brooch, incorrectly identified as one derived from an Aesica type (Young 1953, 100; F. Hunter pers. comm.), was recovered from the base of pier 4 in the wheelhouse. Analysis by Coghlan (in Young 1953) demonstrated that the brooch was a leaded quaternary alloy with an appreciable inclusion of zinc (ibid.). Coghlan suggests that '... if actually cast on the islands, metal of continental origin was re-used for the manufacture of this find. Looking at the rather artless manner of the workmanship, it seems possible that valued scrap metal may have been re-fashioned by an island craftsman' (ibid.).

It is unrealistic to view these patterns simply as an example of a conscious rejection of Roman material culture by natives living in Atlantic Scotland. Its seems nonsensical to suggest that the natives wanted Roman goods merely to melt them down. Intact Roman goods from Atlantic Scotland are well attested, such as the bowls from Helmsdale, Sutherland (Spearman 1990) and the suggestion that natives acquired Roman goods only to chop them up seems inherently unlikely. However, at the same time, the smiths were clearly using Roman metal within their work (see Dungworth 1996; 1998a & b). Perhaps this suggests that patterns manifested in the later period of natives obtaining chopped up Roman metal took place earlier and are now, thanks to the smith, archaeologically invisible.

Return to the Hebrides

If we argue that non-ferrous metalworking on complex Atlantic roundhouse sites in Orkney and Caithness is indicative of elevated status, crucial to local trajectories, can we afford the same interpretation to the metalworking evidence from the Hebridean wheelhouses and duns? Wheelhouses do have a 'quiet monumentality' (Armit *forthcoming a*). Although little work has been done on the subject the metalworking may be suggesting, like on Atlantic roundhouses, that there were social differences between the inhabitants of similar buildings. The Roman iron finger ring and the fragment of Egyptian blue from Sollas, North Uist (Campbell 1991b, 162-4) are one of the few exotica or imports found during excavations of wheelhouses. The size and sophistication of the wheelhouse could also be an indicator of special status. Campbell (1991b, 166-7) has suggested that the large size of the Sollas wheelhouse could be interpreted as reflecting the special status of one particular family group.

It is also possible to suggest that the metalworking may have been controlled, perhaps even from Orkney and Caithness. As we have seen it has been argued that wheelhouses were being used at the same time as the Orcadian nucleated settlements. The metalworking distribution may well be explained as outlined by Armit & Ralston (1997, 187). By the end of the first millennium BC, Shetland and the Western Isles may have been integrated into more extensive power structures centred on Orkney and Caithness. It can be argued that a distribution of power based on a pattern of numerous, largely autonomous, Atlantic roundhouse settlements, typical of the mid-first millennium BC in the northern Atlantic Province, was replaced by authorities whose influence encompassed larger regions. During this later phase, broch architecture appears to have been restricted to a few elite centres, primarily on Orkney and Caithness.

While control from Orkney and Caithness is a possibility there may be an alternative. As will be demonstrated in the next chapter as the first millennium AD progressed the organisation and control of metalworking in certain areas, particularly the Hebrides, appears to follow a different trajectory than in other areas, particularly the Gaelic and British Kingdoms. With the Middle Iron Age metalworking evidence from Hebridean wheelhouses in mind it is possible that these regional patterns, which manifest themselves most clearly in the Late Iron Age, may have had their foundation in the Middle Iron Age. In other words, the organisation and control of metalworking in the Hebrides was independent of practices in other areas of Atlantic Scotland.

Conclusion

It is has been argued that during the Middle Iron Age non-ferrous metalworking was a prized asset, not open to all; it was controlled by individuals who lived on nucleated settlements. This equation of crafts with influential people is not new (Brumfiel & Earle 1987, 3-4) but it is argued here that it was not necessarily what the smith made, nor even the control and distribution of the objects that was important but the symbolism behind their production and acquisition. Patrons may have sought contacts with smiths not to gain the objects they produced, but more to obtain ritually and politically charged symbols of legitimisation and authority. As Helms (1993, 49-50) states:

> One of the most essential rationales underlying all outside associations, acquisitions, and transformations involves questions of political-ideological legitimisation, verification, and authenticity. Those who create and/or acquire goods...are not only providing goods and benefits *per se* but also are presenting tangible evidence that they themselves possess or command the unique qualities and ideals generally expected of persons who have ties with distant places of supernatural origins and, therefore, are themselves "second creators". Evidence of inalienable connections with places of cosmological origins thus conveys a certain sacrality, which readily translates into political-ideological legitimacy and facilitates successful exercise of power. This, in a nutshell, is why in traditional societies seekers or holders of influential political positions must give evidence of distant outside contacts, be they via the vertical realm, the geographical realm, or both.

This fits well with the wider social models formulated for the structural record where monumentality played a key role in legitimisation. Helm's suggestion may also help us understand non-ferrous metalworking in Middle Iron Age Atlantic Scotland. With all the symbolic and cosmological connotations, the person who controlled the smith may have been seen as even more powerful.

The metalworking evidence allows us to move this discussion forward. We can now see nucleated roundhouses not just as central places or the homes of high status individuals but as places with additional sacred connotations, a place where artisans performed symbolic acts. However, although these elites had access to other prestigious goods, such as Roman finds, control of metalworking in some areas followed a different trajectory than other 'exotica' circulating at the time. Concern was less with the acquisition of finished products but more with the perceived role of the artisan as mediator both within communities and a greater realm outside and their ability to transform 'outside' (non-native; non-worldly, natural) objects into 'inside' (native, cultural) traditions. The inhabitants of these sites are, therefore, involved in a process by which resources from 'outside' are brought 'inside' into their society, where they are subsequently transformed, both materially and symbolically, in order to meet local ideological needs.

A final thought

With the above model in mind it is pertinent to briefly consider assemblages of non-ferrous metalworking debris that appear to date to the cusp between the Middle and Late Iron Ages. These include Loch na Berigh, Lewis, Mine Howe and possibly Gurness, Orkney. Dating of the metalworking activity is problematic and relies on the recovery of moulds for the manufacture of objects argued to be current in the 3rd to 5th centuries AD, such as doorknob spearbutts and a selection of pins (Heald 2001). The assemblages from Gurness and Mine Howe are perhaps the most relevant.

These Orcadian examples, together with perhaps a crucible from Howe, appear to continue the trends outlined throughout this chapter. It has been suggested that non-ferrous metalworking took place on sites, usually nucleated, where the inhabitants were looking for various forms of legitimisation. As we leave the Middle Iron Age it is clear that some forms of legitimisation, particularly the construction of outwardly monumental architecture, ceased. However, non-ferrous metalworking continued to be undertaken on some of the nucleated places used in the Middle Iron Age. In other words, as some forms of legitimisation (e.g. structures), ceased to be used, others (metalworking and smiths) continued to be important within particular foci.

This suggestion gains support from the recently recovered metalworking assemblage from Mine Howe. This curious site comprises a mound with an underground chamber and surrounding ditch. The site has no obvious domestic function; at present a ritual explanation is preferred. With all that has been outlined in this chapter it is surely no coincidence that the smith should have chosen to work here, right at the end of the Middle Iron Age. This metalworking evidence, dated to the end of the Middle Iron Age, suggests that when other forms of legitimisation were falling out of use, non-ferrous metalworking and smiths, with all their social and symbolic connotations, continued to be central actors in the creation and maintenance of identity in Iron Age Atlantic Scotland.

Late Iron Age non-ferrous metalworking: Symbolism, messages and politics

Chapter Seven

Introduction

The common perception of non-ferrous metalworking during the Late Iron Age, here defined as *circa* AD 500 to AD 800, is that it was a high status activity controlled by kings who lived in forts and other central places. This is particularly true in studies of the Gaelic and British Kingdoms where high status metalworking, particularly the production of brooches and use of precious metals, has been recovered from strongly fortified sites with a suite of specific characteristics and often documentary evidence that indicates royal status (Campbell 1991a; 1996a & b; Lane & Campbell 2000). This chapter suggests that these patterns, while undoubtedly important, only tell part of the story. Non-ferrous metalworking took place on a wider variety of sites than previously studied including sites occupied by people at the lower end, if not the bottom, of the social ladder. Often, the smiths who worked on these sites produced objects that were not mundane, everyday objects, but objects of some status that had hitherto been considered to be manufactured only on 'higher status' sites. They also used often precious metals. The possibility that these different sites were high status cannot be sustained. This evidence challenges common theories and requires new avenues to be investigated. As throughout the study, emphasis is given to studying the wider socio-political implications embedded within the practice. Two models are investigated. They are not necessarily mutually exclusive.

The first model considers the role smiths played *beyond* the confines of nuclear centres. As there is good evidence that non-ferrous metalworking took place, and was perhaps controlled, by the upper echelons of certain regional societies it is logical to consider whether non-ferrous metalworking was part of some re-distributive package. Were, for example, the raw materials, expertise or the actual specialist part of wider social politics? It is suggested that while the finished objects created were a powerful statement - a medium through which wider group affiliations were constructed and maintained – within this social transaction the presence of the smith at the receiving site was as important. The smith was sent as an explicit expression of the wealth and expertise royalty could control and redistribute. The magical components inherent within their craft may have heightened this significance.

Allied to this model is the second. A starting point is the recognition that the production of ornate jewellery and the use of precious metal at a wider range of sites, particularly in parts of the Inner and Outer Hebrides, suggests there was regional variation. In some areas fine metalworkers were not tied to aristocratic sites. This forces us to consider why this is the case. One possibility is that centralisation on high status sites is a sign of political development, and that certain areas lay outside the areas under the direct control of, for example, Pictish and Gaelic royalty. It is suggested that metalworkers in the Outer Hebrides were able to work independently, perhaps with itinerant visits to the wealthy patrons of both areas, thus enabling them to develop a fusion of technological styles. The question of why the actual production of various characteristic items of early medieval metalwork took place in areas far from the main distribution of the types concerned is also considered.

The evidence

Table 10 outlines the evidence for non-ferrous metalworking on sites argued to date to the Late Iron Age. Unlike the previous Middle Iron Age period a wider range of objects were being made on a larger number of sites.

The usual suspects: power centres, nuclear forts, hillforts and monastic sites

The majority of evidence for non-ferrous metalworking in the Late Iron Age is from nuclear forts (Figure 66). In 1949 Stevenson interpreted these sites as chiefly or kingly residences, or 'Dark Age' capitals. Excavations for example at Dunadd, Argyll (Lane & Campbell 2000) and Dundurn, Perthshire (Alcock, Alcock & Driscoll 1989) confirm this. A number of hillforts have also produced evidence for non-ferrous metalworking, such as Craig Phadraig, Inverness-shire (Small & Cottam 1972) and East Lomond Hill, Fife (RCAHMS 1933, 143, no. 244) and smaller univallate forts, such as Mote of Mark, Kirkcudbrightshire (Curle 1914). In total, seven nuclear- or hill-forts have produced evidence for non-ferrous metalworking of arguably Late Iron Age date: Dunadd, Argyll; Dunollie, Argyll; Dundurn, Perthshire; Clatchard Craig, Fife; Mote of Mark, Kirkcudbrightshire; Alt Clut, Dunbartonshire and Craig Phadraig, Inverness-shire.

Various excavations at Dunadd, Argyll have produced one of the largest corpus of non-ferrous metalworking evidence in Britain. Moulds indicate the manufacture of brooches, rings, buckles, decorated discs, pins and mounts and the crucibles show that both base and precious metalworking took place (Christison & Anderson 1905, 311-314; Craw 1930, 120-3; Lane & Campbell 2000, 106-49).

Site	Site type	Crucible 1	Crucible 3	Crucible 4	Crucible 5	Crucible 7	Crucible 8	Crucible 9	Crucible 10	Crucible Misc	Brooch	Pin	Buckles	Discs	Rings	Ingot	Rosette	Decorative panels	Hanging bowl	Glass stud	Tacks	Misc.
Dunadd	Fort	X		X	X	X	X	X		X	X	X	X	X	X	X						X
Clatchard Craig	Fort							X		X	X	X		X?	X?							
Mote of Mark	Fort	X						X			X	X	X					X			X	
Dundurn	Fort			X?	X?					X		X										
Dunollie	Fort			X?	X?	X?	X?			X	X?	X		X?		X						
Craig Phadraig	Fort																		X			
Alt Clut	Fort									X												
East Lomond Hill	Fort															X						
Dalmahoy	Fort															X						
Brough of Birsay(Pictish)	?	X		X	X?	X	X	X		X	X	X	X?		X	X					X	X
Whithorn	Monastic	X				X?	X?					X				X		X?				
Iona	Monastic	X				X?	X?					X?			X					X		X
Portmahomack	Monastic	X			X	X		X		X	X?	X			X	X				X		X
St Blane's	Monastic					X				X						X						
Buiston	Crannog	X				X?	X?									X						
Loch Glashlan	Crannog						X															
Ardifuir	Dun	X														X						
Ugadale Point	Dun									X												
Kildonan Bay	Dun									X												X
Gurness	Cellular building				X						X	X			X							X
Eilean Olabhat	Cellular building	X				X?	X?					X		X	X	X						X
Scalloway	Cellular building	X			X?					X	X?	X		X?		X						
Howe	Cellular building								X						X							
Dunan Ruadh	Cellular building	X?																				
Scatness	Cellular building										X	X				X						
Dun Cuier	Cellular building			X																		X
Skaill	Re-used roundhouse									X		X				X		X				*
Bac Mhic Connain	Re-used wheelhouse	X													X	X						X
Jarlshof	Re-used wheelhouse											X				X						
Cnoc a' Comdhalach	Re-used wheelhouse										X											
A' Cheardach Mhor	Re-used wheelhouse			X						X												
Garry Iochdrach	Re-used wheelhouse	X	X						X													
Clettraval	Re-used wheelhouse	X?		X?																		
Bruach an Druimein	Open settlement									X												
St. Columba's Cave	Cave			X?		X			X?													X
Ellary Boulder Cave	Cave	*																				

Table 10: Sites with non-ferrous metalworking evidence from c.AD 400 to AD 1000

Excavations at the royal site of Dunollie, Argyll, the *Dun Ollaigh* of the early annals, revealed at least five phases of activity, of which the first three date to the 7th- to 9th/10th-centuries AD (see Alcock & Alcock 1987). Alcock & Alcock (ibid., 123-4) suggest that the metalworking package, together with the other finds, point to 'Dunollie [being] the seat of a person of importance, whether a royal or noble'.

At Mote of Mark, Kirkcudbrightshire extensive metalworking took place, the most important finds a series of clay moulds for the casting of a variety of non-ferrous objects including penannular brooches, pins, studs and mounts (Curle 1914; Laing 1973a; 1975a; 1976; Graham-Campbell 1976; Close-Brooks 1976; Swindells & Laing 1980; Longley 2001). This phase of metalworking was associated with imported pottery and glass of Germanic origin, manufactured in the 6th century, with a few pieces slightly later. Anglian finds, including two runic inscriptions, indicate possible Northumbrian presence on the site in the later 7th century.

The mould for a hanging bowl mount from Craig Phadraig, Inverness-shire led Stevenson (1972, 51) to believe that the site had a workshop comparable to those in the strongholds at Dunadd, Argyll, and at Mote of Mark, Kirkcudbrightshire. Similarly, the finds from Dumbarton Rock or Alt Clut, including moulds and crucibles led Alcock & Alcock (1990, 114-4) to interpret the site as a royal one where, over a period of several centuries, the inhabitants imported wine from the Mediterranean and drank it from glass cups and beakers of Germanic origin. During this time bronze was being worked to create high-class jewellery.

Although the lack of contextual information make it impossible to deduce the date of activity from many hillforts, the find from East Lomond Hill, Fife can perhaps be placed within these Late Iron

Age discussions. During inspection of East Lomond Hill a spindle whorl, two hollow glass beads and a mould for casting small metal ingots were found (RCAHMS 1933). Although survey indicates features typical of Early Iron Age hillforts (e.g. ramparts, ditches and traces of two enclosures and a possible hut circle) a Pictish stone slab (NMS X.IB 205), bearing the incised figure of a castrate, found within the fort in 1920, and other small finds illustrates that the hilltop saw long periods of activity, probably from the first millennium BC / AD. A similar story is attached to the mould from Dalmahoy Hill. Again, the mould was found during inspection of the site, and is therefore unstratified. However, the recovery of a gold stud, the mould and a survey of the site suggested to Stevenson (1949, 187-91) that the site, and metalworking, may be post-Roman.

During excavations at Brough of Birsay evidence for non-ferrous metalworking was recovered. The time span covered is traditionally placed at the Pictish period of the late-8th century through several Norse phases (the Pictish objects found in the lower Horizon indicating the possibility of continuity). Metalworking evidence was also found during the recent excavations (Hunter 1986). The majority of non-ferrous metalworking evidence came from Zone 1 and included moulds for penannular brooches, ornamental fragments, rings, dress pins and larger objects, bagged shaped crucible, lugged crucibles, a flat bottomed dished and small fragments of coloured glass. Although other finds, such as pins and combs, were recovered the main finds from this horizon consisted of debris from what appears to have been an important bronze-working centre (Curle 1982, 18). Other moulds and crucibles were scattered across the other zones. The complexity of the deposits are shown by the recovery of a mould for a penannular brooch and numerous crucibles from 'Norse' horizons in the same area.

Metalworking on monastic sites is also well documented, for example at St. Blane's, Bute (Anderson 1900; Laing, Laing & Longley 1998), Iona (Barber 1981; Reece 1981; McCormick 1992), Portmahomack, Ross & Cromarty and Whithorn, Galloway (Hill 1997). In 1973 excavations on Iona in the 'Carpenter's Shed' recovered a mould for a glass stud, providing a '... unique record for any deposit of the early monastic phases' (Reece 1981, 19). In this light other small-scale excavations within the 'infirmary' on Iona may be significant as they also produced evidence for metalworking. The excavators interpret these finds as indicating a metalworking area of local origin during the Columban foundation. The Roman pottery (late 1st to late 2nd century AD) found on the site are argued to be relics (McCormick 1992).

Excavations at Whithorn produced evidence for non-ferrous metalworking throughout the 5th to 13th centuries AD. The production of objects was clearly important throughout the sites long occupation. Ongoing excavations at Portmahomack on Tarbat Ness, Easter Ross continue to reveal a vivid picture of Late Iron Age life on a monastic site. Importantly for this discussion a metalworking dump, and probable associated structure, has been recovered. The site is believed to be a focus for an 8th-century settlement which had a cemetery and group of workshops flanking a road in which bronze and precious metals, glass, wood, fine leather (and perhaps even vellum) were worked.

These secular and monastic sites have long dominated discussions of non-ferrous metalworking in Late Iron Age Scotland. However analysis shows that non-ferrous metalworking was also being carried out within the confines of a variety of other sites, including duns, crannogs, re-used wheelhouses, cellular buildings and other settlements, even caves.

New players: crannogs, duns, re-used wheelhouses, cellular structures and enclosed settlements

Crannogs are one of the most enigmatic Iron Age structures. Dates from Scottish examples suggest that they date from c. 500BC into the Early Historic or Medieval period (Barber and Crone 1993). It is difficult to be sure whether the evidence for non-ferrous metalworking on these sites dates to the Middle or Late Iron Age (see Appendix A) and perhaps only two can be confidently assigned to the later period: Loch Glashan, Argyll and Buiston, Ayrshire.

Excavations at Loch Glashan, Argyll (RCAHMS 1988, 207) recovered a lidded crucible used for silver working, perhaps niello (E. Campbell pers. comm.). Most of the finds from Buiston, Ayrshire, including the metalworking evidence, were found during the earlier excavations in a 'refuse heap' which lay outwith the palisade (Munro 1882a, 210; MacSween 2000, 143). The palisade has been dendrochronologically dated to AD 630 thereby placing the deposition of the 'refuse-heap' artefacts after that date (Crone 2000). This supports MacSween's (2000) analysis of the artefact assemblages from the excavations. Only a limited number of artefacts can be ascribed to the first two centuries AD during which time the crannog was first constructed and presumably occupied. All the more exotic elements in the assemblage can be dated to the 7th century AD, arguably the main period of occupation on the crannog.

Duns

Like crannogs any discussion of duns and their assemblages are hindered by problems of classification, chronology and function. Nieke (1990, 133) suggests that the majority were built in the second half of the first millennium AD. Others have followed suit, arguing that, at least in mainland Argyll, the majority were occupied around AD 700 (Alcock & Alcock 1987, 131)[xiv]. Indeed, of excavated duns, only Rahoy has a clearly prehistoric occupation, suggested by a bronze brooch dated to the 3rd/2nd centuries BC (Nieke 1990, 133; Alcock & Alcock 1987, 131). Others believe a significant proportion of duns date to the first millennium BC and were re-used over long periods (Harding 1997, 122-32). The issue remains unresolved. However, what concerns us here is irrespective of their original construction date and function some were undoubtedly occupied in the mid- to late-first millennium AD period and form an integral settlement unit in the Early Historic social and political network. Thus, as Harding (1997, 128) rightly says, in any assessment of the hierarchy of structures of the early historic period it might be safer to focus on secondary occupations in duns.

Three duns, all from Argyll, have apparent evidence for non-ferrous metalworking during the Later Iron Age: Kildonan Bay, Ugadale Point and Ardifuir. However, not all have been traced by the author and some examples, particularly the 'crucibles' from Kildonan and Ugadale, must remain doubtful. That said, the evidence from Kildonan is argued to be similar to, and contemporary with, examples from Dunadd (Fairhurst 1939, 203; fig. 4, nos. 102; 220). Later excavation confirmed that the site was used during the 7th to 8th centuries AD (Peltenburg 1982, 207; Nieke 1984, 122).

There is little stratigraphic or contextual information available for the other two sites, although it is clear that both were multi-phased. Excavations at Ugadale Point uncovered at least two phases of occupation, with the earlier material particularly the crucibles, needle and glass beads[xv], through comparisons with Kildonan, argued to date to the 7th or 8th centuries (Fairhurst 1956, 20). The secondary circular cellular structure built into the interior of the Ardifuir dun also shows that although site may have its origins in the 1st/2nd centuries AD (Christison & Anderson 1905, 267; MacKie 1997, 142), the site was occupied into the second half of the first millennium AD (Harding 1997, 128). This is supported by the artefacts which include material of indisputably early historic date (ibid.). This, combined with comparisons with the Dunadd assemblage, have led others to suggest that the stone mould and crucible dated to the Early Historic period, perhaps the 7th century AD (Christison & Anderson 1905, 269, Alcock & Alcock 1987, 131).

Re-used wheelhouses

Although wheelhouses were constructed during the Middle Iron Age like duns, many show re-use over considerable periods, often incorporating cellular structures comparable to those built inside complex Atlantic roundhouses (Gilmour 2000; *forthcoming a*). Use in the Later Iron Age is shown in the artefactual assemblages: for example, every wheelhouse in the Vallay Strand, North Uist, except Sollas produced Late Iron Age pottery (Lane 1983, fig. 26). This is important because although the poor recording of many finds from wheelhouse sites makes discussion of context and date difficult a considerable amount of non-ferrous metalworking evidence from wheelhouses does date to the Later Iron Age. The finds we have to work with are from older excavations, normally pre-1950s, where the excavation and recording techniques make it difficult to be sure of date or contextual information. However, analysis of other finds from the sites clearly illustrates that most sites were used into the mid-first millennium AD. Therefore, although some non-ferrous metalworking from wheelhouses, such as Cnip and Sollas, North Uist dates to the early centuries AD a significant proportion appear to date to the second half of the first millennium AD (Table 10).

This is best demonstrated at Cnoc a' Comdhalach, North Uist, excavated by Beveridge (1911, 200-6). The wheelhouse was inserted into a pre-existing Atlantic roundhouse (Armit 1992, 32) and there was later occupation, involving a complex of cellular structures outwith the wheelhouse, and an extensive kitchen midden (Beveridge 1911, 204). Beveridge talks of at least five successive periods of occupation, represented by two central hearths and three strata of ashes, all divided by layers of slowly accumulating soil, which represented '... long intervals of rest' (ibid.). Although the poor recording makes it impossible to relate any of the finds to the long series of occupations a mould for the production of an 8th century pennanular brooch indicates that non-ferrous metalworking took place in the Later Iron Age (Figure 67).

The wheelhouse at Bac Mhic Connain, North Uist (Beveridge and Callander 1932) was also re-used for metalworking after it went out of initial use. A substantial hearth and 'furnace' was built in front of the wheelhouse entrance (Beveridge and Callander 1932, 43; fig.. 2) making entering the wheelhouse by the original door impossible (Figure 68). The long use of the sites is supported by the ogham-inscribed bone handle dated to the second half of the first millennium AD and that one of the crucibles shows traces of silver may suggest a date no earlier than the 3rd or 4th centuries AD.

Against this emerging picture the metalworking evidence from A'Cheardach Mhor, South Uist, Garry Iochdrach, South Uist and Jarlshof, Shetland take on added significance. The crucible from A'Cheardach Mhor was assigned to re-use of the wheelhouse during Phase III, associated with nail-headed pins and pottery indicative of a date in the 5th or 7th centuries AD (Young and Richardson 1960, 158). Although it difficult to put forward a convincing structural sequence for Garry Iochdrach, North Uist, it is clear that there was numerous periods of use (Beveridge & Callander 1931; Armit 1992, 58). While the Roman coin of Constantius (Armit 1992, 58) suggests use in the 4th century AD or later the large decorated polyhedral headed pin, probably with a kidney ring, illustrates activity in 11th to 12th centuries AD (Fanning 1983). Although the majority of finds are classed as being found in or near the earthhouse, the excavators did note that '... a small clay crucible containing traces of bronze was found in chamber E' (Beveridge 1932, 36). This cell had had its floor level secondarily raised by one foot and that structural features were rebuilt during secondary occupation (ibid., 34-5).

Although best known for the Late Bronze Age material, excavations at Jarlshof, Shetland also revealed evidence for casting during the Later Iron Age. All examples occur in the post-broch period, re-appearing during the wheelhouse phases. Hamilton argues that fresh arrivals in the 2nd or 3rd centuries AD introduced this new class of dwelling along with new material culture; importantly '... the working of metal also seems to have taken place on a more extensive scale' (Hamilton 1956, 59; see Fojut 1998). Moulds are scattered throughout this general wheelhouse phase, from the earliest wheelhouse through to later buildings[xvi]. At a late date in the wheelhouse complex a large circular building was built, 'with little regard for the earlier structures in the area' (ibid., 75). Found within this structure was a steatite mould as well as a painted quartz pebble and a whetstone. The picture from Jarlshof, then, is one of metalworking taking place at different moments (perhaps 3) throughout the period from the 2nd to 8th centuries AD. Although activity may date to the end of the Middle Iron Age (see Chapter 6) there is a good chance that some, particularly the material from the latest phases, belong to the Late Iron Age.

'Pictish' cellular structures (reused roundhouses and external broch complexes)

Eilean Olabhat was originally the site of an Middle Iron Age Atlantic roundhouse; its abandoned shell was reoccupied in the 6th / 7th centuries and used as a non-ferrous metalworking workshop (Armit 1996, 176-8). The largest cell was almost free of hearth waste prompting the suggestion that it may have been used as living accommodation during the use of the workshop (Armit 1996, 177). Amongst the items produced were hand-pins and a disc decorated with trumpet spiral decoration which can be paralleled with one from a 7th-century context on Dunadd. Analysis of the crucibles shows that silver was also used.

Non-ferrous metalworking evidence dating to the second half of the first millennium AD was also recovered from outbuildings 'characteristic of the cellular type which can be paralleled at many other sites in the north in this Late Iron Age period' at Scalloway, Shetland (Sharples 1998, 205). Seven crucibles occur in Early phase 3 contexts, dated to between AD 500 to 650[xvii]. Two crucibles were found in Later phase 3 deposits, both within House 8, dated to around AD 650 to 900[xviii]. Despite being found in two distinct phases it is possible the some of the crucible fragments belong to the same phase of metalworking activity (Clarke 2001, 301-302; Campbell 1998, 161). The handpin mould, found in a rubble layer in the broch associated with the end of the Late Iron Age occupation, dated to between the 8th century AD and the 14th century AD, also shows metalworking during the Late Iron Age (Sharples 1998, 80). Another mould, possibly for a brooch, was found in the middens on the southern slope and radiocarbon dated to between AD 886-991.

A mould from Howe, Orkney also demonstrates that non-ferrous metalworking took place between the 4th and 7th/8th centuries AD (Phase 8)[xix]. This phase saw the broch tower being used as a dump and an iron-working area, with the settlement focus shifting to a 'domestic' settlement with a cluster of yards on the north east (Ballin Smith 1994, 91). However, there was no evidence of *in situ* working: the crucible was found within one of the farmstead walls and the mould within the North East building.

Metalworking also seems to have taken place in a roundhouse at Skaill between the 4th and 8th centuries AD. Indeed the mould for a ball-headed pin, is comparable to examples from 8th century Birsay. The recently excavated material from Scatness also appears to have taken place in a 'Pictish' cellular building (J. Milns pers. comm.).

Although devoid of contextual information this broad pattern of non-ferrous metalworking in 'Pictish' cellular buildings, can be replicated on other sites investigated during the first half of the 20th century. Three examples illustrate the general pattern. Although Young (1956) suggested that Dun

Cuier, Barra was a single-period construction dated to the 7th century AD, re-interpretation suggests that a cellular building was built into the original Atlantic roundhouse and that the internal structures and much of the finds related to secondary occupation (Armit 1992, 37; 1996, 170-3). Although there is no contextual information for the crucible Young believed that the area was '... used primarily for metal working' (Young 1956, 300). Several internal features are recorded including hearths and work-benches, from the back of which came a high-backed composite comb that can be paralleled at Lagore (Topping 1985; Lane 1983). The bulk of the other material is also consistent with a date in the second half of the first millennium AD[xx]. The nailed-headed pins, found in the ash spread of hearth 2, may have been patterns for making clay moulds and suggest activity during the mid- to late-first millennium AD (Stevenson 1955; Foster 1989a, 80-2).

Moulds for the production of a penannular brooch and a handpin were recovered from the upper floor level of an annexe to a multi-phased Pictish 'shamrock' house at Gurness, Orkney (Hedges 1987, 65)[xxi]. Another crucible, assigned to 7th and 9th centuries AD, came from the north-eastern buildings. It is pertinent to mention the crucible found during excavation of the interior of the multi-phased Atlantic roundhouse at Dunan Ruadh, Barra. The crucible was from the upper deposits that had been disturbed by structural collapse and re-worked. Two discrete ash lenses were identified within this reworked deposit, suggesting intermittent re-use of the abandoned site. It is therefore possible that the crucible may relate to metalworking activity late in the site's history. Although dating is difficult the handpin indicates activity around the mid-first millennium AD.

Non-defended settlements

The Late Iron Age settlement at Bruach an Druimein may be crucial evidence for a non-defended settlement broadly contemporary with Dunadd (Lane & Campbell 2000, 256). Analysis of the crucibles suggests that the smith working on the site melted metal with a significant silver component, suggesting precious metalworking took place on the site.

Caves

Caves were also foci for non-ferrous metalworking during the Late Iron Age. These include St. Columba's Cave and Ellary Boulder Cave in Argyll. One of the crucibles from St. Columba's Cave is a type 7 crucible, used on other sites for precious metalworking (see Tolan-Smith 2001).

Discussion

Here then, is the evidence for non-ferrous metalworking in Late Iron Age Scotland. Numerically, the largest amount was recovered from nuclear- and hill-forts. Indeed, at Mote of Mark so many moulds were found that the excavator quantified the amount in terms of volume rather than actual numbers (Curle 1914, 152). It is well known that these sites were important power centres in the Late Iron Age period (see Alcock & Alcock 1987; Alcock 1988; Campbell 1996a & b; 1999; Foster 1996; 1998). Structural characteristics, together with artefactual analysis and literary sources demonstrate that these sites stood apart from other settlements, with their inhabitants controlling access to exotic goods and maintaining their royal power through redistribution. It seems that, at least on some sites, the production of precious objects was under the direct control of aristocrats at the top of the social hierarchy. This has led to a common social interpretation, that the control of jewellery manufacture was the '... prerogative of the elite (e.g. Crone 2000, 9) and '... a means of obtaining and maintaining hierarchical status' (Nieke & Duncan 1988, 16). As Nieke & Duncan (1988, 13-4) state:

> his [the Kings] ability to mobilise wealth and control the production and distribution of certain craft products played a central and critical role. Ethnographic studies indicate that hierarchical status can be obtained and maintained through privileged access to valued items and control of their distribution through society. In this light, the control of craft activity can be seen as important to the Dalriadic kings for the enhancement of their power and position.

Foster (1996, 16; 41) concurs, arguing that:

> Early Historic power centres, both secular and ecclesiastical, can be defined as the places where the people who controlled material and technologies lived... specialised craft activities, such as fine metal-working, appear to have been largely confined to high status sites...all the evidence points to potentates having used their surplus resources, acquired through the process of demanding tribute / tax and service from clients, to support a range of specialised activities and hence to control the production and/or distribution of prestige goods. In turn, these goods were used to win further clients...in the absence of a monetary economy manipulation of these goods was an important means of establishing new elites and extending authority over increasingly greater distances.

The situation is summed up by Alcock (1988, 25, my emphasis), '... with very rare exceptions, the working of bronze, glass and gold, to produce high quality jewellery, *has only been recorded in our period in secular enclosed places*'. This position now needs modification.

There is emerging evidence that during the Late Iron Age a wider range of sites than hitherto appreciated were domains for metalworking activity. Many are of a different nature than traditional foci, being undefended, isolated sites and not of apparent high status. Importantly, many of the objects produced were not mundane, everyday objects, but objects found on other 'higher status' sites and widely over the Celtic West and beyond. For example, the smith at Eilean Olabhat, North Uist produced decorative discs, comparable to those made at Dunadd, and hand pins found widely across Ireland and Britain. The brooches made at Cnoc a Comdhalach have a long history of use as indicators of status by both the secular and ecclesiastical elites, their gift endowed authority and legitimisation upon the wearer, who was hence obliged to the patron (Henry 1965, 102; Small, Thomas & Wilson 1973, 105; Nieke & Duncan 1988, 14; Nieke 1993; Foster 1998, 17). Other sites, for example Loch Glashlan, Argyll and Eilean Olabhat all show evidence for the working of silver.

precious metals that the Irish Laws tell us are the prerogatives of the upper levels of society. Although these patterns are not entirely new – similar evidence has been recovered from undefended sites such as Dooey, western Ireland (O' Ríordáin & Rynne 1961) and Longbury Bank, Dyfed (Campbell & Lane 1993a) – the implications have never been adequately discussed. How are we to interpret these new patterns?

The same end game?

The first thing to consider is whether sites such as duns, crannogs, wheelhouses, cellular structures and caves with metalworking can be ascribed high status, thus fitting the interpretations into conventional wisdom. Alcock (1988, 29) suggests that some duns and crannogs may have been inhabited by people of high status or potentates. Campbell (1999, 22) agrees suggesting that '... they must have been the houses of the upper echelons of society, the nobles and important freemen'. This is linked to the presumption that, in the case of crannogs, '... only important nobles could command the large resources of timber and many labourers to build these artificial islands' (Campbell 1999, 28; Alcock 1988). Indeed some crannogs may have belonged to kings; there is evidence that Irish kings had more than one residence with the royal fort matched by a crannog (Campbell 1999, 28). Loch Glashan's proximity to Dunadd may have allowed it to have functioned as such a residence situated to exploit upland hunting, fowling and fishing resources (Lane & Campbell 2000, 256). Crone (2000, 164-6) suggests that Buiston may have been the seasonal habitation of a wealthy freeman farmer, who controlled local resources and manpower but who was bound to a powerful overlord. The ability to acquire additional services, goods and manpower '... may have guaranteed the community access to the socio-political hierarchy of Strathclyde' (ibid., 166). Crone (ibid.) concludes that Nieke and Duncan's (1988, 17) broad definition of the occupants of duns and crannogs as persons of considerable social position who had close connections with the ruling elite '... is still the most appropriate interpretation of the evidence from Buiston'.

Artefacts from these sites certainly support these suggestions (see Dark 1994; Campbell 1991a; see table 11). Using the Anglo-Saxon and Continental finds as his foundation Campbell (1991a, 129), describes Buiston as '...a major crannog, comparable to Irish royal examples such as Lagore'. The status now seemingly defined, the metalworking evidence may conceivably be pulled into this general model with the presumption that the individuals on these sites were of suitable status to obtain such practices (Alcock 1988, 25; Nieke & Duncan 1988, 17; Campbell 1999). In this light the hierarchical relationship between metalworking and privileged sites stands firm.

However, pulling the data into conventional models is masking wider social trajectories that have largely escaped study. First, there is a clear assumption in the literature that, although difficult to recognise easily[xxii], there were social differences between the inhabitants of crannogs and duns and the larger forts (e.g. Campbell 1999, 22-4; Alcock & Alcock 1987, 131-4). Although this has resulted in a closer socio-political study of inter-site differences of exotic imports (e.g. Campbell 1991a; 1996b) discussions of other material have been largely superficial (although see Duncan 1982). In assessing the metalworking evidence from Buiston Crone (2000, 165-6) concludes that:

> when compared with the quantities of moulds, crucibles and finished items found on many of the Early Historic strongholds, the implied scale of production at Buiston was very small...Perhaps jewellery making did take place on the crannog but on a domestic scale, involving the repair and reworking of existing pieces rather than the creation of new items. This activity, therefore, would not constitute elitist control of craft production.

To interpret such complex activities by means of a quantitative comparison with other sites is problematic. Do we really believe that the smiths working at Buiston was only able or allowed to 'repair' or 'rework' pieces and not create their own? Even if this was true, the implications of this statement need to be investigated: who, for example, decided this and who enforced it? And where did the smith come from?

More importantly, although it is possible to view the inhabitants of some crannogs and duns as having some status allowing the metalworking evidence to be slotted into conventional models the possibility that other sites, such as re-used wheelhouses, were all high status cannot be sustained. There is no evidence of a church, cemetery or monastic enclosure on any of these sites. Some of the material could be interpreted as evidence of a smith working within abandoned domestic structures, as at perhaps Bac Mhic Connain, North Uist, but this cannot account for all of the evidence. Unlike crannogs and duns, it is assumed that the majority of the Early Historic population would have lived in open, undefended settlements (Driscoll 1992, 18). Importantly, the stone-built cellular structures of first millennium AD date from the Northern and Western Isles are classed within this undefended group (e.g. Crone 2000, 9). Recognising other sites on the mainland is more difficult although they are beginning to appear. At Easter Kinnear, Fife, a settlement of small, scooped sub-rectangular houses has been radiocarbon-dated to the 6th and 7th centuries (Driscoll 1997) while the excavations of two cellular longhouses at North Pitcarmick, Perthshire has yielded radiocarbon dates in the late first millennium AD (Barrett & Downes pers. comm.). One of the large roundhouses excavated at Bruach an Druimein, Argyll is also thought to be Early Historic in date (RCAHMS 1988, 204). Although there is no doubt social variety within the many of these buildings even if we exclude the continental and Mediterranean pottery these sites clearly did not have the same traditional characteristics used to define sites of high status (Table 11).

Site	Glass vessels	Mediterranean pottery vessels	Continental pottery vessels	Fortified	Gold / silver	Brooches	Weapons	Royal references
High status defended								
Cadbury Congresbury	60	17	?1	Yes	Yes	Yes	Yes	No
Dinas Powys	38	14	21	Yes	Yes	Yes	Yes	No
Mote of Mark	13+	-	13	Yes	Yes	Yes	No	No
Hen Gastell	10	2	6	Yes	No	Yes	No	No
Dunadd	7	-	30	Yes	Yes	Yes	Yes	Yes
Dumbarton Rock	5	2	2	Yes	Yes	No	Yes	Yes
South Cadbury	5	14	1	Yes	Yes	Yes	No	No
Clogher	2	2-8	5	Yes	Yes	Yes	No	Yes
Lagore	2	-	5	Yes	Yes	Yes	Yes	Yes

High Status undefended								
Whithorn	80	14	17	No	Yes	No	No	No
Longbury Bank	15	5-7	7	No	Yes	Yes	No	No
Trading sites								
Dalkey Island	6	3	8	No	No	No	No	No
Samson, Scilly	-	1	12	No	No	No	No	No
Caldey	-	1	1	No	No	No	No	No
Monastic								
Armagh	1	1?	1	No	No	Yes	No	No
Iona	-	1	1	No	No	No	No	No
Reask	1?	2	1?	No	No	No	No	No
Clonmacnoise	-	-	1	No	Yes	No	No	Yes?
Randalstown	1	1	3	No	No	No	No	No
Derrynaflan	-	1	1	No	Yes	No	No	No
Crannogs								
Loch Glashan	-	-	5?	Yes	Yes	Yes	No	No
Lochan Dughail	-	-	-	No	No	No	No	No
Airieolland	-	-	-	No	No	No	No	No
Hyndford	-	-	-	No	No	No	No	No
Buiston	Yes	-	Yes	Yes	Yes	Yes	Yes	No
Dowalton Loch								
Duns								
Ugadale	-	-	-	Yes	No	No	No	No
Ardifuir	-	-	?	Yes	No	No	No	No
Kildonan Bay	-	-	-	Yes	No	Yes	No	No
Forts								
Dunollie	1?	-	4	Yes	Yes	Yes	No	?
Re-used roundhouse								
Skaill	-	-	-	No	No	No	No	No
Re-used wheelhouses								
Bac Mhic Connain	-	-	-	No	No	No	No	No
Garry Iochdrach	-	-	-	No	No	No	No	No
Clettraval	-	-	-	No	No	No	No	No
Cnoc a' Comdhalach	-	-	-	No	No	Yes	No	No
A' Cheardach Mhor,	-	-	-	No	No	No	No	No
Allasdale,								
Alt Christal,	-	-	-	No	No	Yes?	Yes	No
Jarlshof	-	-	-	No	No	No	No	No
Cellular structures								
Loch na Beirgh	-	-	-	No	No	Yes	No	No
Dun Cuier	-	-	-	No	No	No	No	No
Eilean Olabhat	-	-	-	No	No	Yes	No	No
Dunan Ruadh	-	-	-	No	No	No	No	No
Gurness	-	-	-	No	No	Yes	No	No
Howe	-	-	-	No	No	Yes	No	No
Scatness	-	-	-	?	?	?	?	?
Scalloway	-	-	-	No	Yes	Yes	Yes	No
Open settlement								
Bruach an Druimein	-	-	-	No	Yes	No	No	No
Caves								
St. Columba's Cave	-	-	-	No	No	No	No	No
Ellary Boulder Cave	-	-	-	No	No	No	No	No

Table 11: Imports and other characteristics of sites in the Celtic West in the mid- to late-first millennium AD (after Campbell 1991a, tables 1-7, Campbell, Hill & Price 1997, 299)

Other interpretations have, therefore, to be considered. Is there a difference between the metalworking activity at the better-documented royal and monastic sites and these more isolated sites? Were the manufactured objects for local use? How do we explain the manufacture of ornate metalwork within isolated sites, outwith supposed metalworking 'cores'? Why are objects found widely over the Ireland and Britain being produced at isolated sites such as Cnoc a Comdhalach and Olabhat? To progress it is necessary to reflect on the common theories concerning the relationship between non-ferrous metalworking and the social and political structure of the Early Historic period. This will provide us with a better understanding of the role the production and consumption of non-ferrous metalworking played in Late Iron Age Scottish society.

The wider role of non-ferrous metalworking in Late Iron Age society

The importance of non-ferrous metalworking to the inhabitants of important power centres cannot be disputed, and has been discussed before. However, what requires consideration is the evidence for smithing activity *away* from these sites. As with the previous chapter a series of possibilities emerge from the evidence. At the outset it is necessary to reject the suggestion that more people than hitherto appreciated had access to non-ferrous metalworking in certain areas. Although literary sources illustrate that craftspeople of the period were peripatetic and actively sought out patronage, this was usually of chiefs and princes at fortified, perhaps royal, sites (see below). Even though variation can be discerned from the law tracts which state that some craftspeople were protected beyond their own *túath* it seems unlikely that everyone had the ability to acquire the patronage of a precious metalworker. Other possibilities must be investigated.

Redistribution from royal sites

Historical sources allow a general picture of the early history and structure of Later Iron Age Scotland, particularly Scottish Dál Riada, to be formulated. Society appears to have been characterised by the emergence of warlike, heroic kings, who ruled over defined territories, though we may not recognise specific geographical boundaries. In Gaelic areas the landscape was divided into *tuatha*, tribes or territories, consisting of large groupings of households which were ruled over by a king, who lived in power centres, such as Dunadd, Argyll, and was supported by a retinue of specialist staff. Kings of individual tribes owed their allegiance to kings of groups of tribes, who in turn owed their allegiance to kings of provinces and, ultimately, to the king of Ireland. Territories could expand when the lord of one area accepted the authority of another or, more frequently, was victorious in battle. The primary economic unit was the individual household or farmer. Between the king and the free farmer stood a class of nobles, to whom the free farmer stood in relationship of clientage, and who were themselves clients of the king. These are the men who appear as *comites* in the sea battle between Cenel Loairn and Cenel nGabrain in AD 719 (see Duncan 1982, 26-30 for fuller outline).

Numerous studies (e.g. Foster 1998) highlight how early historic kings extended their authority over greater distances through the creation of intermediary sources of authority, both secular and ecclesiastical, from their power centres. Authority was closely tied to the number and type of clients one could support. This was ultimately tied to the ability to exploit the agricultural resources of the land. Control of land was the base for all power: the dispersed activities of the agricultural community, who undoubtedly formed the bulk of the population, were orientated by obligations arising from the granting of land rights by authorities who were increasingly identified within a dominant ideological system through the church. The Irish laws stress the important role of this clientship. In return for land to farm, protection, and patronage, the majority of the population paid a range of food renders and other tributes and services, such as labour and military service (see Gerriets 1983, 1987). Clientship extended the distances over which relations of authority could successfully operate and facilitated the establishment of new elites whose authority might be acquired rather than inherited. Other resources were also used as legitimising tools such as literacy, a fundamental technology necessary for the maintenance of political and administrative resources. Late Iron Age power centres were a *domus* for individuals who controlled resources and technologies, and from where resources were administered, collected, transformed and exchanged (Foster 1998, 3).

Crucially, within this relationship gift-exchange was a formal act which cemented the social and political organisation of the society. The importance of imported goods to royal elites who, by amassing a surplus, were able to control the importation and re-distribution of exotic goods into the wider society, thereby enhancing their own power and status and maintaining wider allegiances with lesser nobility, is well documented. For example, Dál Riada was part of a trading network which linked France with western Britain and Ireland in the late 6th and 7th centuries AD (Lane 1994, Campbell 1996a & b, 1999, 43-52). Dunadd has the largest quantity of continental pottery of any site in Britain and Whithorn has the largest quantity of glass vessels (Campbell 1999, 45). As well as accumulators these sites were also redistributors (Campbell 1991a, 1994) as the occurrence of E-Ware pottery from duns and crannogs attests. The few luxury goods from Ardifuir, Kildonan and Loch Glashan have been interpreted as gifts from kings that helped to cement social relations (Campbell 1999, 47). A similar network may have functioned in southern Scotland. Although Crone (2000, 159) suggests that the presence of exotic goods at Buiston is related to direct trade, the occupants trading with foreign merchants at local emporiums such as Dumbarton Rock, gift-exchange, reciprocity and re-distribution may be equally valid explanations.

This framework allows us a platform on which to interpret the evidence of non-ferrous metalworking away from high status centres. As historical texts and archaeology demonstrate that metalworking took place on sites lived on by the upper echelons of society, it seems sensible to ask whether metalworking was part of these re-distributive packages with raw materials, expertise or the actual specialist being part of a complex exchange network across regional landscapes. This position can be considered in two ways. First, as evidence that the inhabitants of, for example, crannogs and duns, were obtaining raw materials, such as copper alloys, silver, crucibles etc., for their own use, from nucleated sites or as evidence of an actual smith sent to the site to work.

The first suggestion seems unlikely as it presumes that people on the receiving site were all competent in non-ferrous metalworking, a difficult scenario to accept. The second option seems more appropriate with smiths as part of a complex process of gift-exchange and redistribution controlled by the inhabitants of high status sites. In some areas the evidence appears to support this. Taking Argyll as an example it is of note that over half of the sites with evidence for non-ferrous metalworking lie within a five mile radius of Dunadd. Ever since 1905 there has been a belief that the metalworking evidence reported from Ardifuir and Kildonan was related to those from Dunadd. That the lidded crucible from Loch Glashan is of the same type to those used at Dunadd may suggest that the same smithing techniques were used on all sites. This may also explain why the smith working on some of these sites had access to precious metals: he or she may have taken them from Dunadd. Thus, far from the Kildonan and Loch Glashan brooches being made at Dunadd (Nieke & Duncan 1988, 17) they were perhaps actually made on the crannog or dun.

However, in accepting this model we have to ask why the finished objects themselves were not traded. Why bother sending the smith when you could more easily send the product? While products such as E-ware pottery can be fitted neatly into previously espoused re-distributive models, non-ferrous metalworking sits uncomfortably with them. Pottery is a finished object where the return is immediate and the message and contents obvious. Conversely, moulds, crucibles, raw materials, and indeed smiths are production tools where the return is not immediate. In this light comparing the two seems inappropriate and with it questions whether metalworking can be understood within traditional redistribution or gift-exchange models. I would argue that it can be, provided we return to suggestions outlined in previous chapters: that the metalworker's participation in the social, political and religious life of his community was important and had a number of socio-political implications, which worked on a number of levels. Again, it may be more beneficial to study the wider social and symbolic principles embedded in the material and practice.

In order to understand the full importance of non-ferrous metalworking in Late Iron Age society we need to investigate the wider social, often symbolic, trajectories integral to the production and acquisition of the metalworker's craft when they are sent out into the wider society. We have seen that is archaeologically and anthropologically commonplace to associate royal rulers with coteries of skilled artisans. Still largely working within this political model two areas are worthy of study: the objects produced by the smith and the smiths themselves.

Meanings in the objects and materials

Emerging evidence suggests that across Late Iron Age Scotland numerous crannogs, duns, wheelhouses, and cellular structures were domains for non-ferrous metalworking. Although the evidence is scant the moulds demonstrate that objects such as brooches, pins and decorative discs were made, and the crucibles show that the smiths used precious metals. Evidence from the Irish Law Tracts and pictorial evidence on decorative sculpture of the time indicates that brooches and precious metals were a prime means of expressing status in material culture (Nieke 1993). For example, the development of the penannular brooches from simple copper alloy examples in the 7th century to the much larger highly elaborate gold and silver brooches exemplified by the Tara and Hunterston brooches of the 8th century can be correlated with an increasingly stratified society with the concentration of power and wealth in the hands of fewer individuals. Brooches and pins were not simply clothes fasteners; they may have been made more as insignias of important individuals and groups, a medium through which wider affiliations were constructed and maintained (see Nieke 1993). Embedded in social relationships objects and materials may come to have social identities connected with the identities of persons and human groups (Strathern 1988, 176; Munn 1986, 15; Mark 1994; Thomas 1999, 93). This extract from the early 8th century Irish Law tract, *Ancient Laws of Ireland* 2, 146 (Henry 1965, 102) supports this claim:

> When they are in fosterage, there must be brooches of gold, having crystal inserted in them, with the sons of the king of Erin and of the king of a province, and brooches of silver with the sons of the king of a territory; or the sons of each king is to have a similar brooch as to material, but that the ornamentation of all these should appear in that brooch.

That the king's son should have a brooch of gold with crystal inset, while boys of lesser rank should have brooches of silver, with no inset crystal, and so on, throughout the wardrobe clearly shows the ways metal objects were conscious signs of wider social politics. This gradation of trappings according to rank finds an analogue in the *cingula* worn as a badge of office in Roman Britain in the 4th century, in which the splendour of the fittings must vary according to rank (Hawkes 1974, 390). All this suggests that the significance of some metalwork during the Late Iron Age was grounded less in function than in the symbolic. Objects can embody and trigger social memory and their involvement in everyday activities through to ceremonial events can actively and repeatedly remind people of important ideals and accepted modes of conduct. Artefacts can at once be instrumental tools which facilitate the operation of mundane practices, symbols which render these practices meaningful, and mnemonic devices which remind people of how to proceed and act. As Thomas (1999, 93-4) reminds us, '... material culture is part of an apparatus which people use to construct meaningful worlds, rather than simply a jumble of things to be classified'. It is these meanings that we must endeavour to study, using the objects as metaphors, as texts to be read (see Patrik 1985; Hodder 1986; 1988; Buchli 1995; Tilley 1993).

With this in mind it can be suggested that smiths, controlled by the upper echelons, were sent to use and produce metals and in so doing tied individuals into wider socio-political landscapes. We know from a number of documentary sources that kings possessed brooches and that these were used as gifts to others. In the late 6th century *Eulogy of Cynan Garwyn* by Taliesin the King of Powys is praised for the gifts, including brooches, which were given to the poet (Jarman 1982). However, within this framework care was still taken to maintain status differences. As the early 8th-century Irish Law tracts tell us, individuals of different standing had different objects according to rank. Foster (1998, 17) believes that during the Early Historic period there was an increasing tendency to mass-produce smaller pieces of jewellery because they were needed to enable more frequent gifts to be made to the expanding number of followers. The mould evidence tells us that although smiths were producing objects that were part of a wider metalworking tradition there were important differences between sites that may represent differences in social status. For example, although the brooch made at Cnoc a Comdhalach is related to the general Pictish series it was far smaller in size. In this light, the Brough of Birsay assemblage is of note.

The assemblage, and its affiliations to the St. Ninian's Isle Treasure, are well known. Previous interpretations of this material have followed the traditional path: evidence of a high status activity associated with high status people. However, although the brooches produced were related to wider Pictish traditions, they would have been half the size of the more elaborate Pictish brooches, for example, seen in the St. Ninian's Isle Treasure. That the brooches recovered from Brough of Birsay were of copper alloy and not silver is of note. This pattern is not confined to brooches: the mould for the production of an object similar to the St. Ninian's Isle chapes is also half of the size of those found at St. Ninian's. In other words, the Brough of Birsay smith did not produce the most elaborate objects of the Pictish period. Instead, their products were smaller. If we presume that the smith was making objects for the inhabitants of Brough of Birsay, we have to accept that the inhabitants were not getting top-of-the-range Pictish metalwork. Alternatively, the status of Brough of Birsay remains intact if we assume that the smith was actually commissioned by a Brough of Birsay elite to produce lesser objects that were ultimately sent to other sites in the Pictish realm.

Beyond the product: meanings in the practice

We are still left, however, with a nagging question: why were finished items simply not sent to crannogs and the like? What purpose did it serve sending the smith? Arguably, our answer lies within previous suggestions - that the artefacts produced and the materials used by the smith were inextricably bound up in wider aspects of social, economic and ritual life. In this framework it can be suggested that the presence of the smith at the receiving site may have been as important as the objects made or the materials used. The smith was sent as an explicit expression of the wealth and expertise that the king could control and redistribute. They were sent as messengers.

At numerous points throughout this study (Chapters 1 and 6) the recurrent link between the smith and non-economic trajectories has been emphasised. The starting point has been the work of Mary Helms (1993) who suggests that in pre-literate societies smiths were often viewed as powerful as their work requires the esoteric kind of knowledge to enable them to manipulate the dangerous forces unleashed in the process of transforming shapeless metal into a finished product. This relationship between magic, status and power of the smith is echoed in the Irish texts of the Late Iron Age. The crafts recognised as ennobled in the early Irish and Welsh tract laws included the building of houses, of ships and raths; the making of mills and chariots; the carving of wood; the leatherworker and, importantly for this study, the workers of metals and smithcraft (MacNeill 1923, 273-81; 1935, 94-5; Williams & Powell 1942, 26-7; Richards 1954, 41-2; Gillies 1981, 76). Not every craftsperson had the same status: herders, musicians and fencers, for example, were not afforded high status whereas others, including smiths, enjoyed the privilege of free status (Gillies 1981, 75-6; O'Rahilly 1976, 17). Indeed, some saints regarded descent from a craftsman as conveying acceptable social overtones (Gillies 1981, 77) with many made out to be the sons of craftsmen (see Plummer 1910, xcvii). For these reasons some craftsmen enjoyed the privilege of free status in the stratified Celtic society. As Gillies (1981, 75-6) tells us:

> ... that is to say, blacksmiths, goldsmiths and some others could squeeze in above the line which separated the freemen from the rest; practitioners of such recognised crafts could thus own or inherit property, make oaths, enter into contracts and attend assemblies as members termed *nemed* – literally 'sacred', i.e. communicant (as it were) in the business and mysteries of the tribe.

The texts tell us that high status and respect for the smith was often associated with superstitious awe; indeed this is a recurrent theme. In outlining the divisions of early Irish society Kelly (1998, 9-10) illustrates that at the top of the hierarchical group were the privileged called the *nemed*. This literally means 'holy' or 'sacred'. There were four main categories within this prestigious group: kings, lords, clerics and poets. Other texts demonstrate that there was a lower appendage called the *base nemed* which included judges, physicians, druids and smiths (black and copper). Many of this group may have obtained their status not through control of land or people (as in the case of the lords or kings) but in their perceived superior knowledge, skill and links to the supernatural world (Kelly 1998, 39). The *Annals of Ulster* s.a. 1024 recount how Cúán hua Lothcháin, chief poet of Ireland was killed in Tethba. Before dying he was able to cause the bodies of his murders to rot within an hour by means of *firt filed*. This alleged power of poets to 'rhyme to death' both men and animals is echoed in later 16th century English sources (Kelly 1998, 44). The poet's supernatural powers were not only for destructive purposes. Legal sources states that the chief poet should remain in the king's presence to protect him from sorcery (Kelly 1998, 44). The *Táin Bó Cúailnge* tells how King Conchubar's physician Fingen restored a warrior's strength even though '... the sinews of his heart had been severed so that it was rolling around inside him like a ball of thread in an empty bag' (Kelly 1998, 58). A similar link exists with druids (ibid., 59-60). Importantly, smiths seem to have occupied a position of similar esteem, intricately bound up in what they made, particularly their role as armour-maker in a warlike society and jeweller in an intensively vain honour-culture (Gillies 1981, 75; Kelly 1998, 62-3). Lest there be any doubt of their perceived supernatural powers an 8th century hymn asks God for protection from the spells of women, druids and smiths (Kelly 1998, 60).

This cumulative suggestion that the smith was perceived not just as a manufacturer of metal objects is supported by one final consideration: itinerancy. The perception of craftspeople as individuals who had links to, or even embodied, the supernatural qualities of a different, perhaps dangerous, world beyond the settlement would have been heightened by the qualitative significance attached to the distances smiths often travelled (Helms 1988; 1993; Hedeager 2001, 487). The reasons smiths travelled distances may be varied, ranging from seeking patronage to the need for raw materials (Eliade 1962, 5). Such travelling may be temporary or permanent, voluntary or involuntary, but the resultant spatial distance often has a very significant symbolic component causing people from outside realms to be respected or feared (Helms 1988). Studies have shown that in pre-literate societies geographical distance is often accorded political and ideological qualities virtually identical to those associated with vertical (heaven / underworld) distance, space and time. As Helms (1993, 44-9) highlights, although the cosmographies of traditional societies accord diverse interpretations to geographical distance, all basically contrast such realms with whatever qualities are associated with their own immediate heartland. In other words, there is a contrast between the cultural and the natural, the local (well-known, safe) and the distant (unknown, chaotic). For this reason, artisans may be allowed safe passage through areas dangerous to others. Itinerant workers would have been one of the most travelled artisans and those most personally associated with the supernatural qualities of the spatial world. Indeed, these groups are often perceived to be 'between units of settled life' (Helms 1993, 34; Court 1985). Again, this idea is supported in the Irish texts where we are told that early Irish skilled crafters were one of the few groups would could pass freely and safely between tribes. Some craftspeople were protected beyond their own *túath*. Whilst some craftsmen were sedentary others were not.

That skilled artisans already under chiefly or royal patronage were sent to the courts of other peoples would only have enhanced the spatial range of both their own and their patrons' reputations (also see Helms 1993, 34). Skilled artisans may have been sent to work on areas outwith their normal working areas not only to produce goods that tied individuals and groups to wider social institutions but also as an explicit expression of the powerful, indeed fearful, energies that important individuals could control. Smiths, therefore, provided extremely valuable services far beyond the products of their craft. Through the visible act of creation they significantly contributed to the recognition and acceptance of political leaders. Although difficult to prove, it is also possible that, being itinerant, smiths, and other craftspeople, were integral to the continuing formulation and maintenance of social ties, being messengers from far off lands.

Regional differences

This model could account for the recovery of non-ferrous metalworking from a wider variety of sites across Late Iron Age Scotland than hitherto appreciated. However, as argued throughout, it is unlikely that one narrative is suitable for understanding the complexities of Iron Age societies. We should expect regional variations. This geographical component is illustrated by a variety of sources

– including annals, literature, genealogies, homilies and religious tracts – that make it clear that Scotland emerged in the post-Roman period divided into numerous kingdoms, largely based on earlier tribal divisions (e.g. Alcock 1971; Dumville 1977; Smyth 1984; Duncan 1982, 10-15). In AD 731 Bede referred to the five tongues or languages of nations or peoples (*quinque gentium linguis*) then existing in Britain. One of these was Latin, the language of the Church; the others were those of the English, the Britons, the Scots, and the Picts.

We have seen that a general picture of the early history of Scottish Dál Riada can be obtained through a variety of sources. Other areas of Scotland are more difficult to interpret. Although in the east of Scotland, from the Forth to the Tyne, were the Gododdin with a major centre at Din Eidyn, generally equated with present day Edinburgh (Jackson 1969, 95-8; Driscoll & Yeoman 1997). In the north-west corner of Gododdin territory, near Stirling and around the head of the Forth, was located the sub-province of Manaw. The second major kingdom was Rheged. Their territory included the Solway Basin, perhaps Galloway, the Eden Valley up to the crest of the Pennines and possibly across Swaledale and may have evolved out of the combined territories of the Brigantes and the Novantae. The third kingdom is Elved or Elmet, which lies south of the present day Scottish border between the Pennines and the Yorkshire plain east of Leeds. To the west of Gododdin territory lay Strathclyde. Strathclyde was a major British kingdom and played a significant politico-military role in the early development of northern Britain into the kingdom of the Scots. Evolved out of the older unit of the Damnonii, its territory would have encompassed most of the Clyde basin and may have extended as far north as the Forth in Stirlingshire and the head of Loch Lomond where it would have bordered both Pictish and Dál Riada territory. Its southern boundary is less certain and certainly varied over time (Kirby 1962, 77-83). Rheged lay to the south.

Northern Scotland, or 'Pictland' is more difficult to define. Late 9th-century documentary sources suggest that during the Late Iron Age 'Pictland' was divided into seven provinces (see Foster 1996, 1998). The earliest source, a king list, contains a tradition that Cruithne, the 'father of the Picts' (*Cruithni* is Gaelic for Picts) had seven sons, their names corresponding to specific districts. Although this legend was undoubtedly to create an image that Pictland had long been unified (Broun 1994) there is a strong possibility that the seven provinces, and more, existed. Prior to this period our picture is sketchy, although other historical sources talk of powerful kings and sub-kings. According to Adomńan and Bede there may have been a northern and southern province to either side of the Mounth, perhaps reflecting a bipartite division (see Smyth 1984; Lynch 1991; Foster 1998, 6).

Recognising these regional patterns in the archaeological record has, however, been a little more problematic. Structural analysis offers some help. For example, the distinctive 'Pictish' cellular structures discussed earlier all lie within the assumed territories of Pictland: Orkney, Shetland, Caithness and perhaps the Outer Hebrides. However, recognising the architectural equivalent in other areas, for example, southern Scotland has been far more difficult. Although Strathclyde played a major politico-military role in the early development of northern Britain our understandings of where the kings, nobles and the free commoners lived is badly hindered by the lack of modern excavation (see Alcock 1990; Smyth 1984). Only the work of Alcock (1981, Alcock & Alcock 1987; 1990; 1992; Alcock *et. al.* 1986; 1989) and Crone (2000) helps us in our task. Constructing regional material cultures have long preoccupied many. Pictish symbol stones are an obvious example and other items, such as combs, have long been upheld as other Pictish characteristic (e.g. Foster 1990). However, although the distribution between vitrified forts in the east and south-east and Atlantic roundhouses in the Atlantic fringes suggest that there may have been some form of diverse cultural and political streams in Pictland as far as artefacts are concerned no case can be made for significant political or linguistic distinction between these areas (Smyth 1984, 53). Indeed, recognising specific Pictish material is becoming increasingly difficult. Smyth's (1984, 52-3) belief that '... provided it is found outside Dal Riada in the south-west and provided it can be shown to be of native manufacture then an artefact is Pictish in so far as it belonged to the historical Picts in the period AD 80-850' is tempting to use but not always realistic. The problem is not confined to northern Scotland; attempting to recognise differences between the Britons and Dal Riata has proved equally difficult (Duncan 1982).

The extent to which regional material cultures can be distinguished is obviously important if the inter-relationships between areas are ever to be teased out (see Foster 1996, 28). However, to date, there are few recognisable differences and it is fair to argue that large elements of cultural repertoires may be shared. That said, it is possible to suggest that non-ferrous metalworking evidence may be allowing us a rare glimpse.

Of crucial importance is how we interpret the metalworking evidence from the Outer Hebrides. Instead of seeing, as the previous model did, the evidence from Cnoc a Comdhalach and Eilean Olabhat as being controlled by Dal Riata capitals perhaps it is better to view them within a 'Pictish' milieu, and evidence of regional differences. It is pertinent to return to the mould from Cnoc a' Comdhalach, North Uist[xxiii].

The form of the brooch cast in the mould is related to those of the St. Ninian's Isle type, conventionally given the cultural label of 'Pictish' as most examples have been found in the north-east of Scotland. However, the technological details of the mould relate it to the moulds from Dunadd, in Gaelic Dál Riata, rather than Brough of Birsay, in Pictish Orkney, even though the brooch itself is conventionally of Pictish form. This is shown not just by the distinctive keying pattern, but also by the fact that the front face of the brooch is impressed into the lower valve, rather than the upper as at Brough of Birsay and other Pictish sites (Lane & Campbell 2000, 203). There is increasing evidence that the Western Isles were part of the Pictish cultural province, though a Pictish political affiliation does not necessarily follow. Square burial cairns of Pictish type have recently been discovered at several sites on the Uists and Eigg, supplementing the known Pictish symbol stones from the area. A mixture of cultural influences is not unexpected in this region, from purely geographical considerations.

As we have seen, the context of the mould, from an undefended and isolated low status settlement site is unusual for an object of this importance. This is not the only site to have produced evidence of high status metalworking in North Uist. We have seen that the Atlantic roundhouse at Eilean Olabhat was reoccupied in 6th or 7th centuries AD and was used as a non-ferrous metalworking workshop. Amongst the items produced were hand-pins and a disc decorated with trumpet spiral decoration which can be paralleled with one from a 7th-century context on the royal site of Dunadd. Further, analysis of crucibles from the metal working deposits at Eilean Olabhat and Bac Mhic Connain show that silver was used in the production of these items.

What this accumulating evidence may be showing is that instead of being some form of re-distributive package controlled by elites, production of high status objects in particular parts of Scotland was *not* confined or controlled by high status settlement sites. Indeed, although the Middle Iron age broch towers of Western and Northern Scotland have been claimed to be high status there is little evidence for the existence of a hierarchy of sites in these areas in the Late Iron Age. This situation contrasts markedly with that in the better known areas of Gaelic and British Kingdoms. Indeed, removing the Outer Hebridean assemblages from discussions, in these regions manufacture of high status objects such as brooches was under the direct control of aristocrats and took place on sites inhabited by those at the top of the social hierarchy. Even then, the silver working from Loch Glashan can be interpreted in this framework, if we accept the site is already of some status (see above).

The evidence from particular areas of Atlantic Scotland, particularly the Hebrides, suggests that the organisation of metal working was not concentrated in royal hands. Whether these sites were the sites of itinerant smiths producing material for distribution to other areas, or whether it really reflects a more egalitarian distribution of wealth in this peripheral area, is a question for further research. At the very least, this emerging evidence for metal working on lower status sites in the Western Isles suggests that there may be regional variations in the organisation of fine metal working in early medieval Britain. The areas of differing organisation may or may not coincide with the conventional boundaries associated with the known peoples of this period. Even in areas such as the Northern Isles, which also fall in to the Pictish cultural province, the situation may have been different as brooch production has been so far only encountered on the apparently high status site of Brough of Birsay.

One other aspect is of interest. It reinforces a growing trend towards the discovery of actual production of various characteristic items of early medieval metalwork in peripheral areas far from the main distribution of the types concerned. The best known example of this was the discovery of the only mould known for the production of hanging bowl discs at Craig Phadraig near Inverness, while the distribution of finished items are concentrated in south-eastern Britain and Ireland. Similarly, evidence for the production of hand-pins, examples of which are found throughout Britain and Ireland, is concentrated in the Northern and Western Islands of Scotland, with finds of moulds from Scalloway, Shetland, and Gurness, Orkney, and Eilean Olabhat in North Uist (Campbell 1998, 171). At the moment the significance of this imbalance in production and distribution is unclear. It could be suggested that these areas were acting as production centres for the distribution of fine metal work to other parts of the British Isles but this would seem unlikely. These sites produce little evidence for trade and exchange such as the imported ceramics and glass found in quantity at production sites further south, such as Dunadd. The imbalance may merely be a function of preservation, as excavated sites of the 8th and 9th century are scarce in all western areas, while there have been major excavation programmes in the Northern and Western Isles in the last fifteen years.

In conclusion, this new material, showing the production of brooches of precious metal at low status sites in the Outer Hebrides, and arguably also in other parts of Atlantic Scotland, is significant as it suggests that fine metalworkers were not tied to aristocratic sites, as in other areas of western Britain and Ireland. This forces us to reconsider why there should be regional differences in the control of fine metalwork. One possibility is that centralisation on high status sites is a sign of political development, and that the Western Isles lay outside the areas under the direct control of both the Pictish and Gaelic royalty. Metalworkers in the Isles would then be able to work independently, perhaps with itinerant visits to the wealthy patrons of both areas, thus enabling them to develop a fusion of technological styles. It is interesting that in contemporary Middle Saxon England there is little evidence of fine metalworking on high status sites (other than ecclesiastical), suggesting that metalworkers were also more independent and itinerant.

Conclusion

The common perception of non-ferrous metalworking during the Late Iron Age is that it was a high status activity controlled by kings who lived in forts and other central places. Analysis shows that, particularly in the Gaelic and British Kingdoms, this is true. This chapter has suggested that these patterns, while undoubtedly important, only tell part of the story. Analysis shows that non-ferrous metalworking took place on a wider variety of sites than hitherto studied including sites considered to be occupied by people at the lower end, if not the bottom, of the social ladder. Often, the smiths who worked on these sites produced objects that were not mundane, everyday objects, but objects of some status. These had previously been considered to be manufactured only on 'higher status' sites. They also used precious metals. The possibility that all of these sites were high status, monastic or ecclesiastical sites, cannot be sustained. By studying the wider socio-political implications embedded within the material, alternatives have been suggested with particular importance given to the role of the smith *beyond* the confines of nuclear centres and their wider role in the first millennium AD landscape. One suggestion is that, at least in some parts of Scotland, non-ferrous metalworking was controlled by the upper echelons of certain regional societies. It is argued that both the finished products and the actual act of creation were integral components. The finished objects were powerful statements through which wider group affiliations were constructed and maintained. Furthermore, within this social transaction the presence of the smith at the receiving site was as important as the objects made, sent as an explicit expression of the wealth and expertise that royalty controlled and redistributed. The magical components and perceptions of itinerancy inherent within their craft may have heightened this significance.

Allied to this is the suggestion that the production of ornate jewellery and the use of precious metal at a wider range of sites, particularly in parts of the Inner and Outer Hebrides, suggest there was regional variation and that in some areas fine metalworkers were not tied to aristocratic sites. This forces us to reconsider why there should be regional differences in the control of fine metalwork. One possibility is that centralisation on high status sites is a sign of political development, but that some areas lay outside the areas under the direct control of both the Pictish and Gaelic royalty.

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Conclusion: Non-ferrous metalworking in Iron Age Scotland

Chapter Eight

This thesis has discussed the evidence for non-ferrous metalworking, particularly casting, during the Scottish Iron Age (*circa* 700BC to AD 800). The wider goal has been to offer a fuller understanding of the role that the production of bronze, silver and gold objects played in Iron Age society. In order to reach this goal it was stressed at the outset that a wider range of theoretical and methodological frameworks had to be adopted than had hitherto been utilised in studies of Iron Age craftsmanship. In particular, there was a strong need to study issues other than technology, function and economics. It was argued that while these were part of the metalworking rationale, they were not the only ones. Often other factors played a more important part in the production and consumption of non-ferrous metalworking.

By using the corpus and analysis of known crucibles and moulds from Iron Age Scotland attempts have been made to arrive at fuller understanding of the role the producers and consumers of bronze, gold and silver objects played in Iron Age Society. Key issues investigated have been the people-manufacture relationships embedded within the practice; the social contexts and organisational dynamics structuring and giving meaning to the practice; and the wider social trajectories and transformations emanating from the practice. Study of these themes took the form of three chronological case studies. The aim of each study was not to give an all-embracing historical narrative for every region. Instead, the aim was to stress variability and, more particularly, study the role of non-ferrous working and the objects, within the creation and maintenance of social identity, structures and politics in Iron Age Scotland in specific regions at specific periods. This required contextualising the production and consumption of non-ferrous objects within wider themes and discussions of Iron Age society.

The first study (Chapter 5) dealt with the Early Iron Age. The starting point was a consideration of the effects ferrous metalworking had on non-ferrous metalworking. A key area was the realisation that as we move from the Late Bronze Age through the earlier Iron Age there was a change in the objects cast in bronze, with high-quality metalwork (axes, swords, spears, etc) giving way to more 'prosaic' casting traditions (pins, ingots). Although this may be purely an issue of archaeological 'visibility' there may be a more relevant social explanation; we may be witnessing the 'marginalisation' or 'redefinition' of non-ferrous metalworking casting practices. Despite the actual crucible and mould evidence being slim, this model appeared to gain credibility when viewed in relation to other processes taking place during this period. The transition from Bronze Age to Iron Age saw the cessation, or at least reduction, in bronze hoarding and a general reduction in the quantity of bronze objects evident in the archaeological record around this period. There was also a shift in attitude to what objects were made and from what material. As the first millennium BC progressed there are more tools and fewer weapons. This takes place alongside an increase in the use of iron and iron 'mimicking' of objects once produced in bronze (e.g. socketed axes, spearheads, sickles). These technological patterns appeared to be linked to wider socio-economic changes, particularly an increased emphasis on elaboration of the domestic sphere, organisation and exploitation of the agricultural landscape, a movement towards enclosure and ritual deposition of agricultural objects. It was suggested that we may be witnessing an emerging system based on the control of land and agricultural production. Crucially, this contrasted with the previous Late

Bronze Age 'prestige goods' political system that was based more on the manipulation of exchange relationships, political alliances and crafts such as metalworking. Thus, whereas in the preceding period bronze was used for the production of objects whose functions were largely concerned with prestige, exchange or ritual, in the following period concern was more with the production of more 'functional' items, and the use of non-bronze items. The result was that as the earlier Iron Age progressed bronze smiths had to redefine their role within a new social milieu.

The second study (Chapter 6) was concerned with the Middle Iron Age, here defined as c. 200 BC and AD 300, particularly in Atlantic Scotland. This period saw major changes in the structural record which appeared to have been linked to new social trajectories and issues of identity. It was argued that non-ferrous metalworking played a pivotal role in this cycle. However, concern was less with the finished products than with the perceived social use of the smith by emerging power groups who were looking for various forms of legitimisation. This process was probably linked to the symbolic and transformational attributes of the smith's work. Because of this metalworking was confined largely to nucleated roundhouses or hillforts which we can now see not just as central places or the homes of high status individuals but as multi-functional units concerned with economic, social, political, religious, ritual and cosmological practices. The inhabitants were involved in a process by which individuals (smiths) and resources (metal) from 'outside' were brought 'inside' their society, where resources were transformed, both materially and symbolically, in order to meet local ideological needs.

The final study (Chapter 7) was concerned with the later Iron Age, here defined as c. AD 500 and AD 800. Non-ferrous metalworking during this period had been better studied but was largely confined to material from forts such as Dunadd, Argyll and Mote of Mark, Kirkcudbrightshire. Furthermore, the practice has been used solely as an indicator of status and as an activity controlled by elites. While not disputing this relationship chapter 7 attempted to tease out wider interpretations. One key theme was the role of the smith *beyond* the confines of central places and their role in the wider world. The starting position was recognition that particular 'special' objects, such as brooches, and precious materials were being made away from royal centres. Two avenues were investigated. First, it was suggested that the act of creation of these objects was a powerful statement, along with the finished artefacts; an insignia through which wider group affiliations were constructed and maintained. The smith was sent to produce objects that tied individuals to wider socio-political landscapes. Within this social transaction the presence of the smiths at the receiving site were as important as the objects they made, being an explicit expression of the wealth and expertise that royalty could control and redistribute. Second, it was suggested that the emerging evidence may be reflecting regional differences in non-ferrous production and that in some areas fine metalworkers were not tied to aristocratic sites. It was suggested that the centralisation on high status sites is a sign of political development and that some areas lay outside the areas under the direct control of both the Pictish and Gaelic royalty. Metalworkers in the Isles would then be able to work independently, perhaps with itinerant visits to the wealthy patrons of both areas that enabled them to develop a fusion of technological styles.

It is argued that this study has allowed a more realistic interpretation of the production and consumption of non-ferrous objects in Iron Age Scotland. Clearly, the theoretical and methodological approach adopted here does not provide some totalising account for the whole of the period. However, the structure and makeup of Iron Age Scotland suggest that it is unrealistic to even expect to find one. As argued in Chapter 1 there is unlikely to be a final, settled end-game that absolutely establishes everything in some totalistic theory. This study is offered as a basis for future discussion. If we are ever to reach a fuller understanding of non-ferrous metalworking in Iron Age Scotland much clearly remains to be done. For reasons of space this study has largely ignored the sparse evidence for smelting, tools and sheet-working and this is a valuable avenue for future research. From here we enter the realms of future priorities for Iron Age research. Hopefully, this study has shown that we will never reach an adequate understanding of non-ferrous metalworking if we do not understand the other crafts of Iron Age society. Although the relationship between ferrous and non-ferrous metalworking was considered in the Early Iron Age, we are still far from understanding the relationship in the later periods. And what of stone- and bone-working? This material dominates the Iron Age record, particularly of Atlantic Scotland, but with a few notable exceptions (Foster 1989a; 1990), we are still far from understanding how production and consumption was organised and its role in wider society. Arguably, attempts should be made in the future to gain a better grasp on the dating and sequence of material culture.

Using disparate material pulled from the ground for over two centuries this study has two ultimate conclusions: that non-ferrous metalworking was a fundamental concern to important individuals, a prized asset, not open to all and played a crucial role in the creation and maintenance of social and political trajectories at different times throughout the Iron Age. This opens the door for future research into Iron Age material culture: if it can be demonstrated that non-ferrous metalworking was integral to wider social trajectories, what of other understudied practices such as bone-, stone- and iron-working? Over the last three decades structures have continued to dominate the Iron Age literature. This study is offered as an illustration of what objects can tell us about living in Iron Age Scotland.

[i] However, it is important to note that the Garranes, Co. Cork semi-spherical crucibles did show evidence of 'great heat on the top parts of the sides, and on the upper surface around the interior' with all 'glazed to a considerable extent around the mouth (ibid.). O'Riordian also correctly points out that due to the thickness of the objects and the place of vitrification that they were heated using a different technique than the triangular crucibles perhaps implying a different purpose, probably for 'glass and enamel manufacture' (ibid). Also, although analysis by Mr. J Cecil Maby on material from Lagore, Co. Meath shows that the 'flat bottomed crucibles were...associated with copper-working' (Hencken 1951, 237-8) the type are notably different from Garranes, Co. Cork and Dunagoil examples, being smaller, more flat bottomed and thinner.

[ii] Some enclosures contained only enough space for one house, for example St Germains, East Lothian and Green Craig, Fife. Alternatively, other enclosures probably contained larger communities, such as the earthworks at Hayhope Knowe, Roxburghshire and the Dunion, Roxburghshire.

[iii] This dichotomy is a little simplistic as some enclosed sites do occur in the areas of Fife and Tayside (Hingley 1992, 34).

[iv] For example, in some areas, notably Atlantic Scotland, there is evidence for declining economic potential prior to and during the Early Iron Age (e.g. McCullagh 2000; Fairhurst & Taylor 1971; Armit 1992). In these areas a 'broad spectrum economy' (Armit & Ralston 1997, 188) may have been in place with fishing, hunting and fowling essential complements to arable and pastoral activities, the balance varying considerably, dependent on local conditions and strategies.

[v] This has led to differing social discussions. For example, some see examples in the Western Isles as the typical household of the local population not related to one social class (eg Armit 1992, 126; 1996, 129). Others take the opposite viewpoint, arguing that they were the homes of important individuals (eg Parker Pearson, Sharples & Mulville 1996; Sharples and Parker Pearson 1997). A similar situation occurs in Orkney and Caithness. Some view substantial roundhouses as homes of elites where constructing and maintaining power is based on the building and maintenance of substantial monumental houses (e.g Hedges 1987; Armit 1990, 441-3; 1992; Hingley 1992, 25; 40; Barrett 1982, 215; MacKie 1997; 2000, 104). Again, others have problems with this view, stirred by the realisation that in some areas substantial houses appear to be virtually the only types of settlement other motivations for their construction have been suggested (e.g Hingley 1992; 1995). Thus, 'it is unlikely that the differences in scale and nature of the differing types of substantial house can be explained purely in terms of the positions of their households within a hierarchical system...we will not understand the complexity of the evidence if we reduce explanation simply to the idea of the substantial house as a projection of household status' (Hingley 1995, 189).

[vi] Secure radiocarbon dates for the construction of Atlantic roundhouses are rare. Some sites, such as Dun Bharabhat, Lewis and Howe, Orkney, produce early dates, although usually only as *termini post* or *ante quem*. The construction of Dun Bharabhat is argued to date to around the 2nd century BC, and perhaps even earlier (Dixon & Harding 2000; but see MacKie 2000, 366) and Armit (1991, 189) has suggested a similar date for Crosskirk, Caithness (Fairhurst 1984). The radiocarbon dates from the Howe, Orkney (Smith 1994) suggest that the first complex Atlantic roundhouse was built between the 6th or 5th centuries BC and the 3rd or 2nd centuries BC (Gilmour 2000). Taken together, these sites support the 'early inception' school of complex Atlantic roundhouses construction, between 400BC and 100BC (Gilmour 2000; Armit forthcoming in land inheritance). However, the building of complex Atlantic roundhouses carried on to later periods, providing the basis for the second school of thought. The second complex Atlantic roundhouse at Howe was built sometime between the 5th centuries BC and the 2nd century AD (ibid.). Radiocarbon dates from Dun Vulan, South Uist (Parker-Pearson & Sharples 1999) also suggest a slightly later date for building complex Atlantic roundhouses. One from beneath the roundhouse's revetment wall calibrated to the 4th century and 1st century AD at two sigma (or 190 – 40BC at one sigma) and another within the core of the broch calibrates to between 100BC and AD220 at two sigma. However, these dates have not been accepted by all, some argue that they relate to secondary occupation thereby forcing the construction date back to between the earlier 4th centuries and 1st century BC date (Gilmour & Cook 1998; Gilmour 2000). Similarly, MacKie argues that the Dun Mor Vaul, Tiree broch was constructed in the first century BC (but see Armit 1991, Lane 1990, Harding 1997 for criticism and a rejoiner by MacKie 1997, 177). Moreover, a cluster of dates from Scalloway, Shetland suggest that primary occupation with the complex Atlantic roundhouse extended until about AD500 (Sharples 1998, 86ff).

[vii] I am grateful to Niall Sharples for access to his unpublished, forthcoming work.

[viii] Two earlier structures, 3 and 4 built originally around 300BC, may also have continued into this period.

[ix] A later date can also not be discounted - Medieval pottery of 12th/13th century date, a gun flint, and a musket lead shot were also found.
[x] The occurrence of metalworking evidence in forecourt areas of some Atlantic roundhouses may also relate to 'the liminal status of metalworking' (Parker Pearson & Sharples 1999, 17) suggest. This fits with other views which see the practice associated with boundaries and entranceways elsewhere in Britain (Hingley 1997).
[xi] As recent discussions have highlighted we have to distance ourselves from status defined in simple terms by power; 'in order to understand why brochs [were built] we need to go beyond simple explanations of power and status (although these were undoubtedly part of the equation)' (Sharples & Parker Pearson 1997, 264). As Hingley (1995, 187) notes, 'even if the architecture of some substantial houses was intended to display power, we need to know why Iron Age communities chose to project inequality in this particular way'. Noting differences between wheelhouses and brochs Parker Pearson & Sharples (1999, 363-4) doubt whether these patterns can be interpreted 'as a simple class distinction' with the relationship perhaps one of 'two mutually reliant opposites'. Thus far from representing the heads of a hierarchical settlement roundhouses may reflect a new form of household organisation, with single households living in isolated unified large roundhouses.
[xii] That said, this may still have led to brochs embodying hierarchical social relationships in, for example, their contrast between labour mobilization and occupant numbers (Parker Pearson, Sharples & Mulville 1995, 66).
[xiii] Of course, as Hingley (1992, 25) and Armit (1997) state, it is too simplistic to expect one answer. Instead both sress that we should not be looking for 'one simple explanation for the construction of substantial houses. Instead, we must allow for very great complexity in the organization of past society – archaeologists need to find more convincing explanations for variations in the form of substantial houses... All the evidence for differing types of organisation should alert archaeologists to avoid the use of simplistic models for social organisation and its change through time'. Hingley's concludes by arguing for more complex models and regional studies: 'only when we establish a more complete picture of settlement patterns in a variety of regions shall we be able to place substantial houses in their correct social contexts' (1992, 40). In other words, Hingley, although favouring the second 'egalitarian' stance does not actually fall defintely down on one side. He concludes, '... a considerable amount of further excavation, field work, post-excavation analysis and academic thought will be required before we can begin to understand this period of our past in detail' (1992, 42).
[xiv] This is supported, for example, by the E-ware from Ardifuir and other sites such as Kildonan (Fairhurst 1939, Peltenburg 1982), Ugadale (Christison 1905) can be pulled into this general period (see Alcock and Alcock 1987, 131 for fuller discussion).
[xv] The small annular bead is part of Guido's Group 6, undecorated annular bead (Guido 1978, 160) which may have been in use from about the 6th or 5th centuries BC to at least the 8th century AD (ibid, 68). In Ireland most of these beads appear to belong to the 7th to 10th centuries AD (eg. Lagore) and 'may have been worn by the Scotti in the Dalriadic territory of Ulster and Argyllshire' (ibid, 67).
[xvi] Moulds from wheelhouse I came from three principal areas: from secondary floors within the contracted wheelhouse, from earlier floors within the larger wheelhouse and associated passage and from the midden scatter outside the settlement proper. Two clay mould gates (ibid, 64; fig 33) were found in layer 2a of the midden. Also found within this general layer was a bronze wire projecting ring-headed pin. Moulds were also recovered from Wheelhouse II. The large sandstone block with mould cut for mirror-like object and a bar mould was found during this phase. It was found within windblown sand yet 'found resting against the face of the upright stone forming the inner face of the radial pier separating chambers iii and iv' (ibid, 69). This mould with slot and disc are similar to that found at Bac Mhic Connain, North Uist; Trochrigg, Ayrshire, Whithorn and Buston, Ayrshire (ibid).
[xvii] One crucible (CAT 5407) and a heating tray (CAT 1232) were found in a backfilling layer of cellular building 4; it appears that the house had been kept clean until it was abandoned when it was carefully demolished and deliberately infilled. It is of particular interest that this fragment is but part of one crucible. The other fragments are found in different houses, 2 of which are from Late Phase 3 contexts. Three crucible fragments and an ingot mould (cat 4584) were recovered from House 1; two fragments (5387 & 5405) join the fragment from House 4. The interior of this building had a floor level with a central hearth and other features although very little occupation material had survived *in situ*. In the centre of the house was a hearth covered by a black charcoal (context 707) in which crucible (5406) was found. Another crucible (CAT 5405) was found in post hole packing (context 700). Sealing the floor of this structure was a silty clay (668). Within this layer and lying just above the floor were several important finds, including the final crucible (CAT 5387), a steatite lamp,

and a steatite bar and disc mould. Sharples believes that this layer was deposited to deliberately infill this structure. The remaining 2 crucibles (CAT 5012 and 5414) were found in House 7. However, this was largely a 'disorganised mass of stone lines and occupation layers'.

[xviii] The building of house 8 destroyed House 1 being built on top of it and is roughly contemporary with the final structural activity inside the broch (Sharples 1998, 63). No very clear floor layer could be isolated in House 8 and it seems more likely that the buildings were deliberately dismantled and the area infilled. This difficulty may explain the confusing fact that crucible fragments found in this later phase join other fragments from the earlier Phase 3 deposits

[xviii] Smith sees this phase as an Late Iron Age farmstead comparable to other Orcadian sites such as Skaill, Pool, Brough of Birsay and Buckquoy, explaining the transition from a defended village to a single farmstead as due to population movement (ibid, 117).

[xix] Smith sees this phase as an Late Iron Age farmstead comparable to other Orcadian sites such as Skaill, Pool, Brough of Birsay and Buckquoy, explaining the transition from a defended village to a single farmstead as due to population movement (ibid, 117).

[xx] Although Young suggested that the pottery dated to between the 5th to 7th centuries AD (1955; 1959; 1976) Lane sees the assemblage as thoroughly mixed, incorporating Dark Age and earlier elements – there is an example of a ring-headed pin stamped decoration - with the plain flaring rims suggesting a terminal date in the late Pre Norse (Lane 1983, 255). Armit sees the earlier elements as representing 're-deposition and disturbance of primary layers' (Armit 1992; 38).

[xxi] A 7th to 8th century AD date for the hand-pin mould, and a date in the later 5th to 7th century for the penannular brooch mould fragment is argued by Close-Brooks (reference) with other finds supporting this view: Ritchie (1969, 131) argues a late 5th to 8th century date for the symbol stone and Padel (1972, 98) assigns the ogam knife-handle to the 8th century date because it was found at a level beneath a 9th century Norse grave.

[xxii] Indeed, Alcock himself recognises that among the duns, and indeed crannogs, the concept of a potentate 'becomes somewhat diluted' (1988) and variations in status were likely.

[xxiii] The discussion regarding the mould is taken from a discourse between the author and Ewan Campbell. This will be published following examination of the PhD. The author duly acknowledges Dr Campbell's assistance and academic input into the discussion.

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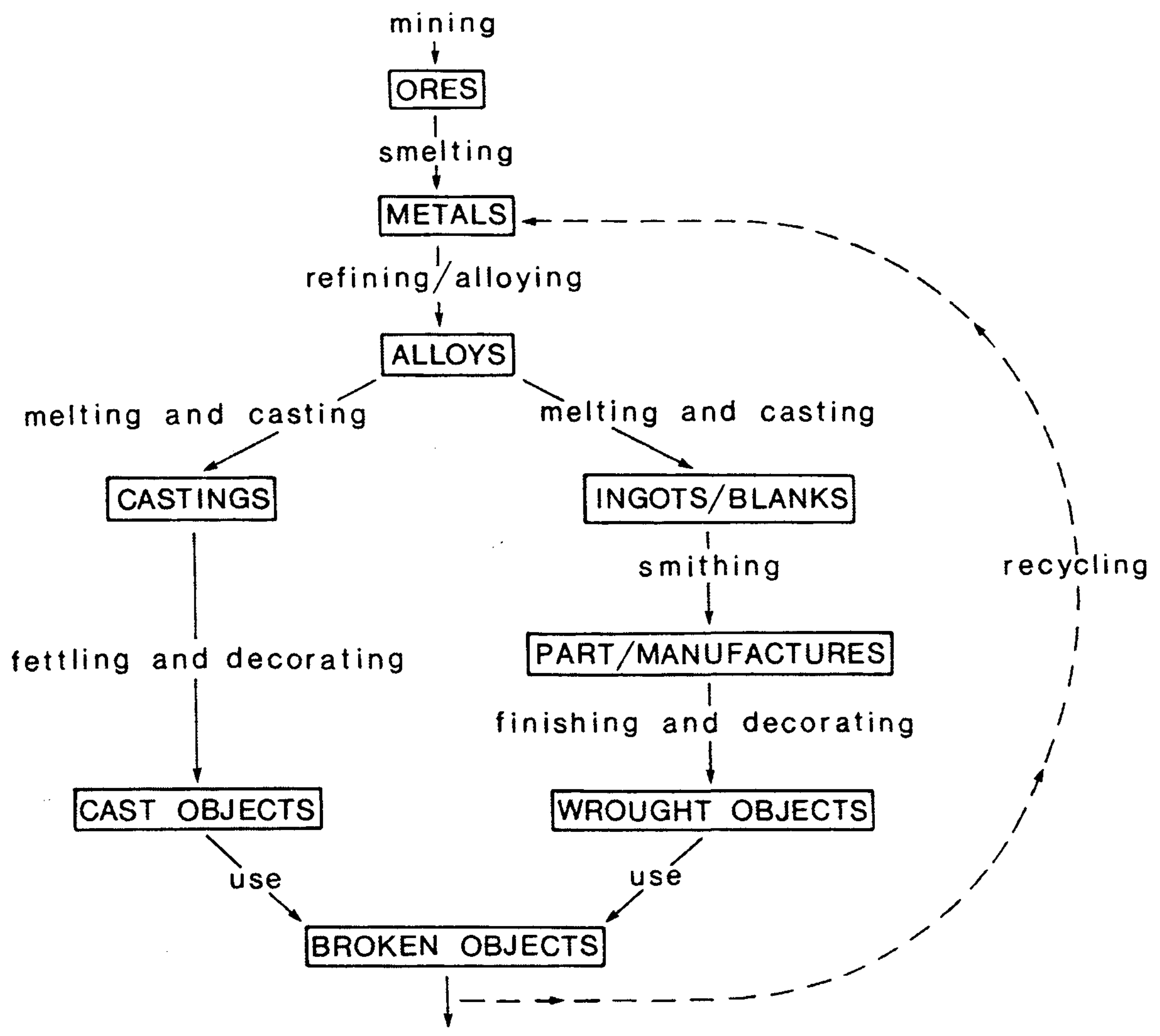


Fig 1 The Bronze Cycle (source: Bayley 1992a, 747).

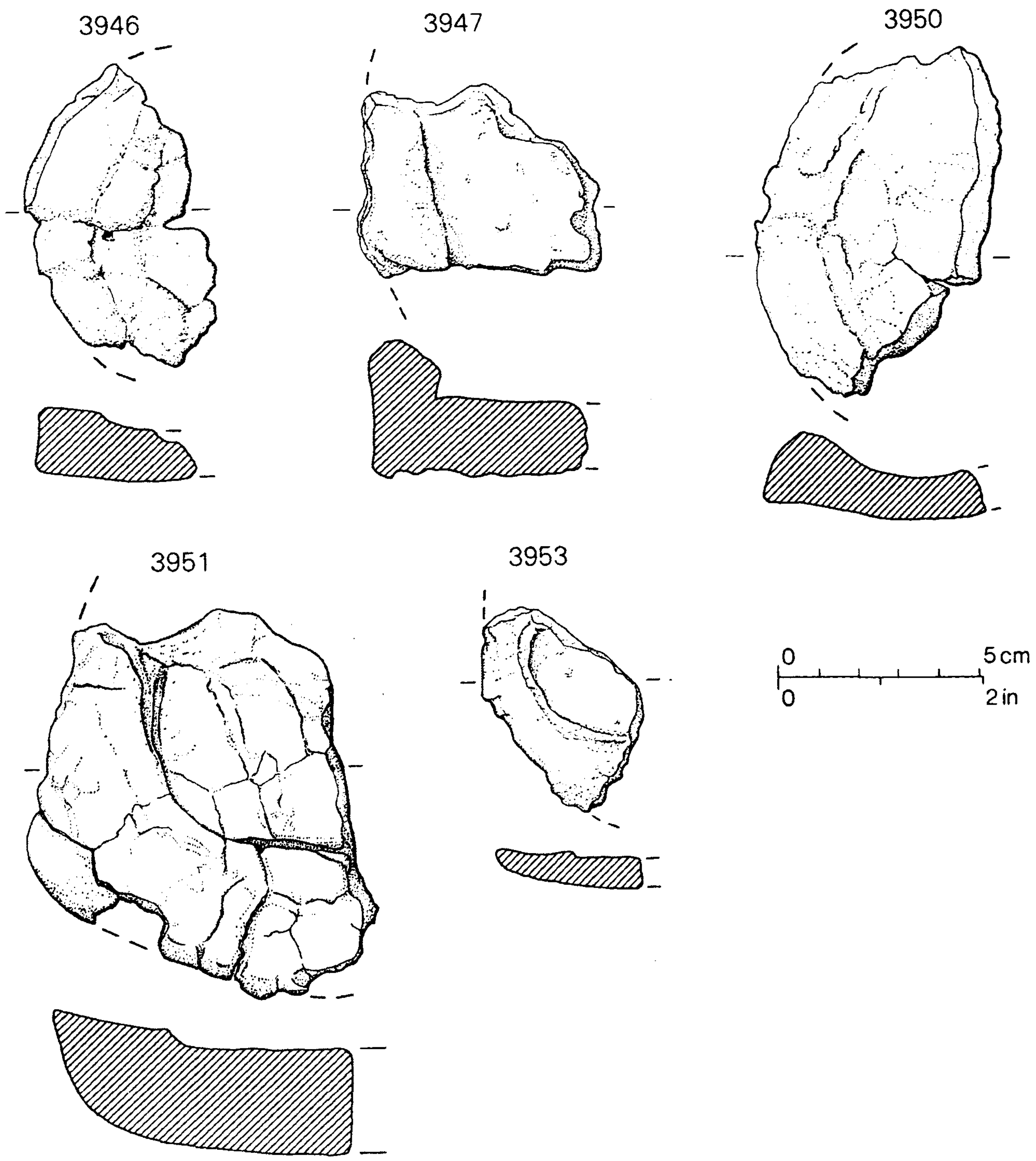


Fig 2 Litharge cakes from Coppergate (source: Bayley 1992a, 748). Scale 1:2.

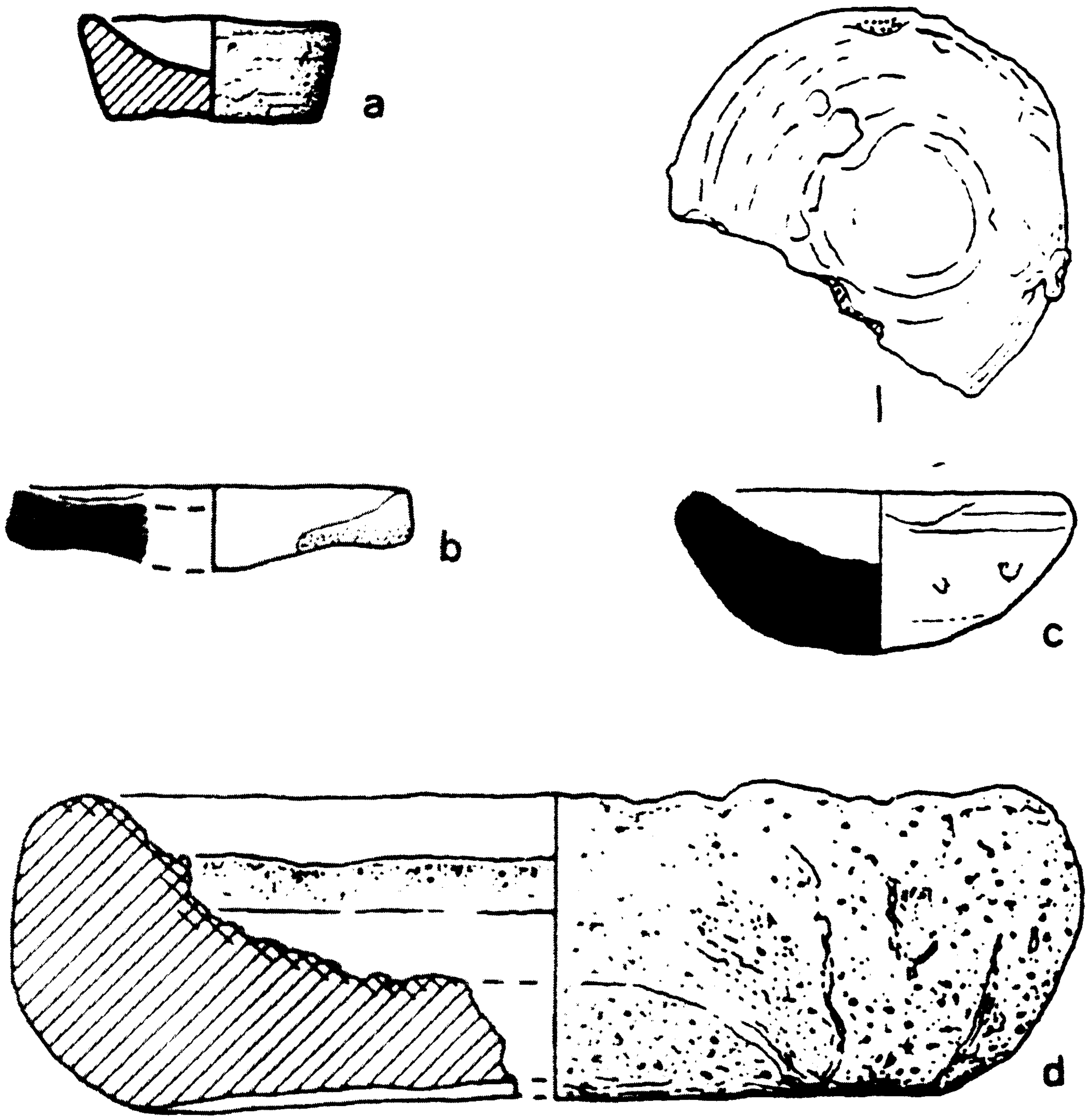


Fig 3 16th-century bone ash cupels, a, from Legge's Mount, Tower of London. Ceramic cupels: b, Lincoln, Flaxengate (late 10th/11th century), c, York, Coppergate (10th century), d, Winchester, Wolvesey Palace (late 10th / 11th century) (source: Bayley 1992b, 6). Scale 1:1.

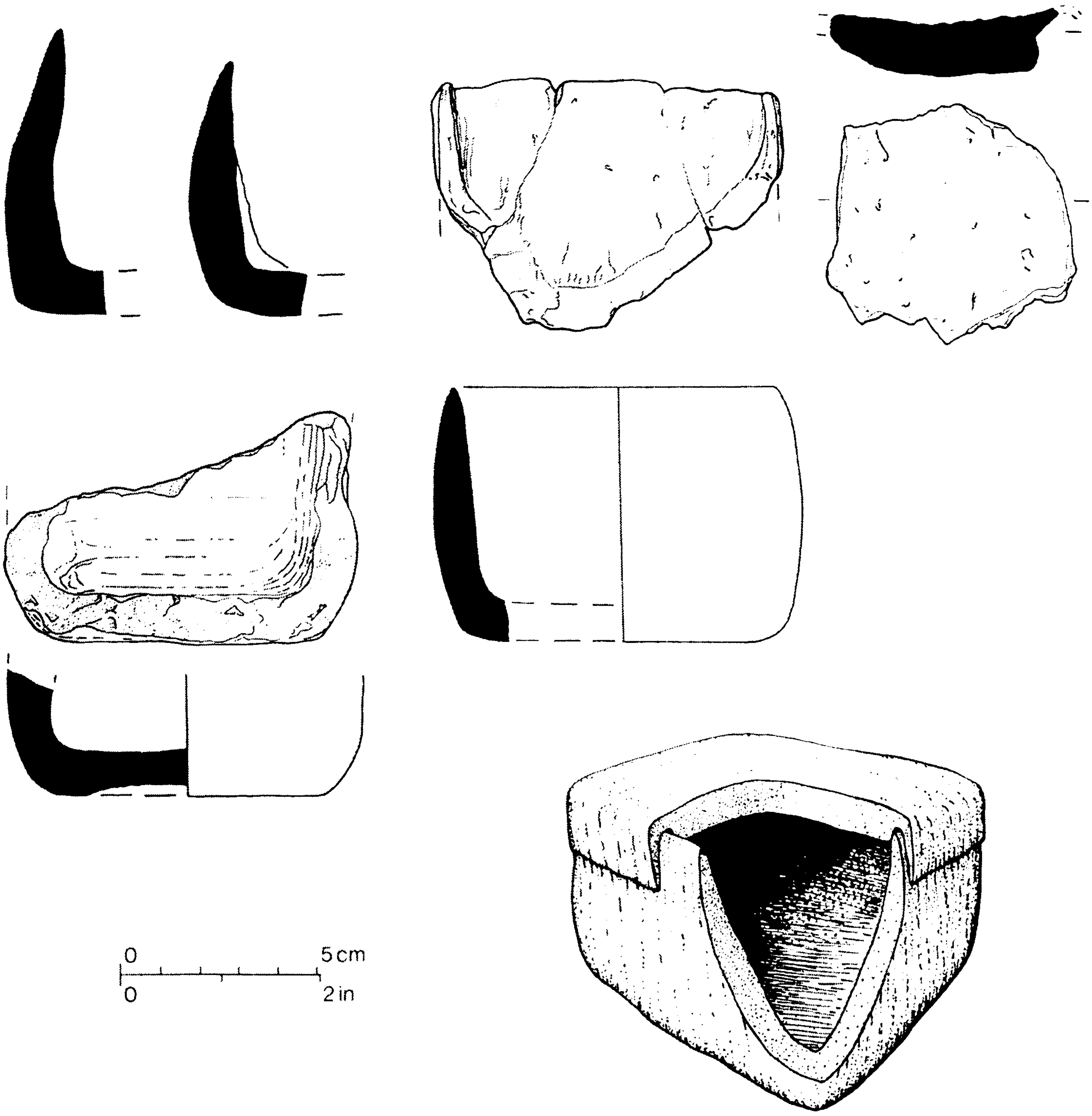


Fig 4 Parting vessels from 22 Piccadilly, Coppergate and reconstruction of a parting vessel (source: Bayley 1992a, 752). Scale 1:2.

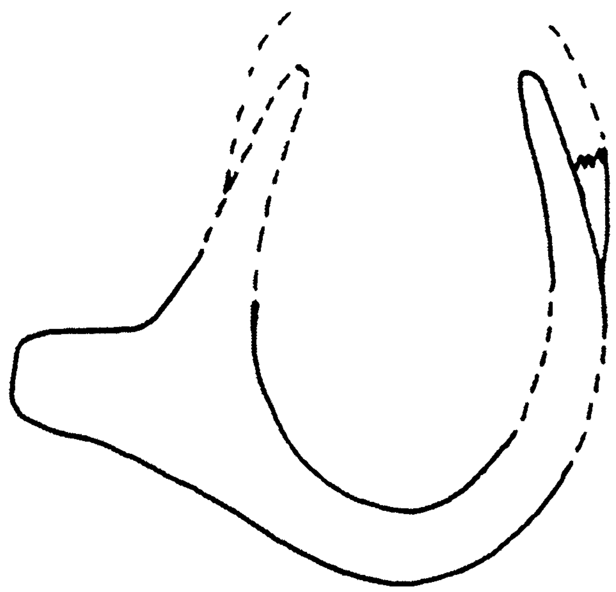


Fig 5 Reconstruction of a brass-making vessel from Colchester (source: Bayley 1984a, 42). Scale 1:1.

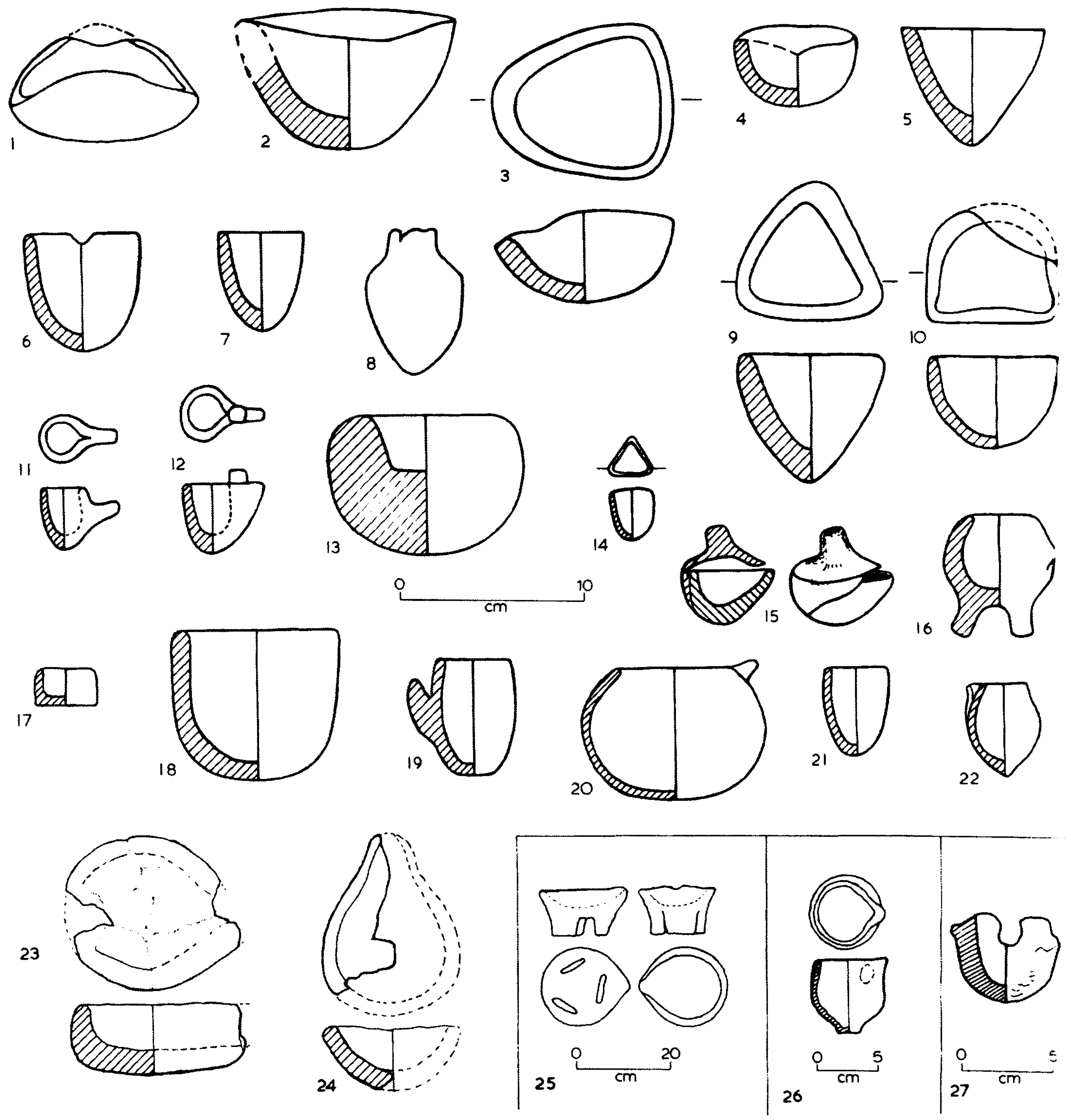


Fig 6 Tylecote's crucible typology (source: Tylecote 1986, 96).

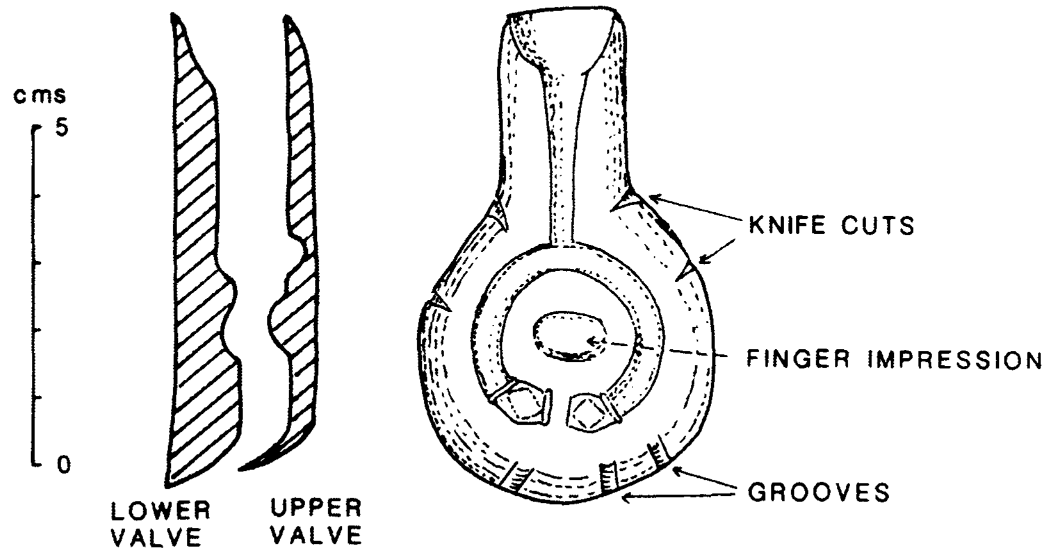


Fig 7 How a mould works (source: Lane & Campbell 2000, 201).

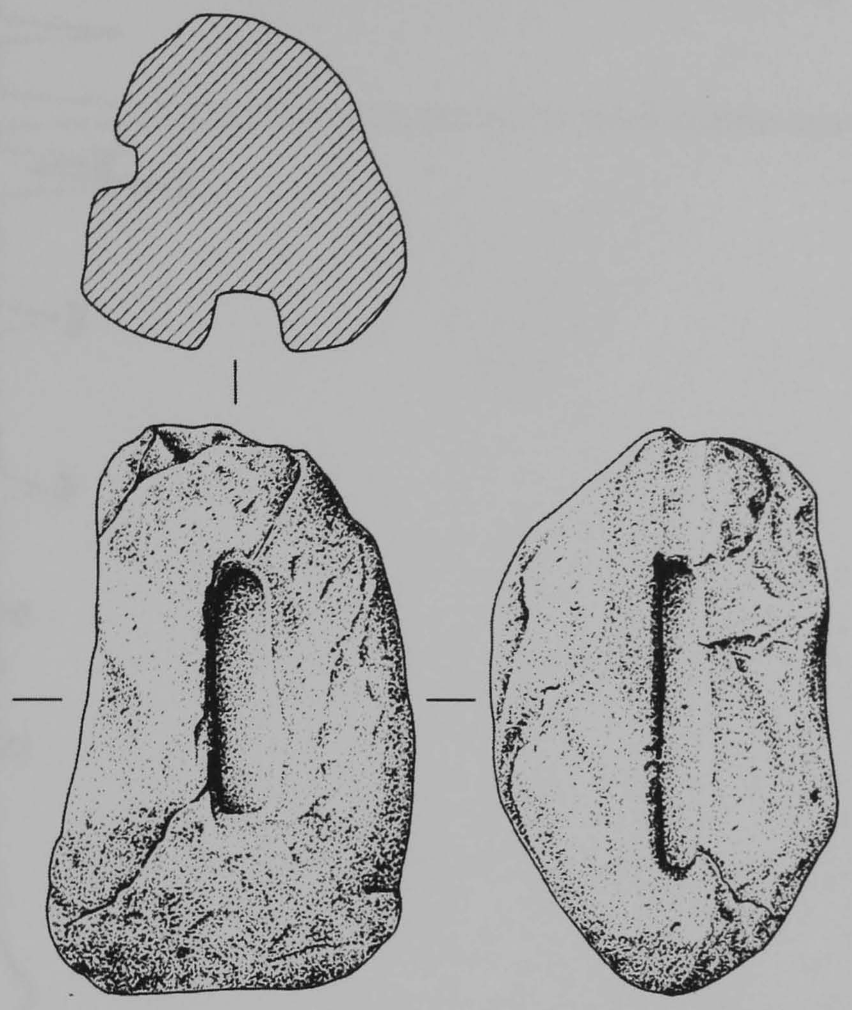


Fig 8 An ingot mould, Buiston (source: Crone 2000, 142). Scale 1:2.

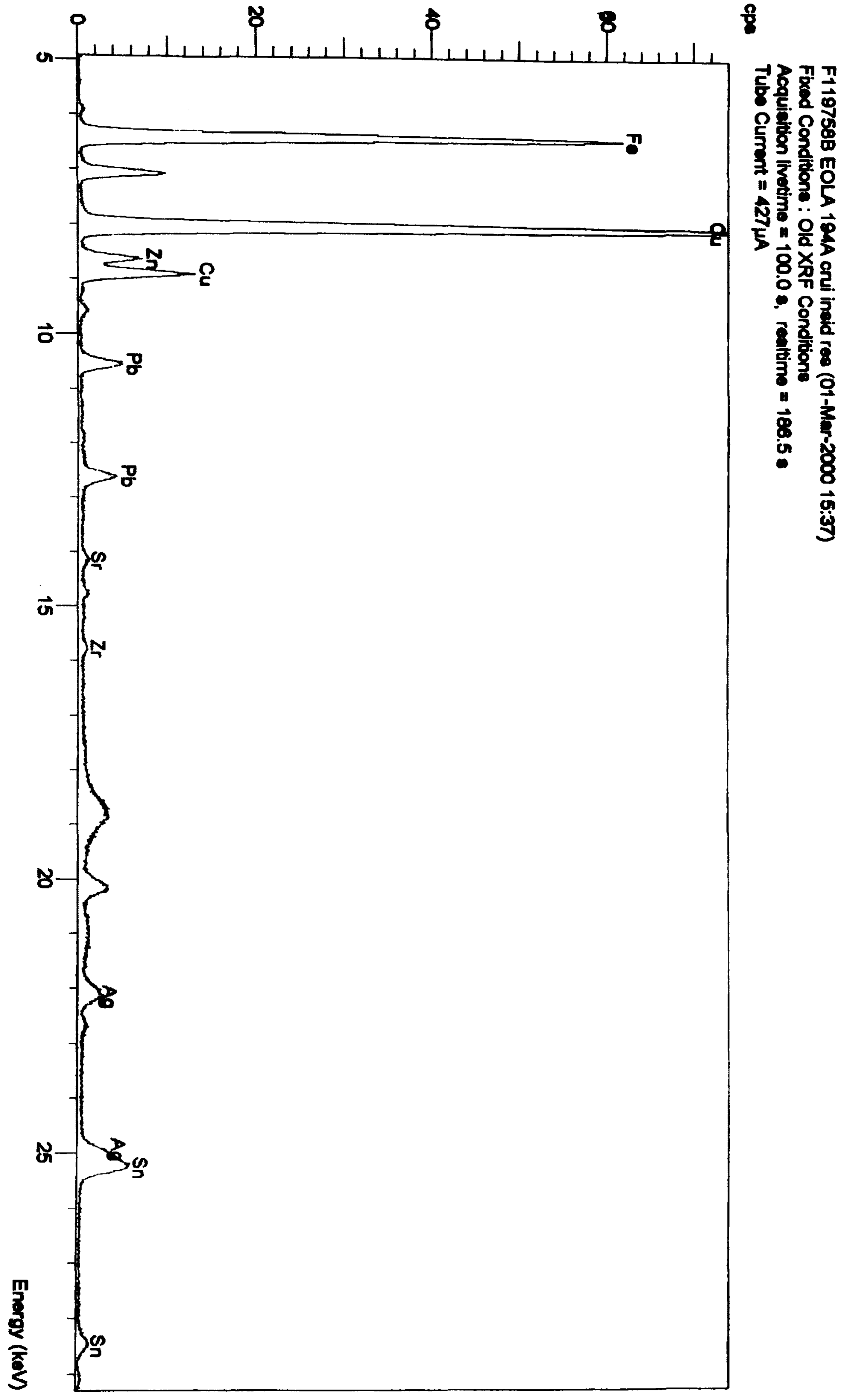


Fig 9 An EDXRF chart. Each peak represents a different element. This chart shows Copper (Cu), Zinc (Zn), Lead (Pb), Silver (Ag), Tin (Sn).

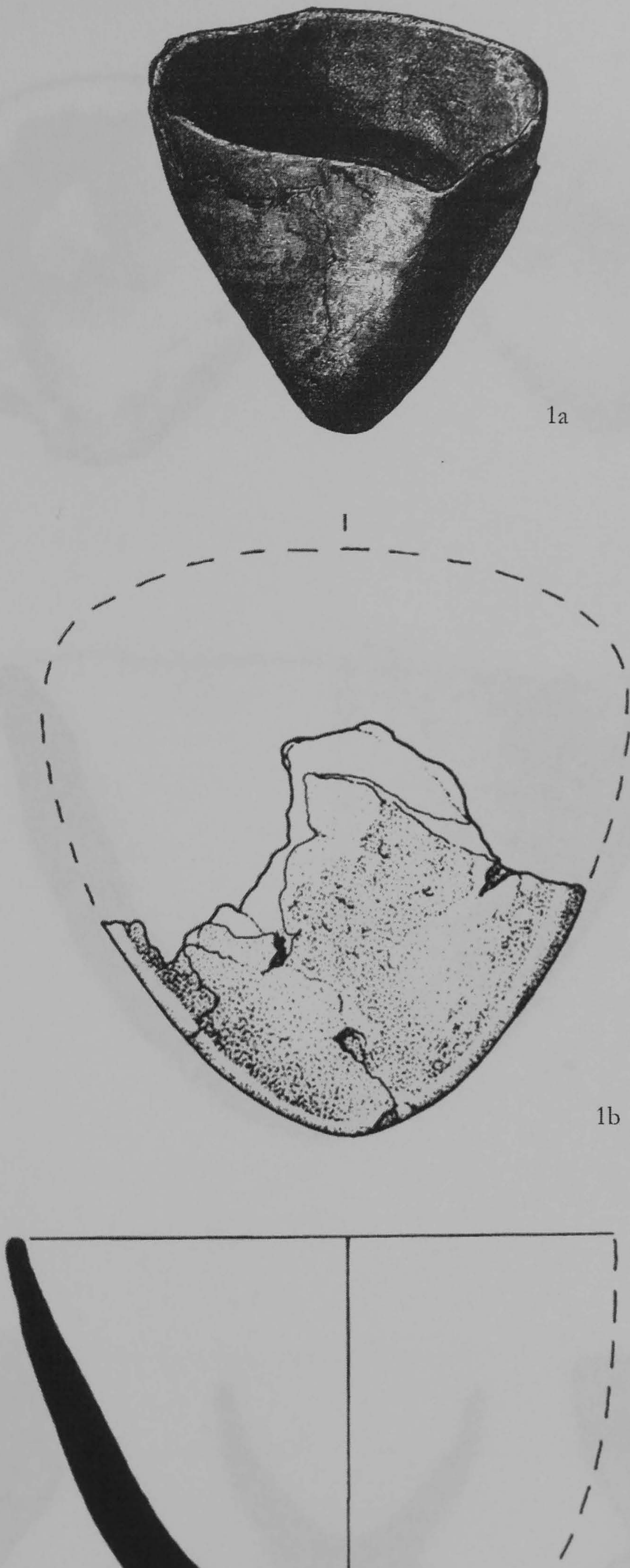
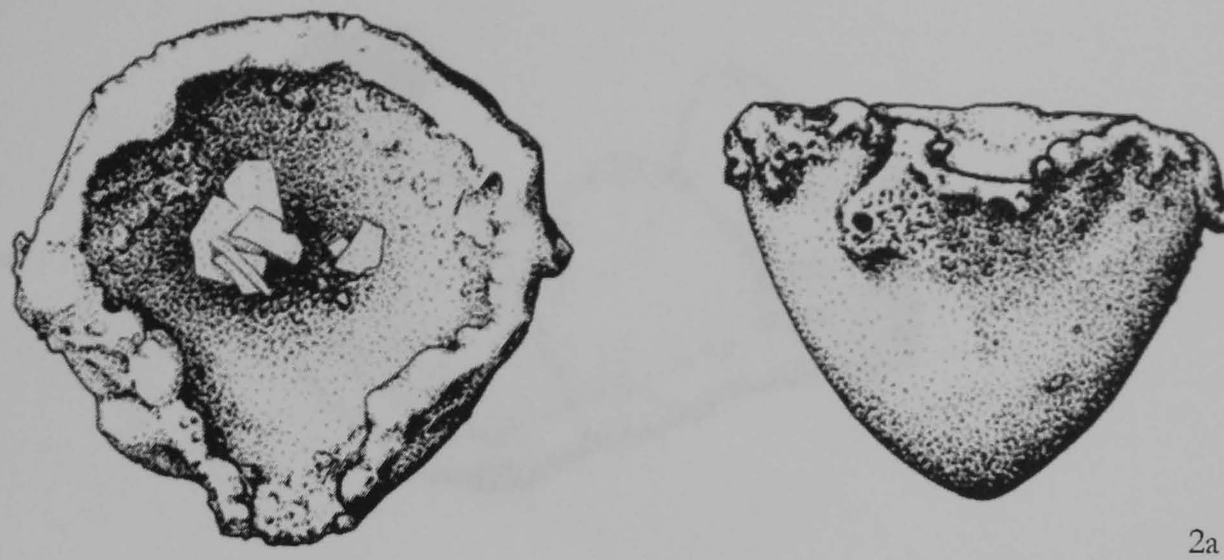
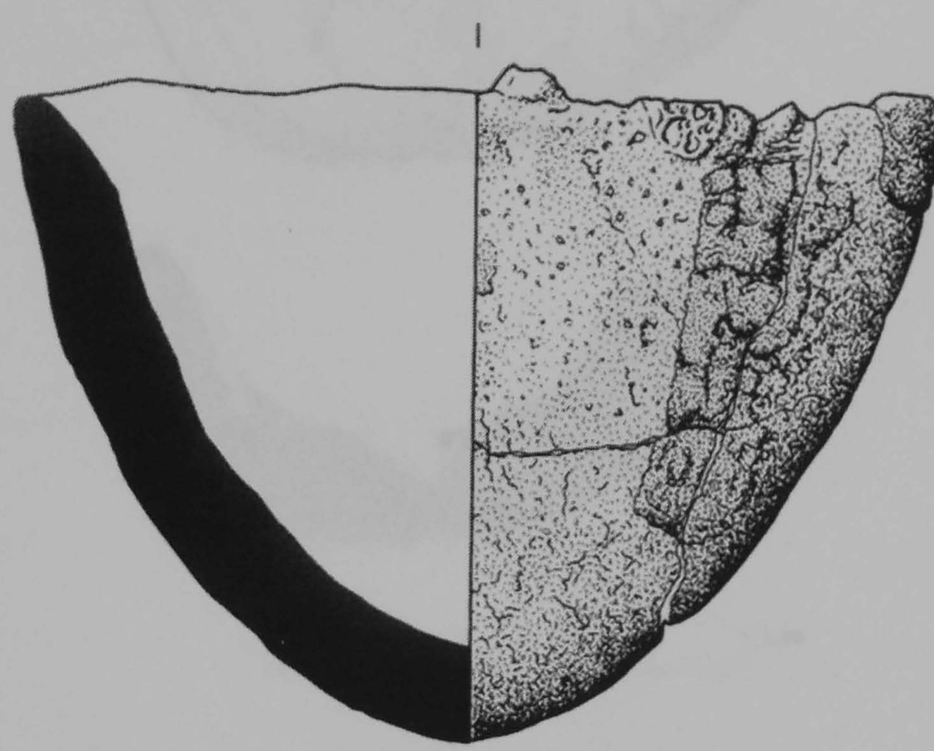


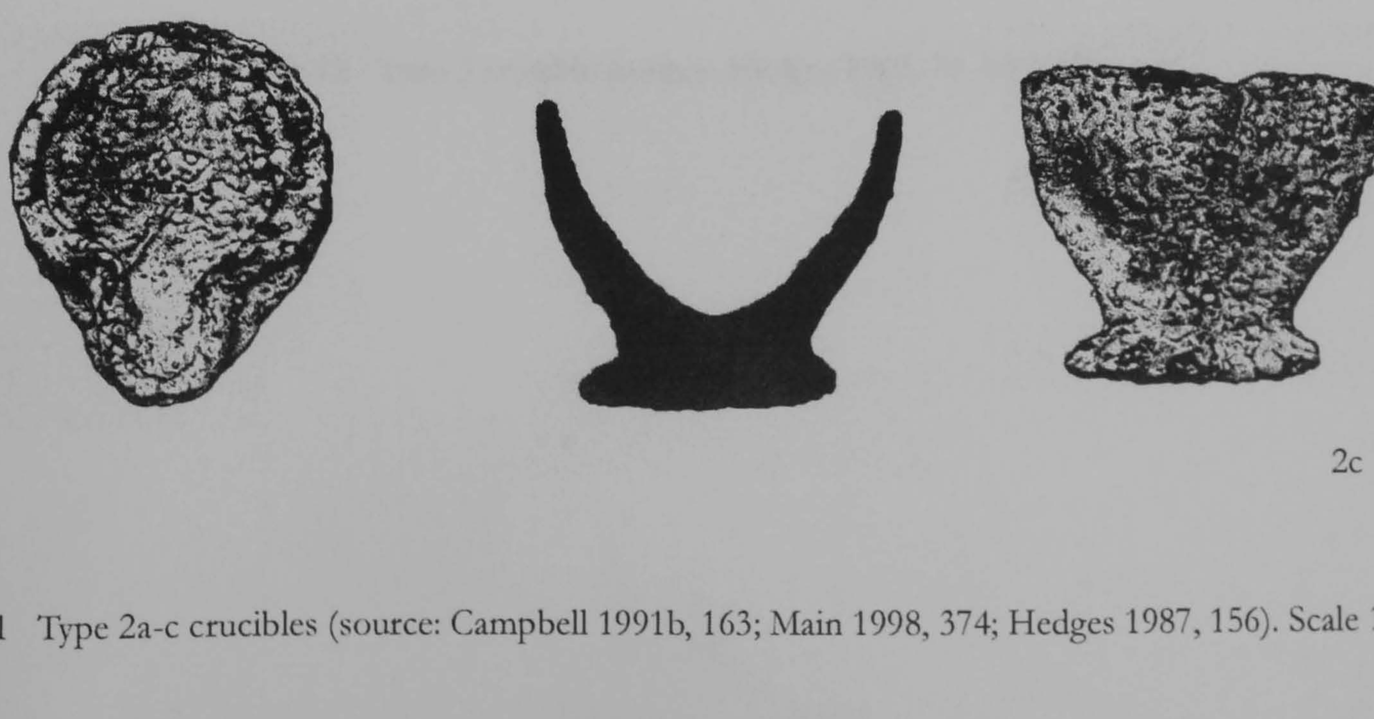
Fig 10 Type 1a and 1b crucibles (source: Crone 2000, 150; Haselgrove & McCullagh 2000, 139)



2a



2b



2c

Fig 11 Type 2a-c crucibles (source: Campbell 1991b, 163; Main 1998, 374; Hedges 1987, 156). Scale 1:1.

Fig 12 Type 3 crucible (source: Hedges 1987, 79, fig 1.47).

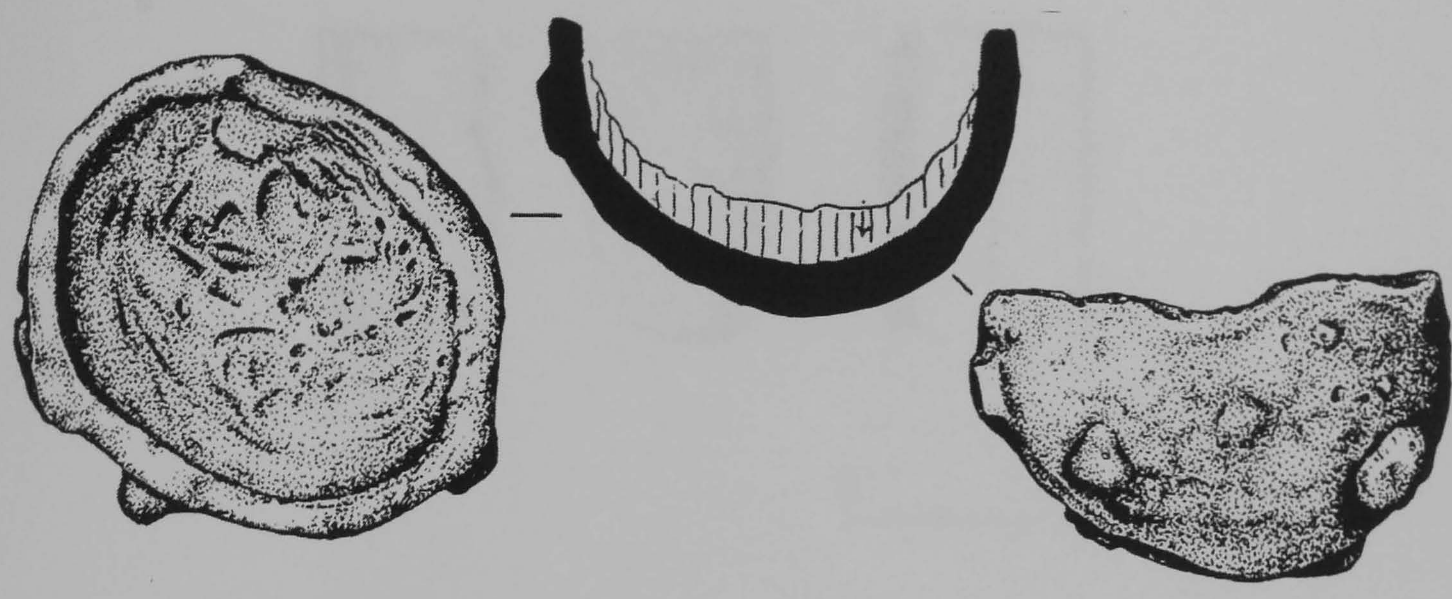


Fig 13 Type 4 crucible (source: Lane & Campbell 2000, 142). Scale 1:1.

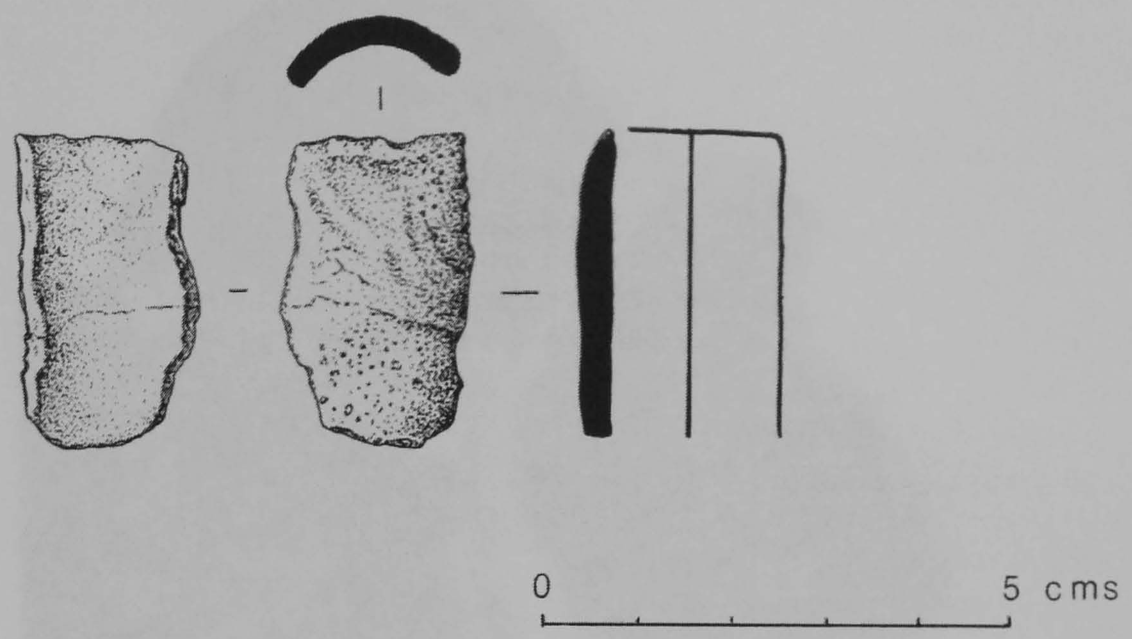


Fig 14 Type 5 crucibles (source: Lane & Campbell 2000, 136).

Fig 15 Type 6 crucible (source: Greig 1972, 230).

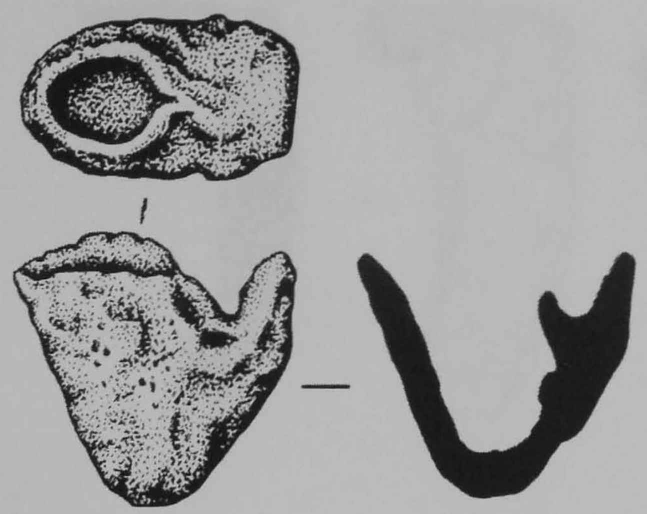


Fig 16 Type 7 crucible (source: Lane & Campbell 2000, 142). Scale 1:1.

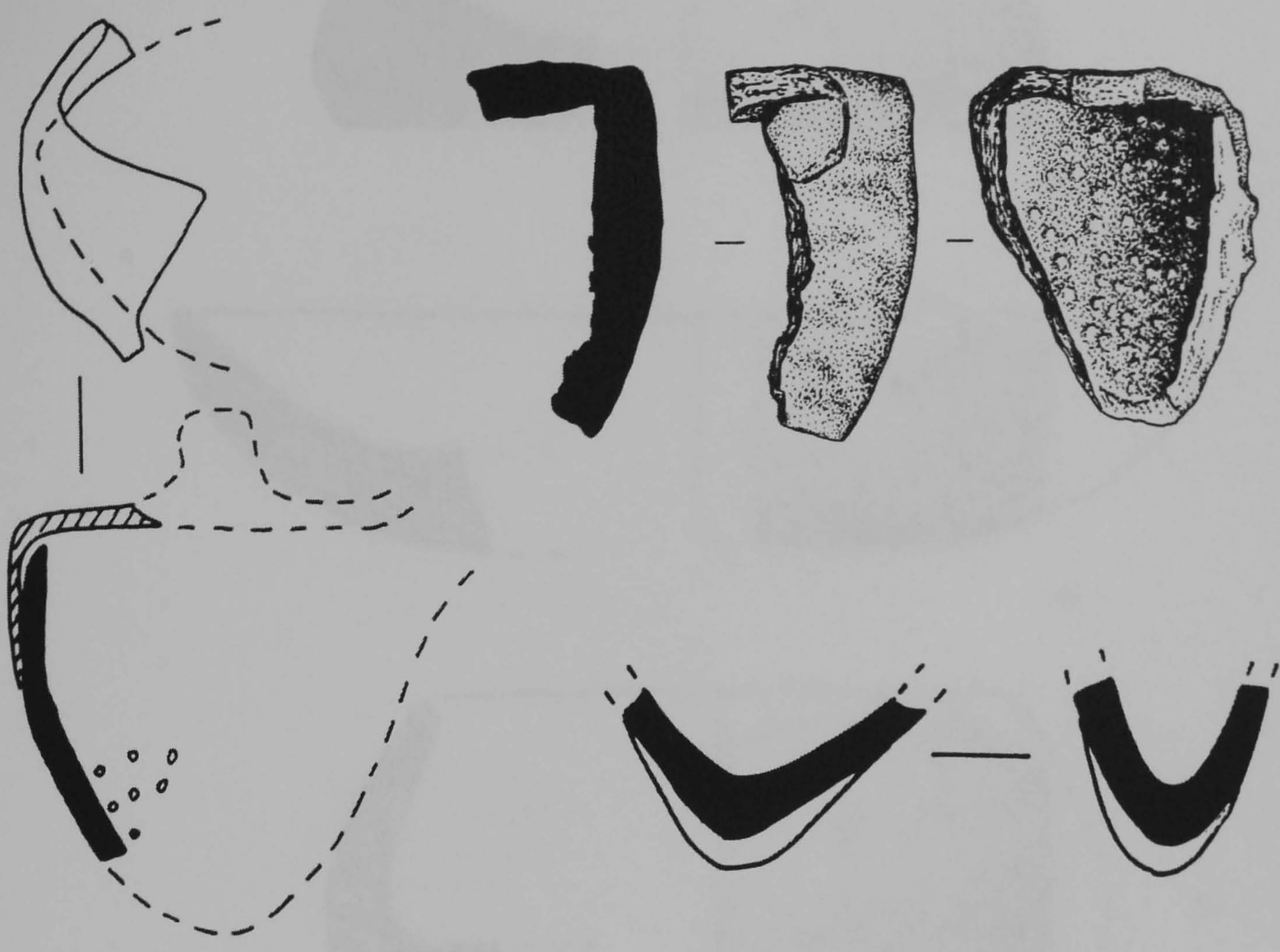


Fig 17 Type 8 crucibles (source: Lane & Campbell 2000, 138). Scale 1:1.

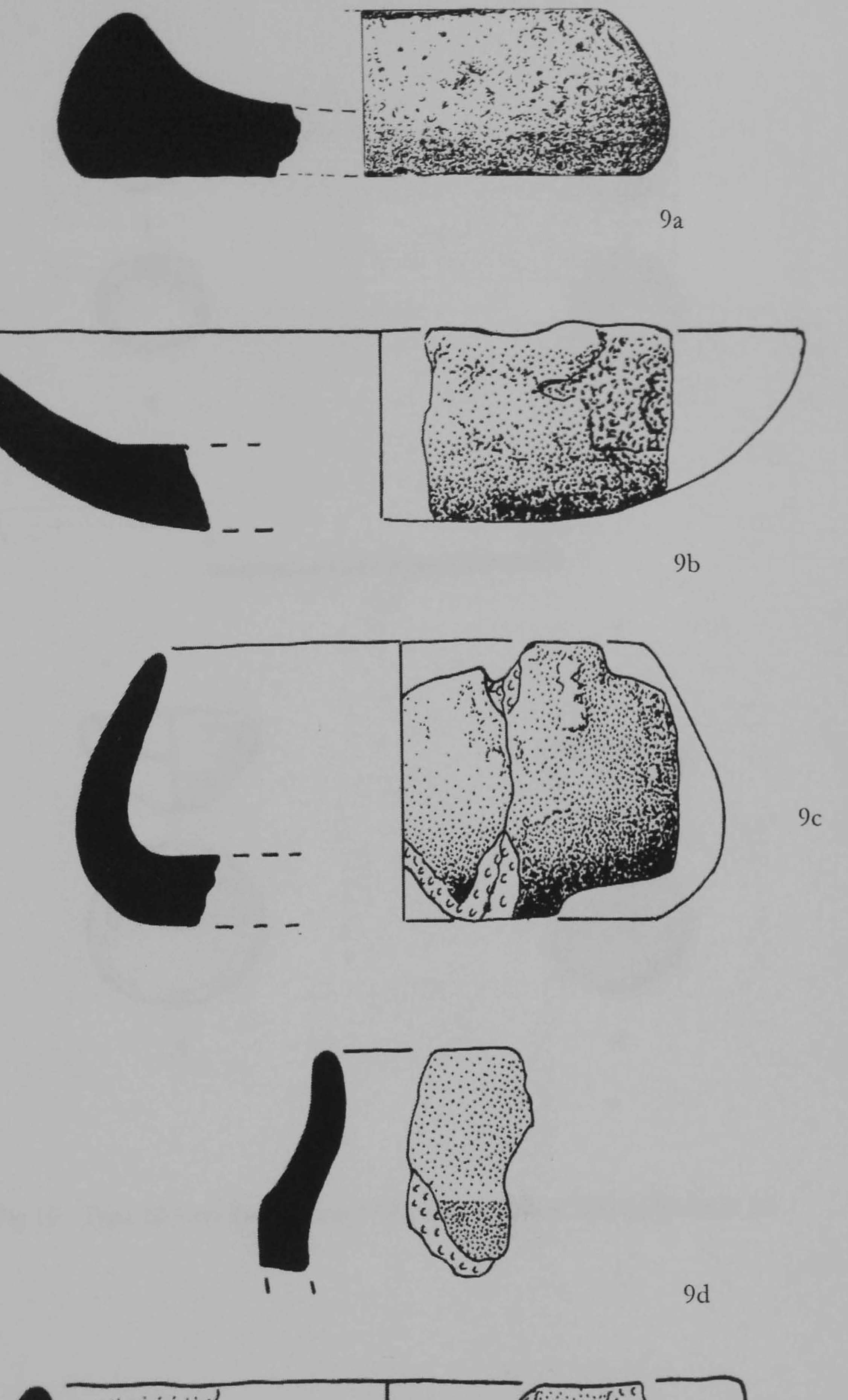


Fig 18 Type 9 crucibles (source: Lane & Campbell 2000, 136-8). Scale 1:1.

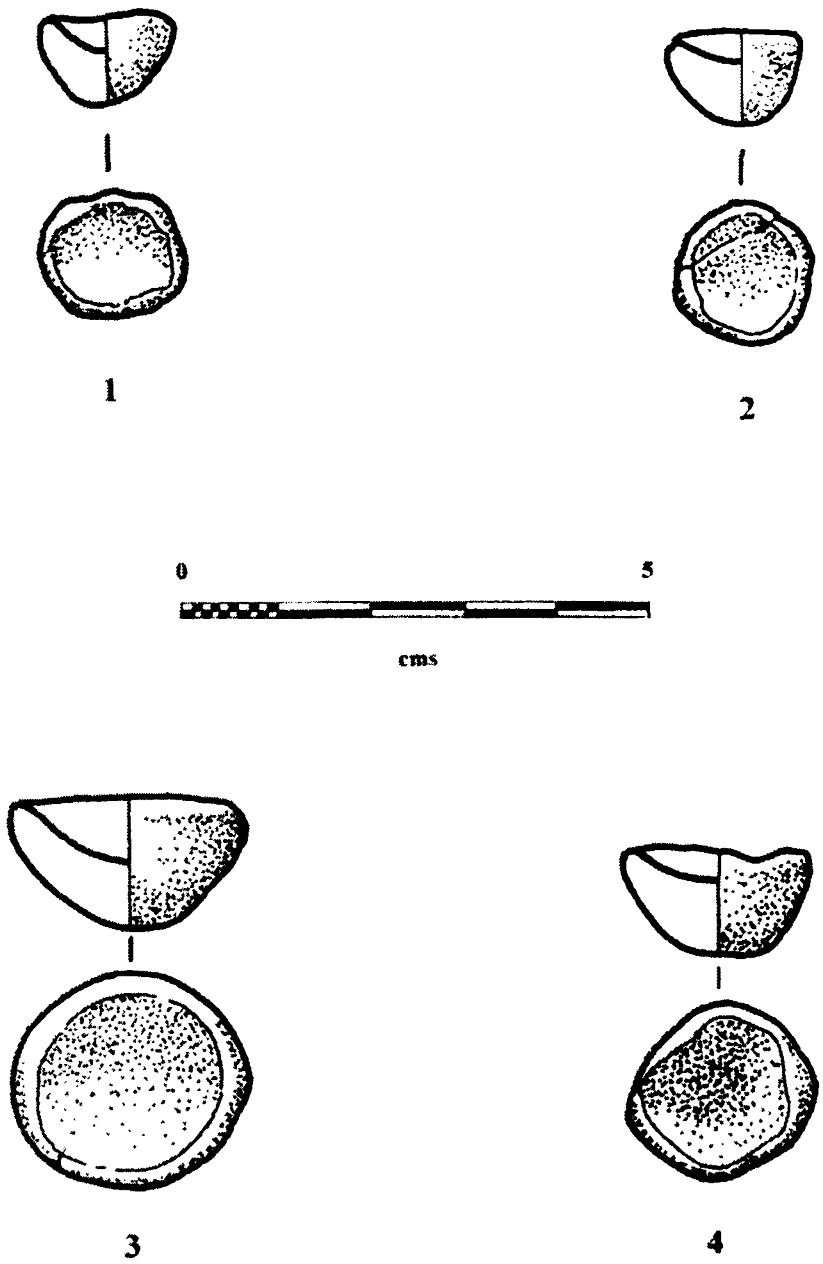


Fig 19 Type 10 'crucibles' (source: Harding & Dixon 2000, 38). Scale 1.1.

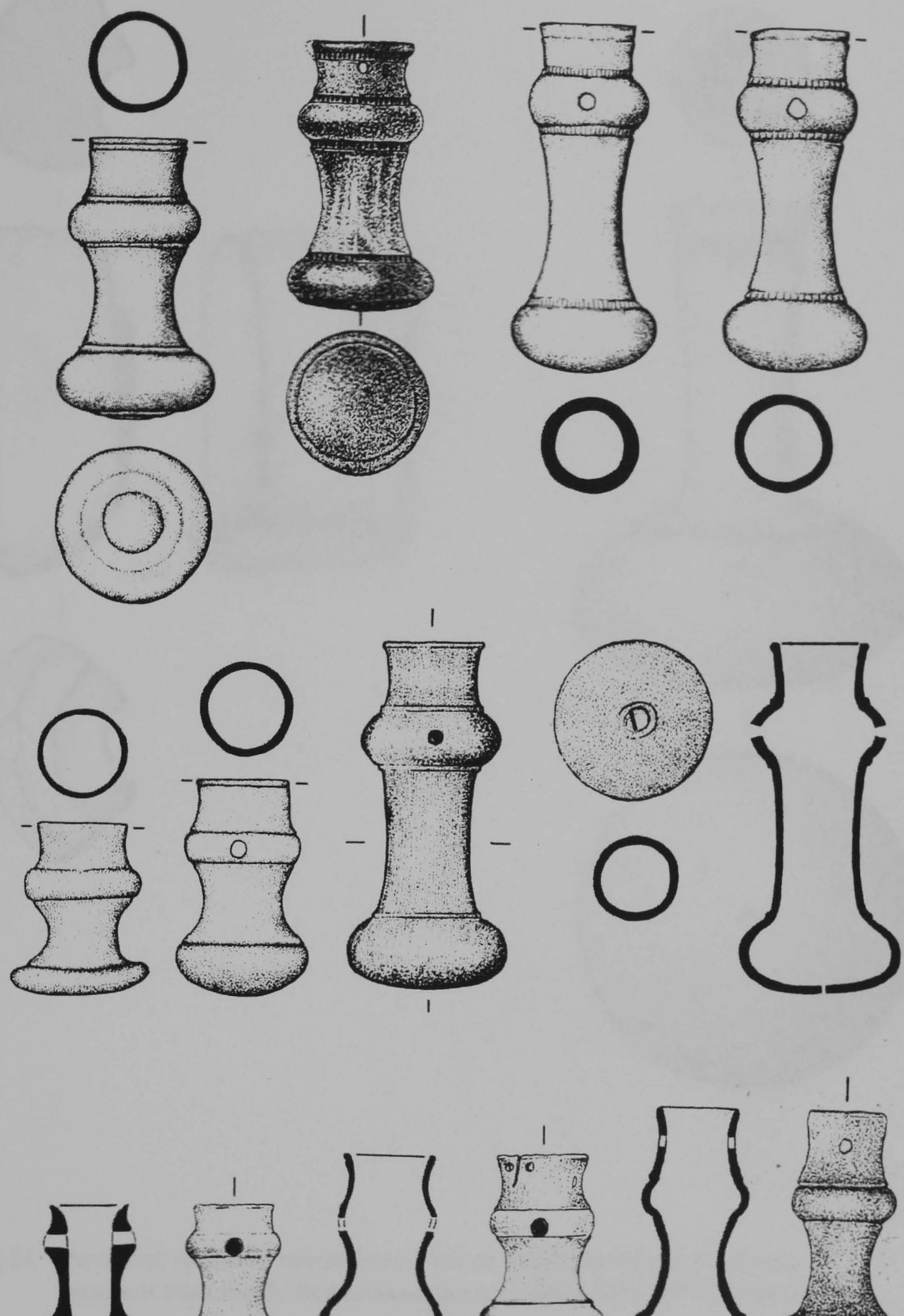


Fig 20 Lisnacrogher spearbutts (source: Raftery 1982). Scale 3:4.

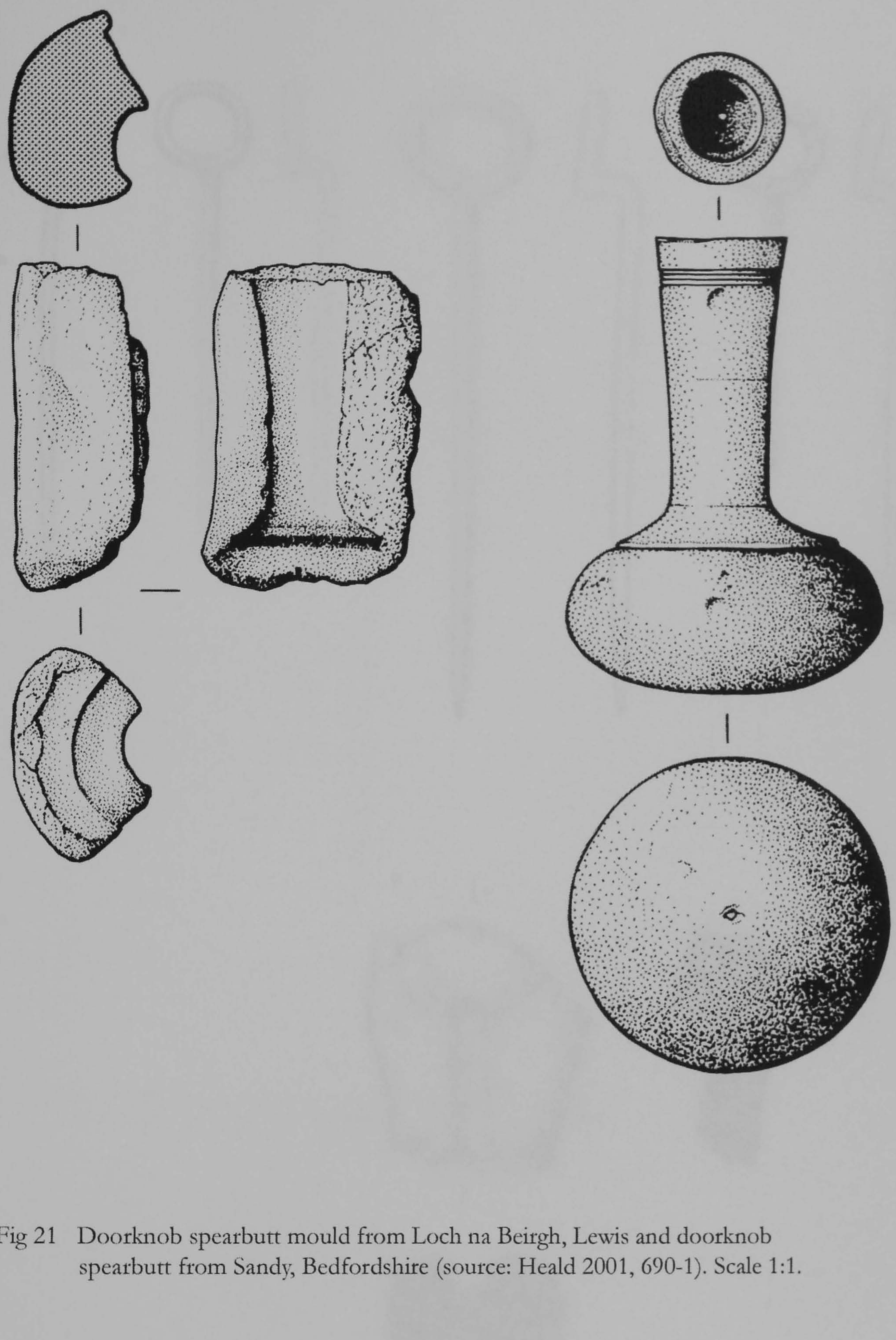


Fig 21 Doorknob spearbutt mould from Loch na Beirgh, Lewis and doorknob spearbutt from Sandy, Bedfordshire (source: Heald 2001, 690-1). Scale 1:1.

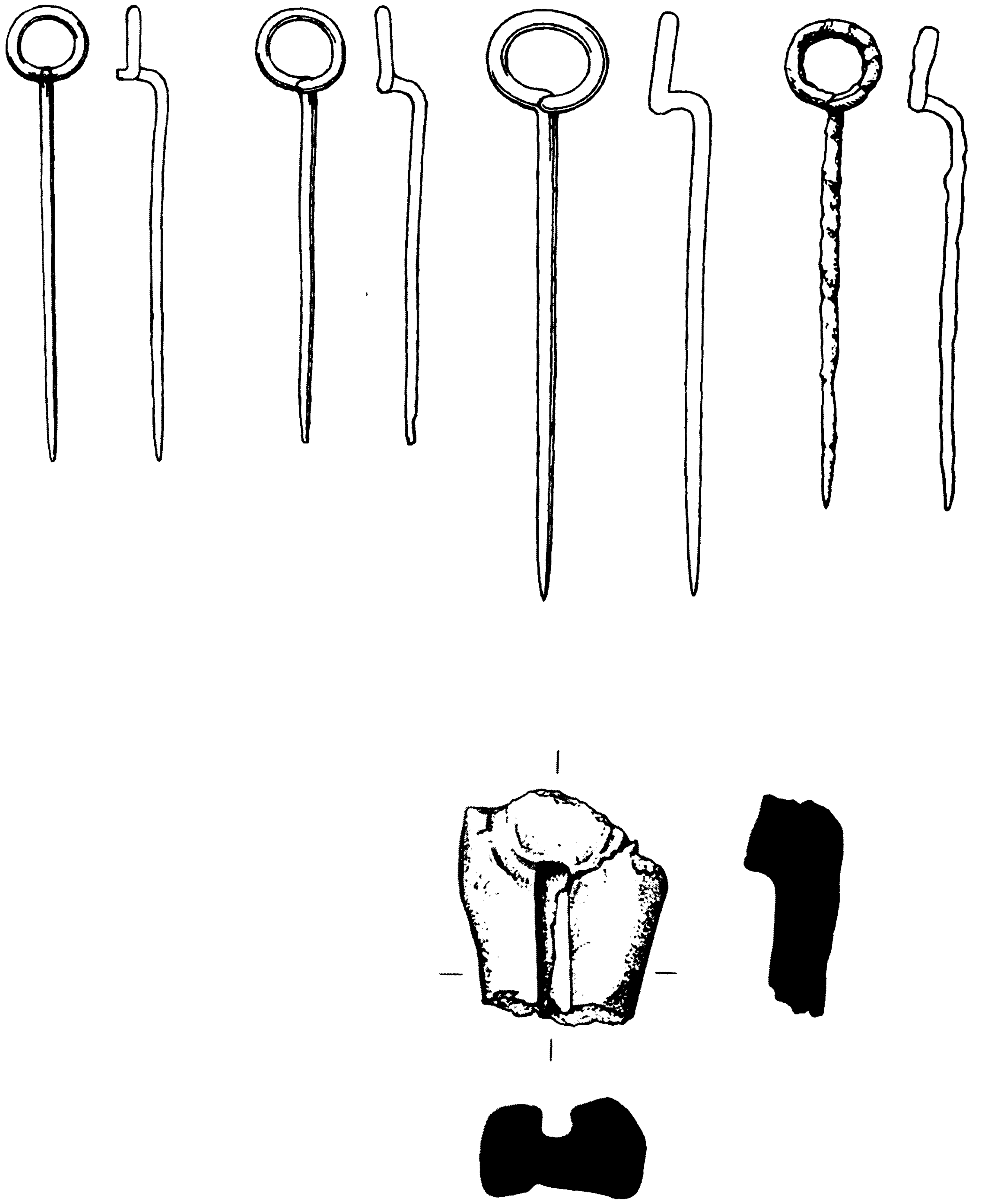


Fig 22 Examples of projecting ring-headed pin; and a mould from Sollas, North Uist (source: Kilbride-Jones 1980a, 192 & Campbell 1991b, 163). Scale 1:1.

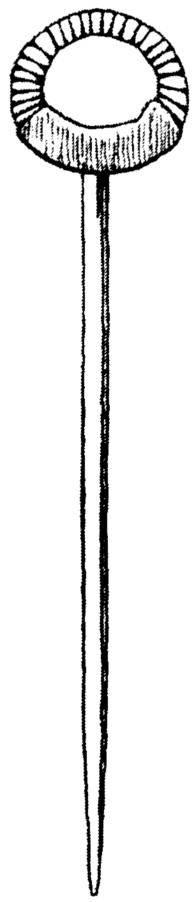


Fig 23 A corrugated pin from Bowermadden, Caithness (source: Kilbride-Jones 1980a, 195). Scale 1:1.

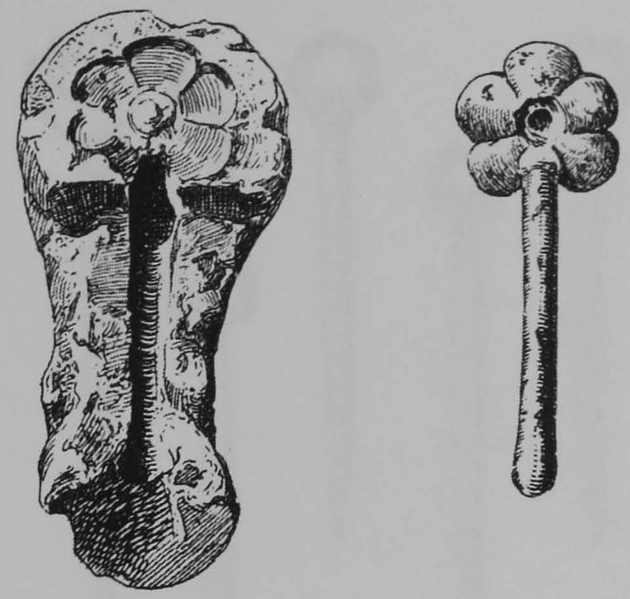


Fig 24 A Rosette-headed pin mould from Traprain Law and a pin reconstruction (source: Curle & Cree 1920, 81). Scale 1:1.

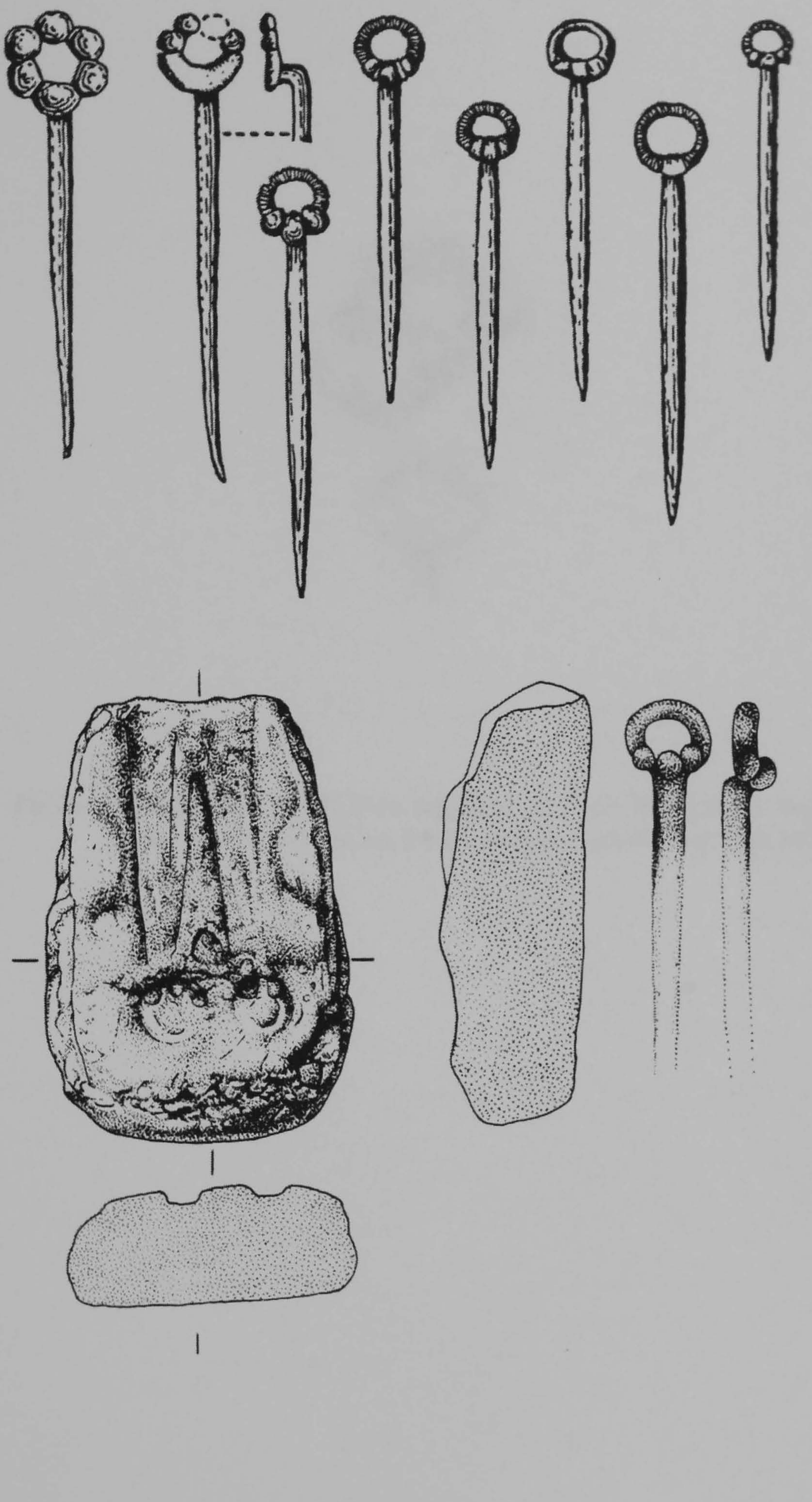


Fig 25 Beaded and corrugated pins (including ibex-headed) from Covesea, Moray and a mould from Gurness, Orkney (source: Foster 1990, 144; Hedges 1987, 158). Scale 1:1.

Fig 26 Proto-handpin mould from Traprain Law, East Lothian and a reconstruction of the pin produced in the mould (source: Curle & Cree 1920, 81). Scale 1:1.

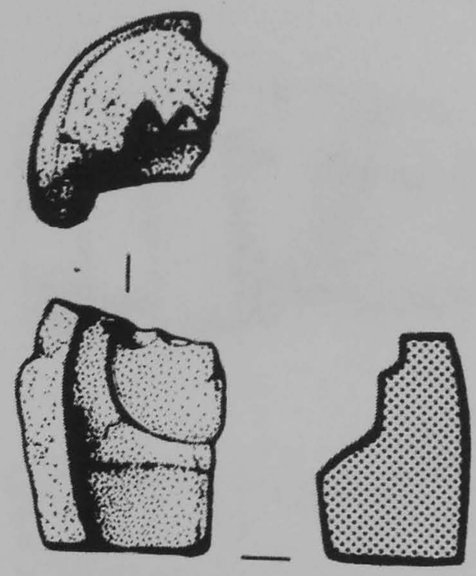


Fig 27 Handpin mould from Loch na Beirgh, Lewis (source: Heald 2001, 690). Scale 1:1.

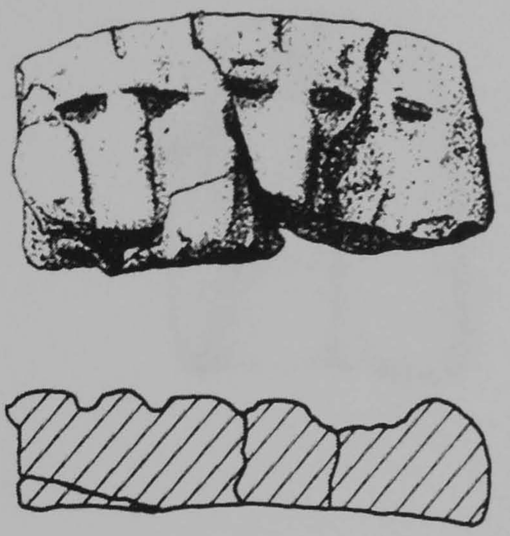


Fig 28 Mould for nail-headed pins from Whithorn, Galloway (source: Hill 1997, 401). Scale 1:1).

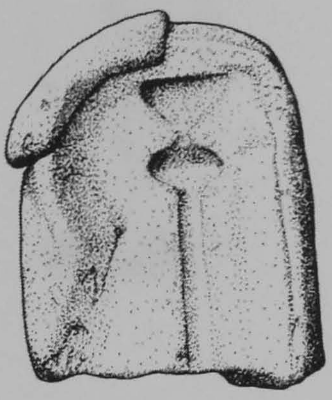


Fig 29 Thistle-headed pin mould from Mote of Mark, Kirkcudbrightshire (source: Longley 2001, 81, fig 7.6). Scale 1.1.

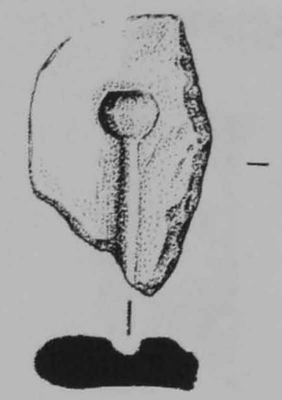


Fig 30 Ball-headed pin mould from Dunadd, Argyll (source: Lane & Campbell 2000, 126). Scale 1:1.

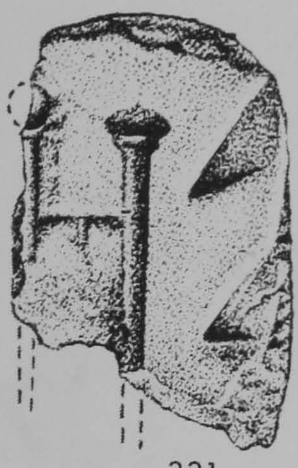


Fig 31 Collared elliptical-headed pin mould, Brough of Birsay, Orkney (source: Curle 1982, 32). Scale 1:1.

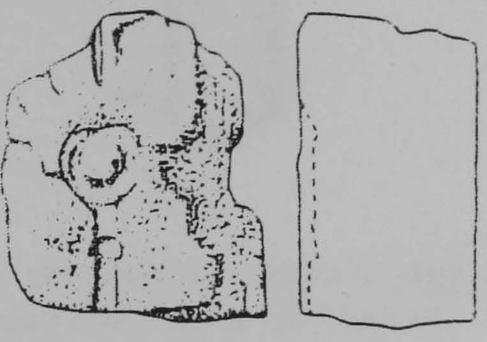


Fig 32 Disc- or dome-headed pin mould from Mote of Mark, Kirkcudbrightshire (source: Laing & Longley forthcoming). Scale 1:1.

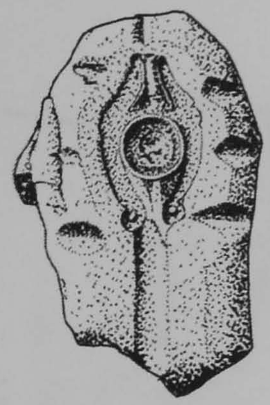


Fig 33 'Hippocamp' pin mould from Mote of Mark, Kirkcudbrightshire (source: Longley 2001, 81, fig 7.6). Scale 1:1.

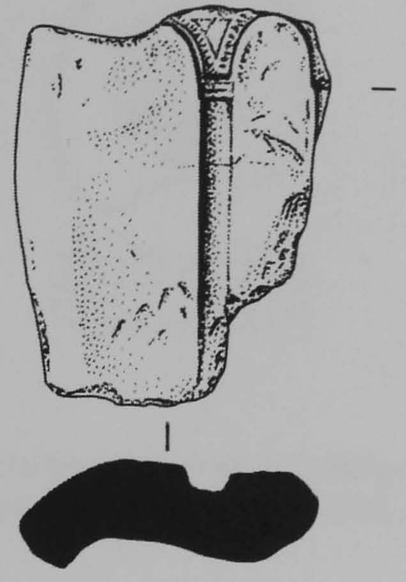


Fig 34 'Pictish' pin mould, Dunadd, Argyll (source: Lane & Campbell 2000, 126). Scale 1:1.

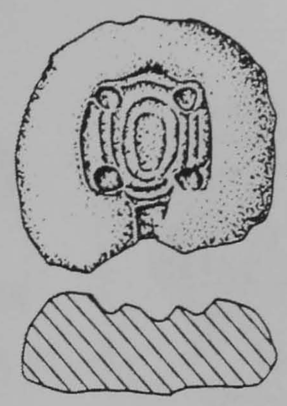


Fig 35 A mould for the production of an ornate pinhead, Dundurn, Perthshire (source: Alcock, Alcock & Driscoll 1989, 215). Scale 1:1.

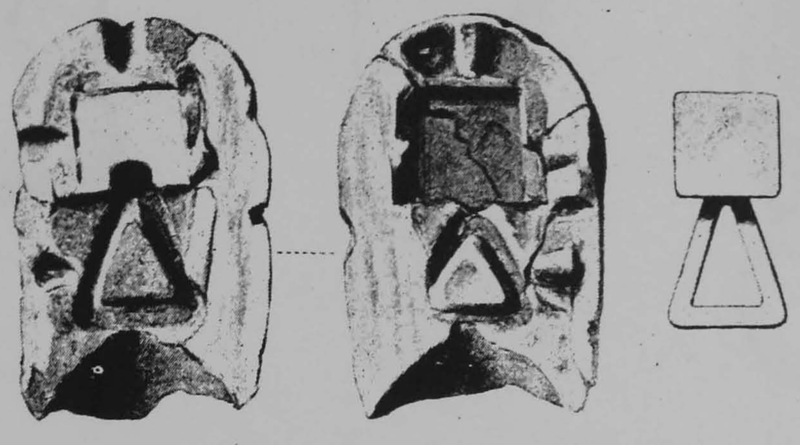
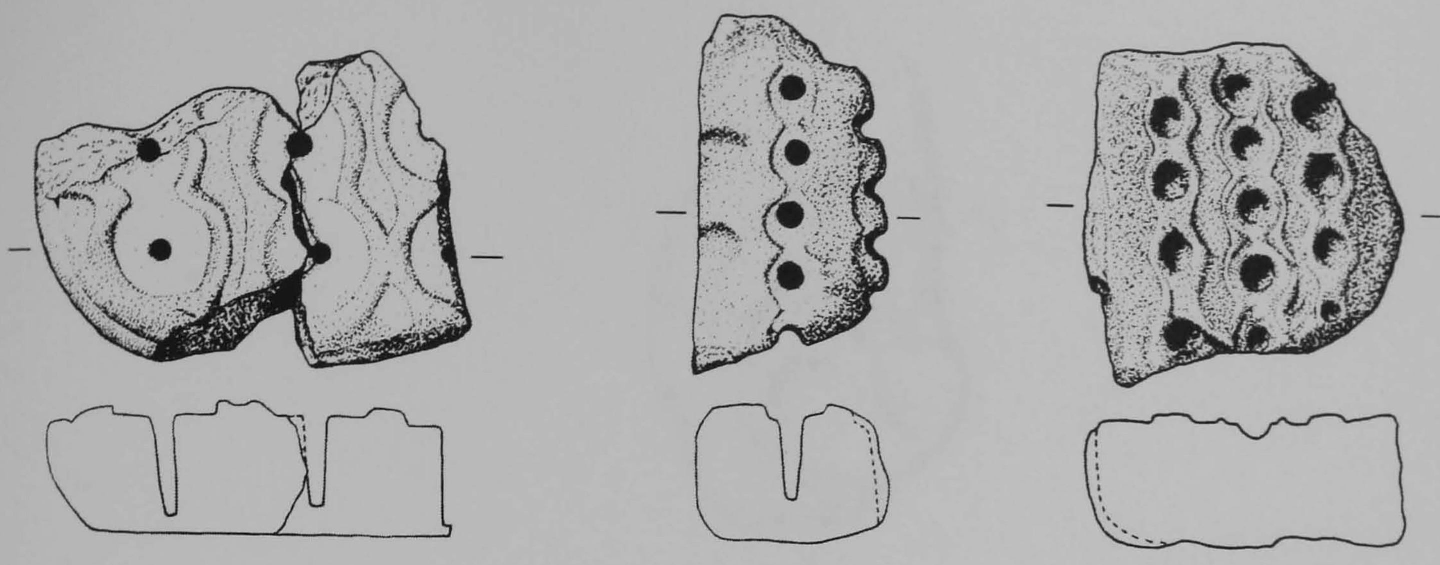


Fig 36 Mould for dress fasteners from Traprain Law, East Lothian and reconstruction of object produced (source: Curle & Cree 1916, 125). Scale 1:1.



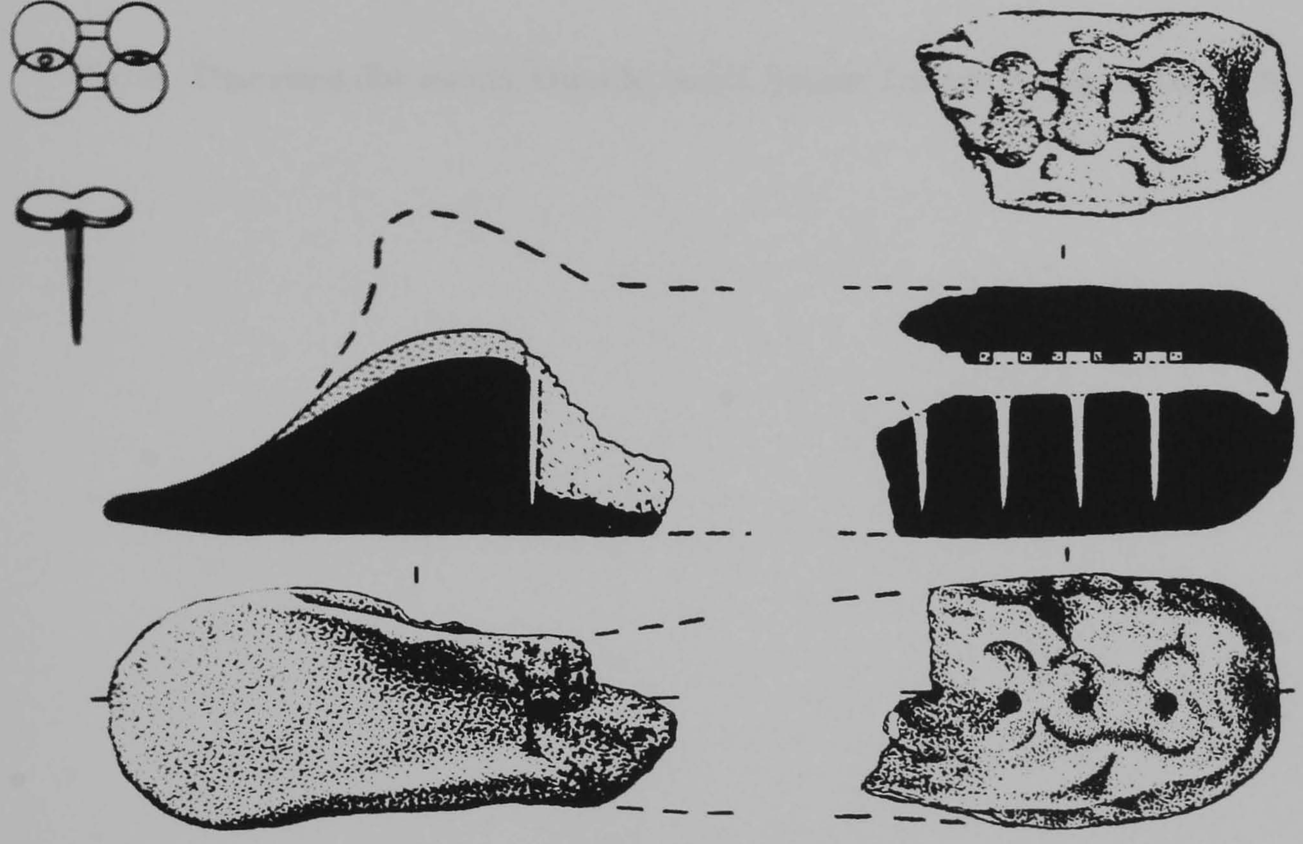


Fig 37 Moulds for the production of tacks, studs or rivets from Mote of Mark, Kirkcudbrightshire and Brough of Birsay, Orkney (source: Longley 2001, 81, fig 7.6; Curle 1982, 38, ill 22). Scale 1:1.

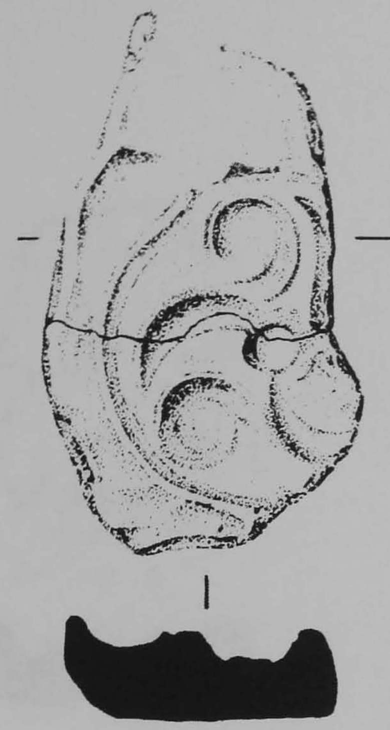


Fig 38 Decorated disc mould, Dunadd, Argyll (source: Lane & Campbell 2000, 128). Scale 1:1.

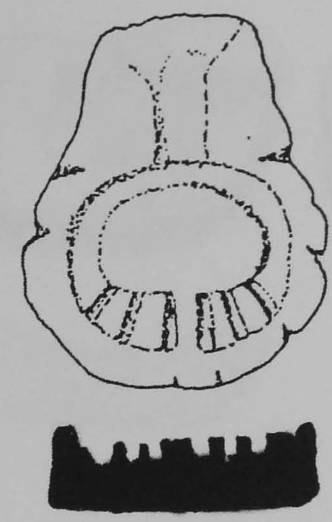


Fig 39 Type D penannular brooch mould from Dunadd, Argyll (source: Duncan 1982, fig 45). Scale 1:1.

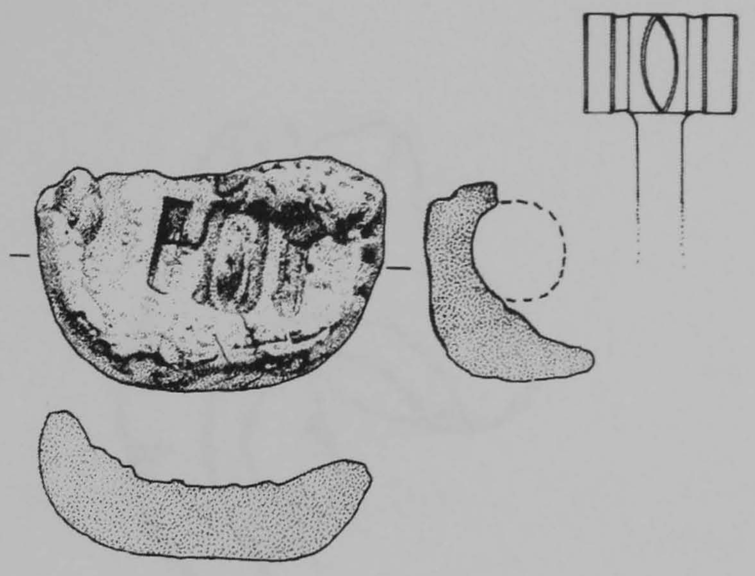


Fig 40 Type F? brooch mould from Gurness, Orkney (source: Hedges 1987, 159). Scale 1:1.

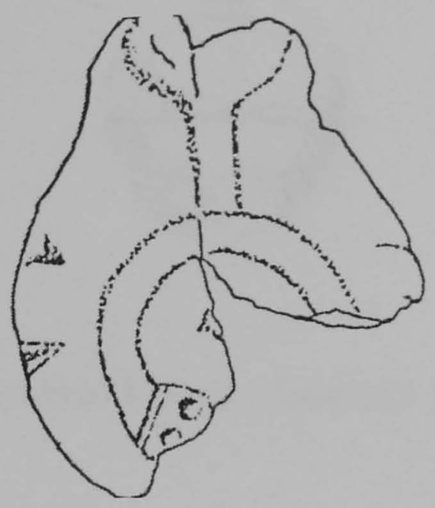


Fig 41 Mould for the production of a type F3 brooch from Dunadd, Argyll (source: Duncan 1982, fig 46). Scale 1:1.

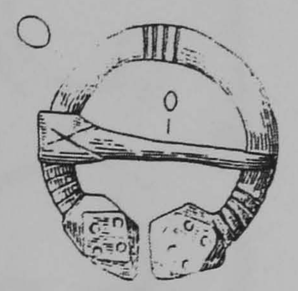


Fig 42 Type G1 brooch (source: Dickinson 1982, 61). Scale 1:1.

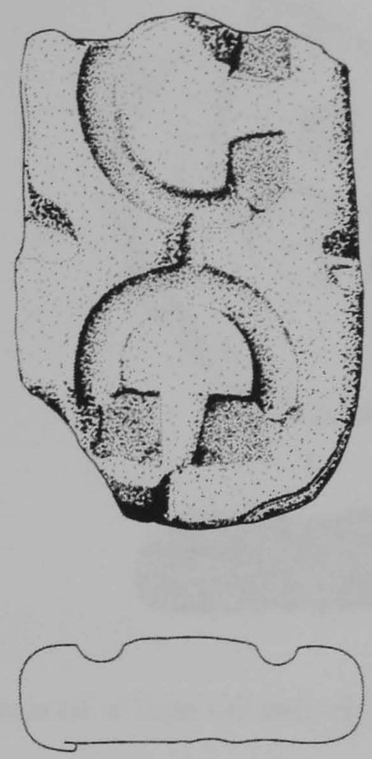


Fig 43 Mould for the production of a Type G2 brooch from Mote of Mark, Kirkcudbrightshire (source: Longley 2001, 81, fig 7.6). Scale 1:1.

Fig 44 Mould for the production of a Type G3 brooch (source: Lane & Campbell 2000, 107). Scale 1:1.

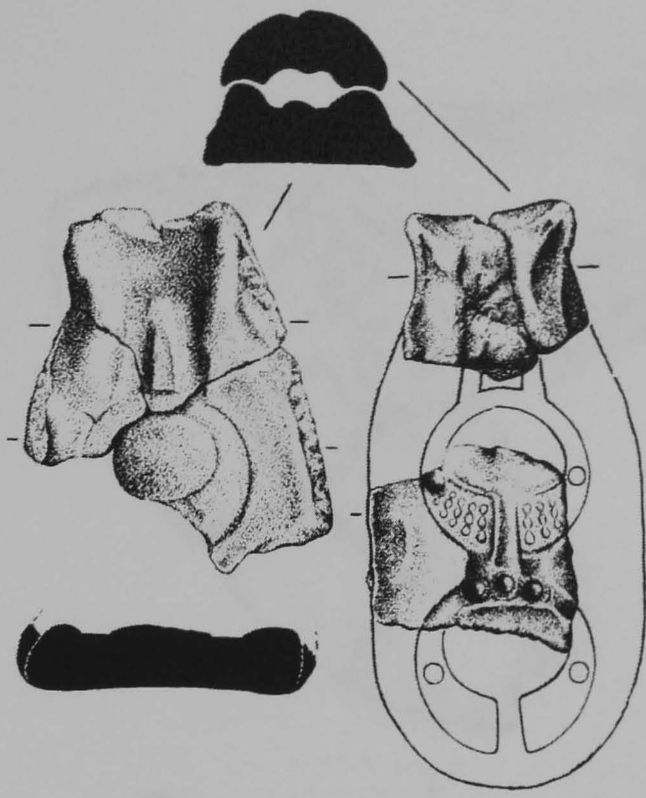


Fig 45 Moulds for the production of Type H (small) brooches (source: Close-Brooks 1986, 159). Scale 2:3.

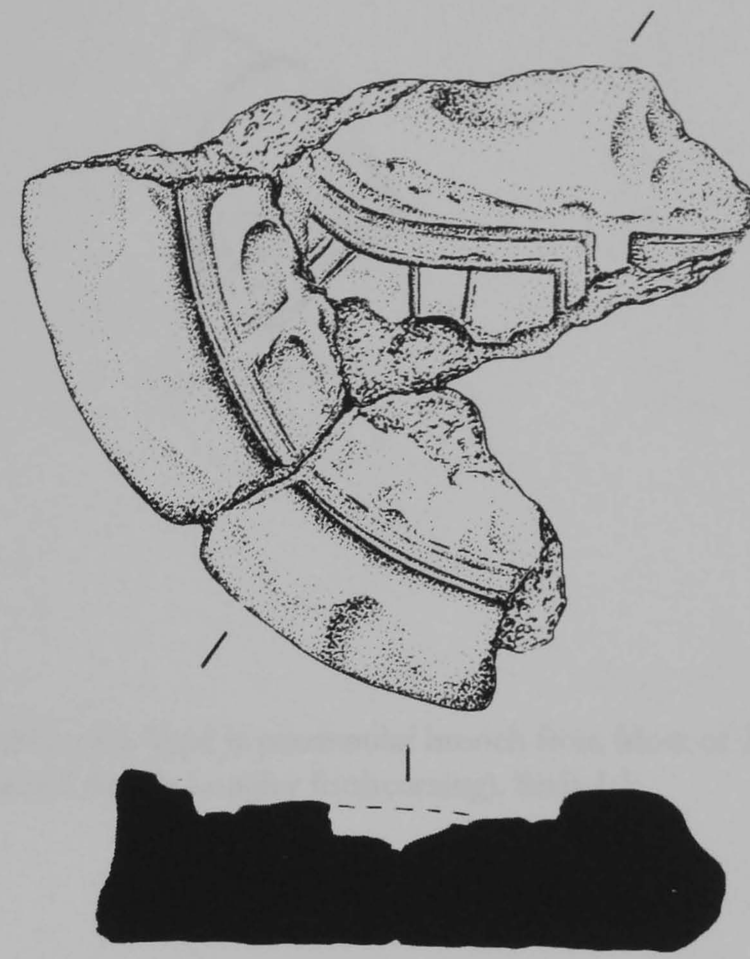


Fig 46 Mould for the production of a Type H (large) penannular brooch (source: Lane & Campbell 2000, 115). Scale 1:1.

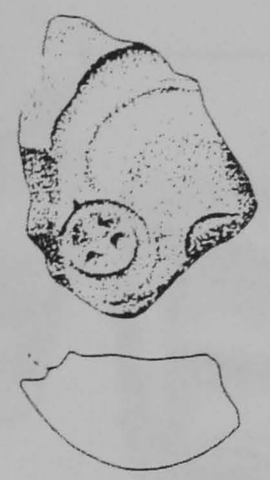


Fig 47 A mould for the production of a Type Ja penannular brooch from Mote of Mark, Kirkcudbrightshire (source: Laing & Longley forthcoming). Scale 1:1.

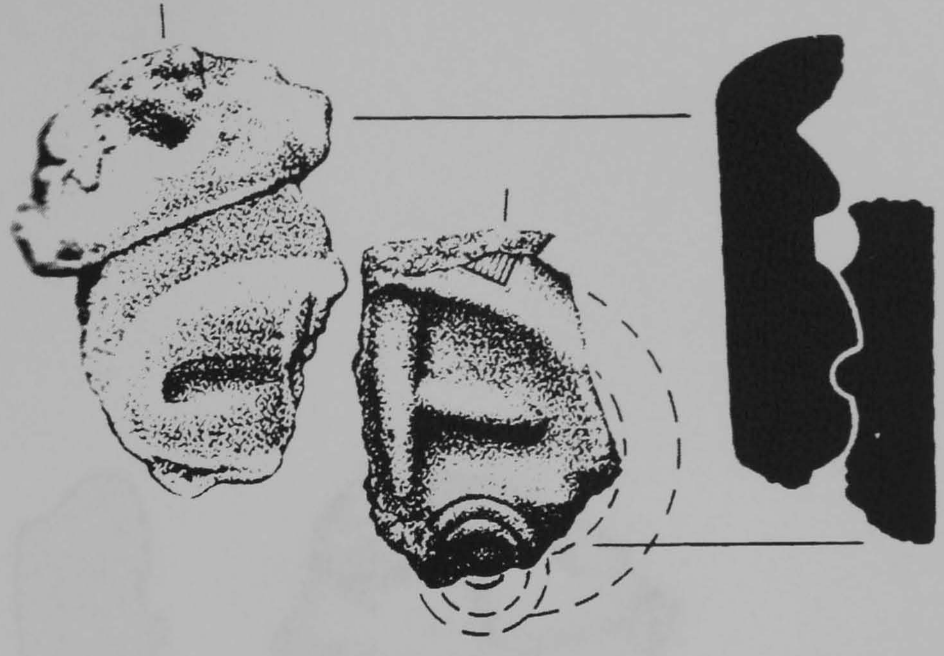


Fig 48 A mould for the production of a Type Jb penannular brooch, Clatchard Craig, Fife (source: Close-Brooks 1986, 159). Scale 1:1.

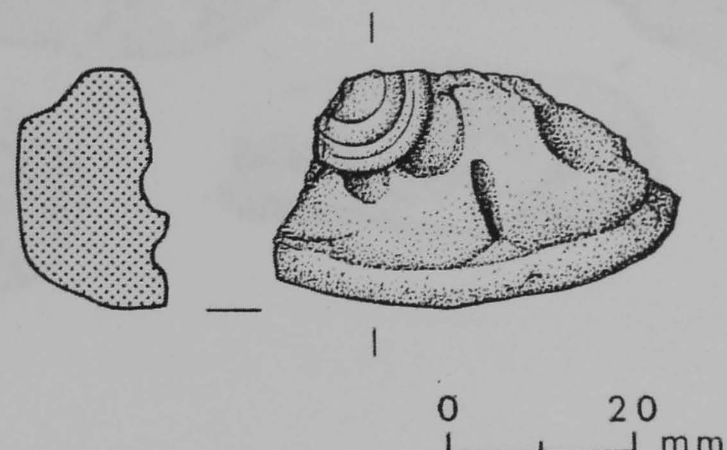


Fig 49: Type Jc penannular brooch mould from Cnoc a Comhdhalach, North Uist. Scale 1:1.

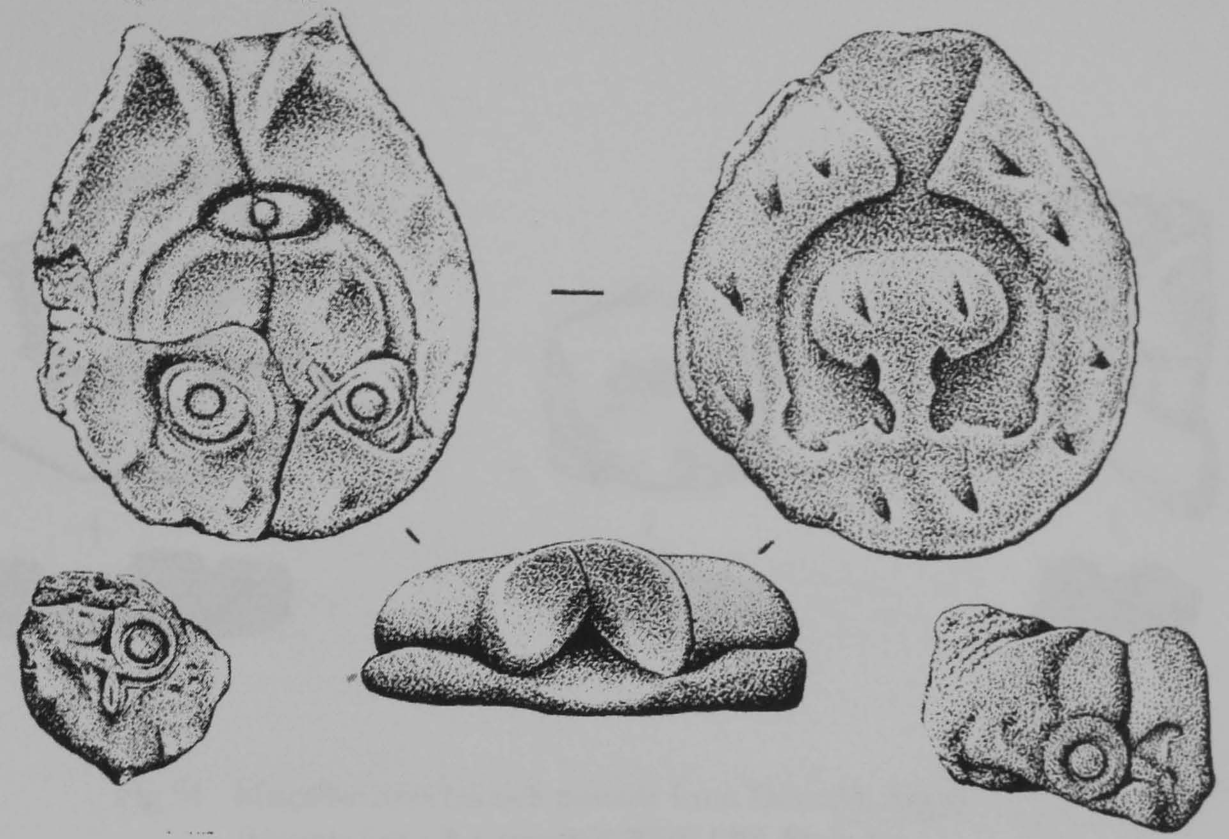


Fig 50 Type K penannular brooch moulds from Brough of Birsay, Orkney (source: Curle 1982, 26). Scale 1:1.

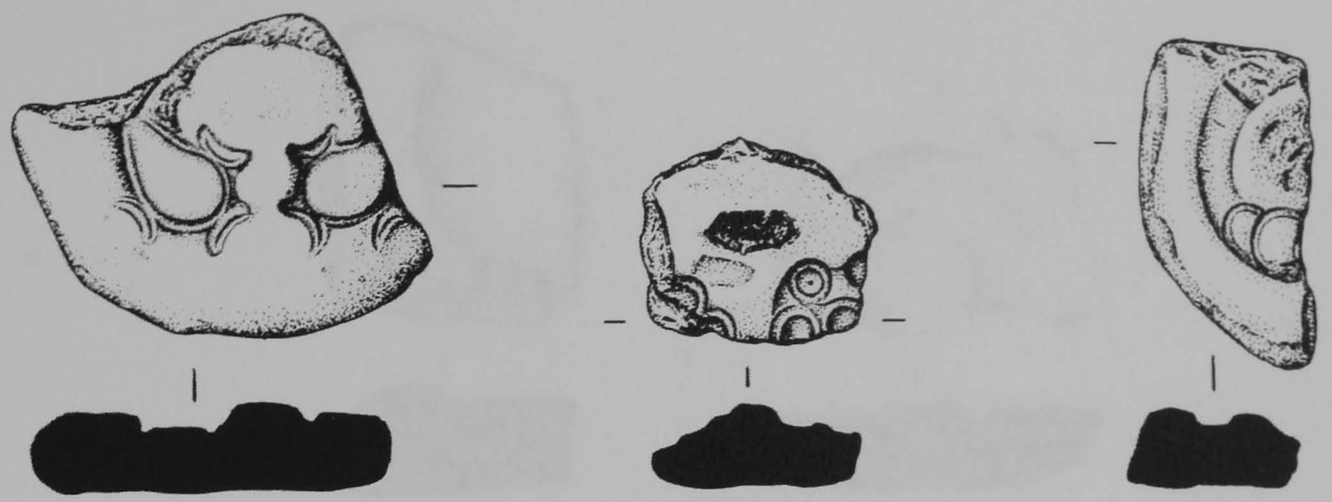


Fig 51 Miscellaneous brooch moulds from Dunadd, Argyll (source: Lane & Campbell 2000, 120). Scale 1:1.

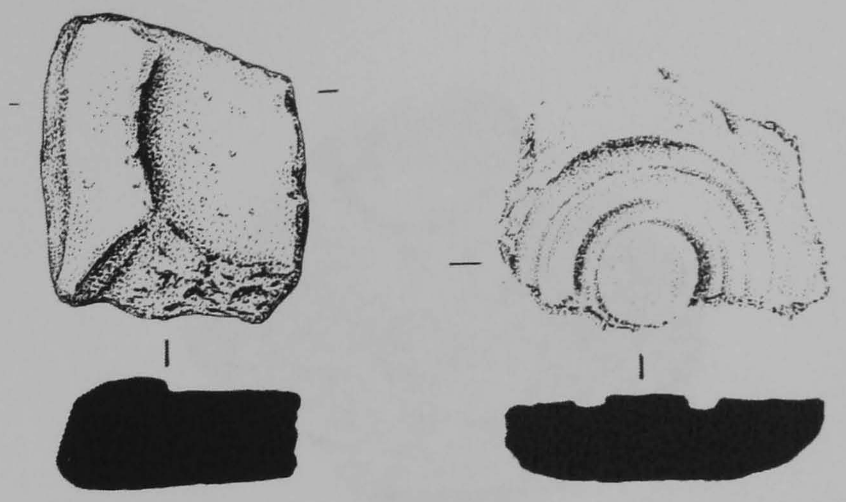


Fig 52 Moulds for brooches or rings, Dunadd, Argyll (source: Lane & Campbell 2000, 131). Scale 1:1.

Fig 53 Moulds for decorative panels from Mote of Mark, Kirkcudbrightshire (source: Longley 2001, 131, fig 7.6). Scale 1:1.

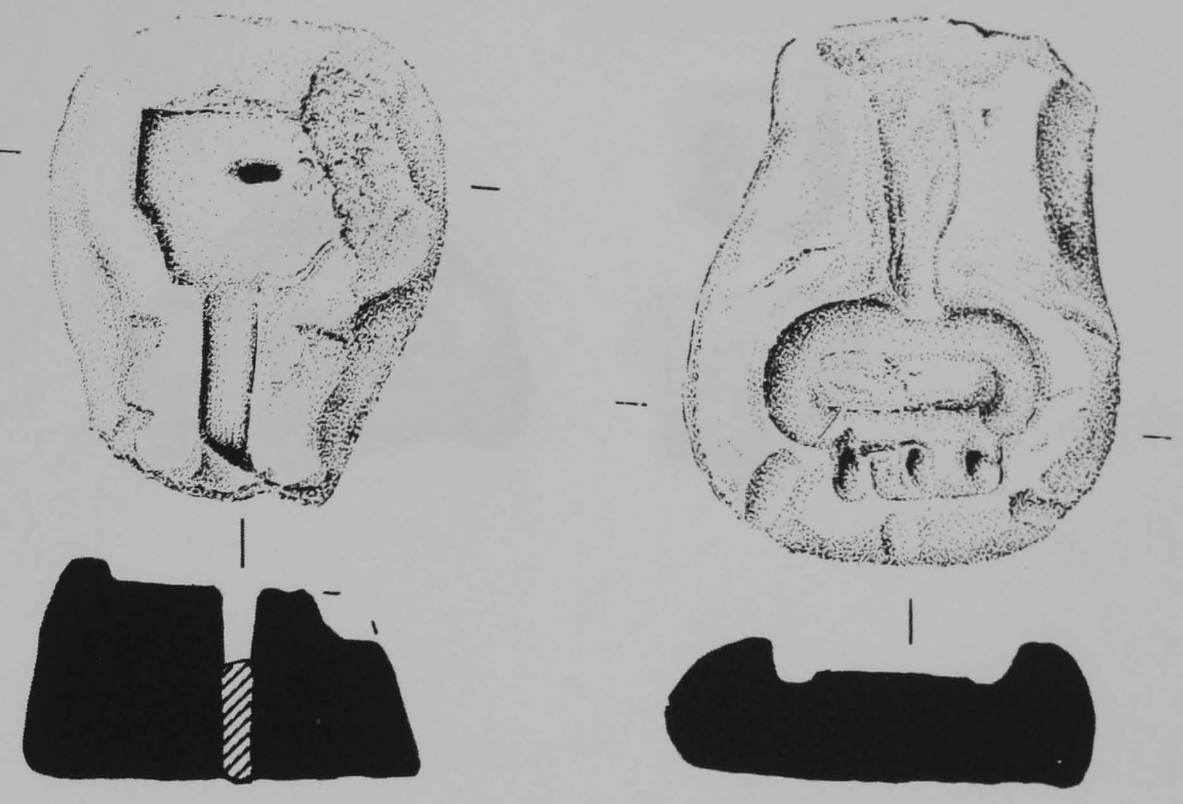


Fig 54 Moulds for the production of buckles from Dunadd, Argyll (source: Lane & Campbell 2000, 126). Scale 1:1.

Fig 55 Moulds for fittings for leather belts and straps from Mote of Mark, Kirkcudbrightshire (source: Longley 2001, 81, fig 7.6). Scale 1:1.

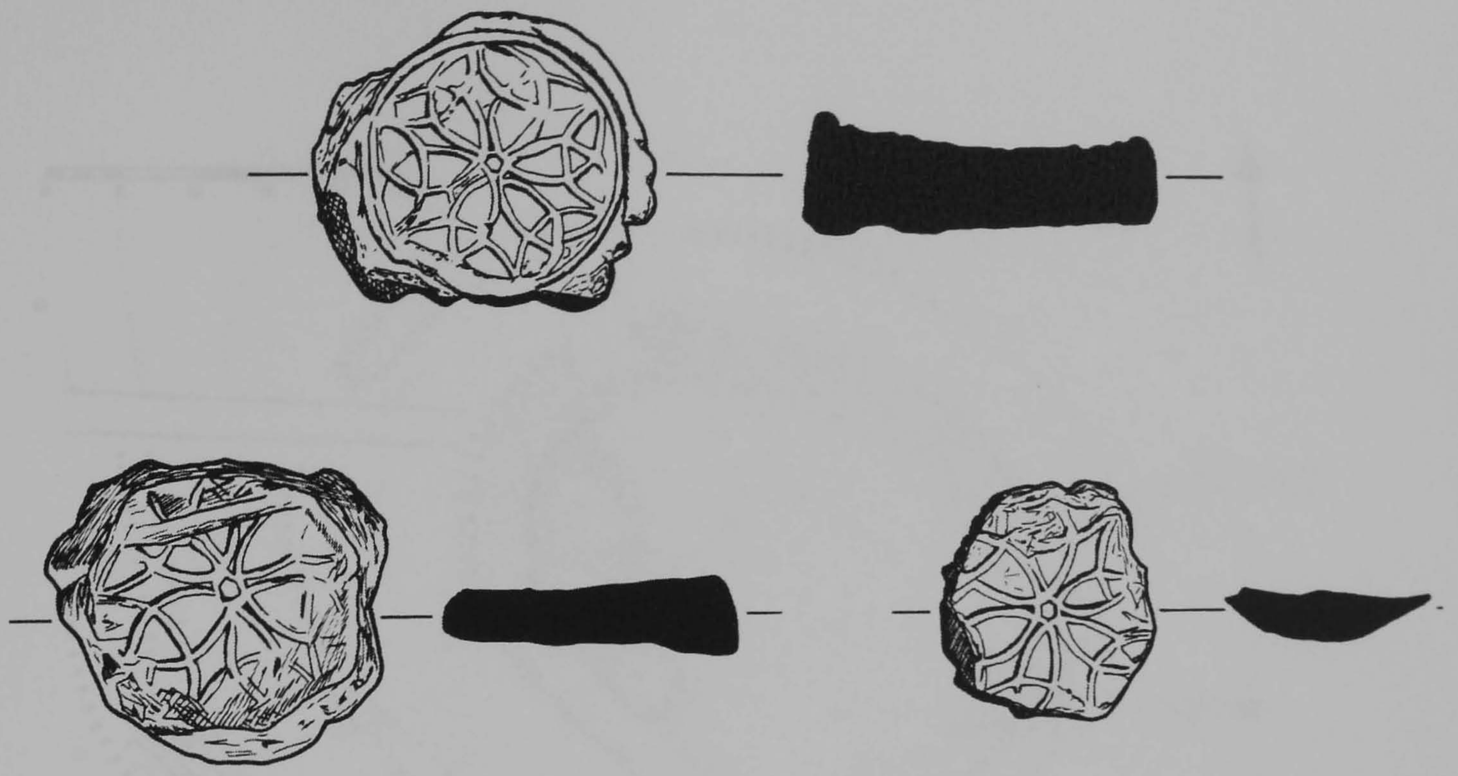


Fig 56 Moulds for the production of glass studs from Iona (source: Reece 1981, 21). Scale 1:1.

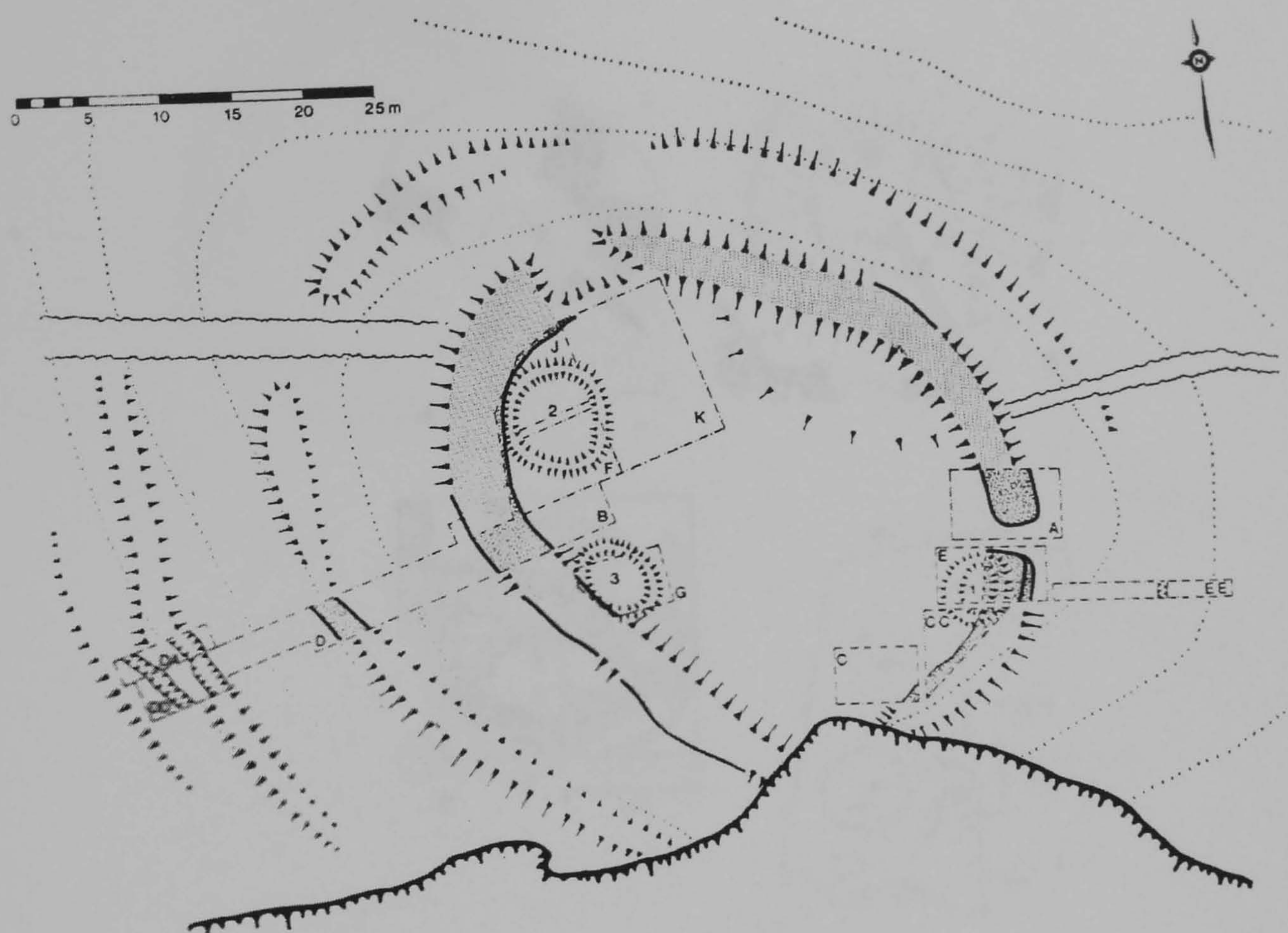


Fig 57 An Early Iron Age hillfort (source: Peltenburg 1982, 145).

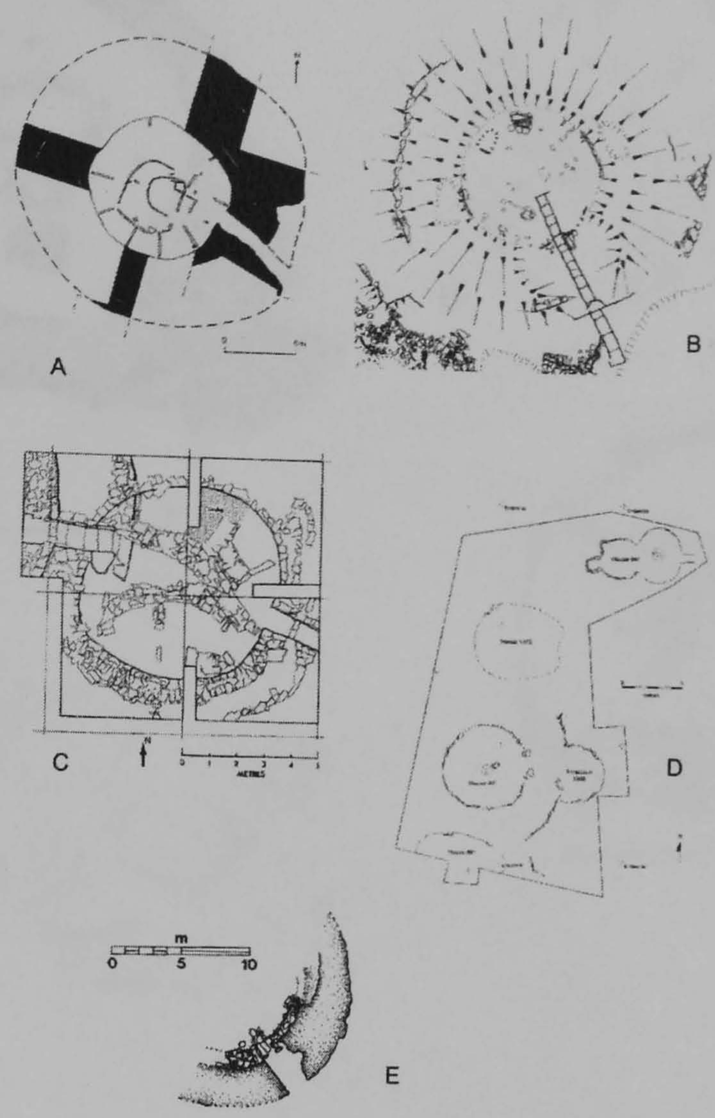


Fig 58 Simple Atlantic Roundhouses a: Bu, Orkney b: Howe, Orkney c: Quanterness, Orkney d: Cladh Hallan, South Uist e: St Boniface, Orkney (source: Gilmour 2002, 56).

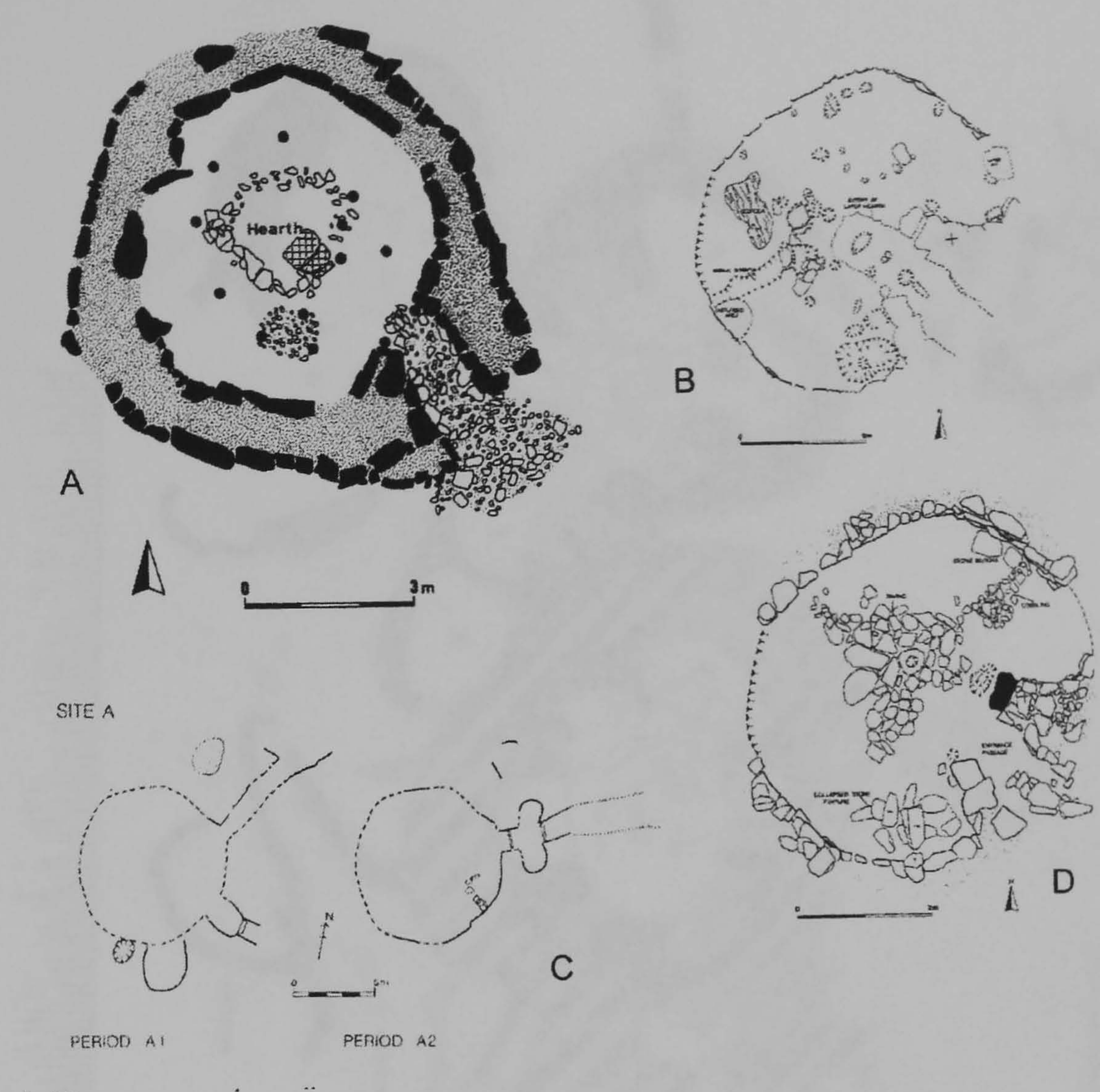


Fig 59 'Non-monumental structures' in North Uist a: Cholie a' Chasgain b: Eilean Olabhat Phase 1 c: Sollas d: Eilean Olabhat Phase 2 (source: Gilmour 2002, 58).

Fig 60 Early Iron Age Village, Jarlshof, Shetland (source: Hamilton 1956, fig 10).

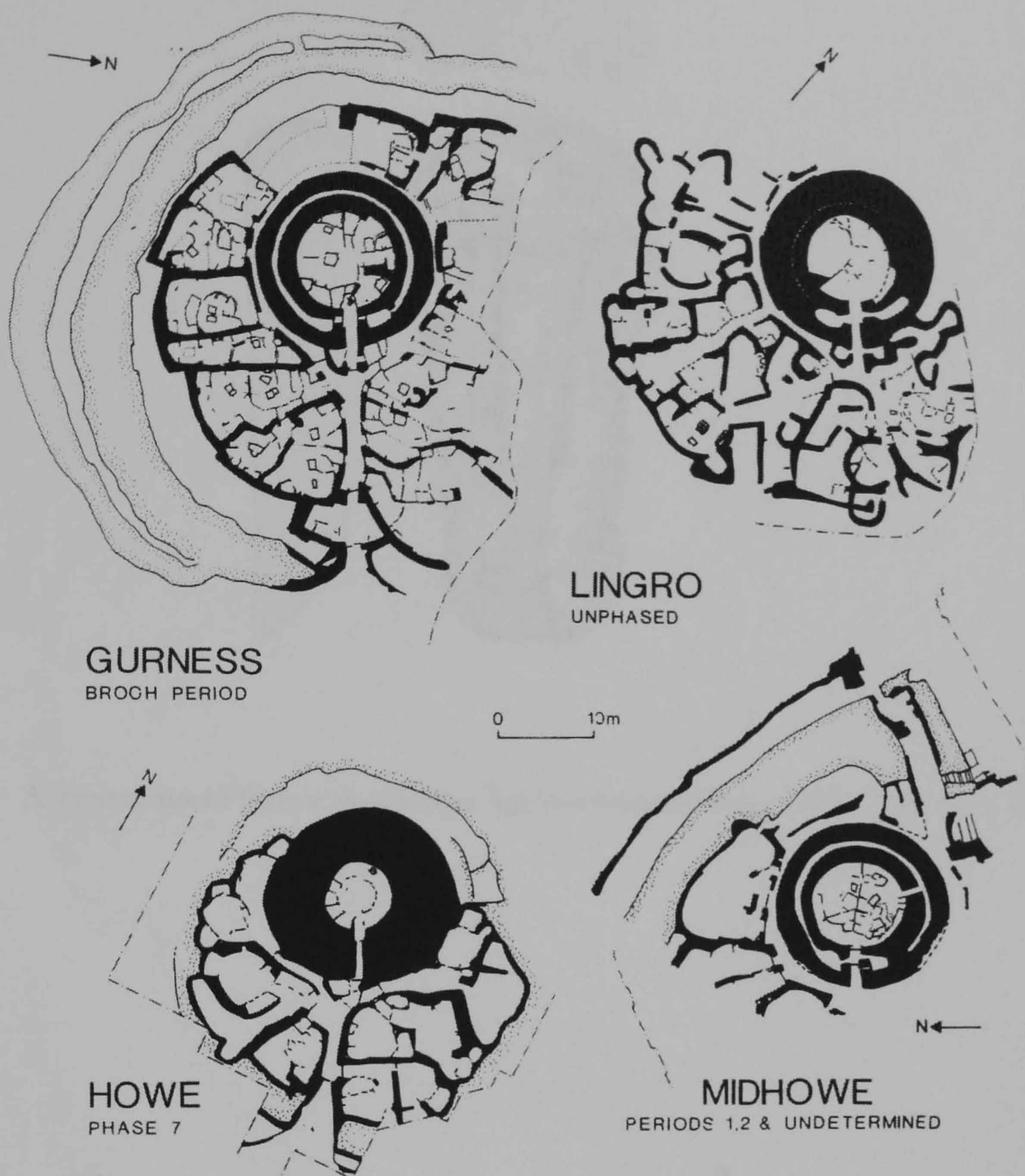


Fig 61 Orkney brochs with nucleated settlements (source: Foster 1989b, 37).

Fig 62 A Typical mould from a Middle Iron Age site (source: Hedges 1987, 158). Scale 1:1.

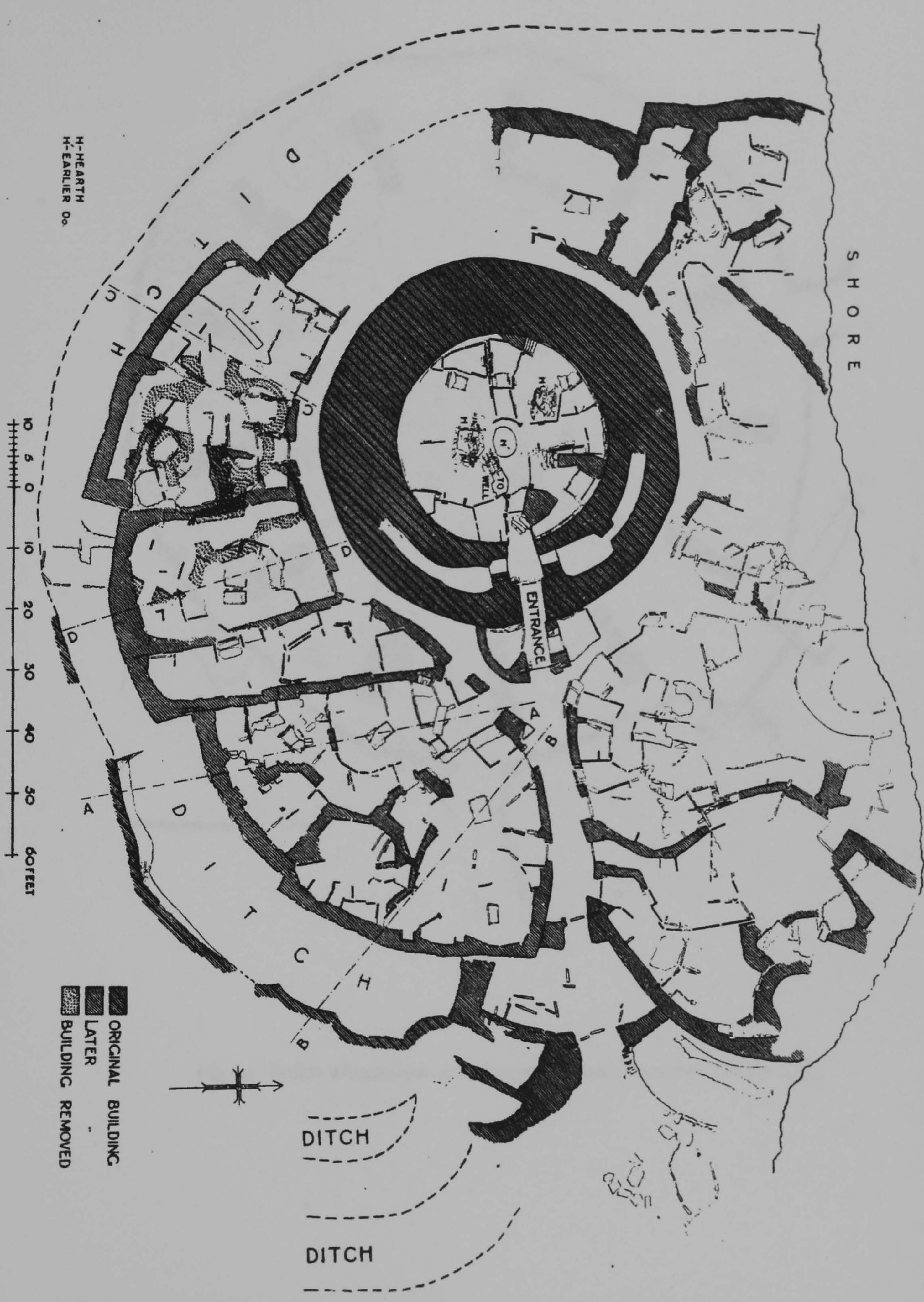


Fig 63 An Orcadian nucleated settlement, Gurness, Orkney (source: MacKie 2002, 288).

Fig 64 Sollas wheelhouse and the pits (source: Campbell 1991b, 129).

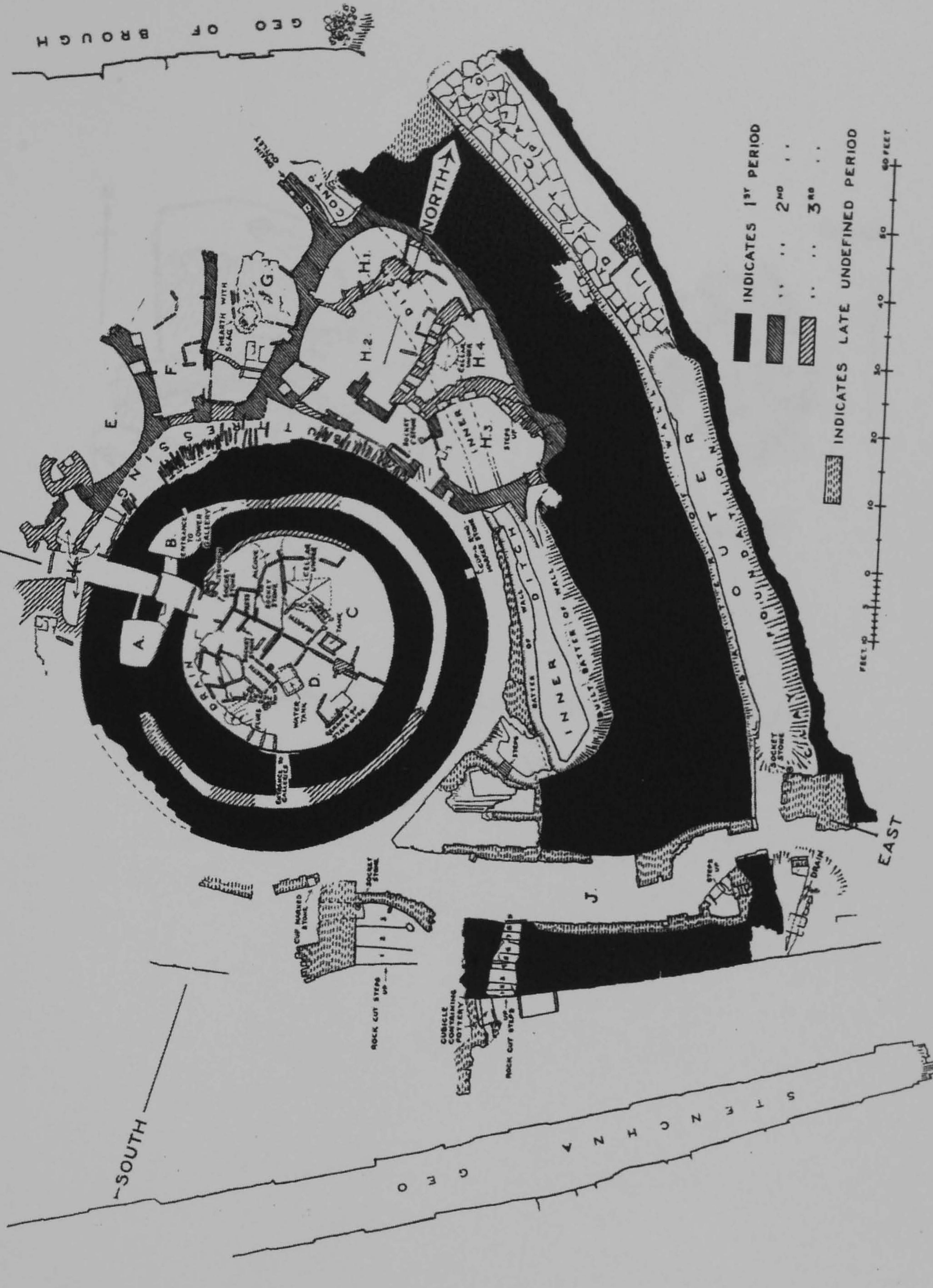


Fig 65 The nucleated settlement of Midhowe, Orkney (source: MacKie 2002, 312).

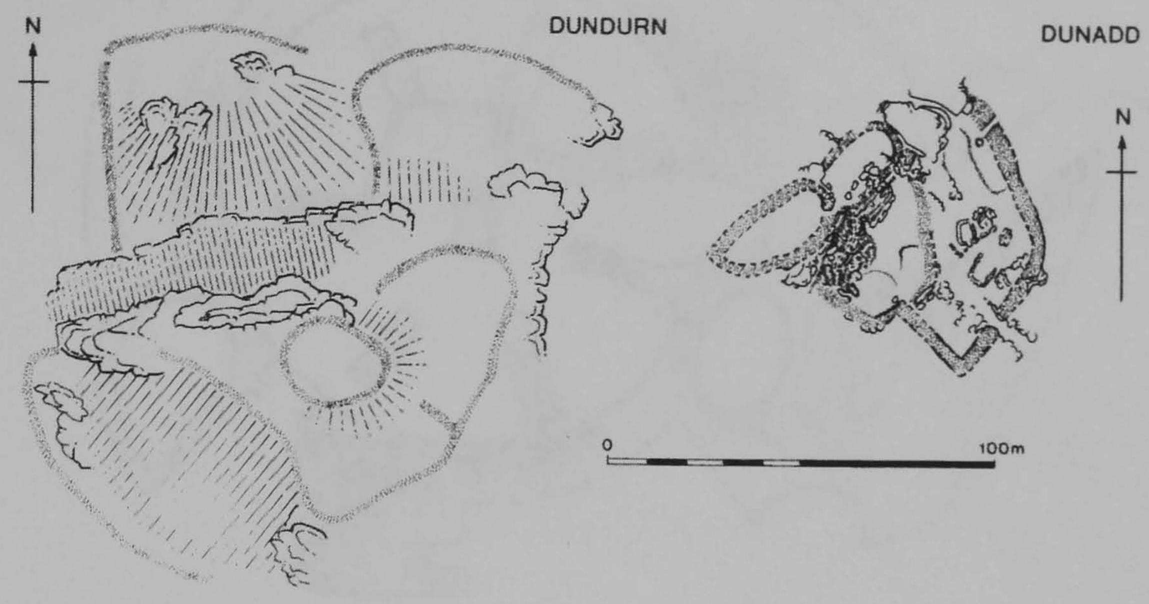
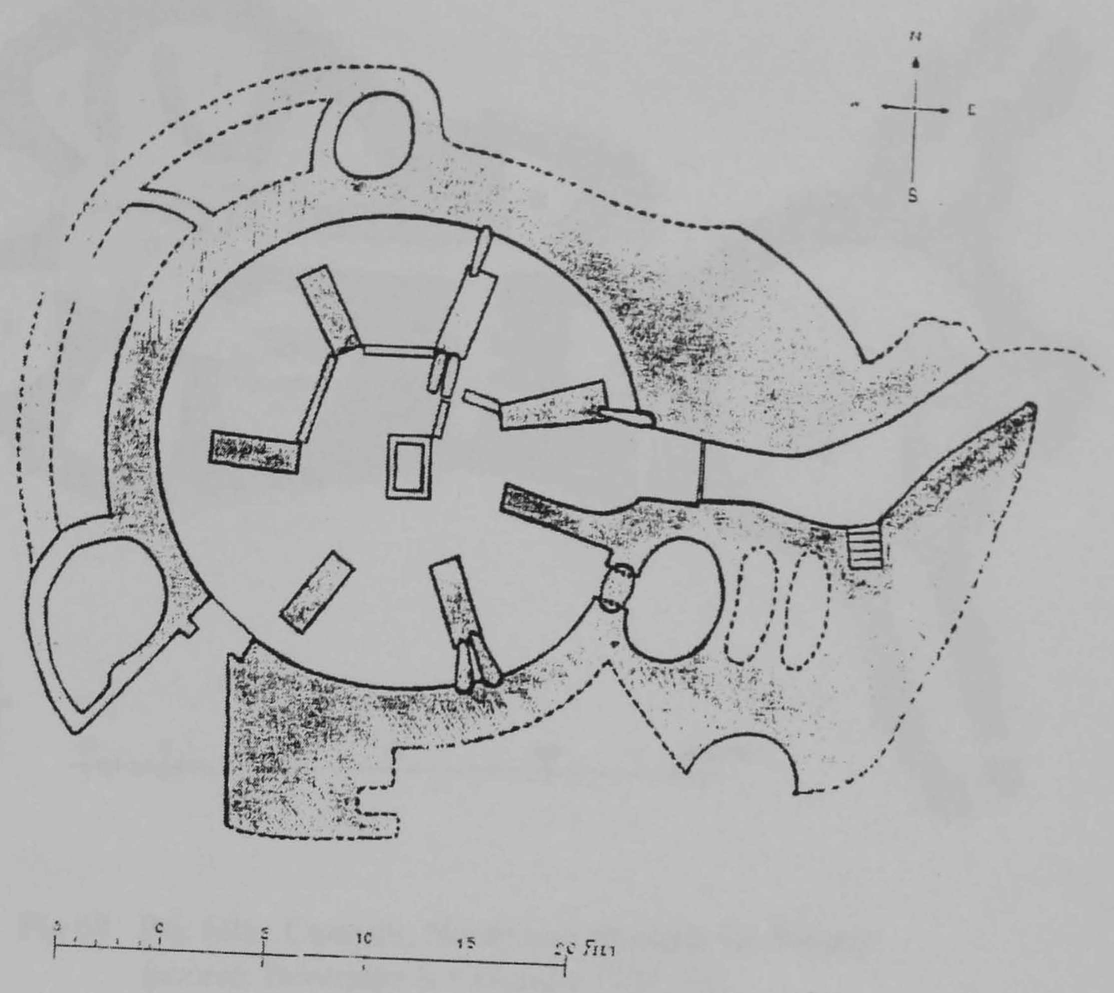


Fig 66 Nuclear forts of the Late Iron Age (source: Alcock 2003, 190)



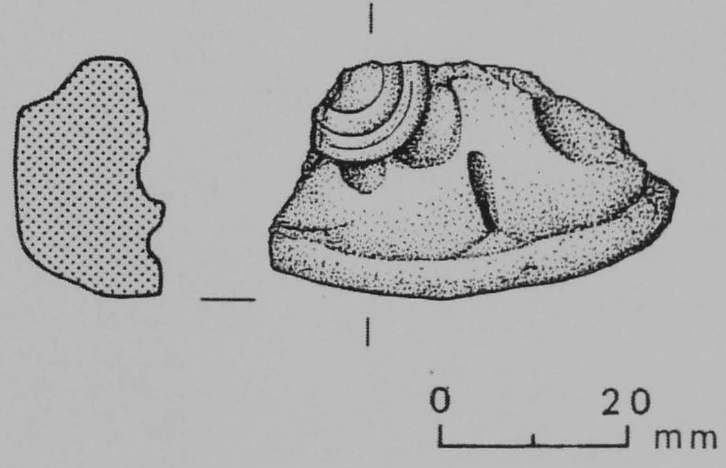


Fig 67 Cnoc a' Comhdhalach, North Uist and the mould recovered there (source of plan: Beveridge 1911, plate facing 201).

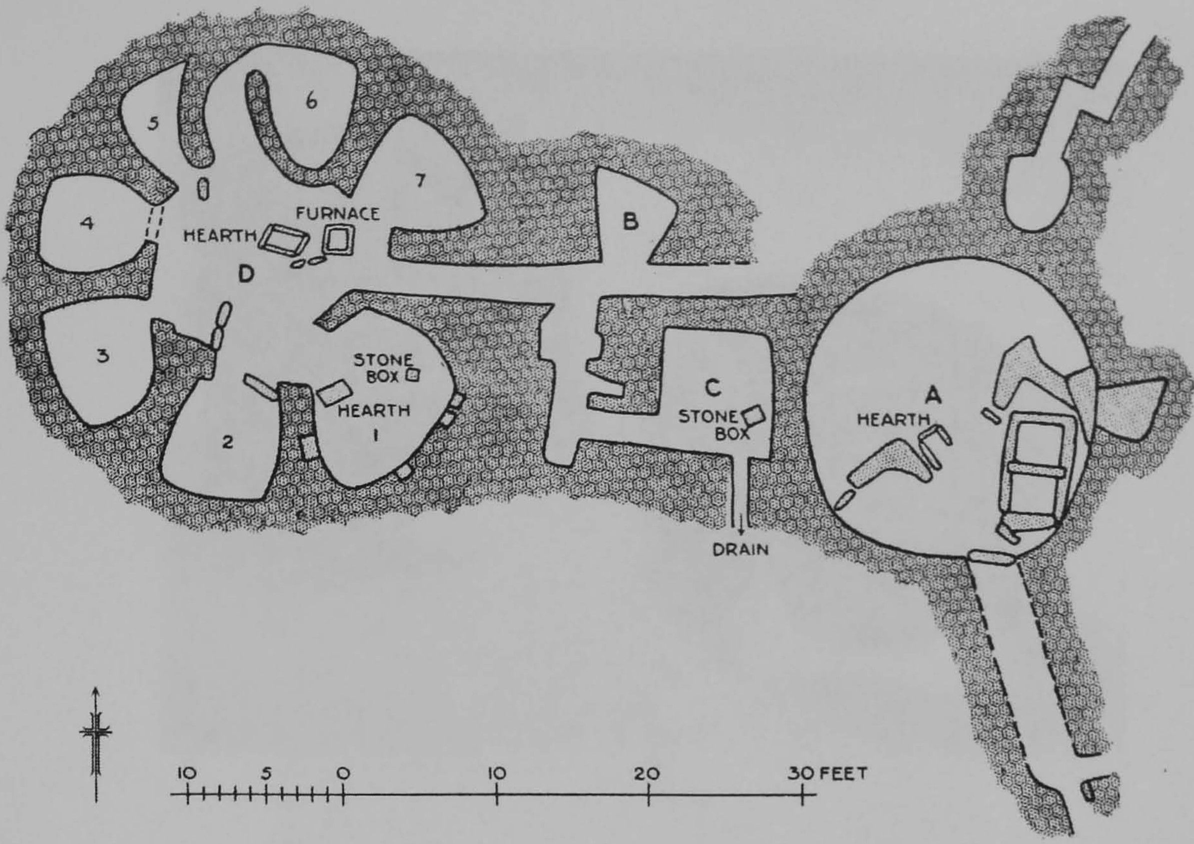


Fig 68 Bac Mhic Connain, North Uist showing the furnace (source: Beveridge & Callander 1932, 43).

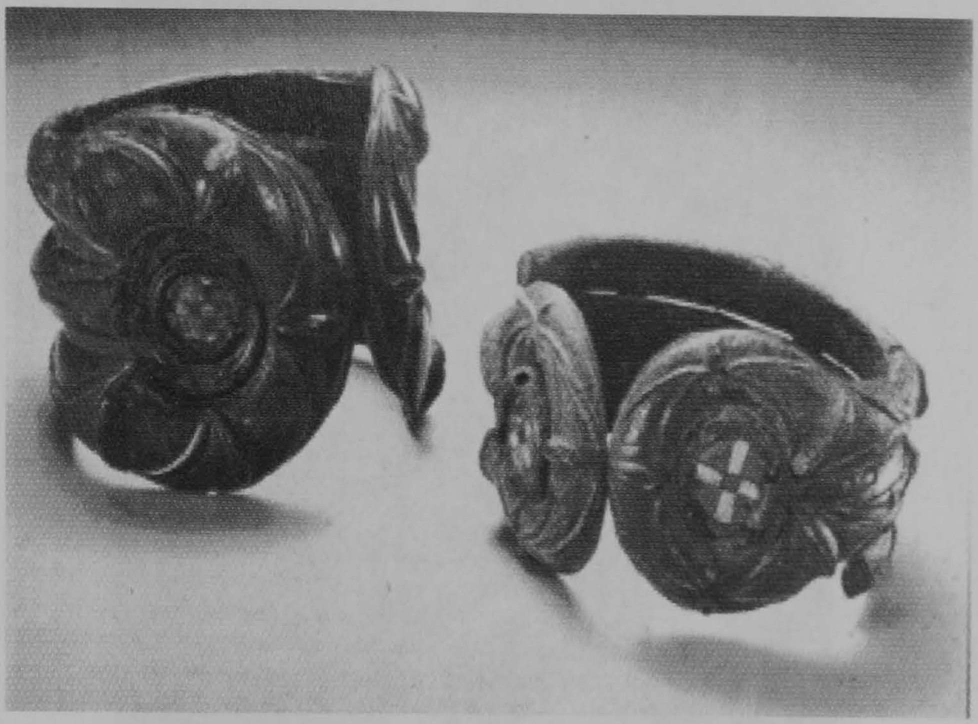


Plate 1 Massive armlets from Castle Newe, Aberdeenshire and Pitkelloney, Perthshire.

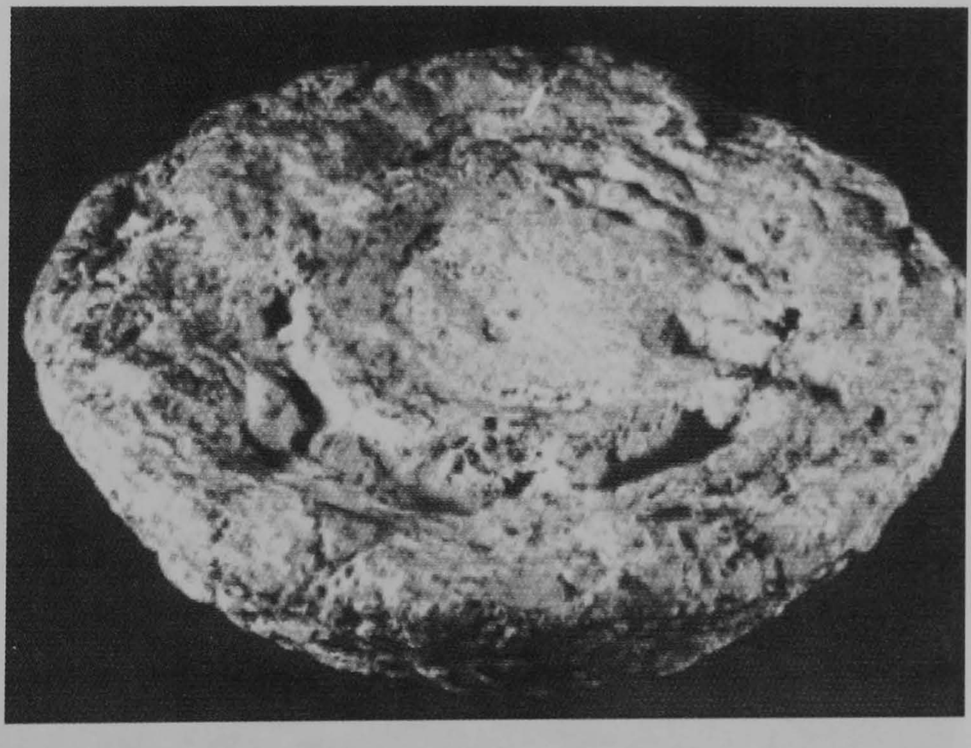


Plate 2 Copper ingot from Edin's Hall, Berwickshire.

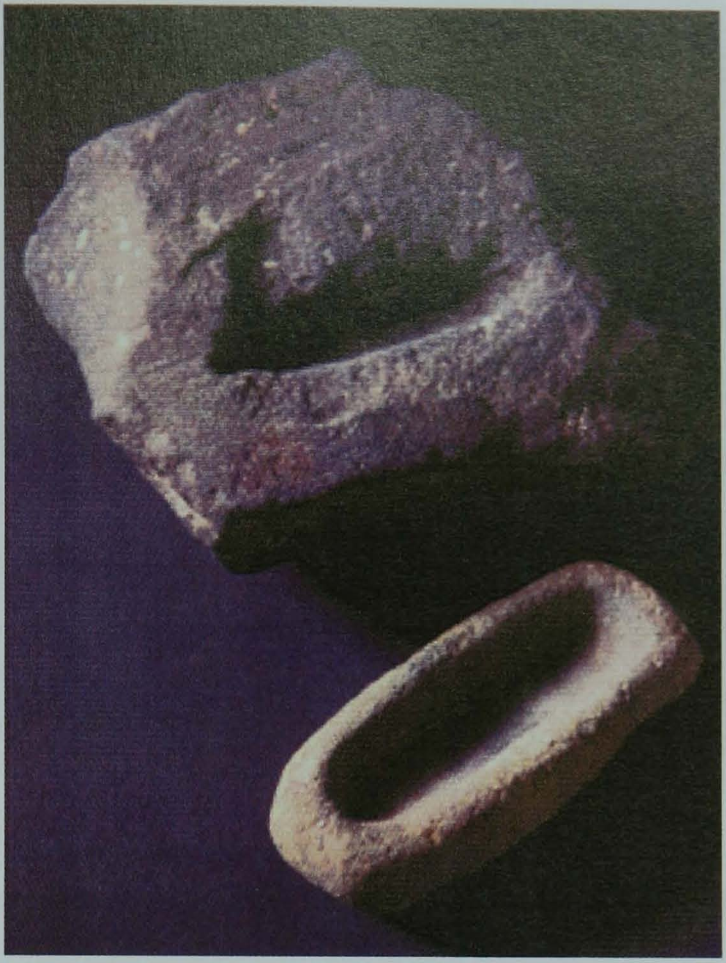


Plate 3 Ingot moulds from East Lomond Hill, Fife and Bac Mhic Connain, North Uist

Plate 4 Type 1a crucible from Dun Mor Vaul, Tiree

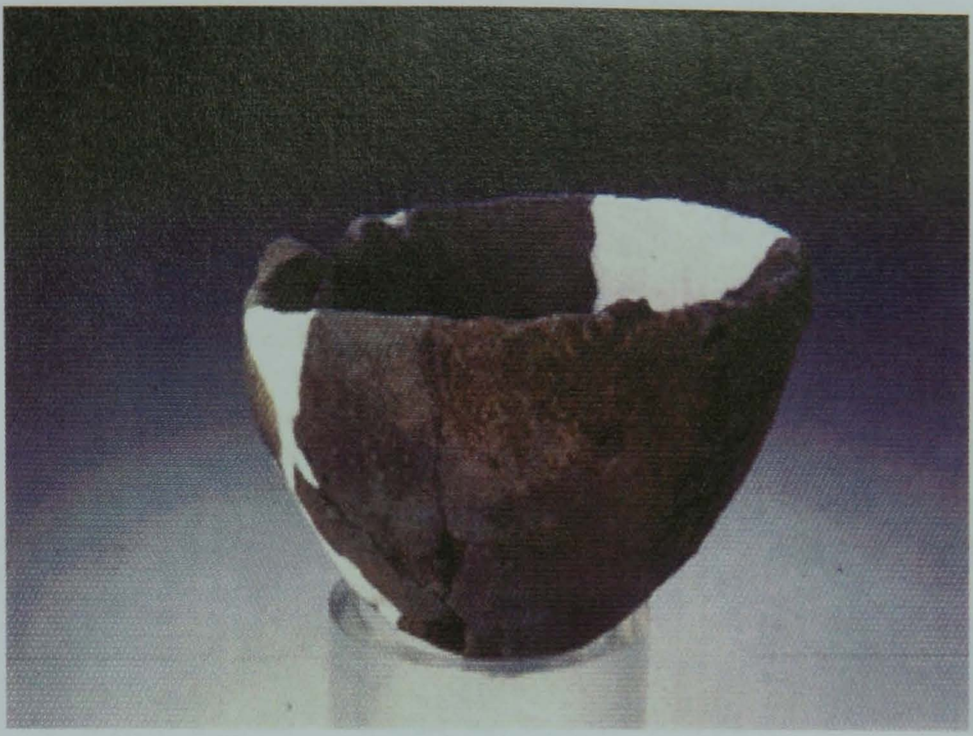


Plate 5 Type 2b crucible from Fairy Knowe, Stirlingshire

Plate 6 Type 7 crucibles from Brough of Birsay, Orkney

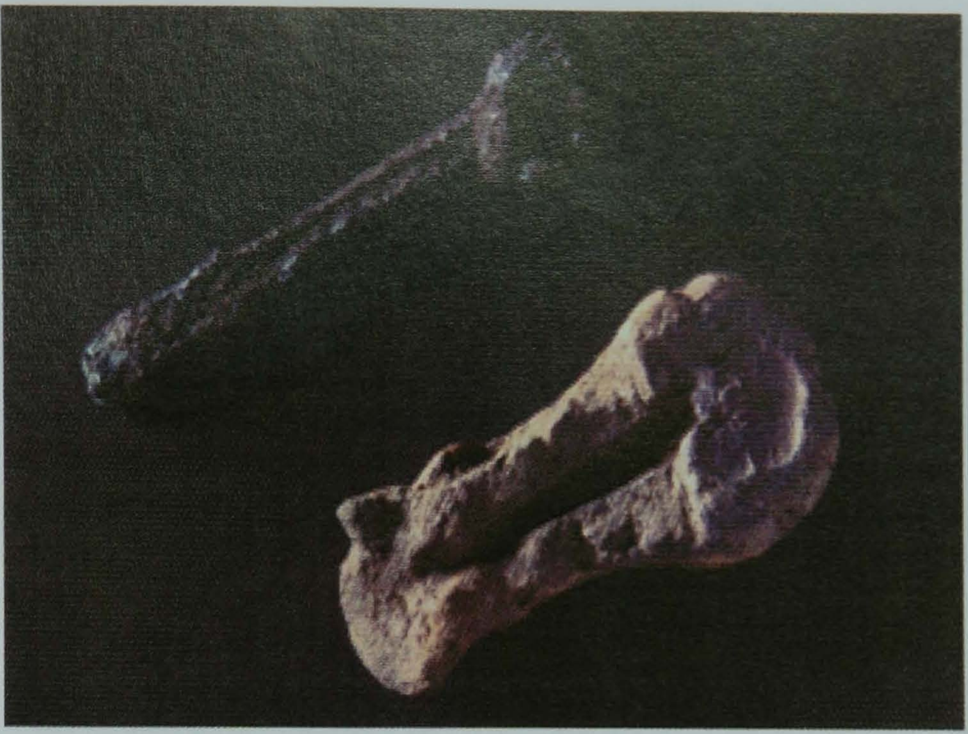


Plate 7 Rosette-headed pin and object cast from Traprain Law, East Lothian

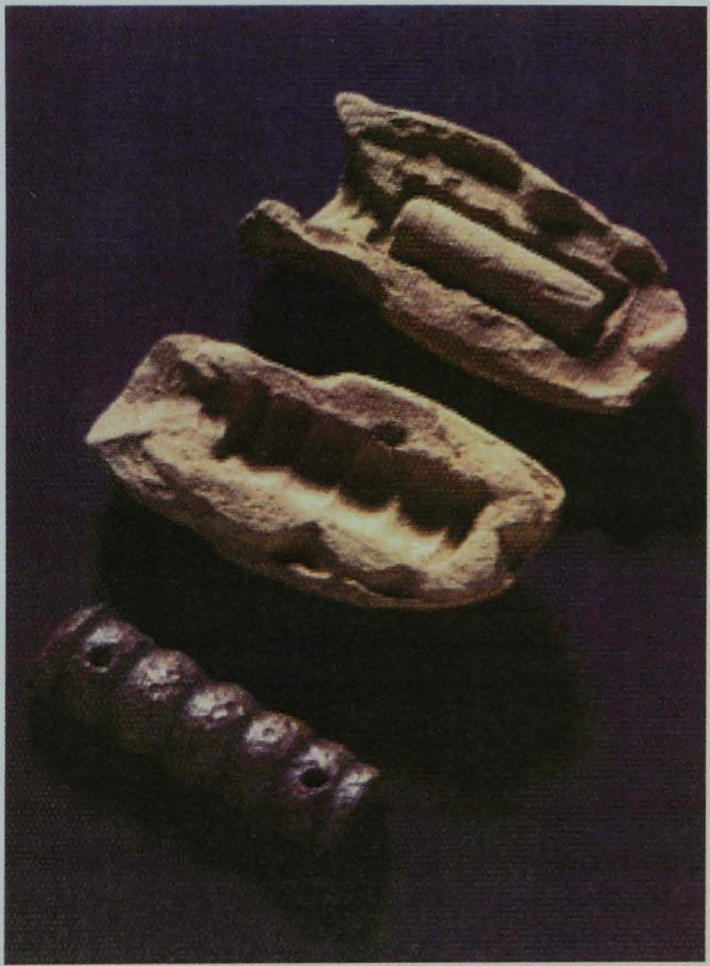


Plate 8 Corrugated fitting and moulds from Traprain Law, East Lothian

Plate 9 Dress fastener and moulds from Traprain Law, East Lothian