

EARLY MEDIEVAL ARCHAEOLOGY PROJECT (EMAP2)
Reconstructing the Early Medieval Irish Economy
EMAP Report 6.1

Industrial Activity on Rural Secular Sites in Ireland, A.D. 400-1100

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Finbar McCormick, & Aidan O'Sullivan**

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The Early Medieval Archaeology Project (EMAP):

Project Report 2012

The Archaeology of Industrial Activity on Secular Sites in Early Medieval Ireland, AD 400-1100.

By

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Seaver, Finbar McCormick & Aidan
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Forward

EMAP Report 6.1 deals with the archaeological evidence for industrial activity on secular sites in early medieval Ireland. It is comprised of four main sections. The first section provides a general overview of the creation of the report, including general distribution maps and histograms. The archaeological evidence for industrial activity is covered in fuller detail in sections two and three. Section 2, prepared by Matt Seaver, examines the evidence in greater depth for specific industrial activity, namely iron-working, non-ferrous metal-working, glass-working, and antler/bone-working. This is accompanied by comprehensive tables outlining the site evidence for the major industrial activities. Section 3, prepared by Maureen Doyle, looks at the production of items of personal ornamentation and decoration. Rather than adopting a single-material approach, this section examines the production of different types of artefact. Thus 'pins' are discussed together, whether they were made of bone, antler, bronze or iron, since they performed a similar function. The final section consists of a site gazetteer of industrial activity in early medieval Ireland. This includes over 300 secular sites, and contains substantial tables outlining the evidence for craft activity, as well as the types of artefacts recovered from the site. Much of the evidence for industrial activity in the gazetteer is derived from reports which have not been fully published, i.e. the large body of 'grey literature' that has emerged during the last two decades.

The investigation of industrial activity shows that certain early medieval secular site-types produced more evidence than others. It also suggests that there was a hierarchy of industrial activity, with perceived high status sites producing more prestigious materials – such as non-ferrous metals or glass. There is also a suggestion of a degree of regional patterning, most clearly indicated by the distribution of shale-working sites, but also possibly influential in the location of iron-working sites. The findings indicate that secular sites played a substantial role in early medieval craft and industry, a fact that is often overlooked due to a focus on the production-levels of 'monastic towns', and latterly, Hiberno-Norse settlements.

The authors would like to thank all those excavators and specialists whose reports are referred to prior to their final publication and especially the Heritage Council (INSTAR) which financed the project.

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Section 1: An Overview of the 2012 Report

Chapter 1: Introduction

Interpretations of the landscape of early medieval Ireland have changed over the decades, driven partly by the changing zeitgeist of historical theory, and partly by the archaeological record. While the predominantly rural focus of life in Ireland during the latter part of the first millennium has been well-discussed, the impact of industry on the every-day life of the inhabitants has had less coverage. It is clear that Viking towns were centres of industry (e.g. Wallace 1987), but the locations of native centres of activity are less studied. 'Monastic towns' (*sensu* Doherty 1985; Valente 1998; Swift 1998) fulfil many of these roles, and recent excavations on the ecclesiastical site of Clonfad, Co. Westmeath (Stevens & Channing 2012) and Armoy, Co. Antrim (Nellis *et al.* 2007), for example, revealed large-scale production of specialised metal-work (e.g. bells), and 1,300 pieces of shale-working debitage respectively. The importance of typical secular sites, however, has often been overshadowed by a small number of urban and 'proto-urban' sites which have produced large amounts of evidence for industrial activity.

This report, therefore, will examine the role of industry and craft on secular occupation sites. The ability to distinguish between early medieval 'secular' and 'ecclesiastical' sites has, however, become increasingly blurred as a result of the excavation boom of the early 2000s. The discovery of numerous 'cemetery-settlements'/settlement-cemeteries/ 'secular-cemeteries' (e.g. Johnstown, Co. Meath (Clarke & Carlin 2008) or Raystown, Co. Meath (Seaver 2010)) during roadworks in the first decade of the twenty-first century make it very difficult to distinguish between a site which is solely 'secular' and one which is solely 'religious' in nature. While Conleth Manning's excavations at Moyne, Co. Mayo (1987) and Killedderdadrum, Co. Tipperary (1984) argued that certain ecclesiastical sites may have originated as secular enclosures, this was partially based on the development of graveyards at these sites. It is now increasingly clear that a formal burial ground at an early medieval site does not necessarily constitute a change in function to a church site, nor can it be taken to imply the presence of a church on site. Rather, it seems that burial beside and alongside the living was a regular practice through much of Ireland until at least the eighth or ninth century. The industrial activity and associated finds from obviously ecclesiastical sites such as Armagh, Clonmacnoise or Reask have not been discussed here, however, similar activity from the pre-ecclesiastical phases on possible church sites, such as Dunmisk, Co. Tyrone (Ivens 1989) or Kilgobbin, Co Dublin (Bolger 2008) have been included. Similarly the findings from 'settlement-cemetery' sites have been included, but, where possible, these have been restricted to occupation evidence and have not included grave-goods associated with burials.

After eight or nine decades of systematic archaeology in Ireland, there are noticeable changes in the way in which craft-working and small finds have been recorded. Early excavation reports, such as those by S. P. Ó Ríordáin of University College Cork, or H. O'N. Hencken of the Harvard Archaeological Mission, tended to focus heavily on the finds recovered from site. This artefact-heavy approach was a product of the contemporary archaeological tradition, which was dominated by typologies. By identifying specific artefacts to a sub-type level, it was possible to work out relative, or even absolute, chronologies for these various sites.

The development of radiocarbon dating, however, shifted the focus away from artefacts to ecofacts and other material which could be sampled for the dating process. Archaeology in Ireland had also shifted away from the multi-season excavation on a headline site, towards an attempt to understand the wider archaeological landscape. This led to attempts to create settlement models, by examining the locations of sites in relation to the local topography and to each other, and also was associated with palaeoecological studies which tried to understand the ancient environment and climate. A mixture of preservation issues and the generally aceramic nature of the larger part of the island meant that such studies could add

value to excavation reports far beyond that available from the description of yet another blue-glass bead or corroded knife blade. As a result of this change in focus, artefact studies (and the concomitant study of craft and industry) became increasingly marginalised in report publications. Where once papers have consisted largely of descriptions of finds (for example over 60% of Ó Ríordáin's paper on the Lough Gur excavations dealt with the finds (1948-50)), the appendices now were filled with animal bone reports, human bone reports and radiocarbon dates.

The sheer volume of material produced from the National Roads Authority excavations, however, meant that artefact studies became both increasingly viable and necessary. Many of these specialists were employees of the excavating company, and thus their reports were limited in scale and scope to those sites excavated by that specific company. Others were external experts recruited for a specific contract, who may have had no previous experience of Irish archaeological material. These factors mean that there is a danger that certain regional patterns may be the product of the preferences, experiences or expectations of the post-excavation process, rather than reflecting any 'actual' pattern. One of the clearest examples of this possible bias is the identification of isolated early medieval charcoal production pits in Co. Meath along the route of the M3 (e.g. Kenny 2010). This cluster should not be taken to imply that this area held a virtual monopoly over charcoal production, but rather that the post-excavation team interpreted the data in such a manner.

Another clear example of the issues met when dealing with specialist reports produced over a long period of time is the problem with the identification of perforated stone discs as loom-weights or spindle-whorls. Although both objects are associated with the working of cloth, they come from different ends of the process, with spindle-whorls associated with yarn production, and loom-weights associated with turning the yarn into cloth. While small discs are generally interpreted as spindle-whorls and large ones as loom-weights, it is clearly possible that large spindle-whorls and small loom-weights may have existed.

Report Overview

This report consists of two major sections:-

- (1) A discussion of craft-working and insights into the production of personal, domestic and industrial artefacts; and
- (2) A gazetteer of over 300 sites outlining the evidence for industrial activity on these sites.

The discussion chapters deal with the prevalence of industry and craft-working across the island in a synthetic manner. These examine both broad themes and general trends in industrial activity. While it was possible to look at the geographic spread of sites (distribution maps were produced for the various examined industrial types, such as iron-working or pottery-making), it was not deemed possible to cross-examine this data on a chronological basis. Although large numbers of radiocarbon dates have been produced from the charcoal associated with iron-working, these tend to produce a rather broad, and thus undiagnostic, dating spread. Very few dates or dateable material have been produced for the other craft-making industries.

The gazetteer incorporates two major tables – one looking at the evidence for industrial activity, and the other listing the small finds recovered from the site. While certain aspects of industrial activity, such as metal smelting or ore processing, leave obvious physical remains which may be identified archaeologically, other processes are far more impermanent in their nature. These may, however, be identified by the presence of certain craft-specific tools or other objects within the small finds. The most obvious of these is cloth-working which may be identified by iron shears (for clipping sheep or goats to produce the woollen fibre), spindle-whorls (for turning the wool into yarn) and loom-weights (for turning the yarn into cloth). As such the table on industrial activity is sub-divided into columns for 'Direct' evidence (such as iron slag) and 'Indirect' evidence (such as spindle-whorls).

A column is also included for dating evidence. The radiocarbon-dated evidence largely comes from charcoal residue within furnaces, but there are also certain objects which have been dated based on their typology. Radiocarbon dates have been calibrated to 2σ under IntCal09 using Calib611, and results of above 85% probability have been highlighted in bold.

It was possible to compare the prevalence of industrial activity on various site types. While it is generally quite obvious what constitutes a 'crannog', 'rath' or a 'cashel', there are a large number of less clearly defined site types, specifically the 'settlement-cemetery' or 'non-circular enclosure' (*sensu* Kinsella 2010). 'Settlement-cemeteries' and 'non-circular enclosures' share similar characteristics and have been clustered together when producing the statistics. It is also clear that some sites are rather mutable and may actually be described as different site types throughout their occupation history, for example the change of a 'rath' to a 'raised rath'. There also exist a large number of sites which have been clustered as 'other', including cave sites, isolated house sites, and sand-dune sites. The statistics based on the various site types should thus be seen more as a general trend rather than a definitive statement.

Examining the prevalence of activity simply by listing the numbers of various site types may lead to rather skewed results. Fig. 1.1, for example, shows the percentages of site types on which iron working was found against the total numbers of sites included in the gazetteer. While one third of all iron-working sites are univallate raths, this partially reflects the fact that univallate raths are by far the most numerous early medieval site type excavated. A more useful way of examining the prevalence of a particular industrial activity is to look at what percentage of the various site types had evidence for it. Thus Fig. 1.2 includes the same data as Fig. 1.1, but represented as a percentage of the individual site type. While over 50% of univallate raths show evidence for iron-working, this is no longer the dominant iron-working site type, but rather is part of a general trend that indicates that over 50% of most early medieval site types were involved in iron-working. By applying this method, it is clear that some forms of industrial activity were conducted regularly on all types of sites, regardless of social standing or geographical location (Figs. 1.2-1.4; Maps 1.1-1.3).

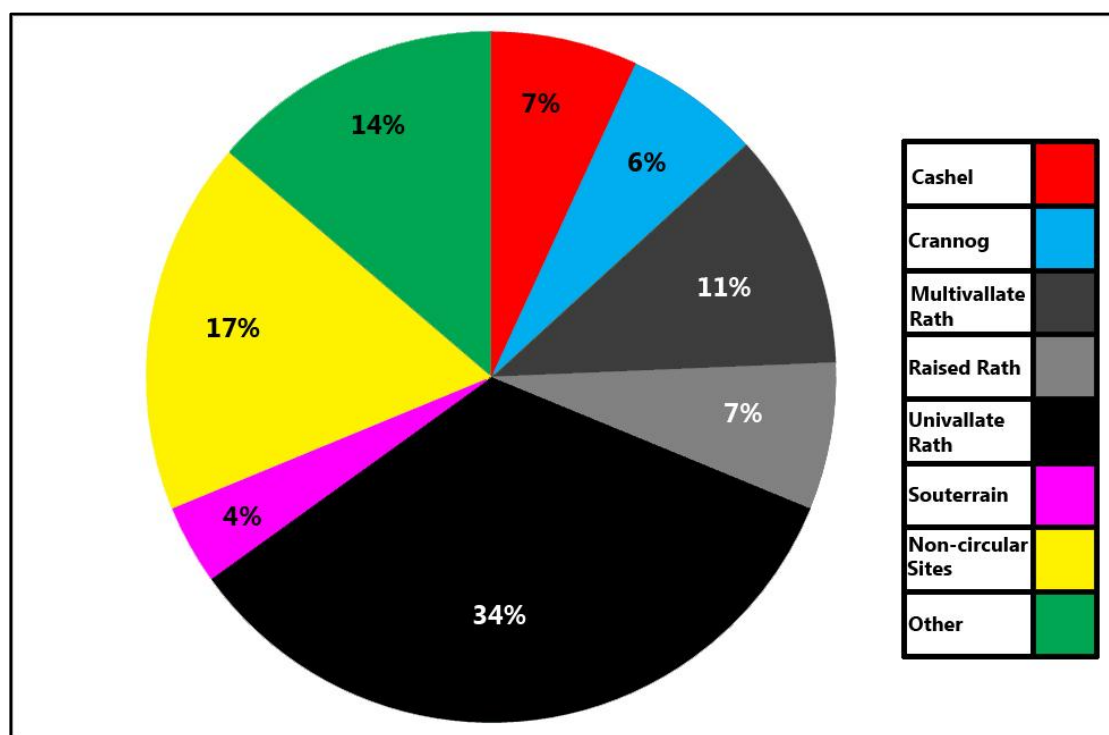


Fig. 1.1: Percentages of sites in gazetteer with evidence for iron-working.

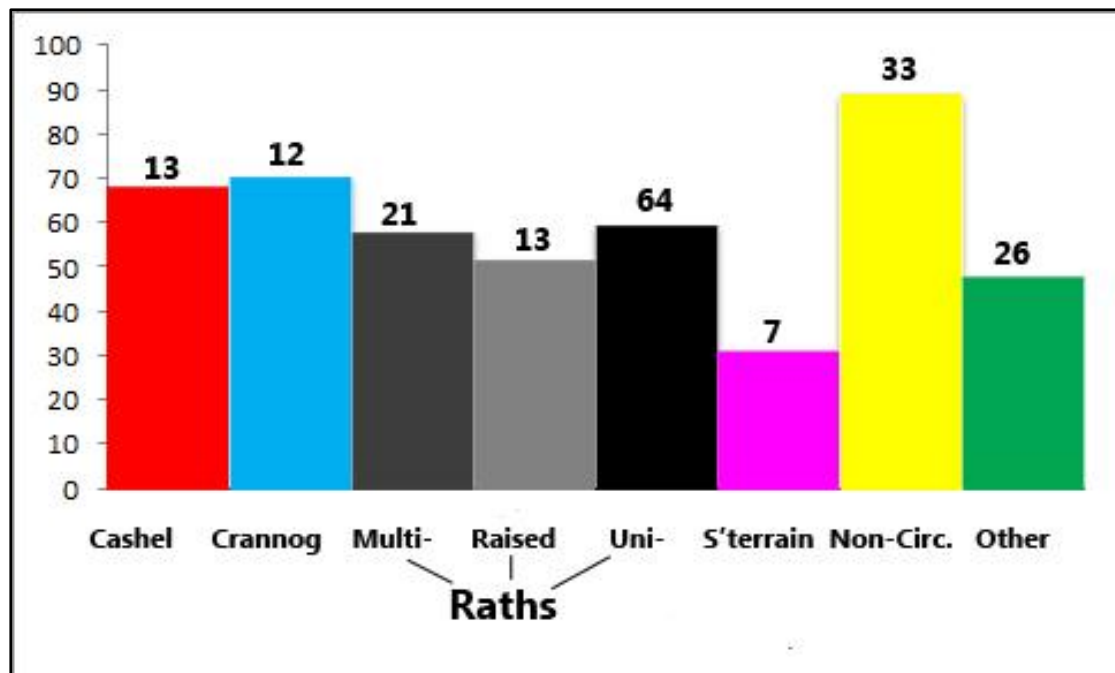


Fig. 1.2: Percentages of site types in gazetteer with evidence for iron-working (figures above columns indicate the number of sites in gazetteer)

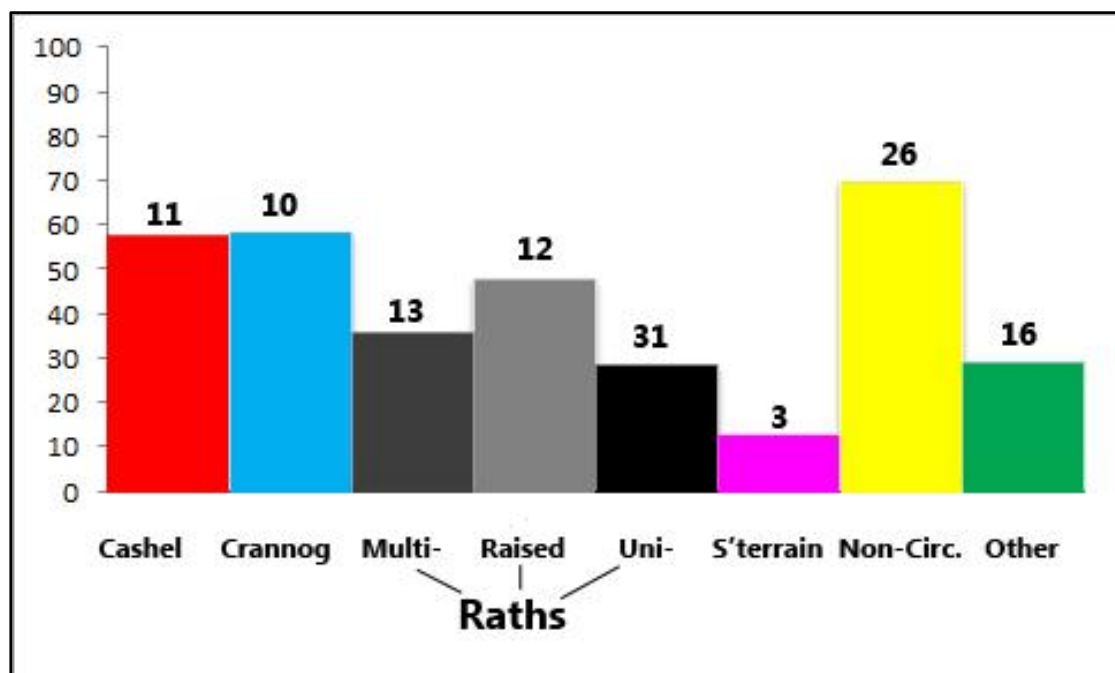


Fig. 1.3: Percentages of site types in gazetteer with evidence for cloth-working (figures above columns indicate the number of sites in gazetteer)

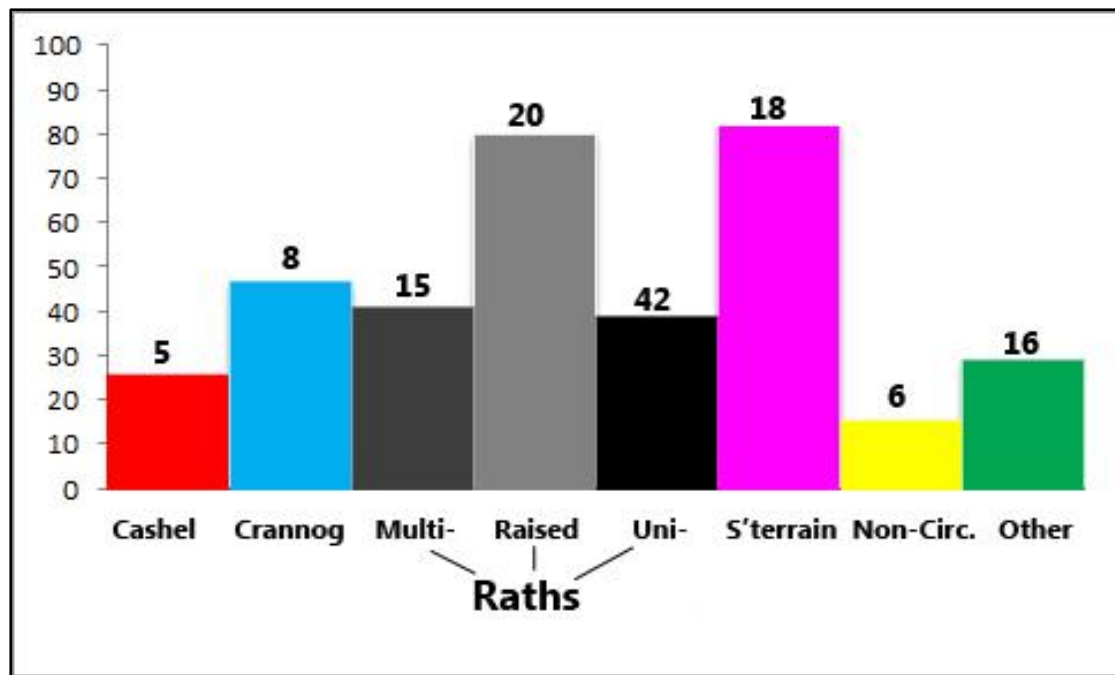
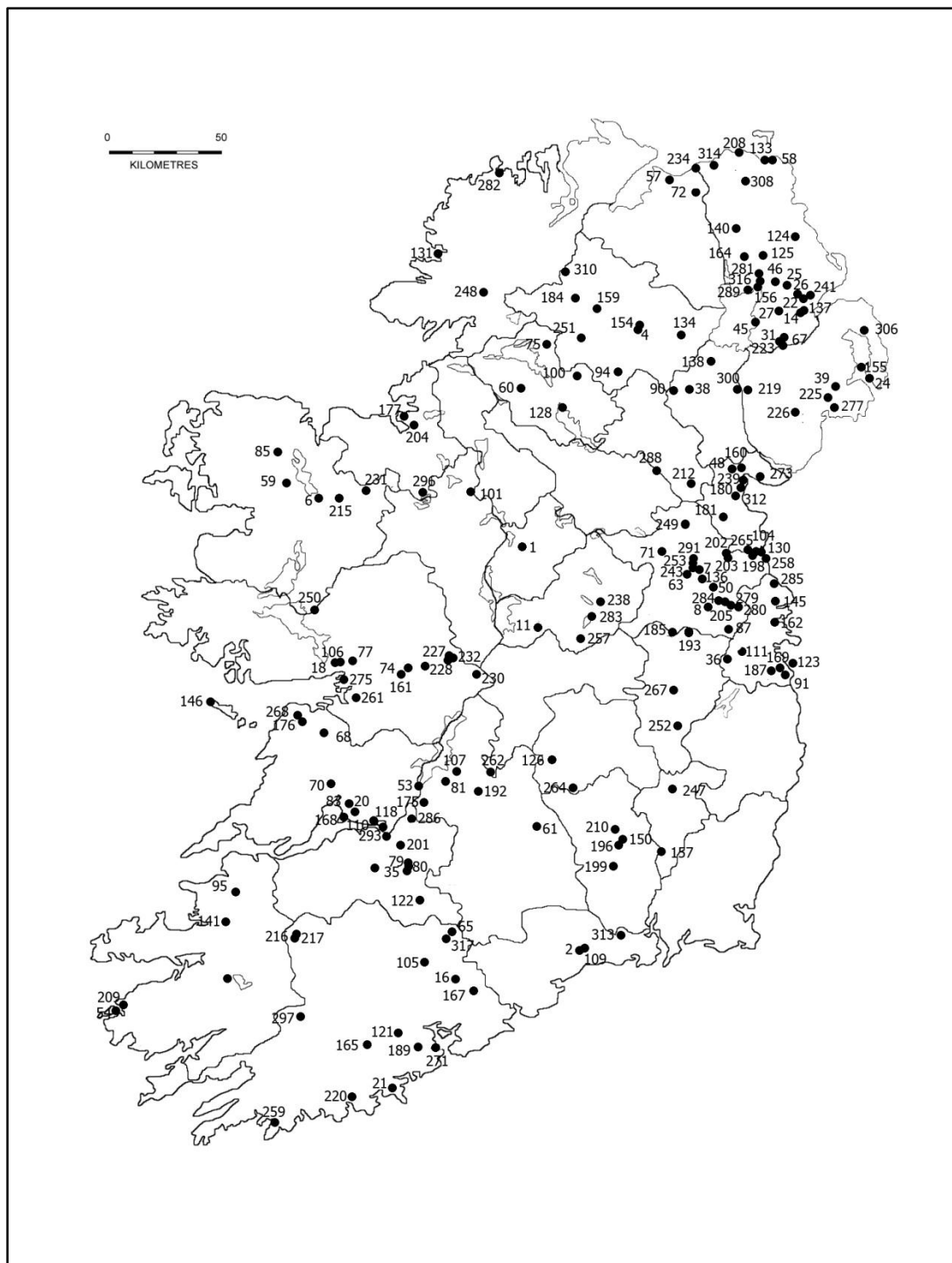


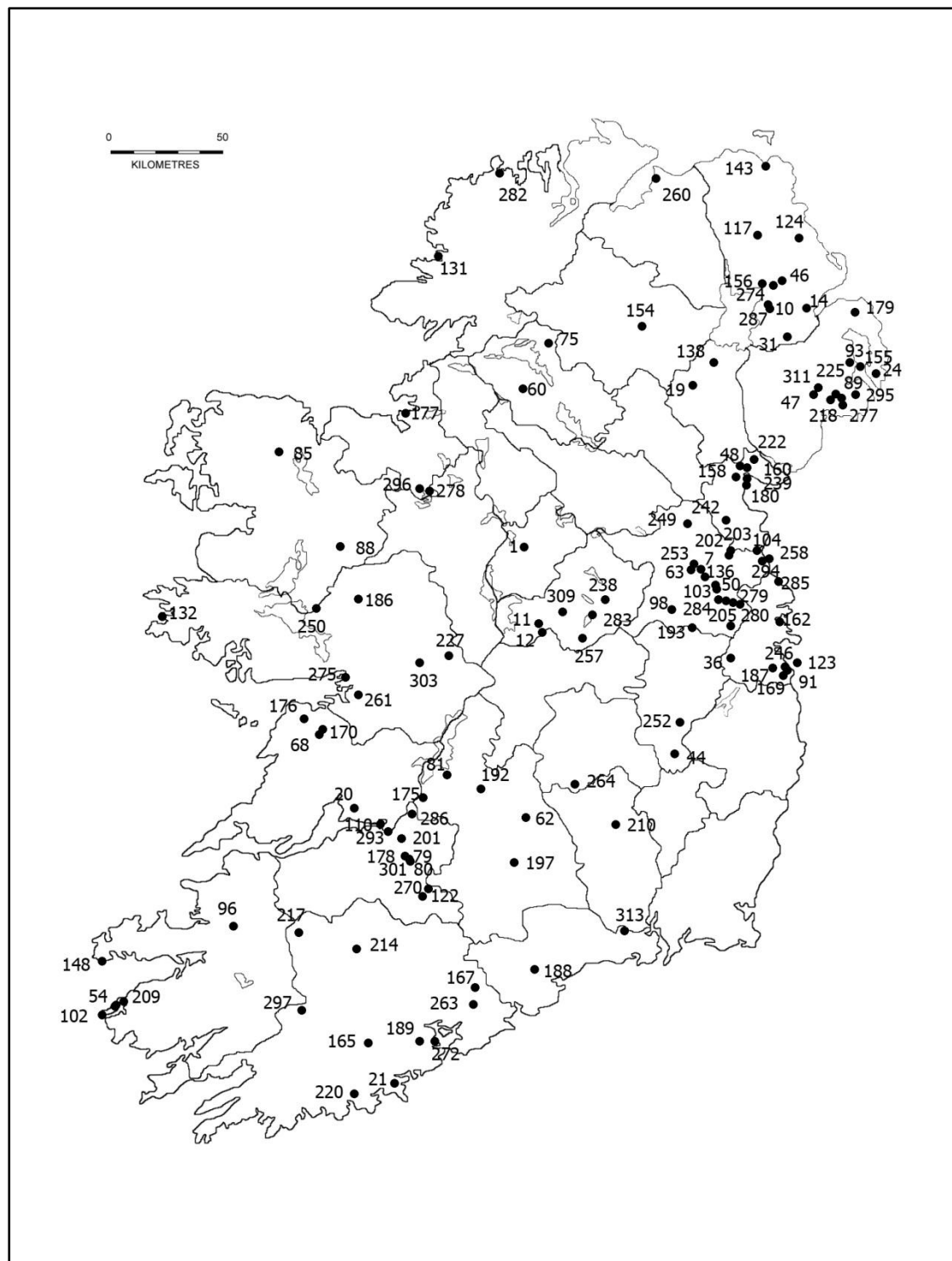
Fig. 1.4: Percentages of site types in gazetteer with evidence for pottery-working (figures above columns indicate the number of sites in gazetteer)

It is also clear that, taking into account preservation bias on crannogs, certain craft activities were carried out on a small number of sites, but still without any apparent preference for social class (Figs. 1.5-1.7; Maps 1.4-1.6).

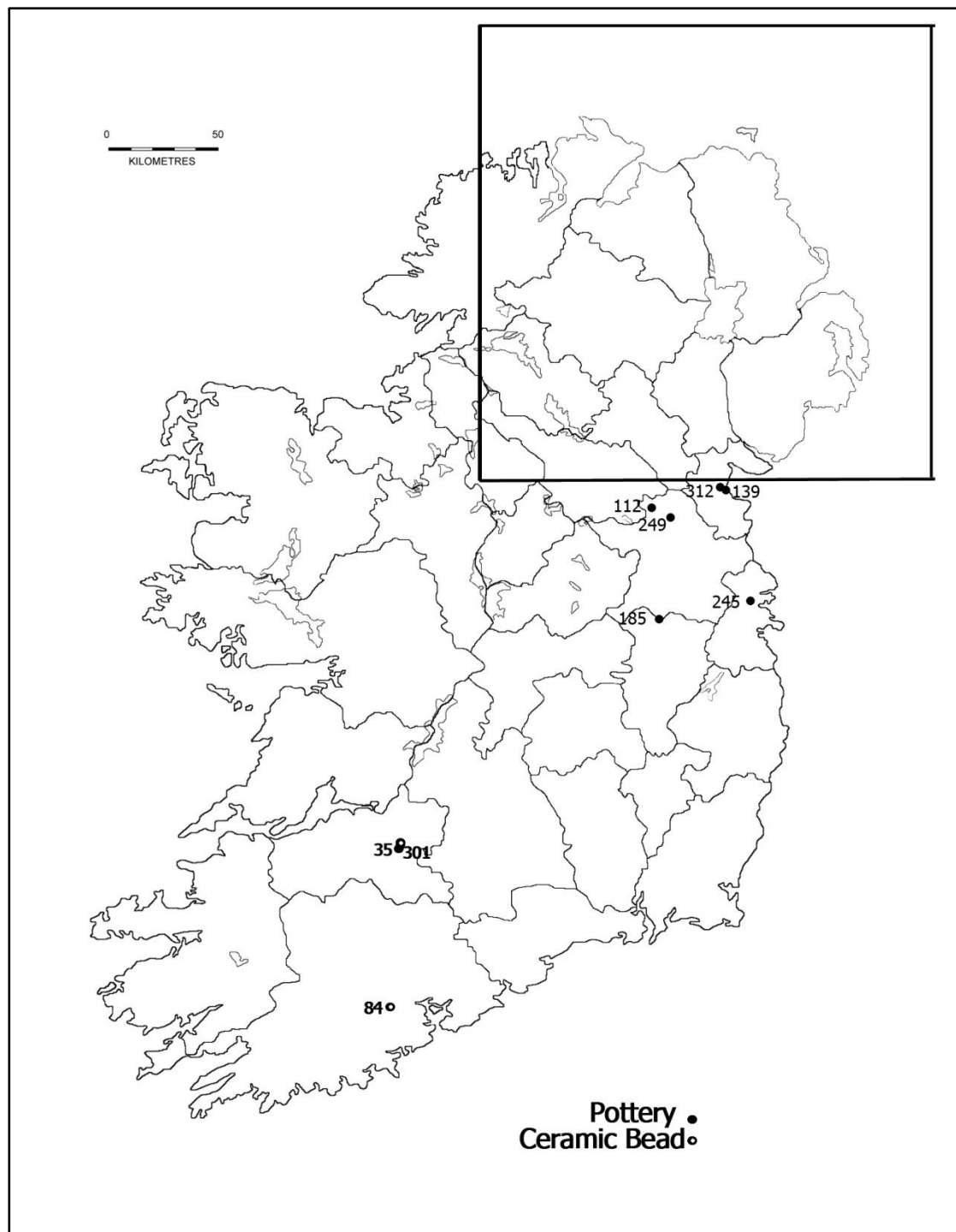
Certain site types, however, appear to be more strongly associated with certain industrial practices than others. A high percentage of the crannogs included in this report, for example, show evidence for perceived 'high status' industrial activity, such as non-ferrous metal-working and glass working (Figs. 1.8-1.9; Maps 1.7-1.8). It is equally clear that a tiny percentage of the perceived high status multivallate sites showed evidence for bone-working, an occupation associated in the Early Irish Laws with one of the lowest ranked individuals (Kelly 1988, 61-63) (Figs. 1.10-1.11; Maps 1.9-1.10).



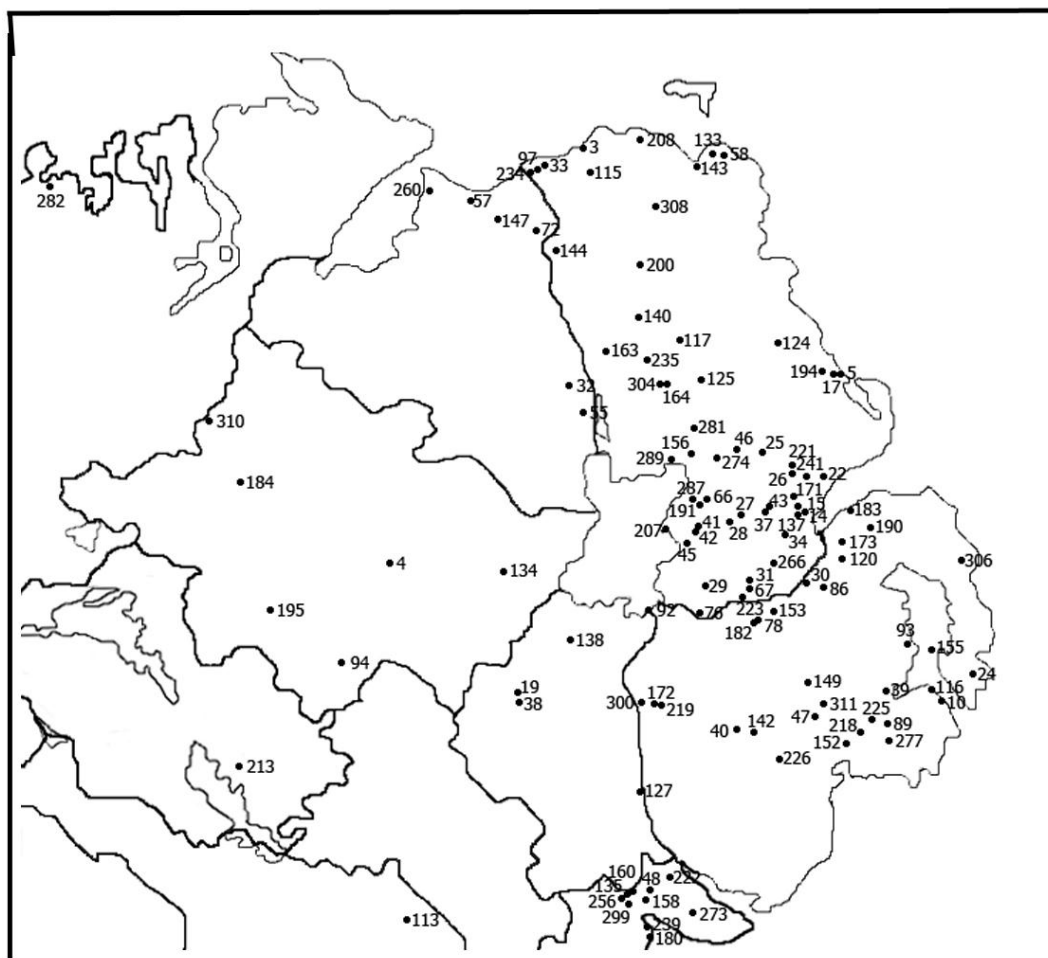
Map 1.1: Map of site that produced evidence for iron-working (numbers relate to gazetteer entry)



Map 1.2: Map of site that produced evidence for cloth-working (numbers relate to gazetteer entry)



Map 1.3a: Map of site that produced evidence for pottery-working (numbers relate to gazetteer entry). See Map 1.3b for inset.



Map 1.3b: Map of site that produced evidence for pottery-working (numbers relate to gazetteer entry)

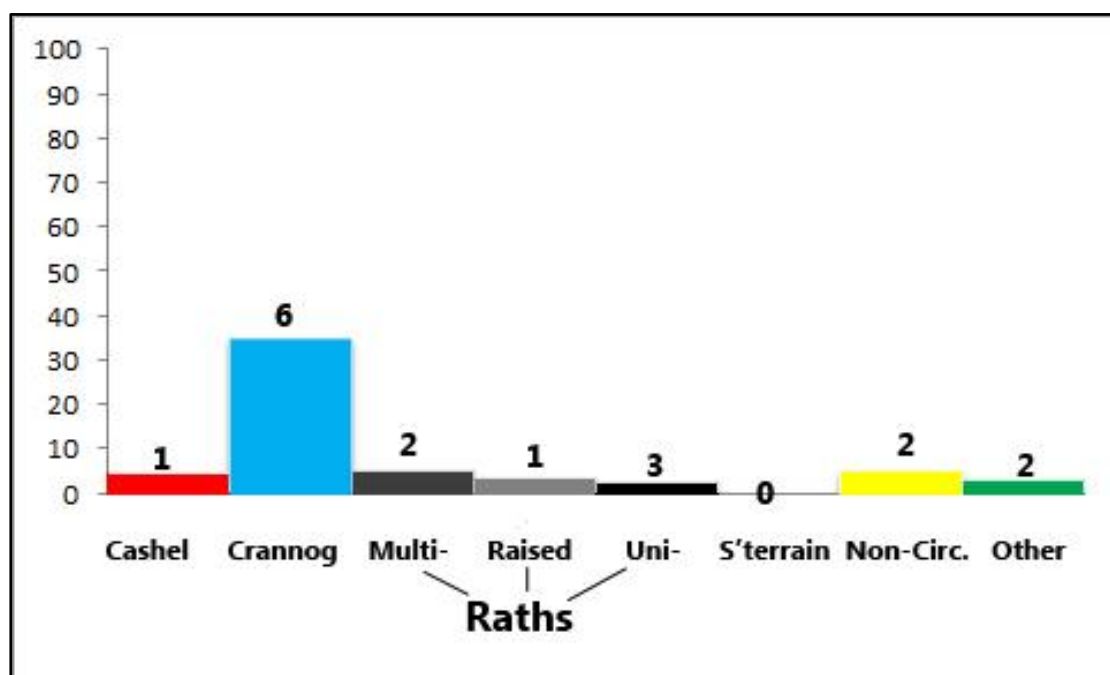


Fig. 1.5: Percentages of site types in gazetteer with evidence for leather-working (figures above columns indicate the number of sites in gazetteer)

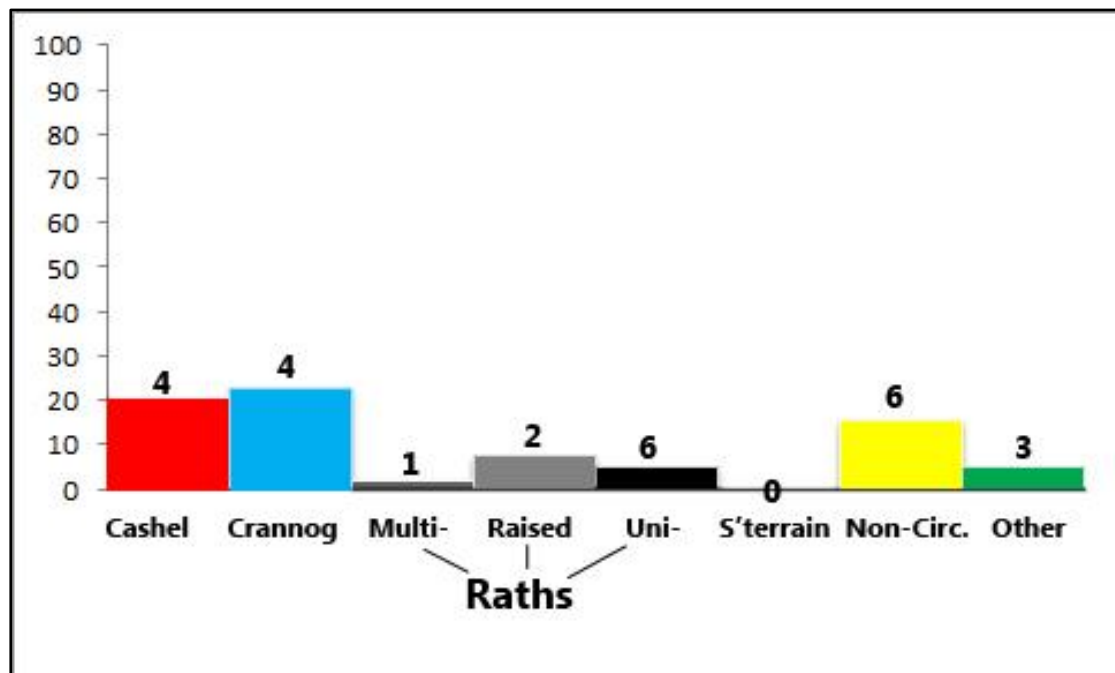


Fig. 1.6: Percentages of site types in gazetteer with evidence for wood-working (figures above columns indicate the number of sites in gazetteer)

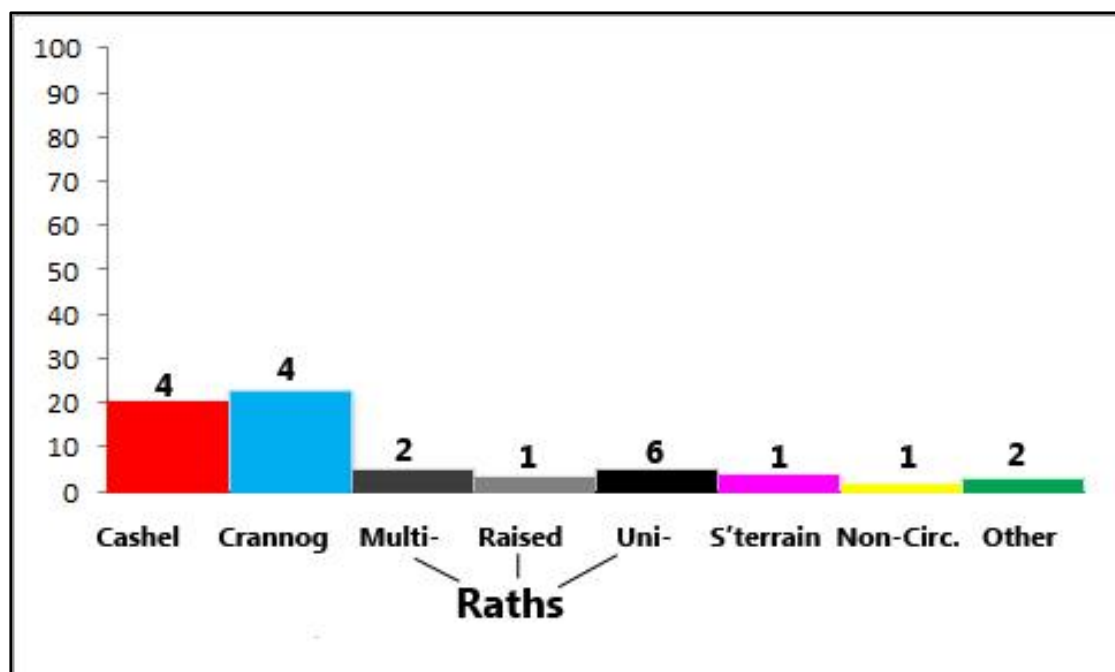
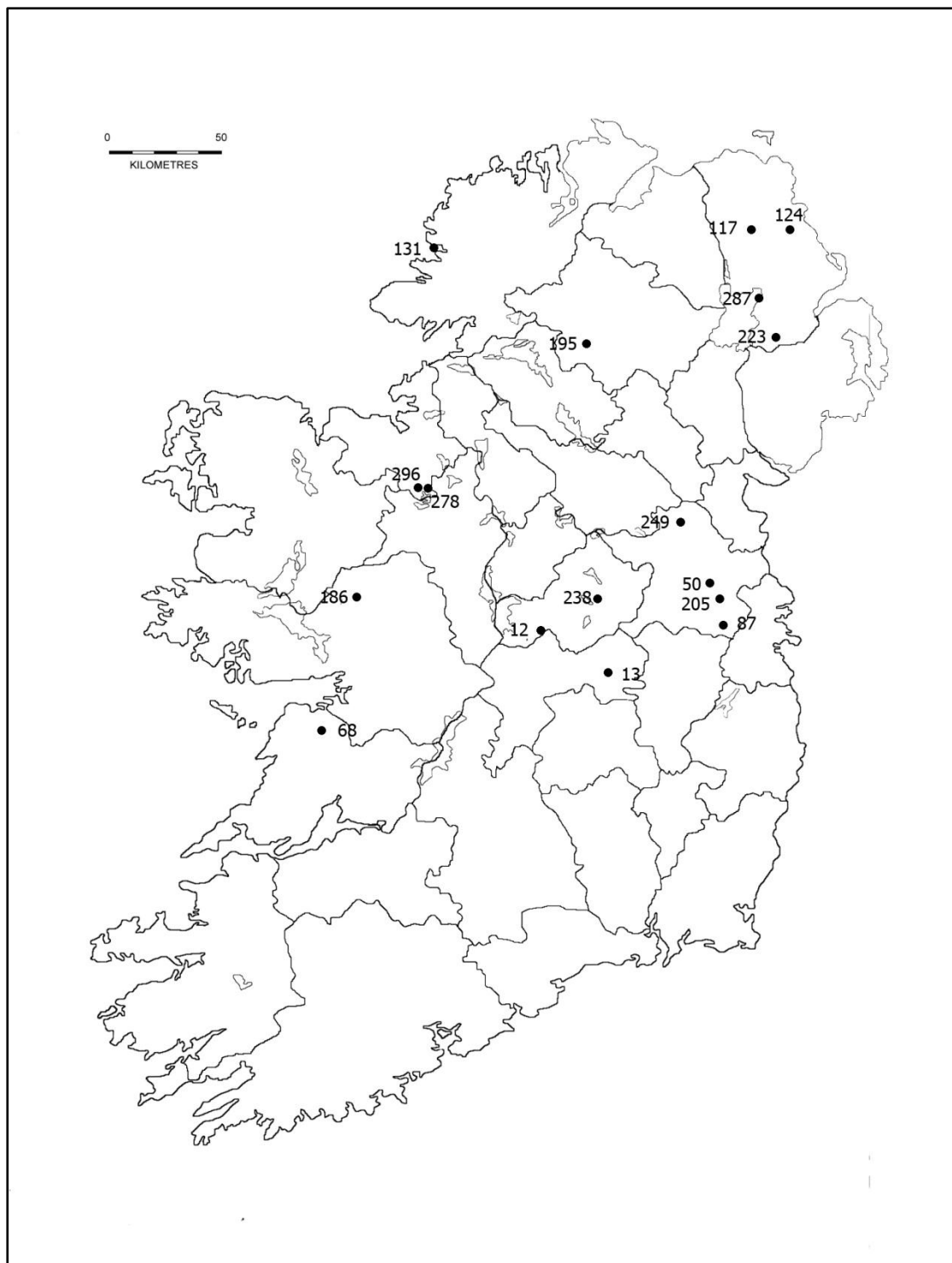
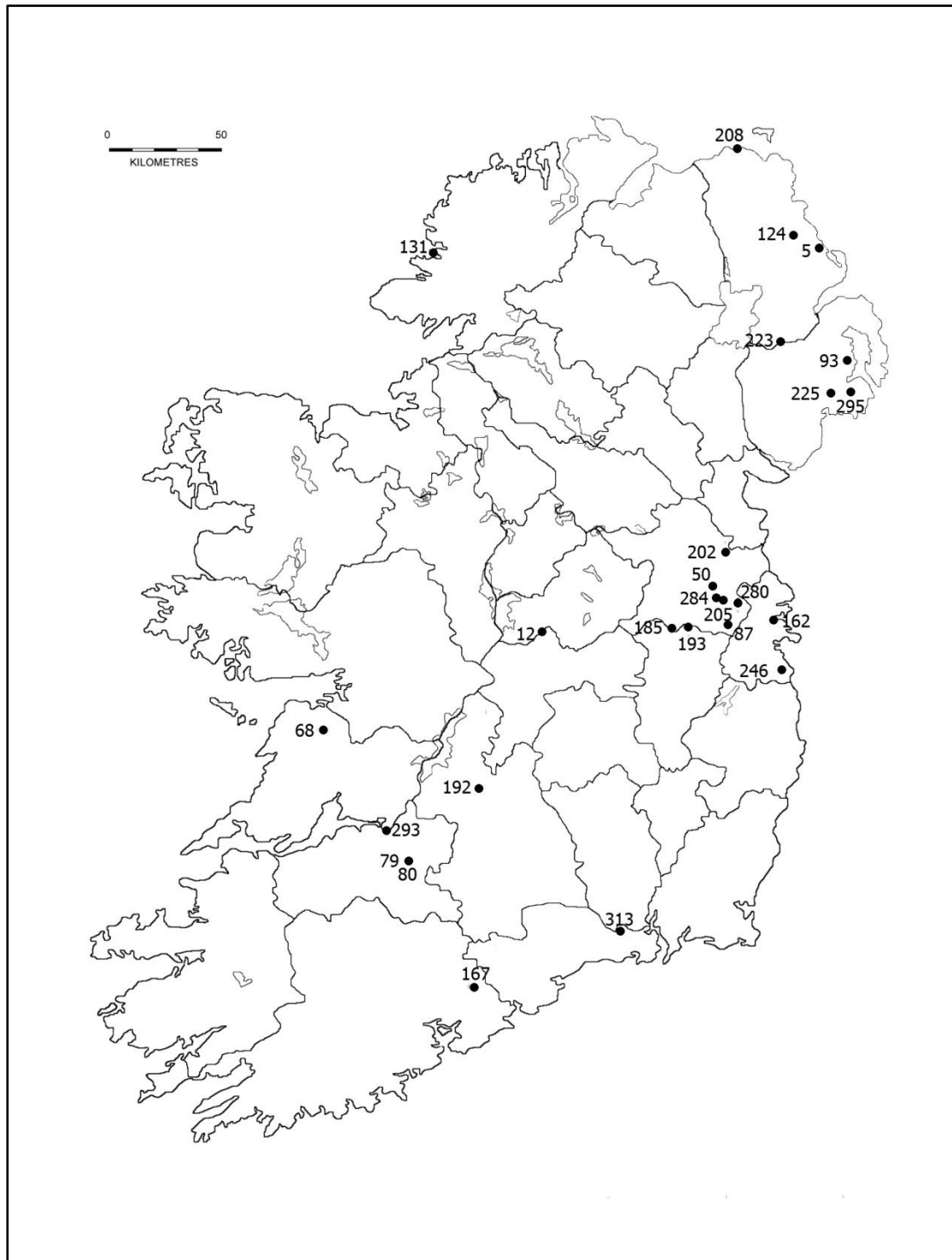


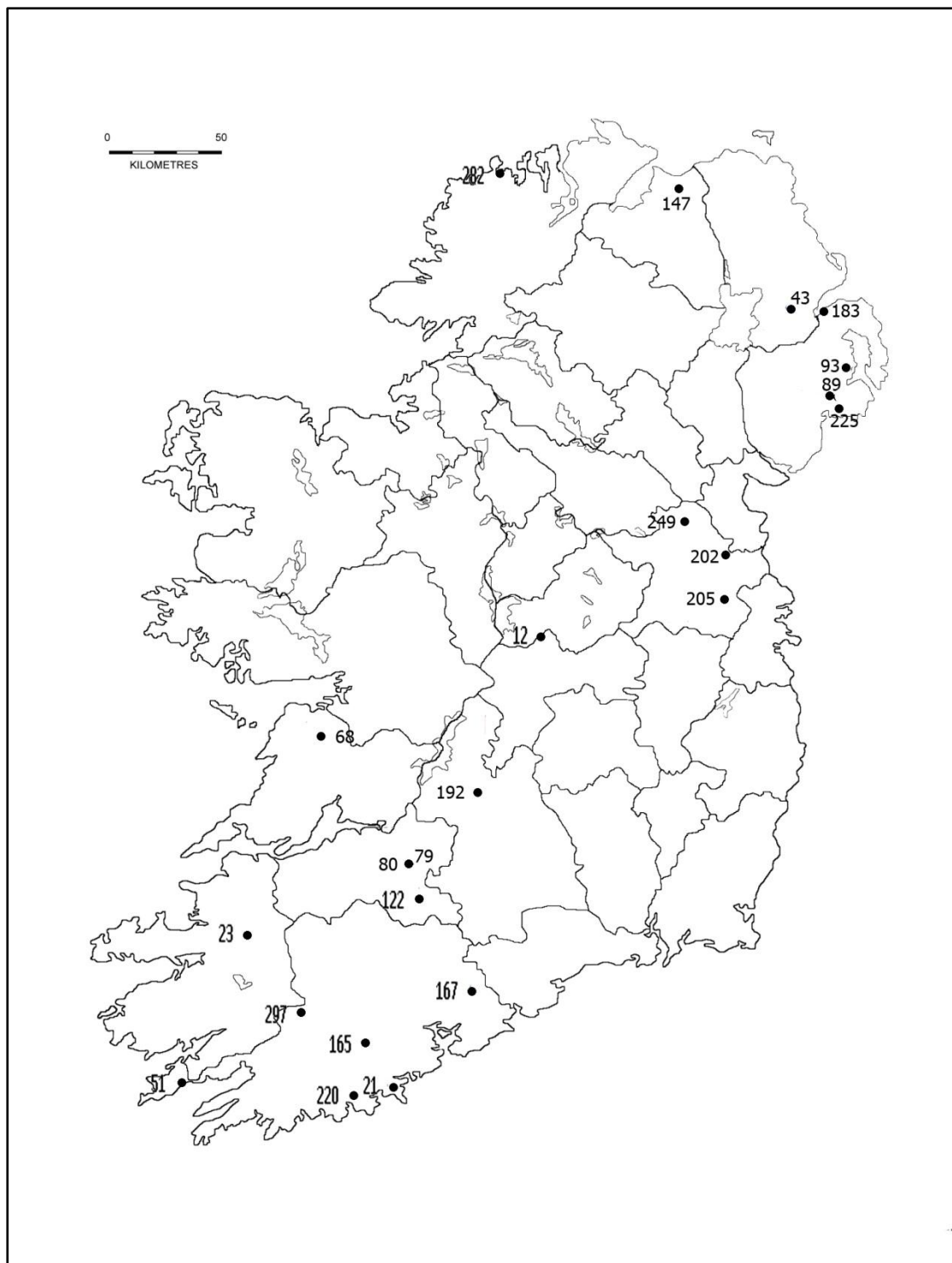
Fig. 1.7: Percentages of site types in gazetteer with evidence for stone-working (figures above columns indicate the number of sites in gazetteer)



Map 1.4: Map of site that produced evidence for leather-working (numbers relate to gazetteer entry)



Map 1.5: Map of site that produced evidence for wood-working (numbers relate to gazetteer entry)



Map 1.6: Map of site that produced evidence for stone-working (numbers relate to gazetteer entry)

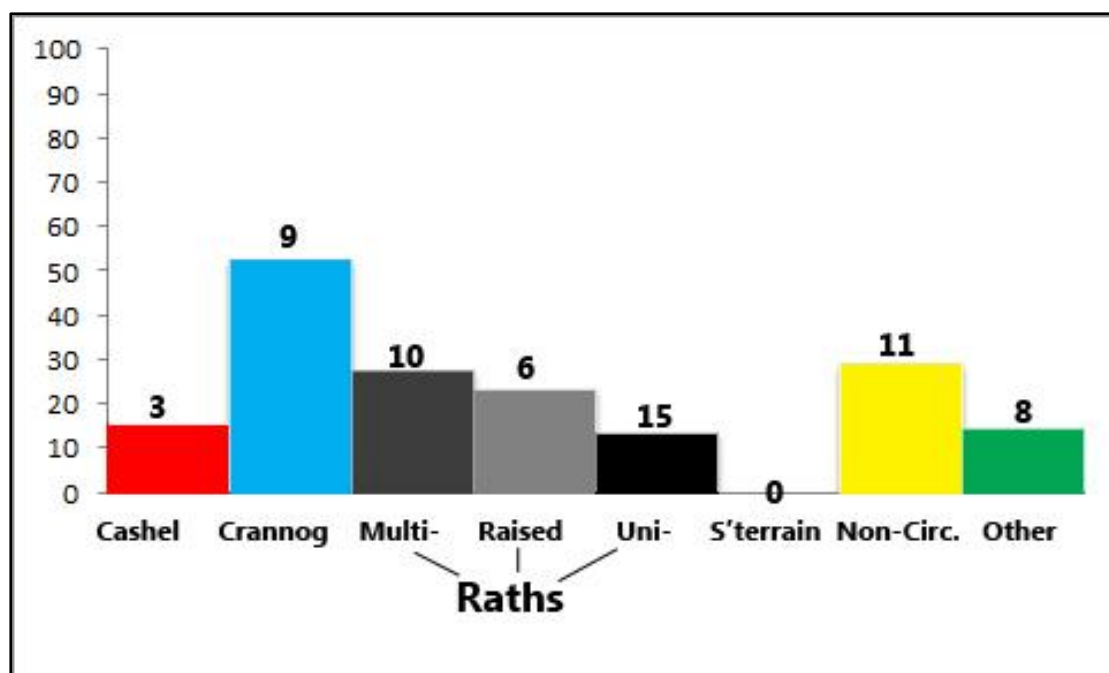


Fig. 1.8: Percentages of site types in gazetteer with evidence for bronze-working (figures above columns indicate the number of sites in gazetteer)

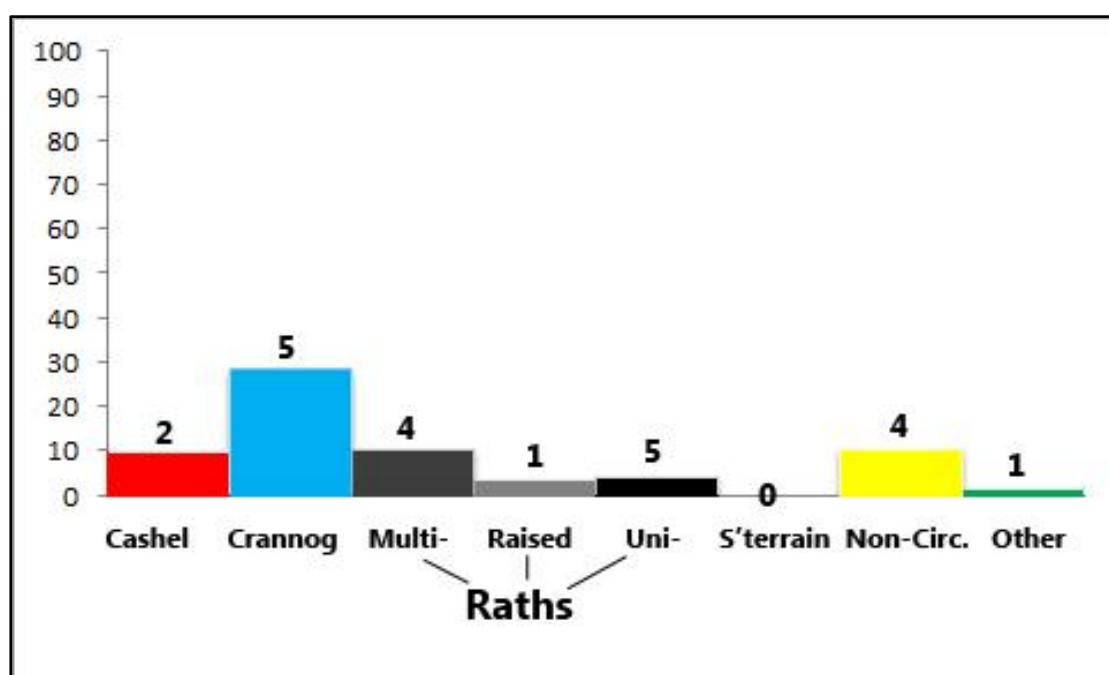
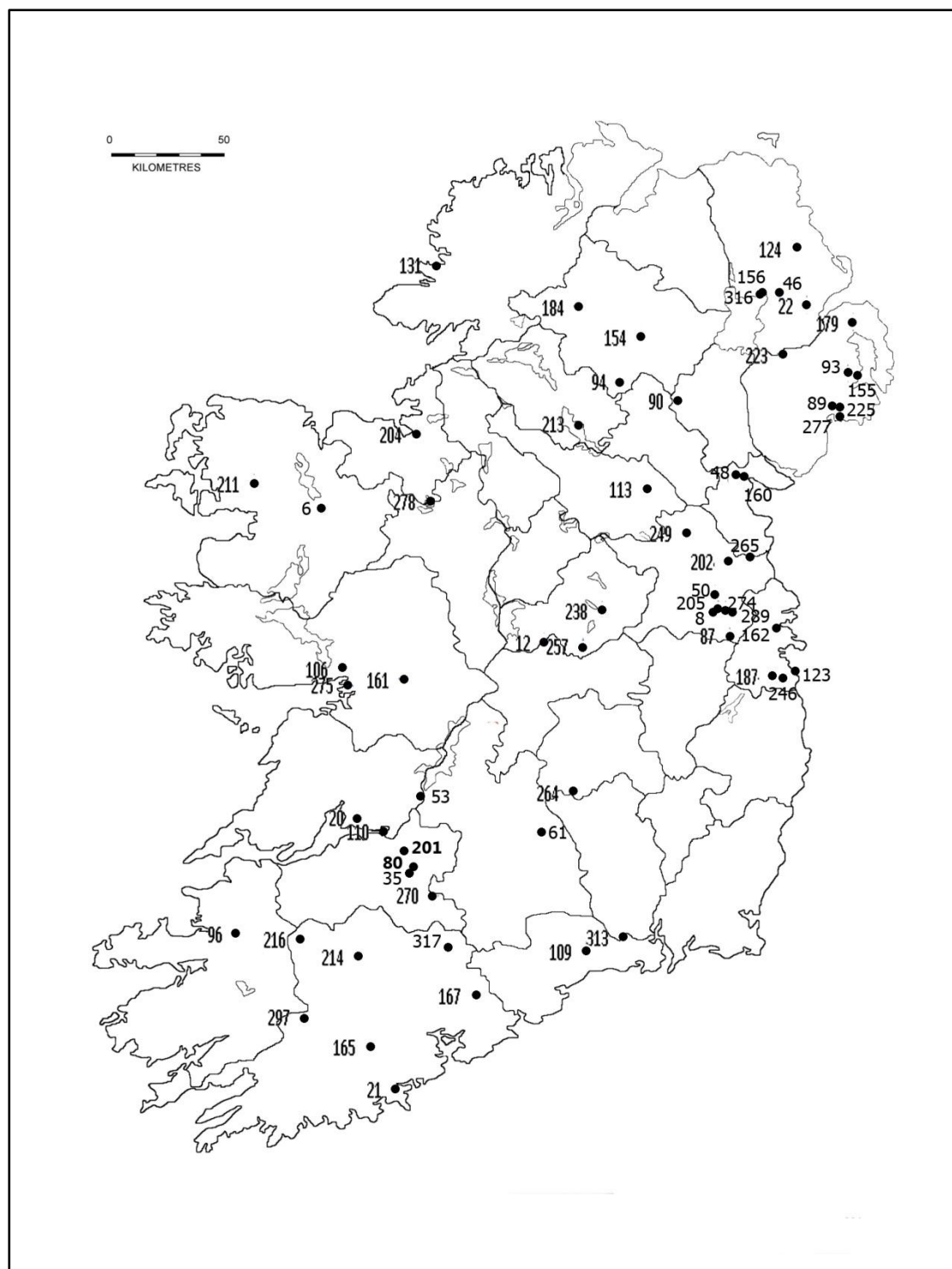
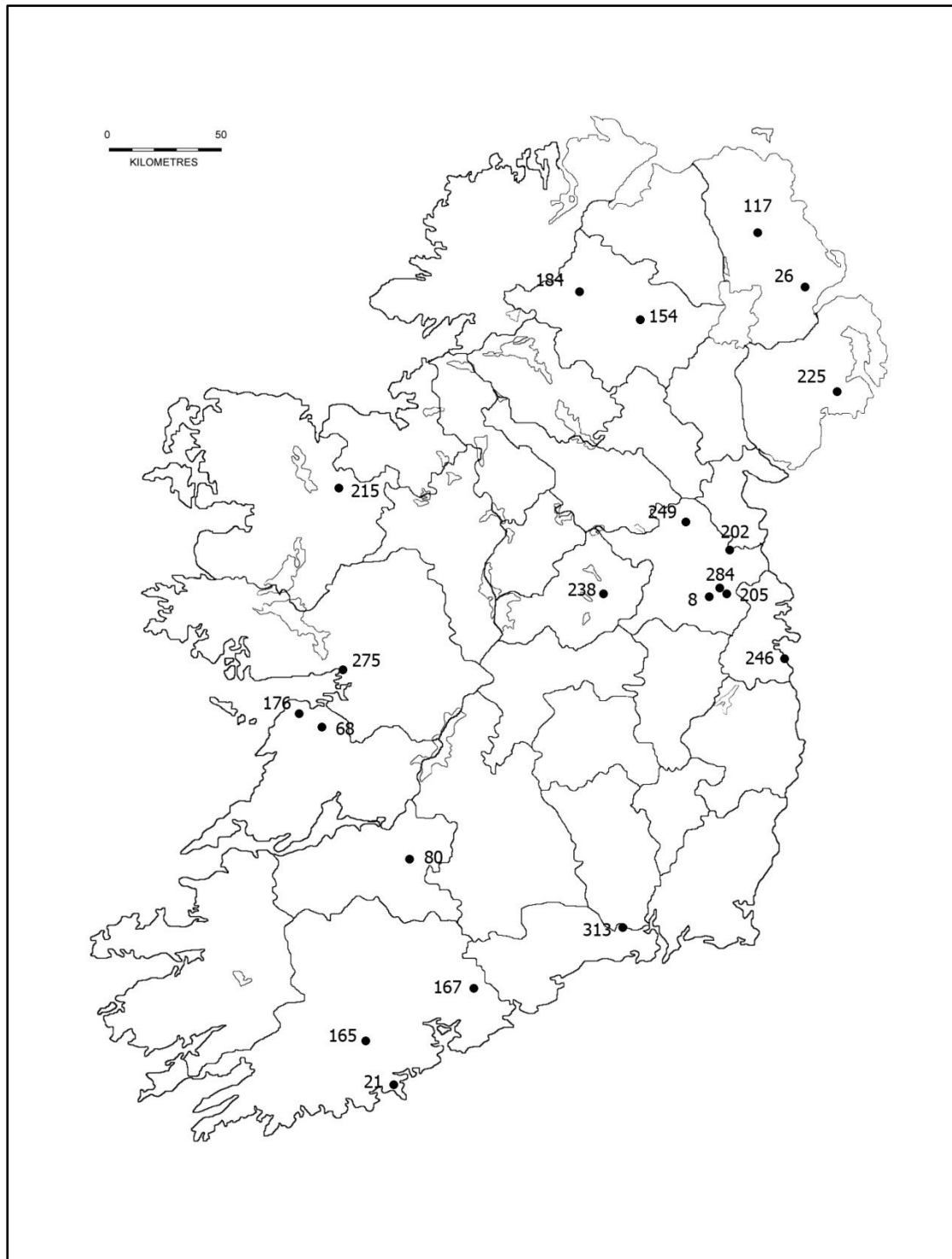


Fig. 1.9: Percentages of site types in gazetteer with evidence for glass-working (figures above columns indicate the number of sites in gazetteer)



Map 1.7: Map of site that produced evidence for bronze-working (numbers relate to gazetteer entry)



Map 1.8: Map of site that produced evidence for glass-working (numbers relate to gazetteer entry)

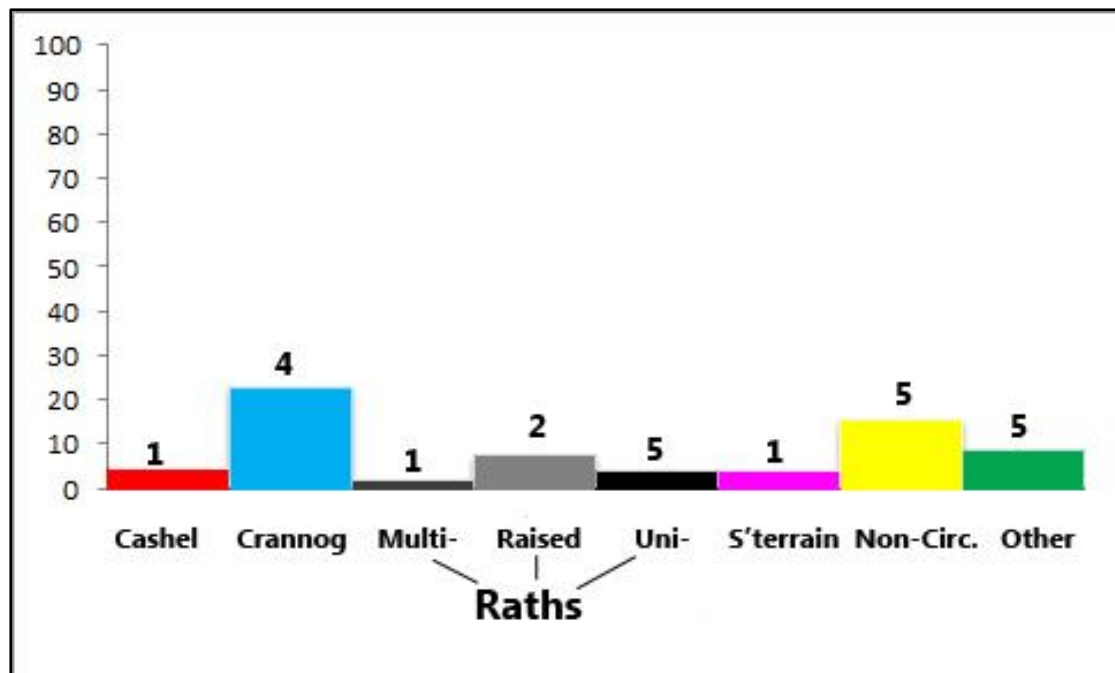


Fig. 1.10: Percentages of site types in gazetteer with evidence for antler-working (figures above columns indicate the number of sites in gazetteer)

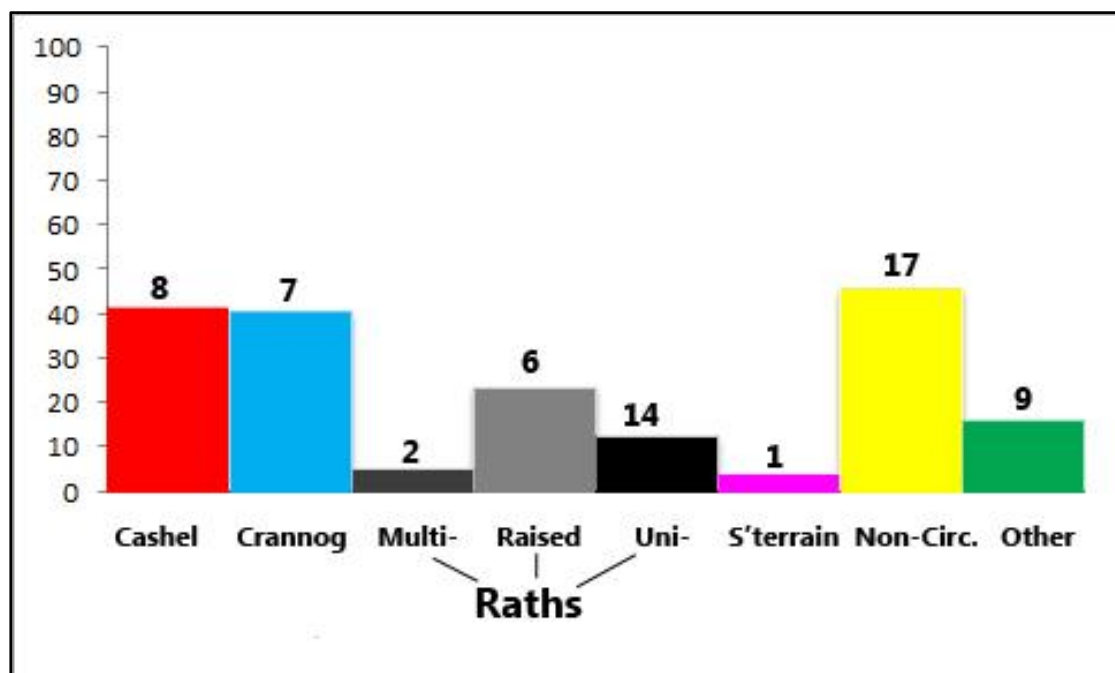
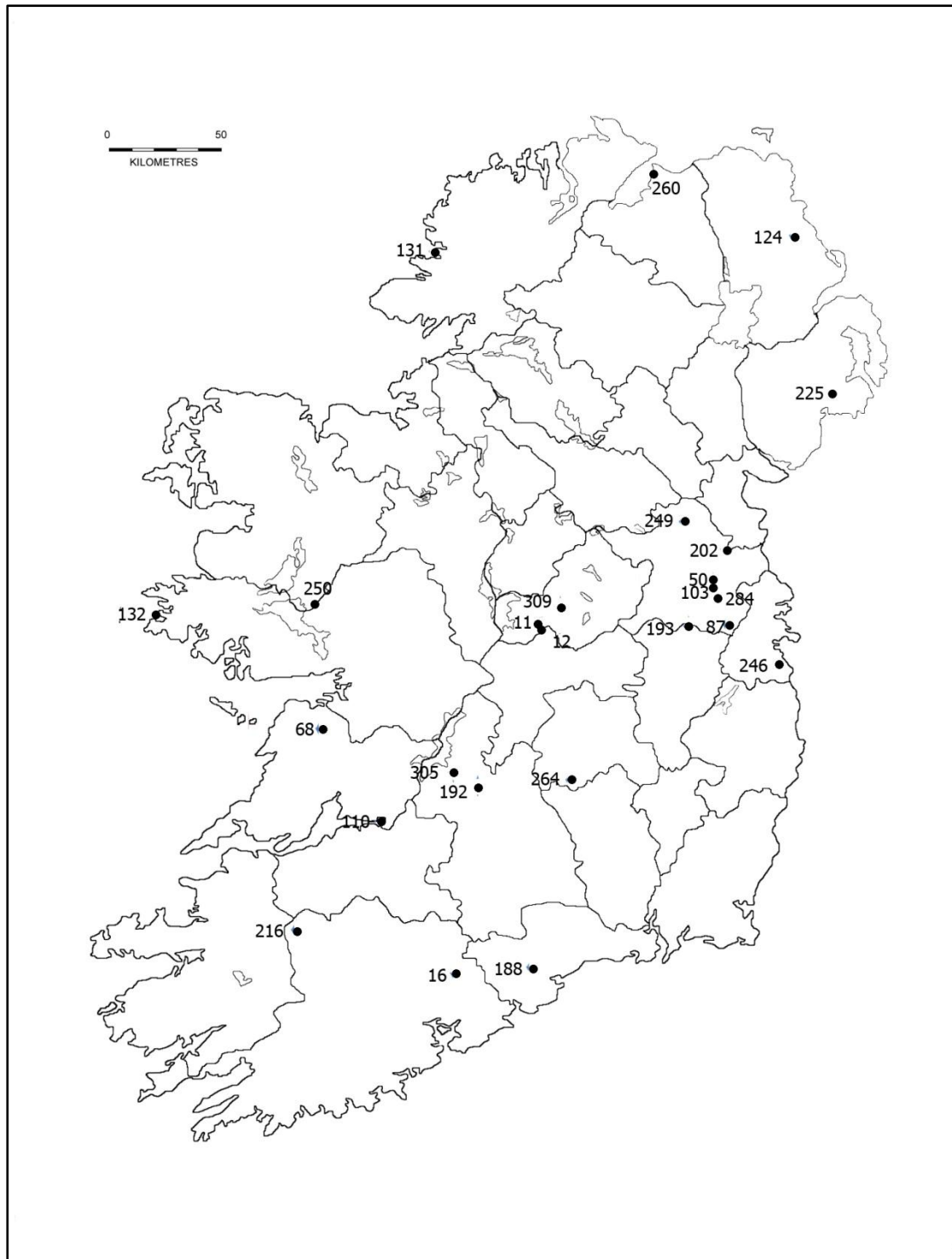
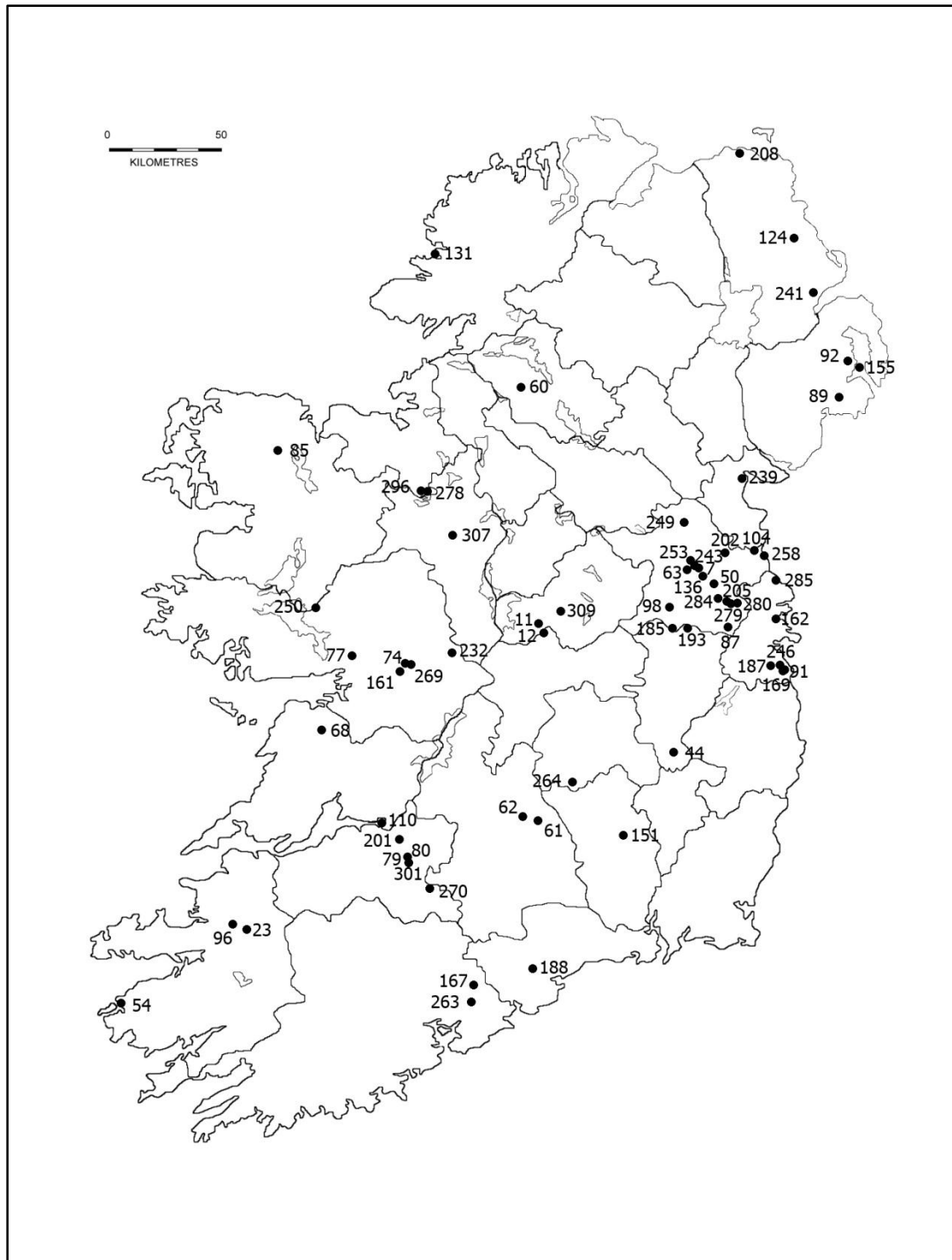


Fig. 1.11: Percentages of site types in gazetteer with evidence for bone-working (figures above columns indicate the number of sites in gazetteer)

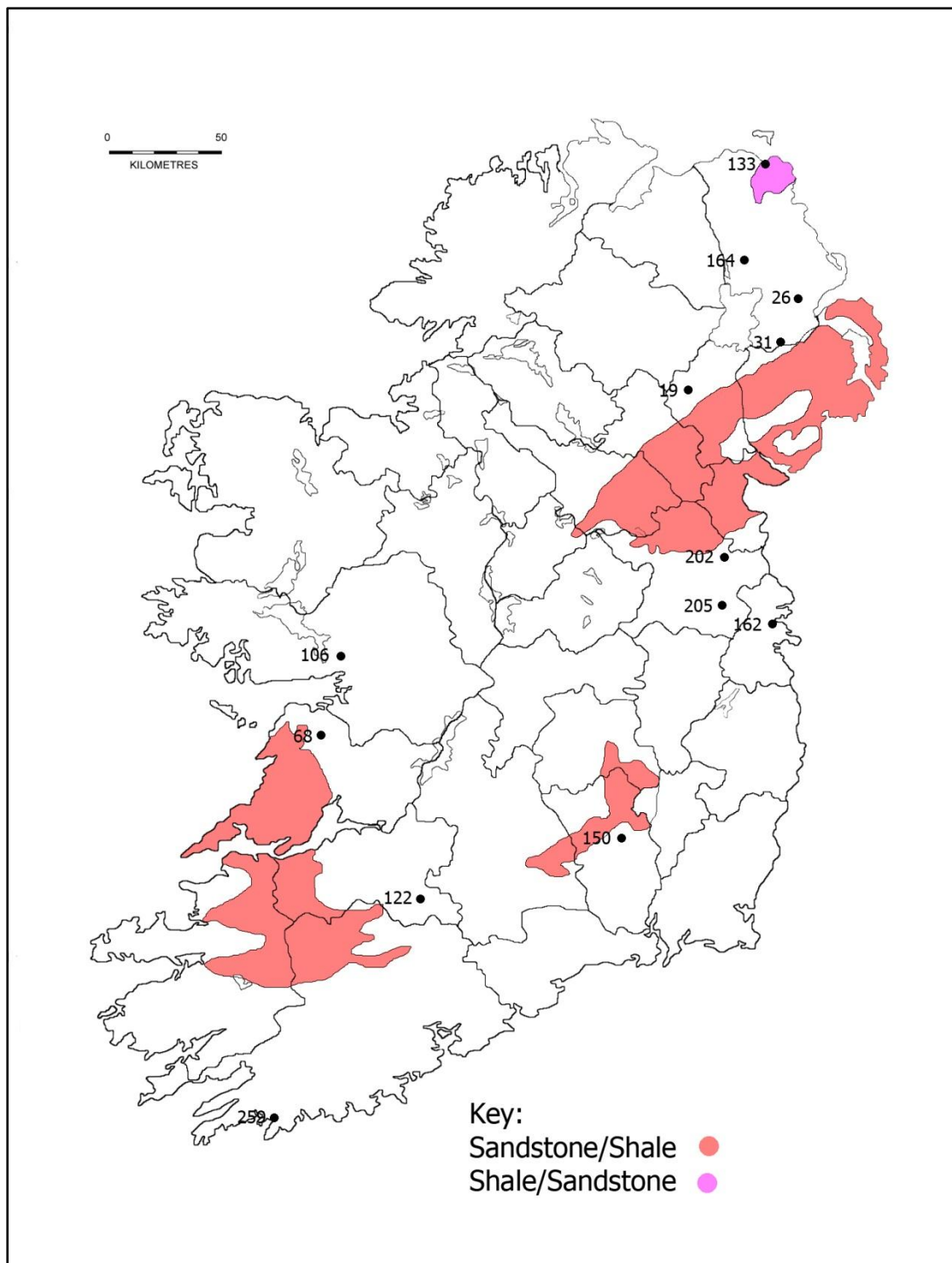


Map 1.9: Map of site that produced evidence for antler-working (numbers relate to gazetteer entry)

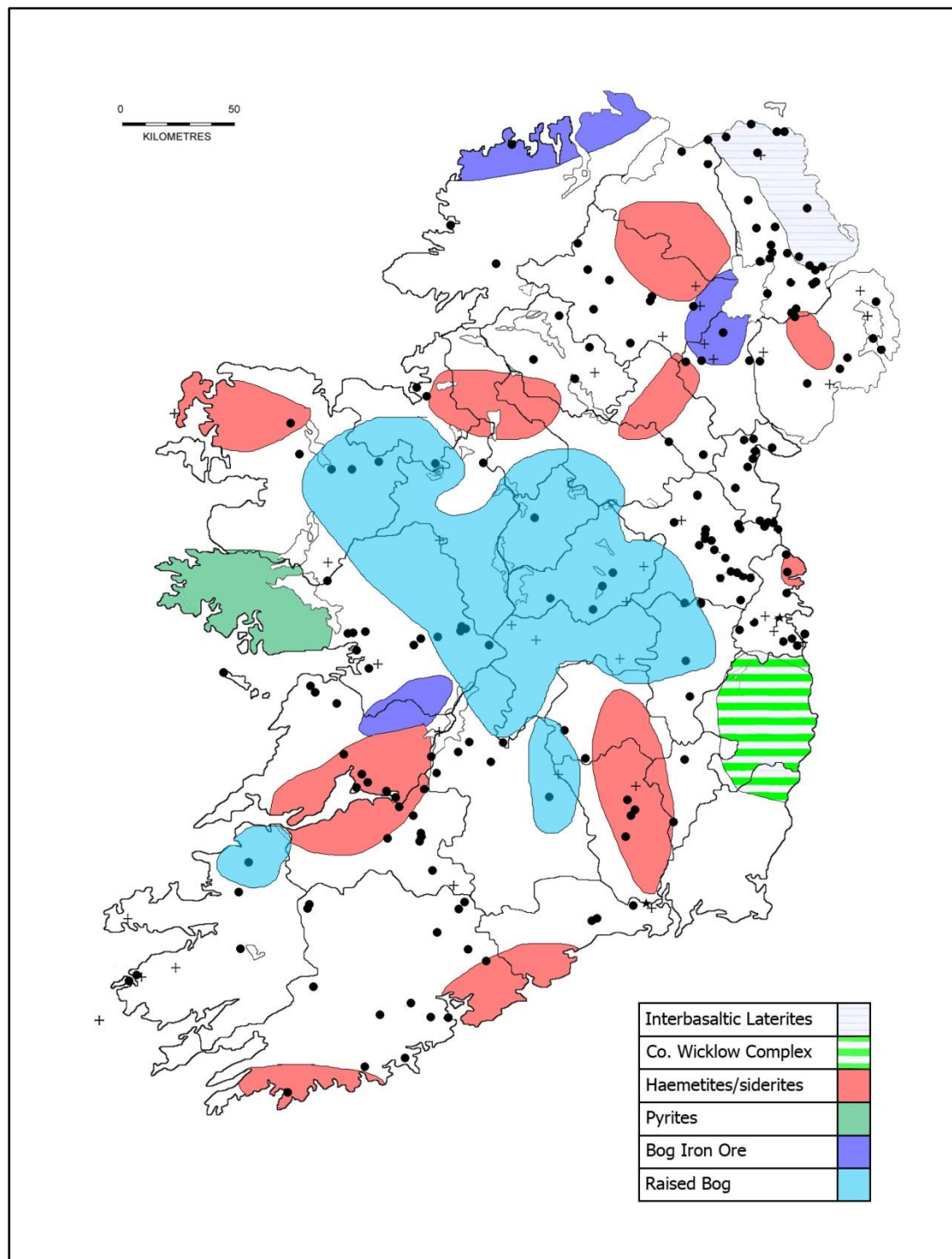


Map 1.10: Map of site that produced evidence for stone-working (numbers relate to gazetteer entry)

It was also possible to plot the distribution of manufacturing sites against raw materials – specifically areas where the geology included shales, and those areas with raised bogs (sources of bog iron ores at the fringes) and iron-bearing rocks (Maps 1.11-1.12). These, unsurprisingly, show a close match-up between the production sites and the distribution of the raw materials.



Map 1.11: Geological evidence for shale and distribution of shale-working sites (numbers relate to gazetteer entry)



Map 1.12: Iron-bearing rocks and known areas of bog iron ore (after Scott 1991), raised bogs and iron-production sites

Conclusion:

A substantial amount of new archaeological evidence for industrial activity in early medieval Ireland has been discovered in recent years. These excavations have produced a more cohesive over-view of craft-working and production in Ireland during this time period by highlighting the role of the smaller secular sites. The identification of charcoal production pits, for example, augment our understanding of smelting from this period, but also add further insights into contemporary land-cover and land-management. While this report has collated

data from over 300 sites, and has produced comprehensive tables and distribution maps on industrial production, there are still a number of outstanding issues for future research. The most clearly pressing issue is a lack of good chronology for much of the industrial activity. In contrast to cereal-drying kilns, for example, which have been produced large numbers of good quality dates, it appears that often industrial activity is either dated by bulk charcoal (thus providing an unsatisfactory date), or by artefact typology. Without a good and reliable typology it is impossible to identify chronological trends in production. An attempt has been made in Section 3 to consider the individuals who wore or/and produced certain ornaments. There is, however, still a temptation to present production and artefacts as ends in themselves, divorced from the people who made/commissioned them. Further work is therefore still required to understand what role industrial activity played in early medieval Irish society, and how it affected those who were intimately involved in the production processes.

Section 2: Early Medieval Craft-working

Matt Seaver

Introduction:

This section will examine various forms of early medieval industrial activity in greater detail. This will consist of individual chapters on specific material, e.g. iron-working, non-ferrous metal-working, etc., which will be accompanied by a series of tables outlining the types of material found on various sites (Appendix 1). Although dealt with separately here, the range of different crafts cannot be completely separated from their interlinked social and economic context. The place of crafts in a social and economic world with a complex system for reciprocity through gift and clientship presents many challenges in theorising about how they worked (Moreland 2010, 75-115). The mechanisms for acquiring or maintaining objects have not been discussed here, nor has the question of who carried out the various production steps, or whether tasks/knowledge were jealously guarded by a sub-set of society. Such issues remain open to interpretation, and further work is necessary in order to more fully understand the way in which industrial activity helped shape early medieval Irish society.

Chapter 2: Early Medieval Iron-working

2.1: Introduction

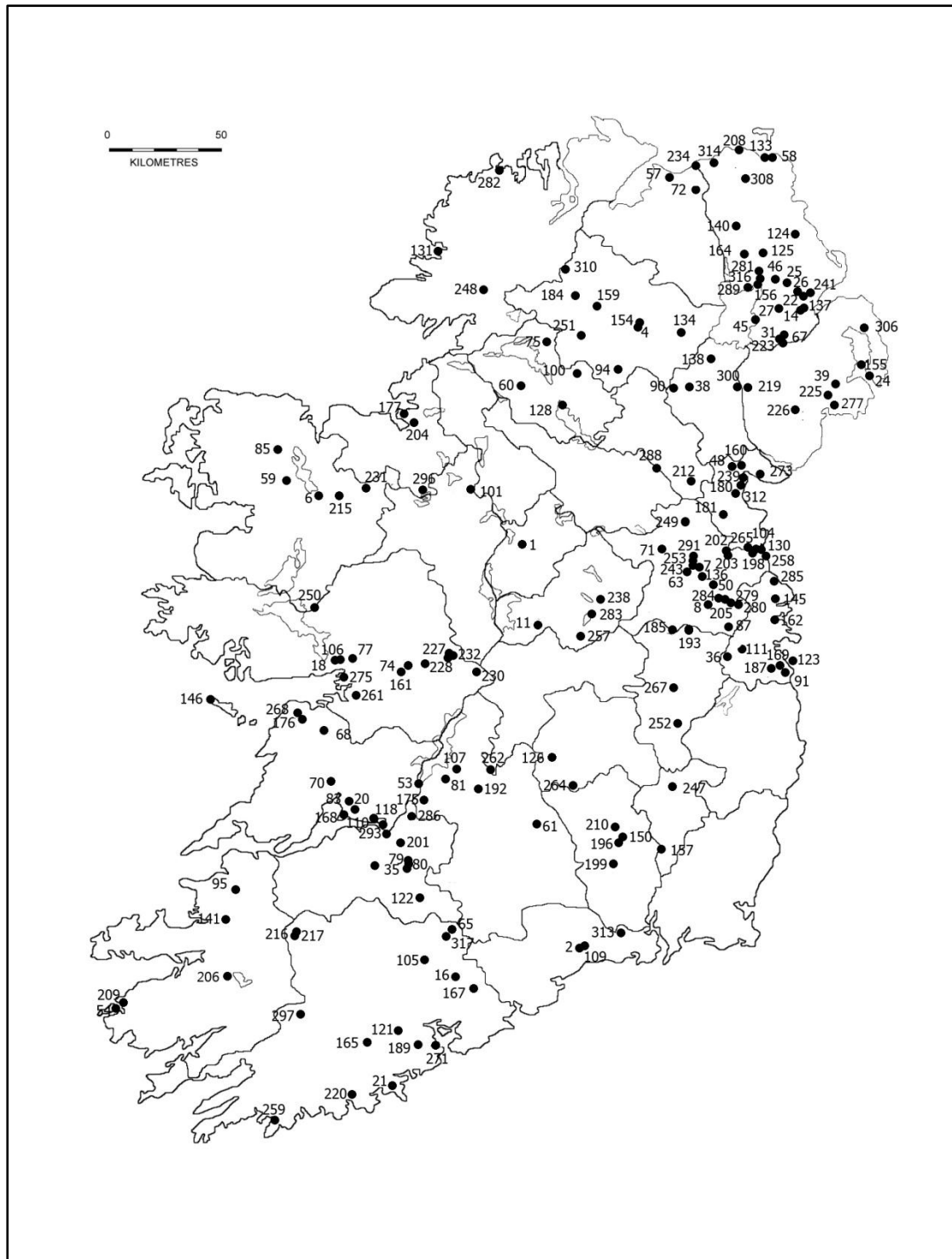
Scott (1991, 109), in his detailed overview, examined the evidence for iron-working from its introduction during the early Iron Age until the end of the early medieval period. He was one of the first to examine in detail the potential evidence for smelting, smithing and mining and the artefacts and technology used behind these processes. Both Scott (1991, 157) and Edwards (1990, 86) highlighted that previous metallurgical studies on early medieval sites often failed to make a distinction between smithing and smelting furnaces, or failed to collect slag in a systematic way. Knowledge of early medieval Irish iron-working has recently been advanced by the published work of archaeologists examining the results of excavations on settlement sites on a national basis (Comber 2008). The significant number of excavations of early medieval settlements during the recent economic boom increasingly included specialist contributions on industrial residues. This led to increased awareness of the importance of sampling for these purposes. The metallurgical evidence from recent excavation schemes has allowed discursive chapters by archaeologists and archaeometallurgists on regional patterns of metalworking (e.g. Carlin 2008). These discussions were informed by a small group of archaeometallurgists who have produced significant quantities of specialist reports on assemblages from a variety of early medieval site types (e.g. Photos-Jones (2008a-d, 2011, Young 2003-12, Wallace and Anguilano 2010b). These are available within 'grey' literature final reports, published volumes and a significant range of evaluations and reports some of which are available online (e.g. <http://www.sasaa.co.uk/sasaa%20projects.htm> and <http://www.geoarch.co.uk/>). This reporting is usually a two stage process with assessment of the assemblage and if it is merited recommendations for scientific analysis which involves thin sectioning of samples. Postgraduate synthesis work on the cultural context of metallurgical production has also been produced in recent years which have taken into consideration some of the recently excavated material (Williams 2010, 31-45, Dolan 2011). It is important to acknowledge that distinguishing different stages of the archaeometallurgical process is only really possible through macro and micro examination of the residues by a specialist with reference to documented collections from experimental work. It also requires very detailed recording of the structures and features involved. For this reason many earlier excavations could represent the results of a range of processes. This chapter presents an outline of the process of iron-working, the archaeological evidence for it and a discussion of how it was integrated into early medieval Irish society.

2.2: Iron artefacts on Irish early medieval sites

EMAP 2012 found that iron artefacts were present on 173 of the 317 settlement sites within the EMAP gazetteer and are the most frequently found object class (Map 2.1). The durable nature of this material meant that it was used to produce a wide range of common tools, equipment and other objects. These typically included knives; awls; chisels; hammers; punches; axes; saws and tongs. Agricultural tools included sickles; shears; bill-hooks; plough-socks and plough shares. Ornate objects of personal adornment were nearly always produced in copper-alloy or silver though simple pins and penannular brooches could be occasionally manufactured in iron but these were rarely lavishly decorated. Military artefacts were manufactured in iron and included swords; spear-heads; arrow-heads; shield bosses; and the famous slave collar from Lagore (Hencken 1950, 115–7). Other objects of iron included tweezers; ladles; horse harnesses; buckles; keys and barrel-padlocks; bells; and the ubiquitous iron nail (Comber 2008, 112–3). While many of these objects were functional they also had symbolic power. For example iron knives could be deeply personal objects, sometimes with decorated bone handles and used for a wide range of tasks and were occasionally buried with people. Although iron objects are a very common find on early medieval settlements, they are frequently severely corroded and without the support of X-ray techniques, it is often very difficult to establish their precise size, shape, use as well as details about their construction and decoration (Edwards 1990, 88).

2.2.1: Metallographic Analysis of Artefacts

The archaeometallurgical examination of early medieval iron artefacts from sites rarely takes place in conjunction with the analysis of residues. A number of key studies have taken place and have looked at the evidence for the hardness and durability of the objects produced. Making steel required a high carbon alloy which required heating to a critical temperature and then quenching in water to produce steel. Crucially this cutting edge was very sharp but susceptible to breaking. Phosphoric iron typical of what was produced from bogs naturally became hardened as it was worked. Rapid cooling in water did not harden the object (Jones 2009a, 255-265). Scott used chemical and metallographic techniques to examine early medieval iron artefacts from a range of Irish sites. He found that they had significant variations in carbon content and noted techniques such as quenching and welding (Comber 2008, 120). At Killickaweeny work by Photos-Jones demonstrated the craft of the blacksmith in producing objects such as an iron knife and a chisel (Jones 2008b, 53-54). She concluded that while the knife may have been imported the chisel had the 'fingerprint' of being made on site. The chisel analysed was made with phosphoric iron with an even carbon content and indicated the smith chose an appropriate bloom for manufacturing based on the objects intended use. A knife from Johnstown was also studied. The hilt and the blade were found to be made from two different blooms containing phosphoric iron. It was a low carbon alloy which matched the slag samples from the site (Photos-Jones 2009, 262). A study of the fifteen iron artefacts from Deer Park Farms found that two objects had successfully quenched and tempered steel within a knife and an axe which had also been looked at by Scott (Hall 2011, 304-14). An awl was made from medium carbon steel. While other knives had low carbon content they would still have provided serviceable cutting edges. The Deer Park Farms objects could have been made by seasonal smiths with limited knowledge of carbonisation or highly skilled smiths who deliberately made harder wearing but not fully hardened objects (*ibid.* 314).



Map 2.1: Evidence for iron-working on early medieval sites in Ireland (numbers refer to EMAP 2012 gazetteer)

2.2.2: Metal-working toolkit

Tools such as hammers, tongs, files and punches were all used in the final stages of iron-working though could also be utilised for several other different crafts. However, there is a relative absence of these iron-working tools on early medieval settlement sites but this could be due to the fact that the iron-smith had the capacity to manufacture their own tools and therefore to recycle them when broken (Carlin 2008, 109). Iron metal-working tongs – variously described as pincers or pliers – have been found on at least five sites in the EMAP

2012 gazetteer as well as at Randalstown (Wood-Martin 1886); and Nendrum (Lawlor 1925, 143; Bourke 2007, 407), (Appendix 1). Iron hammer heads have been found on at least three sites in the EMAP 2012 gazetteer as well as at Killyvilla (D'Arcy 1897a, 220) and Scandinavian Dublin (McGrail 1993, 167). Comber (2008, 118) has suggested that hammer-stones and wooden mallets may have fulfilled similar iron-working functions and the former are known from at least fifteen sites (Appendix 1). In contrast, wooden mallets only survive in wetland contexts at Lagore (Hencken 1950, 163); Ballinderry I (Hencken 1936, 172) and Ballinderry II (Hencken 1942, 60).

Other tools used in the final forging process included iron chisels and punches. Iron chisels are known from at least 25 sites in the EMAP 2012 gazetteer as well as Craigywarren (Coffey 1906, 115); Moylarg (Buick 1893, 32) and Moyne (Manning 1987, 54), (Appendix 1). Files, whetstones and grindstones were used for sharpening, shaping and smoothing iron and metal tools, blades, points and other objects. Association with metalworking sites can be seen at Lowpark with rotary grindstones and a hone sharpening stone (Higgins 2010, 2). Iron files are difficult to identify due to the poor preservation of iron but possible examples are known from Scandinavian Waterford (Scully 1997b, 469) and Woodstown (O'Brien *et al.* 2005, 70).

2.3: Archaeological evidence for early medieval iron manufacturing

Archaeological evidence for the production of iron comes from a range of sources. Heavily scorched pits representing the remains of furnaces or hearths are frequently found. The archaeological residues of the iron working process come in the form of slags, metallurgical ceramics, fuel waste, vitrified fuel ash and ore (Photos-Jones 2011, clxi). These can be found within a variety of features on settlement sites such as ditches and pits or more directly as dumps of industrial waste or within heavily scorched features associated with iron production representing different kinds of hearths and furnaces. Direct evidence for iron-working at some stage in the process comes from a total of 199/317 settlement sites (Map 2.1; Appendix 1). Previous syntheses noted 49 sites with evidence for iron-working which included five ecclesiastical sites not considered in the EMAP sample (Comber 2008, 181). At many earlier sites iron slag and other metallurgical residues were described but was difficult to quantify. Comber originally classified evidence for iron-working as average, minimal or extensive. Metallurgical residues and features can be found in association with structural remains, storage and refuse pits and ancillary working areas. Investigative techniques to better understand these processes on site include consultation with specialist, extensive sampling of metallurgical residue, magnetic and/or phosphate survey of soils. The latter can include the systematic use of a magnet around hearths, pits and other features. Laboratory processes include analysis of metallurgical residues, studies of fuel sources and scientific analysis of selected artefacts. Experimental work is also very important in trying to understand the archaeological evidence with a number of important recent studies of early medieval Irish iron technology (Stevens 2010, <http://www.geoarch.co.uk/experimental/bell.html>, <http://www.seandalaiocht.com/1/post/2010/11/smelt-2010-full-video-in-hd.html>)

2.3.1: Raw materials

The principal source of iron in early medieval Ireland is believed to be bog iron ore (Wallace and Anguilano 2010b, 70); a deposit formed under wet conditions when iron-bearing surface waters meet organic material (Tylecote 1986, 125). Bog iron ore and bog iron slag have been found at the rath complex of Cush (Ó Ríordáin 1940, 154), the rath at Mullaghbane (Spence 1972, 43) and at Reask (Fanning 1981). Bog ore has been found at St Gobnet's, Ballyvourney, Lough Faughan (Scott 1991, 151) and Clonfad (Stevens 2007, 42). The importance of specialist analysis of such samples and their context is demonstrated by the Clonfad sample which may have resulted from secondary mineralisation of archaeometallurgical residue on the side of a stream (Young 2009a, 25). Therefore there are many factors to take into account when considering ore samples. Photos-Jones (2008a, 186) concluded that the high manganese content in iron ore fragments found on excavated sites on the border of Counties Kildare and Meath, for example at Killickaweeney and Johnstown,

most likely indicated that the fragments came from bog ore; and possible bog iron ore was identified from Lough Island Reeve, Co. Down (Gaffikin & Davies 1938, 202). Iron ore has been collected from the bogs around Clonmacnoise and is believed to have been used for iron-working at the site (King 2009, 342). Iron-bearing minerals, such as limonite, have been identified in Cork at Garryduff (O'Kelly 1963, 103) and Oldcourt (Murphy & O'Cuileanain 1961, 90), and ironstone nodules were found at Nendrum (Lawlor 1925, 140).

There is no archaeological evidence for the mining of iron ores in early medieval Ireland and it is possible that these ore-working areas have been destroyed by turf-cutting or later bedrock mining (Comber 2008, 239). Early Irish law makes reference to the mining of iron, for example, the laws of distraint (Cethairslicht Athabálae) referred to penalties for the illegal digging of someone else's silver mine or excavating iron or copper ore from his cliff (Kelly 1988, 105). The extracted ore was then dressed, washed, winnowed and crushed with only the most iron-rich pieces retained for smelting (Wallace & Anguilano 2010b, 70). The large quantity of iron ore from Garryduff (O'Kelly 1963, 103) suggested to the excavator that it was derived from nearby ore-bearing surface outcrops. The site also provided evidence for the roasting of ores and this process involved the transformation of carbonate and sulphide ores into oxides, the latter of which was more easily reduced in a smelting furnace (Comber 2008, 240). Four large stones with concave surfaces at a palisaded enclosure at Lowpark specialising in ironsmithing may have been used for crushing iron ore (Gillespie 2006) and a large slab with a basin in a smelting area at Gallen Priory (Kendrick 1939, 5) was interpreted as having a similar function. The potential significance of bullaun stones at ecclesiastical sites, hollows in bedrock and other possible mortars for the crushing of ore at a number of sites has been highlighted in recent years (Dolan 2009, 16-19). It is likely that iron ore was found on other sites but was not recognised as such by the excavators (Scott 1991, 154).

2.3.2: Charcoal Production

The iron smelting process required charcoal production and the eighth century law tract, Críth Gablach, listed 'a sack of charcoal for irons' as one of the household possessions of the *mruigfher*-class farmer (Scott 1991, 100). Charcoal could be produced in either traditional earth-dug pit kilns or mound kilns where wood was allowed to slowly smoulder and carbonise in an oxygen-limited environment (Kenny 2010, 13-14). Control over the amount of oxygen within the pit allowed the wood to burn slower than in the open air, and thus produce better charcoal. The most common early medieval form of charcoal kiln was the charcoal production pit though evidence for mound kilns tend not to survive as well (*ibid.* 105-6). Charcoal production pits consisted of earth-cut charcoal-filled pit features, circular, oval or rectangular in shape, with evidence for *in situ* burning on their sides and bases. A total of 61 charcoal production sites were identified in a recent survey. Thirty-two of these were radiocarbon dated to the early medieval period, of which the majority belong to the period between A.D. 800 and 1200. Typical rectangular pits were 2-3m in length and 1.2m in width while circular examples were 1.4m by 0.33m in depth. These consisted of small pits in which timbers may have been placed against a central vertical post, covered by straw, bracken and layers of earth and turf (*ibid.* 89). This vertical post was then removed and the resultant hole filled with charcoal and carefully ignited. The wood was then effectively roasted for several days as the water and other impurities were allowed to evaporate without the wood actually burning. Finally, the fire was allowed to die, the kiln was dismantled and the charcoal extracted (*ibid.* 91). Experimental work has replicated these features in recent years using these methods (<http://charcoal.seandalaiocht.com/>). While there has been no synthesis of charcoal specialist reports oak appears to dominate as a chosen species. This factor evidently influences the outcome of radiocarbon dates. Other species were also used - at Killickaweeny 1 ash was used in a furnace (*ibid.* 101), while at Laughanstown a rectangular pit contained charred hazel roundwoods dated to A.D. 1020-1190 (2σ) (Seaver 2011, 273). Many of these sites were discovered isolated from settlement enclosures, sometimes close to features such as field boundaries and also were occasionally close to features related to iron production (Hull and Taylor 2007, 25-26, Carlin 2008, 88). The EMAP survey shows that while this was often the case charcoal production pits were not exclusively distant from the settlement and have

also been found within or close to enclosures at Balriggan, Raystown, Gortnahown 2 and Castlefarm all of which produced varying quantities of metallurgical residues (Delaney 2011, Seaver 2009, Young 2009b, O'Connell and Clark 2009).

2.3.3: Furnaces and hearths

The charcoal could be used in the multiple stages required to convert the ore into iron bloom, subsequently into material suitable for smithing and finally used to make and repair objects. All these metallurgical processes require intense heat and the control of temperature through restricting or introducing oxygen. There is a large group of archaeological features which suggest ferrous metallurgy. From the EMAP 2012 gazetteer, 57/317 sites were described as having furnaces or hearths with metallurgical residues with some sites having multiple examples. The difficulty arises in determining which stage of the process is represented by each feature. The dimensions and character of features can help in determining whether they were hearths or furnaces. More precise indication of their purpose can usually only be determined by examining the feature itself along with the metallurgical remains and even then there can be considerable ambiguity.

2.3.3.1: Smelting Furnaces

The primary stage of iron-working is to convert the ore into a useable form which involves smelting in a furnace. It is difficult to reconstruct the original form and superstructure of early medieval smelting furnaces because these rarely survived above ground as they were dismantled to remove the iron bloom. It was thought that the simple bowl furnace was the only type used in Ireland during this period (Scott 1991, 159) and these have been identified as shallow hemispherical burnt depressions in the ground (Edwards 1990, 87). These 'bowl furnaces' may have contained a low clay domed superstructure, which would result in the discovery of metallurgical ceramic material from the fired lining within the residues.

Both Mytum (1992, 231) and Young (2003, 1-4) have suggested that smelting in early medieval Ireland occurred within more efficient non-slag-tapping shaft furnaces, known interchangeably as slag-pit furnaces or low-shaft furnaces. Dowd and Fairburn in their analysis of a later medieval slag tapping furnace at Farranstack suggested that evidence for shaft furnaces may extend their use into the early medieval period (Dowd & Fairburn 2005, 115-21). This argument was followed by Carlin in his analysis of the M4 metallurgical features (2008, 92). These non-tapping slag furnaces comprised a low cylindrical clay shaft 1-2m in height, with walls 0.2m thick built over a basal pit which preserved the hollow hemispherical bowl in the ground (Carlin 2008, 92, Wallace & Anguilano 2010b, 70). The shaft is defined as a ratio of 2:1 of the height of the furnace to the width of the furnace (Photos-Jones 2011, clxxxiv). The clay material used in these shafts are unlikely to survive as they were distant from the heat and therefore did not become vitrified and were susceptible to erosion by the rain (Young 2003, 1). The sides of the chimney may have contained clay blocks with tubular openings or *tuyères* to allow blasts of air into the furnace using a bellows to reach the high temperatures necessary for smelting. *Tuyères* were also used in smithing hearths and non-ferrous metal-working, thus sometimes complicating the interpretation of iron-working debris (Scott 1991, 162-63; Carlin 2008, 93).

The furnace was charged with fuel and preheated. When it was hot, mixtures of combustible organic material such as charcoal and iron ore were fed into the shaft and blasts of air were pumped in using the bellows. Initial reduction of ore took place at 800°C high up in the furnace to slag liquidation at over 1,000°C near the base (Wallace & Anguilano 2010b, 70). During this process, the iron ore was reduced to form an iron bloom (a spongy mass of metallic iron mixed with slag impurities) and liquid waste slag. The latter ran into the basal pit to form distinctive bowl-shaped blocks of slag, known as 'furnace-bottoms'. The raw 'bloom' remained within the shaft above ground level near the blow-hole of the bellows and required further refinement, reheating and hammering in a smithing hearth to remove excess slag and impurities. The bloom was removed through either the top of the shaft or the breaking of its

clay superstructure (Carlin 2008, 93). These non-slag tapping shaft furnaces were superior to bowl furnaces as they increase the carbon content of the iron and produce greater amounts of it (Photos-Jones 2008, 233).

Evidence for the unrefined 'bloom' produced in smelting furnaces rarely survive though examples have been identified at Hardwood 3, Co. Meath (Carlin 2008, 101), Lough Faughan crannóg (Collins 1955, 71) and Borris (Wallace & Anguilano 2010b, 80-82). The most common evidence for iron-working comprises the waste slag, produced in the smelting, bloom-smithing and forging processes (Scott 1991, 151). Microscopic analysis of the slag can inform about the iron-working process and whether smelting or smithing occurred in a particular context. It is, theoretically, possible to differentiate between the slag mainly created in 'bowl' furnaces or slag-pit furnaces and the tapped shaft furnaces. The tapped slag from shaft furnaces has a 'characteristic drop like surface texture' (Photos-Jones 2008a, 193) while the non-tapped slag, characteristic of the slag-pit bowl furnace, tends to form into rounded 'furnace bottoms'.

The liquid slag that sunk to the base of the basal pits formed distinctive bowl-shaped 'furnace bottoms' when they solidified. These 'bowl' furnace bottoms can easily be confused with the 'smithing hearth bottoms'. In general these are differentiated on the basis of size, with the larger being from the smelting process (Scott 1991, 155-60). On this basis Scott re-identified the furnace bottoms from Ballyvourney as representing smithing rather than smelting activity, and thought that the same applied to the material from Garranes (*ibid.* 161-2). He also cast doubt on the identification of 'furnace bottoms' on several other sites. 'Furnace bottoms' are a very common find and were frequently broken up when the furnace was dismantled. If non-tapping shaft furnaces are used they do not produce large furnace bottoms (Young 2011b, 10). Furnace bottoms are defined as being large plano-convex cakes of slag larger than 0.15m in diameter and weighing more than 4-5kg (Photos-Jones 2010, lxvii).

Site reports using the term 'furnace bottoms' have been recorded at 35 sites within the EMAP 2012 gazetteer in varying quantities with Garryduff 1 and St Gobnetts, Ballyvourney producing by far the greatest number (O'Kelly 1962-4 and O'Kelly 1951-2).

2.3.3.2: Archaeological evidence for smelting furnaces

There was archaeological evidence for early medieval Irish smelting furnaces at 11 older sites reviewed by Comber (Comber 2008, 115-7). This included sites with multiple furnaces such as Garranes and Altanagh as well as an example at Reask (Ó Ríordáin 1942 and Williams 1986). A range of thirteen more recently excavated sites within the EMAP 2012 gazetteer, where specialist reports were available, have produced at least 40 features described as smelting furnaces with accompanying assemblages of metallurgical residues (Appendix 1.1).

Recently excavated furnaces show a range of a relatively restricted range of dimensions generally between 0.4-0.7m with a depth of 0.1-0.2m (Table 2.1). Measuring them accurately can be difficult as the red scorched area or reduced natural clay around the bowl can be interpreted as a clay lining and removed by the excavator thus enlarging the feature (Young 2009a, 6). Most of the sites in Table 2.1 and those discussed by Comber (2008, 115-124) had evidence for other metalworking processes such as bloom refinement and other forms of smithing. Many were also within or on the periphery of enclosures which contained other habitation evidence. More isolated furnaces are also found for example Hardwood 2 & 3, Towlaght 1 and Newcastle 2 found along the route of the M4 in counties Meath and Kildare (Carlin 2008, 94). The remains of vitrified clay fragments were found in several furnaces at Johnstown 1, Killickaweeny 1, Newcastle 2 and Rossan 3 and were interpreted as the probable walls of these clay shafts which were broken to remove the bloom (*ibid.*). However, it should also be noted that simple 'bowl' furnaces may also have contained low clay domed covers which could have greatly increased their efficiency (Comber 2008, 116-7). It is also likely that fragments of clay superstructures have been found though have not been identified as such and items described as 'furnace linings' may have as easily formed part of a

superstructure (*ibid.* 117). A few ambiguous fragments of possible clay superstructures have been noted by Comber (*ibid.*) at Garryduff, Letterkeen and Rathgurreen. A growing number of smelting furnace sites also contained tuyères for example at Carrigoran and Dunlo and this may suggest they were used in primary smelting or that bloom smithing occurred alongside (Young 2010, 3).

Site	No.	F.	Iron waste	Smelting furnace	Context	Other activity	Site date	Ref.
Johnstown	11	558	2000kg	0.6 x 0.63 x 0.11	Cemetery settlement	Bloomsmithing/blacksmithing	C5th-C17th	Photos-Jones 2008a
Killickaweeney	6	561	86kg	0.4m x 0.19m	Univallate enclosure	Bloomsmithing/blacksmithing	C7th-C10th	Photos-Jones 2008b
Derrinsallagh 3	4	819	60kg	0.45 x 0.40 x 0.22m	Univallate enclosure	Bloom refining	C7th-C10th	Young 2008a
Gortnahown 2	3	548	158kg	0.48m x 0.46 x 0.26	Univallate enclosure -	Smithing, bell manufacture	C5th-C7th	Young 2009b
Carrigoran	2	767	30.4kg	0.5m x 0.11	stone enclosures	Blacksmithing	C9th-C11th	Young 2006c
Dunlo	2	5	12.3kg	0.56 x 0.53	Isolated	Bloomsmithing	C10th-C11th	Young 2010
Lisanisk	2	537	827.8kg	0.94 x 0.79 x 0.39m	Bivallate enclosure	Bloomsmithing	C7th-C10th	Photos-Jones 2010

Table 2.1: Recently excavated sites with smelting furnaces, number of furnaces, example of furnace dimensions and context.

There is also significant evidence of smelting from analysis of metallurgical debris on sites which do not have excavated furnaces. A good example of an isolated smelting site including a very large dump of slag was found at Cloonafinneala, County Kerry (up to 520kg of metallurgical remains of which approximately 5% was sampled). It had no evidence for bloom refining and appears to be related to primary smelting which appears to be fifth/sixth century A.D. in date (Young 2012, 4). This site was close to woodland and sources of ore and included a charcoal production pit. At a range of other sites which did not have excavated furnaces the smelting slag was a small component of the overall metallurgical remains which otherwise related to smithing for example at the univallate settlement at Sallymount (Clark & Long 2009). Frequently sites without excavated furnaces or specialist metallurgical reports indicate the presence of furnace bottoms for example the cemetery and settlement at Knoxpark which records eight (Mount 2010, 208). Without indications of size and further analysis it is difficult to say if these resulted from smelting.

Carlin (2008, 93, 107) has suggested that there may have been a progressive shift from slag-pit furnaces (low-shaft furnaces) to slag-tapping furnaces in places where smelting was reliant on solid rock ores. Slag-tapping furnaces were much more efficient as they allowed the slag to flow outside the structure and were the dominant form in Roman Britain and for much of the early medieval period in both Britain and Europe. However, they never appear to have been built in early medieval Ireland where bog ore was the dominant source of iron and this might suggest a link between the smelting of bog ores and the non-slag tapping furnace types (*ibid.* 93). The earliest definitive Irish evidence for tapping slag furnaces seemed to be a number of sites dating to between the eleventh and thirteenth century (Dowd and Fairburn 2005, 115-21). Photos-Jones (2008a, 233) has noted that despite the intensity of iron-ore processing (2,000kg of early bloomer slag) at Johnstown 1, there was no attempt to progress from bowl furnace to tapped shaft-furnace technology. Indeed, up until 2006 there was no published unequivocal evidence for the use of shaft furnaces in early medieval Ireland (Photos-Jones 2011, cxxi). Some recent excavations do suggest more complex structures

existed although the exact furnace technology used appears to be unclear. The excavators at Knockbrack, County Kerry conclude that a tapping slag furnace was present at an early date. This structure had a stone base and a clay lining and while Late Iron Age dates were obtained from oak within a second sample of hazel was dated to A.D. 570-670. This would allow for removal of furnace waste without dismantling. Young concludes that this structure must at least have had a furnace arch for the clearance of waste and bloom (Young 2009a, 234). At Woodstown 6, the Viking settlement in County Waterford, the remains of a shaft furnace over a broader hollow was uncovered with what was possibly a frontal furnace arch (Young 2006b, 1). It was within a ditch and possibly contained within a stake-built area and made from burnt clay 0.55m in diameter. It may have subsequently been used as a smithing hearth. At Milltown, County Kilkenny a complex and large scorched feature associated with smelting was found within a circular structure dated to the seventh to ninth century. This feature was interpreted as either a truncated furnace which was rebuilt several times in the same place or a furnace built on the ground surface through which hot material was removed through a frontal arch (Young 2009e, 4).

2.4: Secondary working of Iron - Bloom Processing

Once the smelting was completed, the iron 'bloom' produced in the furnace was refined in a bloom-smithing (primary-smithing) process which involved reheating it in a hearth and hammering it in a molten state on an anvil to remove excess slag and other impurities and to consolidate the iron prior to shaping. This was an important necessary step as the furnace did not achieve high enough temperatures to completely remove the slag and other impurities. A block of wrought iron referred to as the stock or billet was produced in this process.

Site	No.	F	Iron waste	Smithing Hearth	Context	Other activity	Site Date	Ref
Lowpark	11	C580	1360.00kg	0.9 x 0.55; 0.8 x 0.62 x 0.14	Univallate enclosure	Smithing	560-640	Wallace & Anguilano 2010c
Lowpark	11	C320	1360.00kg	1.1 x 0.63 x 0.15 m	Univallate enclosure	Smithing	650-770	Wallace & Anguilano 2010c
Borris	6	C879	142.74kg	0.4 x 0.38 x 0.12 m	univallate enclosures	Smithing	673-856	Wallace & Anguilano 2010a
Borris	6	C882	142.74kg	1.32 x 0.4 x 0.2 m	univallate enclosures	Smithing	717-887	Wallace & Anguilano 2010a
Johnstown	5	C695	2000.00kg	1.2 x 2.2 x 0.33 m	Cemetery settlement	Smelting	C11th/ C12th	Photo-Jones 2008a
K'weeny	5	C426	86.0kg	1.17 x 0.56 x 0.39 m	Univallate enclosure	Smelting	C9th-10th	Photo-Jones 2008b
Castlefarm	3	C943	75.6kg	0.99 x 0.96 x 0.13 m	Cemetery settlement	Smithing	565-666	O' Connell & Clark 2009
L'bown 1	3	C89	130.00kg	0.6 x 0.39 x 0.2 m	Univallate enclosure	Smithing	1047 - 1257	Kearns in Bower 2009
Gortnahown	2	C545	158.0kg	1.40 x 0.60 x 0.30 m	Univallate enclosure	Smelting	C5th-C6th	Young 2009b
Sallymount	2	C435	265.0kg	0.57 x 0.43 x 0.15 m	Univallate enclosure	Smithing	C7th-C8th	Clark & Long 2009

Table 2.2: Examples of sites with smithing hearths, number of smithing hearths, specific example and dimensions and its context. 2 sigma radiocarbon dates are noted for the feature or associated contexts if available.

2.4.1: Smithing

Secondary smithing (blacksmithing) or forging was then undertaken on the billet to produce or repair metal objects. The metal was heated in a hearth before hand tools and an anvil were used to shape it into the desired object form (Carlin 2008, 94). A range of smithing processes could be undertaken from forging, to plate or bar, artefact manufacture and repair (Young 2010, 8.1). Iron-smithing can be done in most places even at a domestic hearth and does not require a purpose-built structure (Wallace and Anguilano 2010b, 71). Evidence for all these processes can be present in the form of features such as smithing hearths, ceramic tuyères, metallurgical smithing waste and other features such as anvils and a range of artefacts used in the manufacturing process. A total of 15 settlements with 51 smithing hearths have been recorded within the EMAP 2012 gazetteer which had available specialist reports (Appendix 1).

The morphology of smithing hearths is becoming clearer through a wide range of recently excavated examples (Table 2.2). In commentary on smithing hearths Young notes that sub-rectangular or circular hearths of 0.8 in diameter would be small for blacksmithing but that bloomsmithing may not have required the same size (Young 2008, 4). He notes that bloom smithing hearths are poorly known. Young in a discussion of 23 Irish smithing hearths, mostly of early medieval date suggests that they vary from equidimensional in plan through to having a long axis up to 1.5 x the short axis (Young 2009b, 236). A number of smithing hearths were discovered along the route of the M4 at Rossan 4, Hardwood 3, Newcastle 2 and the majority of these had a distinctive rectangular plan with steep sides and a flat base. Most of these smithing hearths were 1-1.6m long and 0.1-0.4m deep and were used for bloomsmithing, i.e. the refining of iron bloom into billet (Carlin 2008, 100). Photos-Jones states that hearths associated with metallurgical waste of 1.2 – 2.5m in size cannot be associated with smelting and must have been used for smithing (Photos-Jones 2008a, 194). She suggests that the hearths identified at Killickaweeny and Johnstown were associated with the bloomsmithing process. Some sites such as Two-Mile Borris had evidence for up to six smithing hearths of different dates one of which was located close to a large consolidated iron bloom (Wallace and Anguilano 2010b, 81).

However, primary smithing may have been undertaken at the smelting site and the furnace pit was occasionally used as a hearth. Iron smelting furnaces inside Structure G at Reask appears to have been deliberately dismantled, but later re-used for iron smithing or copper-alloy melting (Fanning 1981, 108–10). Some smithing hearths may have had low clay superstructures which would have contained blow-holes for connecting bellows. Some sites have revealed the remains of smithing hearths which have been discarded. A flat stone with slag and clay adhering was identified as the base of a smithing hearth within the enclosure ditch at Parnahown, County Laois (Young 2009c, 6).

Stone lined smithing hearths were found at Gortnahown 2 and Park 1 (Young 2011b, 124). The latter was at the base of one hollow within a figure-of-eight structure and associated with hammerscale.

Smithing hearths cannot be definitively identified without analysis of associated metallurgical residues. Many sites do not have smithing hearths within the excavated area but analysis of metallurgical residue suggests smithing was carried out at that site. EMAP identifies at least 16 sites within the sample which did not have a hearth but where archaeometallurgical analysis indicated smithing.

The presence of smithing on a site can be indicated by the presence of particular types of metallurgical waste. The slag would accumulate at the base of the pit to form the distinctive plano-convex lumps of waste, known either as hearth bottoms or cakes (Carlin 2008, 94). The size and chemical composition of these can indicate what kind of smithing process was being carried out. Smithing hearth cakes from refining are generally heavier than those generated by secondary smithing but this can vary (Wallace & Anguilano 2010, 5). Smithing

hearth cakes are generally bun or palm sized (Photos-Jones *et al.* 2010, lxvii). In addition amorphous smaller fragments known as smithing slag lumps are also regularly found (Wallace & Anguilano 2010b, 76).

Analysis of the huge assemblage of metallurgical residues from Clonfad indicated that the refining of bloom produced larger smithing hearth cakes which may have originally have been classified as the product of smelting (Young 2009a, 8.1). This view was based on chemical analysis of the cakes and would mean that many earlier assemblages interpreted as the result of smelting would have to be looked at again. The analysis suggests that at Clonfad residues for smelting were minimal and that this must have taken place elsewhere. Other specialists do not believe that bloom smithing creates large cakes of slag and would attribute them to smelting (Photos-Jones *et al.* 2010, lxvii). The evidence from sites such as Johnstown 1 can be viewed in terms of a large quantity of bloomsmithing carried out alongside smelting (Photos-Jones 2008a).

Micro metallurgical debris known as hammerscale is an important indicator of smithing. This is an oxidised film of metal produced as bloom is hammered and indicates the presence of the anvil (Wallace & Anguilano 2010b, 71). Different types of smithing produce different shapes and flakes are thicker during bloomsmithing and thinner where artefacts are being forged (Young 2012, 3). Evidence for 'hammerscale' has been identified at least nine sites within the EMAP 2012 gazetteer, including within structures at Killickaweeny and Sallymount (Photos-Jones 2008b, 22-23; Clarke & Long 2009, 46). Given that this material is highly mobile after its deposition its presence has to be viewed alongside other evidence. The remains of a building close to a smithing site could contain hammerscale even if it was not directly associated with metallurgy.

Bellows and tuyères were used iron-working as well as in non-ferrous metalworking. They are thought by many specialists to have been used in smithing and smelting (Wallace & Anguilano 2010b, 71). It has also been suggested that they were only employed in smithing hearths although their occurrence in the remains of furnaces requires further investigation (Young 2010). The bellows rarely survive but clay tuyère fragments are frequently identified. Examples of these – used in either ferrous or non-ferrous metal-working – have been recorded at 36 sites within the EMAP 2012 gazetteer in varying quantities and states of preservation (Appendix 1). Comber notes three types, small clay tubes, larger clay tubes and perforated conical disks perhaps designed to protect bellows (Comber 2008, 117). Some commentators prefer the term air-pipes as tuyère is used to describe nineteenth-century blast-furnace technology (Photos-Jones *et al.* 2010, cxxvii). Excavations in recent years have found relatively intact examples at Clonfad where they were typically 140mm across and 26mm in diameter (Young 2009a, 8.1) while at Lowpark they were 140-150mm in diameter with an inner bore width of 25mm (Wallace & Anguilano 2010c, 9-10). The large quantities of vitrified clay fragments at Lowpark and pieces of tuyères found indicate substantial well-insulated smithing hearths with clay wall superstructures and blow holes (Wallace & Anguilano 2010b, 75). At Lisanisk four complete examples were found which were built in coil form with the blowhole possibly made by wrapping it around a wooden block and then air dried rather than fired (Photos-Jones *et al.* 2010, lxxxix). It was suggested that an added layer of clay and straw would be added to the block to increase porosity. Other complete examples are known but not recorded in detail from Ballycasey More (O' Neill 2003b). There is evidence that stones were used to strengthen the sides of the hearth underneath the tuyère as at Clonfad (Young 2009a, 15). At this site a distinctive type of slag was identified as resulting from close association with the tuyère. This was termed the pro-tuyère tongue and developed on the lower edge of the tuyère (*ibid.*). These long tuyères were fed to the centre of a wide hearth for smithing.

A growing number of anvils have been identified on Irish early medieval settlements. A stone-built clay-lined smithing hearth was found at Clogher hillfort associated with two 'bowl' furnaces and a flat rectangular limestone block, interpreted as an anvil (Edwards 1990, 88). Another large stone with a flat working surface was found in close proximity to an iron-

working furnace at Rathgurreen and was identified as having a similar function (Comber 2008, 118). Other possible stone anvils have been recorded at seven other sites in the EMAP 2012 gazetteer as well as in a recent excavation at Dunlo (Young 2010). The most significant example from Lowpark had a bowl shaped depression on one side and a small circular depression which in turn contained a square socket on the other which is likely to be for an iron anvil (Higgins 2010, 3-4). It is possible that large flat stones were generally utilised as anvils in this period and many of these have probably been overlooked during excavations (Comber 2008, 118). Possible iron equivalents have also been noted at Cloghermore cave (Connolly & Coyne 2005, 217); the crannógs at Ballinderry II (Hencken 1942), Randalstown (Wood-Martin 1886, 168); Garryduff I (O'Kelly 1963, 56-7), and the ecclesiastical site at Kiltera (Macalister 1935, 5). The most recently found iron anvil was located in the chamber of a souterrain at Kilree where deposits were dated to A.D. 692-772 (Coughlan 2010, 17). The evidence for a cemented smithing pan that formed on the floor surrounding the hearth and anvil from the trampling of iron residues into the ground by the smith and his assistants can also indicate the presence of an iron smithing workshop (Carlin 2008, 110). Such evidence was discovered at Lagore (Hencken 1950, 233) and Garranes where a dense black metallurgical layer was found associated with a scatter of post-holes and a stone setting (Ó Ríordáin 1942, 86-7).

2.5: Contexts of iron-working

Aside from mining and charcoal-production, the four separate processes involved in iron-working were ore processing (roasting), smelting, bloomsmithing and forging. The dynamics and settlement context of these processes are still poorly understood. It has been suggested that primary iron production took place in peripheral locations close to woodland and fuel and timber sources (Carlin 2008, 108). There are now frequent isolated sites where metallurgical residues suggest smelting and bloomsmithing such as those in County Meath on the M4 (see smelting above for examples). Other linear schemes have revealed many more such sites Aghamore (Byrne 2007, 333-4), Dollas Lower (Dowling and Taylor 2007, 273-4), Kiltinan south (Dennehy 2007, 291) and Ennisnag (Jennings, 2008). Some of these are located close to woodland and bog with several including charcoal making pits. More recently examples have been excavated at Dunlo, County Galway and Ballinglanna north and Cloonafinneela both in County Kerry (Young 2010, 2011a, 2012, 2). These may represent specialised bloomsmithing and/or smelting sites. The apparent absence of secondary smithing i.e the forging/blacksmithing of objects was contrasted with evidence from settlements like Clonfad which was primarily engaged in bloomsmithing and artefact production.

It could be suggested that these 'isolated' industrial features may represent evidence for 'itinerant' ironworkers (Comber 2008, 124). However, Carlin (2008, 107) has suggested instead that they were more the product of local farmer-ironsmiths, exploiting their surrounding natural resources, probably on a seasonal basis. Although they are mentioned in the story *Cath Maige Tuired* itinerant smiths appear to be a rarity in many small scale societies (Hall 2011, 313). It could also be the case that these represented places where specialised ironworkers produced bloom for use in larger workshops at settlement sites.

The crannog at Bofeenaun could be regarded as an 'isolated' specialised iron-working site (O'Sullivan 1998, 122) as it produced evidence primarily for the processing and smelting of iron ore. Two iron-smelting furnaces, furnace lining fragments and a large volume of slag were recovered and the only finds consisted of two crushing stones or stone mortars (for the ore), a saddle quern, a hammer stone, an iron spade and two gouge-type tools (Lawless 1992, 14-21). There was no structural or occupational evidence, except for a revetment palisade and an area of stone paving (*ibid.*). Bofeenaun was located in an apparently marginal landscape and it has been suggested that 'crannogs like Bofeenaun should be interpreted as the island workshops of blacksmiths, seen as semi-mythical personages in early medieval mythology on the edge of society' (O'Sullivan and Van de Noort 2007, 74) which were visited periodically by local farmers to meet their subsistence needs.

In most cases, the primary iron-working activities may have been undertaken close to the ore and fuel resources. It is usually thought that the smelted bloom was then transported to the workshops on nearby settlement sites and was then reheated and refined (bloomsmithing) to produce iron ingot bars. These could then either be forged into artefacts (blacksmithing) on the site or may have been traded further afield where this activity could have taken place (Wallace & Anguilano 2010b, 84). It has also been suggested that iron may have been moved as consolidated bloom rather than ingot bars to sites for smithing (Young 2009a, 234). A reference within the law tracts indicates that significant quantities of bloom were part of the render dues as part of contracts (Comber 2008, 122).

The complication with this model is that there are a range of settlements at different scales which clearly have evidence for smelting, i.e. primary iron processing as well secondary bloomsmithing and artefact production such as Borris (Wallace & Anguilano, 2010a) Johnstown (Photos-Jones, 2008a), Killickaweeny (Photos-Jones, 2008b) and Gortnahown 2 (Young 2009b). Therefore these sites were producing some of their own bloom and not processing it at outlying isolated bloomeries. The key difference appears to be the degree to which smelting took place in proportion to bloomsmithing and forging/blacksmithing. At places like Johnstown and Lisanisk whoever engaged in iron-working directly sourced the ore, smelted and forged the metal. In other cases such as Lowpark (Wallace and Anguilano 2010c), where all the activity seems to be related to smithing they must have sought bloom from other sites, perhaps the specialised examples found in isolated areas. In the latter case they may have sourced and processed it along with charcoal within kin lands. There are also hierarchies of activity at sites engaged in smithing for example at Lowpark (Wallace & Anguilano 2010c) where it was likely to be continual occupation for those living there and Parknahown (Young, 2009c) where it was probably far more sporadic (see levels of iron-working below).

There is growing evidence for smithing workshops at early medieval settlement sites. Some of this iron-working appears to have been practiced in the open while other iron workshops were possibly partially open, flimsy structures. Often the only surviving evidence for a possible iron workshop or forge may consist of a furnace or hearth, iron-working tools (e.g. tongs, hammers, anvils, punches, and chisels), smelting and smithing slags, hammerscale, cemented smithing pans and shelter-like structures for the smith (Wallace & Anguilano 2010b, 109).

Comber (2008, 121) has noted that the early stages of iron-working (e.g. smelting and bloomsmithing) were undertaken away from domestic structures to protect the occupants from the fumes and hazards of the work. It should be noted however that there are examples of furnaces within structures for example at Milltown (Young 2009e, 4). There is evidence that iron-working was undertaken in the enclosing ditches of at Johnstown (Clarke & Carlin 2008, 57); Petitswood (Channing 1992); Rathgureen (Comber 2008, 181); Lowpark (Wallace & Anguilano 2010b, 74-75, 2010c); Clogher (Scott 1991, 160) and Woodstown (O'Brien & Russell 2005, 75). In some monasteries, there is also evidence that iron-working was confined to the periphery of the sites, as indicated by the presence of material within the enclosure ditches, at Tallaght (O'Brien 1990); Butterfield (Carroll 1997); Tullylish (Ivens 1987, 60-1) and Clonfad (Stevens 2010, 91). This evidence might suggest that the smith was seeking the shelter of the enclosing bank, especially as it appears that iron smelting may have primarily been an outdoor activity (Comber 2008, 121).

A range of settlements appear to have had specialised smithing workshops. The palisaded enclosure at Lowpark produced four smithing workshops dating from the sixth to the tenth centuries A.D. Three of the iron-working areas were within sunken sub-rectangular structures – both inside and outside the enclosing palisade – and the fourth workshop was located within a partly silted-up enclosure ditch. The site produced 1,364.5kg of metallurgical waste in the form of iron slag and smithing slag cakes and it was suggested that four large stones with concave surfaces were used for crushing ore (Gillespie 2006; Wallace & Anguilano 2010b, 75-80). At Lisanisk, a bivallate settlement enclosure, the metallurgical remains of

smithing and bloom smithing (827 kg) dominate the excavated remains, although smelting did take place (Coughlan 2010 and Photos- Jones et al. 2010). This took place in two separate sunken areas within the ditches, with postholes and a large charred wooden beam indicating windbreaks and work surfaces dated to the late seventh to ninth century AD. The multivallate rath at Lisleagh II produced 1000kg of metallurgical waste (Monk 1988, 1995), and it has been identified as another upper tier iron smelting specialist site (Scott 1991, 101).

Deerfin, with five smithing hearths, structures and manufacturing of iron objects may also have specialised in iron working although details of the levels and nature of metallurgical waste and features and radiocarbon dates were unavailable (Bratt 1975:04). A further settlement at Milltown, County Kilkenny contained a circular structure with an internal pit which appears to be the remains of a smelting furnace (Young 2009e, 1). Relatively small quantities of metallurgical residue indicate smithing and smelting. This appears to be an unenclosed settlement with further structures, kilns and rectilinear fields dating to the ninth/tenth century (Gaimster *et al.* 2006, no.199).

Further very significant evidence comes from Gortnahown 2, County Kerry (158kg) where a univallate settlement contained a series of iron smithing hearths and smelting furnaces close to a series of structures (Young 2009b). A further oval structure contained two furnaces and two hearths dated to the late sixth to seventh century A.D. The remains of brazing shrouds from the production of iron bells were found within the assemblage. This constitutes the earliest Irish evidence for bell manufacture. One had evidence for the wrapping of the wet clay shrouds in textiles in the production phase. Brazing involved adding a copper alloy coating to the bells to provide a smoother finish. These bells are smaller than those found at Clonfad and may be similar to those worn by livestock.

An enclosed settlement at Borris produced evidence for small-scale primary and secondary iron smithing activities. An assemblage of 142.74kg of iron slag from a metalworking area was recovered including two furnaces and three smithing hearths (Wallace and Anguilano 2010b, 80-82). The assemblage primarily consisted of iron-smithing slag in the form of smithing hearth cakes, slag lumps and hammerscale while fragments of furnace lining, a possible *tuyère* and a rare loaf-shaped piece of iron bloom were also found (*ibid.* 80-1). A large sunken area 6.8m in length and 6.3m in width may have been associated with the working of metal with a chisel, a whetstone, a hammerstone and a lens of smithing waste indicating an area which might have been used for the post smithing work (Wallace & Anguilano 2010a, 3). This work took place in several different areas over the life of the settlement.

At Killickaweeny, there were two areas of iron-working; one some distance from the dwellings in a separate annex, and the second separated from the dwellings by an internal division (Walsh 2008, 28). The evidence for iron-working (86kg of slag) was much more limited than the nearby site at Johnstown, but the presence of smelting and smithing slags, along with hammerscale, indicate that all phases of processing occurred there (Walsh 2008, 40-2). Evidence for the location of iron-working at Dressogagh found that the furnace, slag and charcoal were found in the southeast area, but the main domestic hut was centrally located (Collins 1966).

Another possible example of a workshop was at Ballyvollen which produced 170kg of iron slag, three tuyères, a few sherds of souterrain ware as well as a possible irregular-shaped structure in the southern area (Williams 1985a, 96-101). The site was identified as a specialist iron-working area, rather than a domestic site (Scott 1991, 101), despite the fact that Ballyvollen did not produce any actual evidence for furnaces. It is unclear if this site was enclosed. The industrial area appears to have coincided with a circular cropmark; however excavations failed to locate any evidence for an enclosing ditch or bank.

On most sites, iron-working tended to be an outdoor activity. Possible windbreaks were found in the metalworking areas at Killickaweeny (Walsh 2008, 40-2) and Ahanaghlough (Tierney &

Elliot 2008, 101). However, iron-working appears to have taken place within actual structures at Lowpark (above), Reask (Fanning 1981, 106-8), Church Island (O'Kelly 1958, 69) and at least eight other structures (Table 2.3). A further example may be within the figure-of-eight house at Ballynavenooragh, stone fort which contained a feature described as a 'small furnace' (Gibbons 1997). The majority of these structures were sited within the enclosure itself. It is possible that iron-working occurred after the houses became derelict, as was the case at Illaunloughan where the church was later used for iron-working (Marshall & Walsh 2005, 46). Tierney and Elliot (2008, 105), however, suggest that iron-working was best undertaken indoors in more sheltered darkened locations where it was easier 'to judge the flame colour of the smelting furnace and the colour of the metal when it is heated for smithing'.

Site	Residue weight	Site Type	Structure	Reference
Ballyvourney 'St Gobnets'	Large amounts	Other	Successive circular and rectangular structures with internal smelting furnace, charcoal, crucibles	O'Kelly 1952, 32-5
Caricalla More	13kg	Univallate settlement	Circular building with internal pits containing large amounts of slag and charcoal, whet stones, chisel, anvil stone	Taylor 2006
Carrigatogher Harding	750kg	Cemetery/Settlement	Rectangular building with slag	Taylor 2009, 30
Gortnahown	158kg	Univallate enclosure	Circular building containing smithing hearth	Young 2009b
Killickaweeny	86kg	Univallate enclosure	Rectangular structure containing hammerscale close to metalworking area	Walsh 2008, 40-2
Mackney	12kg	Univallate enclosure	Postholes around smelting furnaces	Delaney 2009, 44
Milltown	3kg	Unenclosed	Circular building containing smelting furnace	Young 2009e, 1
Sallymount	265kg	Univallate enclosure	Rectangular building with smithing hearth, hammerscale	Clarke & Long, 2009

Table 2.3 Examples of structures associated with metalworking indicating site name, overall quantity of metallurgical debris, site type, structural context and reference.

At Nendrum, there was evidence for ferrous and non-ferrous metal-working from the 'hut circles' within the middle enclosure (Bourke 2007, 407, 419; McErlean 2007a, 374-8) and outside the enclosures close to the site of the horizontal mills (McErlean & Crothers 2007a, 68, 2007b, 110). This confirmed Ryan's (1988, 45) conclusion that monastic metalworking was kept well away from the sacred centres of these sites. There was abundant evidence for iron smelting and smithing in various areas at Clonmacnoise in the form of slag, furnace bottoms and furnace material (King 2009, 341-3). However, only one definite small bowl-shaped furnace or smithing hearth has yet been found at the base of an esker in a sheltered position outside the monastic enclosure to the southwest of the site (Ó Floinn & King 1998, 130-1). It appears though that the area to the west and northwest of the ecclesiastical buildings within the monastic enclosure was dedicated to iron-working. A layer of furnace waste, iron slag and tuyère fragments were found to the west of the site (Manning 1989) and a vast quantity of dumped iron-working material containing slag, furnace bottoms, smithing cakes, tuyère fragments was found to the northwest of this. All parts of the iron-working process were evident indicating that these activities (smelting and smithing) were probably undertaken close to the excavated area (King 2009, 341-3).

A series of sites were associated with burial, settlement and different stages of iron production. At Johnstown 1, the settlement was primarily associated with the smelting and processing of bog ore (smelting pits & bowl furnaces) but the discovery of smithing hearths also indicates the forging and repair of iron objects. The site produced some 2,000kg of metallurgical waste though this activity continued intermittently for a thousand years from A.D. 500-1500. Most of the smelting pits were located outside the enclosure or within the enclosure ditches where much of the slag was dumped (Clarke and Carlin 2008, 74-5). Where iron-working was undertaken within the enclosure, it was located in the western areas where there were fewer burials (*ibid.* 74). The specialist viewed the levels of waste produced and

number of hearths as indicative of relatively poor and inefficient levels of skill in ferrous metalworking (Photos-Jones 2008a). At Carrigatogher Harding, an enclosed settlement with a cemetery was sited close to a stream directed through the eastern part of the enclosure with extensive deposits (750kg) of iron slag, charcoal and a tuyère (Taylor 2009, 30-31). Possible furnaces were found in the outer enclosure to the south of the cemetery enclosure (*ibid.*). Likewise at Balriggeran an extensive spread of burnt stone and charcoal was associated with bloomery iron smelting and smithing (113.5kg) in the northwest of the enclosure containing the burials (Photos-Jones 2011, cliii). This was associated with features such as pits and postholes and gullies and was in close proximity to a stream. The proximity and incorporation of the stream may have been connected with metallurgical processes among other things.

This can be compared with the evidence from Clonfad. Here excavations at the produced evidence for a highly specialised iron-smithing area (with up to up to 1,500 kg of smithing waste) dating to between the sixth and ninth centuries A.D. adjacent to a stream on the eastern side of the multivallate enclosed site (Stevens 2006, 10, 2007, 42-3; Young 2009a; Stevens 2010, 89-94,). The earliest metalworking activity dated to the fifth and sixth century and included a 1.5 tonne dump of slag residue from large-scale iron-smithing brazing shroud fragments (vitrified clay pieces) used in the brazing process during the manufacture of wrought-iron hand-bells. Iron-working continued in the seventh and eighth century and the backfilled enclosing ditches produced evidence for metal scrap, ingots, ceramic crucible fragments, smithing hearth cakes, tuyères, stone casting moulds and ferrous and copper-alloy tools and objects (Stevens 2010, 91). The majority of the evidence related to primary and secondary smithing waste with evidence for smelting almost completely absent (Stevens 2010, 93). At Dooley, a site within the sandhills which contained an enclosure containing burials appears to have had an emphasis on craftworking including iron production (Ó Riordáin & Rynne 1956). There has been no specialist analysis of the metallurgical evidence but the scale of the iron-working is evidenced by the presence of 120 iron knives. The site may have been used as a beach-market for traders moving down the North Atlantic seaways between Northwest Ireland and Scotland (O'Sullivan and Breen 2007, 119). While the link between burials and iron-working has been emphasised in recent studies (Williams 2010, 31-45) there can be no simple equation between iron-working and sites with settlement and burials. Sites such as Owenbristy which was in use for 600 years which was fully excavated had minimal levels of smithing slag while enclosed familial burial grounds like Collierstown also had tiny quantities (Lehane and Delaney 2010, 47, O'Hara 2009, 6).

Several types of craftwork have been identified in Scandinavian Dublin but despite extensive excavation, iron-working areas have yet to be identified. Wallace (2004, 833) has speculated that 'the great fires that were so essential for the smith and his forge almost certainly meant that they had to be located at some distance from the town' outside the defences. Evidence for iron-working has, however, been found within a building in Peter Street in twelfth century Waterford (Scully and McCutcheon 1997, 104).

2.6: Levels of iron-working

Scott (1991, 101) described five levels of iron-working on Irish sites; specialist smelting and bloom smithing sites, occasional smelting and smithing sites, sites forging artefacts from imported stock for local and wider communities and sites engaging in occasional artefact repair and production. In discussing the iron-working evidence from the M4 Carlin suggested three levels of ferrous metallurgy (2008, 108-10). Carlin's first level saw local farmers undertaking iron-working at a very low non-specialist subsistence level. It was probably imperative for small self-sufficient farmsteads to possess a basic knowledge of the technology repair iron artefacts (Edwards 1990, 86; Mytum 1992, 235). His second level and third levels were high status ecclesiastical and secular sites which patronised blacksmiths alongside other specialist craftsmen (Carlin 2008, 109-111). A number of royal sites, such as Lagore (Hencken 1950), Garranes (Ó Riordáin 1942) and possibly Moynagh Lough (Bradley 1993), have been described as specialist metalworking centres which probably employed skilled craftsmen in return for food and raw materials. Large monastic centres such as Clonfad,

Clonmacnoise, Armagh and Nendrum also clearly supported craftsmen engaged in specialist iron-, metal- and glass-production.

Other theories have been advanced about the organisation of early medieval iron-working. Mytum (1992, 234) interpreted the evidence of the law-tracts as meaning that smiths worked in permanent forges for a surrounding community of farmers and has argued that each *túath* had one head blacksmith who was a major figure in the territory at these sites. However, Carlin (2008, 111) has criticised this model, noting that the archaeological evidence is not consistent with this centralised approach, but is instead replete with 'isolated' iron-working features such as those along the M4 and 'examples of high-quality, small-scale, localised 'do-it-yourself' smithing that was being undertaken by independent farmers'. The focus of the early literary sources on high-status sites might explain why these sources failed to account for, or mention the importance of, the iron-working activities at smaller, ordinary farmsteads in early medieval Ireland.

Although knowledge of the basics of iron-working was probably widespread in early medieval society, excavations have revealed considerable variability in the extent and character of evidence at various forms of settlements. The slag assemblages from most excavated early medieval sites typically range from 30-200kg although there are a growing number of sites with assemblages over 1000kg (Wallace & Anguilano 2010b, 73), perhaps indicative of specialised iron-working sites. However, it is often difficult to determine the duration of the iron-working activity at some sites (e.g. Johnstown) while the extent of the excavated area on different sites and the size of the sample of metallurgical debris taken can vary considerably, skewing our perception of the character of iron-working at these places. Comber recognised 14 sites with extensive evidence for iron-working and 37 with average evidence (Comber 2008, 123-4). The weight of iron slag from early medieval sites can give a very rough indicator of the scale of such activities and was readily available for 60 sites within the EMAP 2012 gazetteer (Appendix 1). This obviously represents accumulated weight over periods of time and has to take into account that some processes may produce more residues than others. Nonetheless it gives an indication of the range and scale of work.

A total of 148 sites had no ferrous metallurgical residue. While many of these could be a result of extent of excavation or what excavators chose to record in older reports it is a sizeable percentage of the sample. It is striking that some very large excavated settlements have revealed very little iron working debris. Eighteen of the sites in the EMAP 2012 gazetteer had 10kg of metallurgical residue or less. This includes sites such as Baronstown (Linnane & Kinsella 2009b), Dowdstown (Cagney & O'Hara 2009) and long lived enclosed cemeteries such as Owenbristy (Tierney & Delaney 2011) and Collierstown (O'Hara 2009c). Some of these sites had very large excavated areas. This would suggest that iron-working on these sites occurred very infrequently and those within either carried out smelting and smithing at other locations or went to smiths at other settlements.

Twenty eight sites had between 10kg and 100kg of metallurgical residue. This ranged from massive complexes like Roestown 2 (10kg), univallate settlements like Mackney (46kg, Delaney 2009, 44), the cemetery and settlement at Ratoath (73kg, Wallace 2010) and the univallate settlement and workshop at Killickaweeny (86kg, Walsh 2008).

Six sites had between 100 and 200kg of metallurgical residue. This included sites with multiple metalworking areas like Borris (142kg, Wallace & Anguilano 2010a), univallate enclosures with workshops like Gortnahown 2 (158kg, Young 2009b) and settlements with cemeteries like Parcnahown (100kg, Young 2009c) and Balriggeran (113kg, Photos-Jones 2011). Three sites had between 250 and 500kg of metallurgical residue. These comprised the univallate settlement and smithy at Sallymount (265kg, Clarke & Long 2009), the Viking settlement at Woodstown including smelting and smithing (272kg, Young 2009d) and the royal site at Knowth (341kg, Eogan 1977). Six settlements in the EMAP 2012 gazetteer contained 500kg or more. These were settlements with cemeteries at Johnstown (2200kg, Photos-Jones 2008a) and Carrigatogher Harding (750kg, Taylor 2009), the multivallate and

univallate enclosures at Lisleagh 1 and 2 (1000kg and 800kg, Monk 1995), Lisanisk (827kg, Coughlan 2010) and the univallate enclosure at Lowpark (1360kg, Wallace and Anguilano 2010c). Clearly sites like Garryduff (O'Kelly 1963), Garranes (Ó Ríordáin 1942) and St Gobnet's (O'Kelly 1952) are likely to fit somewhere at the upper end of this scale given the number of furnace bottoms from each of these and the suggested minimum weight for these. Clearly ecclesiastical sites like Clonfad belong at the top of this range (1500kg) along with Clonmacnoise (Young 2009a).

There is clearly no simple equation be made between the type or perceived status of a site and the scale of iron-working carried out within it. It is very difficult to estimate how much activity archaeometallurgical waste represents. Any assemblage can only indicate the minimum of activity on that site. Young gives the example of Parknahown, a cemetery and settlement which operated over approximately six centuries, which produced 100kg of waste representing a minimum of a single smelting episode and 150 smithing sessions although activity is likely to be considerably higher (Young 2009c, 3). Likewise at Killickaweeny, Photos-Jones commented that the 86kg of metallurgical waste generated sometime within a possible 100 year time span could not have been seen as industry but as part of the annual calendar of activities for a farming community (Photos-Jones 2008b, 53). Clearly chronology is an important part of this analysis. While the extensive metalworking at Lisanisk (seventh to ninth century A.D.) can be dated to periods throughout the sites occupation the bulk of metalworking at settlements like Kilree 3 and Loughbown 1 took place in the tenth to twelfth century considerably at a time when the ditches have silted up and the overall level of settlement is unclear (Coughlan 2010b, 34; Bower 2009b, 17). Therefore to have a properly nuanced understanding of levels of metalworking over time we need a synthesis of accurately dated iron-working features.

The results of recent excavations clearly suggest that specialised iron-working was carried out at a range of levels. While the traditional high status sites such as Lagore, Garranes or Knowth clearly had high levels of iron-working and therefore possibly smiths under patronage other such as Moynagh Lough did not focussing on non-ferrous metallurgy. On many high-status sites, itinerant craftsmen may have worked for most of the year but perhaps only a few high-status secular and ecclesiastical settlements had the economic and political capacity to support permanent workshops of specialised iron and metal-workers. Specialised workshops like Lisanisk, Lowpark and Lisleagh were clearly related to resident smiths who lived within enclosures of different sizes and individual histories but clearly not materially wealthy relative to places like Garranes. They may themselves have been under the patronage of a secular or ecclesiastical lord. Similarly it might be suggested that places like Johnstown 1, Carrigatogher Harding may have acted like Clonfad as places where smelting and bloom smithing was one of range of activities probably under the control of local family church communities. The presence of master smiths at ecclesiastical sites is noted in the founding story of the early monastery of Brigown (Carroll 2005). The founding saint of the monastery, Fanahan, is said to have named the site in honour of the seven master smiths who worked there and it has also been noted that the name Brigown was written in the Book of Lismore as '*Bri-gobh-unrí*' which can be translated as 'bree' or hill of the smith ('gobha') (ibid). Limited excavation 400m away uncovered several pits and linear features outside the partial outline of an enclosure ditch which contained large quantities of dumped or waste charcoal and slag. One small bowl-shaped pit with evidence for in situ burning was found in the interior of the enclosure and was interpreted as a possible pit-furnace used for iron smelting. In light of this historical evidence, it is possible that the enclosure was occupied by a group of smiths who lived independently of, but in close proximity to and under the supervision of, the nearby monastery.

A significant range of sites had their own smithing capabilities within purpose-built buildings but iron-working was unlikely to be the mainstay of activity at the site. This could include places such as Sallymount (Clarke and Long 2009) and Gortnahown 2 (Young 2009b). Communities from a significant range of sites only occasionally hosted smithing activities on site. There is clearly a debate as to whether these people engaged in smithing themselves as

part of seasonal activities or hosted a number of smiths who travelled the *tuath*, perhaps from their own workshops, repairing and making objects. Clearly maintenance of tools was represented on many sites by whetstones but this does not necessarily imply manufacture (Comber 2008, 119). The self-sufficiency argument for early medieval settlements may be stretched too far given the archaeological evidence for a large range of sites with low levels of ferrous metallurgy or none at all. Smelting, charcoal making and bloomery sites outside settlements fitted somewhere in this hierarchy.

Some archaeometallurgists have also come up with schemes indicating different levels of iron-working activity. While they do not neatly equate with arguments about the position of metalworking in the law tracts they do provide important criteria for ranking activity. Young uses the size of smithing hearth cakes to place sites within four broad categories (Young 2011, 127-128). His first category comprises sites which are primarily engaged in producing and repairing artefacts citing the example of the univallate settlement at Moathill, Navan. This type of site had Smithing Hearth Cakes of less than 0.6kg with 90% weighing less than 1kg. The second group comprised those where smithing and smelting took place which includes sites such as Gortnahown 2, Parknahown 5 and Woodstown 6. These had less of the small smithing hearth cakes and more of the larger types. A third category was sites showing a wide range of practices from raw bloom to smithing and finished artefacts such as Clonfad and Clonmacnoise. His final group were sites which were specialised bloomery sites where he includes some of the isolated examples such as Ballinglanna north 1. These had very large smithing hearth cakes which were typically above 1kg. It would seem quite likely that other archaeometallurgists who have different views on the size of smithing hearth cakes and the type of iron-working they represent may see alternative ranges and levels of use.

2.7: Conclusion

The EMAP 2012 review of metallurgy shows the scale and variety in evidence for early medieval Irish ferrous metallurgy. The routine involvement of specialists has meant that archaeologists have greater awareness of the potential of metallurgy in early medieval archaeology. It also means that there is greater recording and sampling of metallurgical residues and features. There is still considerable disagreement over the stage of process demonstrated by different metallurgical residues and over the technology and construction of furnaces. The identification of workshops and associated structures and residues is demonstrating the range of such sites outside of the traditional 'high status' sites. It further indicates that there were a range of sites engaged in specialist ferrous metallurgy as a key part of their daily lives. Analysis of residues from metallurgical remains, even where there were no furnaces or smithing hearths within the excavated area, is helping provide a better picture of the type of iron-working practiced at a range of settlement sites. A more contextual understanding of the date and nature of iron-working sites is necessary as ferrous metallurgy at many of the sites within the EMAP sample may only have taken place once or twice over long spans of occupation. Through collection of this data we are reaching a better understanding of the variety of sites engaged in metallurgy there is still a need for greater clarity on the procurement, economy and production of iron on settlement sites during the period.

Chapter 3: Early Medieval Non-Ferrous Metal-Working

3.1: Introduction

The evidence for non-ferrous metal-working has recently been reviewed by Craddock (1990) and Comber (2004; 2008, 133-49) and an earlier review of metal-working from monasteries was produced by Ryan (1988). The non-ferrous metals in early medieval Ireland comprised copper-alloy, lead, tin, silver and gold and were almost exclusively used in the production of luxury items. In the early medieval period, copper-alloy was usually in the form of either bronze or gunmetal which was an alloy of copper and tin with lead added to improve its casting qualities (Edwards 1990, 90). Some of the best known early medieval non-ferrous metal objects consisted of copper-alloy pins, brooches, latchets, buckles, strap-ends, rings and studs (Doyle *infra*, Section 3) as well as bowls, wooden buckets or relics covered in copper-alloy sheets. The ninth-century witnessed the beginning of a decline in the Irish fine-metal-working as non-ferrous metal objects became coarser and plainer with amber replacing the use of millefiori and enamel and both filigree and *kerbschnitt* disappearing (Comber 2008, 134-35). Dublin's, and indeed Ireland's, first and only definite pre-Norman mint, was established in A.D. 997. These silver pennies were based on the English *Aethelred* series and found their way all over Europe between A.D. 997 and about A.D. 1040. After this period, the Dublin silver pennies declined in weight and legibility suggesting a more localised distribution (Wallace 2004, 837-9).

Excavations during the recent economic boom as well as consideration of older sites have revealed the extent of evidence for non-ferrous metal-working on Irish early medieval settlements. Non-ferrous artefacts were found at 159/317 sites within the EMAP 2012 gazetteer which did not include ecclesiastical or urban sites (Map 3.1). A total of 62/317 sites were identified as containing direct evidence for non-ferrous metal working (Appendix 1.2). Ten of these settlements had no evidence for ferrous metal-working while the remainder had varying amounts of evidence for this craft as well. Comber had originally identified 37 settlement sites and 8 ecclesiastical sites with evidence for non-ferrous metal working (Comber 2008, 149). In comparison to ironworking relatively few of the sites have had specialist input from an archaeometallurgist. Experimental work has significant potential to add to our understanding and while much of the Irish literature has been concerned with Bronze Age metallurgy (Ó Faoláin 2004). There have been a number of Irish attempts to create copper alloy early medieval objects (<http://www.umha-aois.com/ua-site/2010-k-dennett.htm>). Archaeological evidence for non-ferrous metal-working comes in the form of rare indications of extraction and smelting, processed materials like ingots, artefacts such as crucibles and moulds and rare residues such as slag.

Metallographic analysis of non-ferrous objects has occasionally been undertaken in Ireland. Scientific analysis of silver from ingots, arm rings and other objects in Ireland and hoards from Wales, England and Scotland was undertaken (Kruse and Tate 1992, 295-328). This indicated some similarities in chemical composition between hoards in Ireland and other regions and advocated the potential of examining lead isotopes to provenance the source of the silver. While this technique has had huge success in examining the significance of the Ross Island copper mine in Bronze Age metal-working (O'Brien 2004) its potential to identify origins for early medieval metal sources in Ireland is yet to be achieved. Other objects have been investigated because of their unusual character. An as yet unpublished scientific examination of a copper alloy neck ring found with a burial at Ratoath, County Meath was undertaken to assess its origin (Wallace 2010, 306). Given the distinct nature of the burial and the object this sought to assess the external influences on the site. Larger scale studies of these types or routine analysis of a sample of objects from excavated sites have been seen as a very useful future direction for understanding non-ferrous metallurgy as well as aspects of economy and society (Bayley *et al.* 2008, 14-15).

3.2: Raw materials, processes, manufacturing

Although a wide variety of objects were made of copper-alloy, there is substantially less evidence for the production of copper-alloy than for iron. The first stage involved sourcing metal ores from their primary contexts. Copper ore has been found at Lagore (Hencken 1950, 240-41), and lead ore has only been noted at Ardcloon (Rynne 1956, 208). Smelting slag containing copper has been found at Cooltubbrid East, Co. Waterford along with a copper smelting hearth which the excavator identified as 'experimental copper-smelting' (Tierney 2008, 208). The recent discovery of two early medieval smelting furnace pits at the Ross Island copper mines is the first evidence for the extraction and processing of copper ores from their source in this period (O'Brien 2004). Three slag deposits were radiocarbon dated to the late sixth/early seventh century. The possible remains of clay *tuyères* and furnace wall materials were also found (O'Brien 2004). There was no evidence for moulds or crucible remains indicative of metal casting and this suggests that Ross Island was a primary processing site. The meagre evidence appears to suggest that the processing of copper ore is more likely to have taken place at its source and transported in the form of ingots or cakes to settlement sites. Bronze or copper ingots are found on at least seven settlement sites (Appendix 1.2) as well as at Cathedral Hill, Armagh and Clonmacnoise (Ryan 1988, 43, King 2009, 341-43).

Smelting is the process whereby copper and other base metals such as tin were extracted from their ores. The process involved a furnace which was heated up to very high temperatures by the use of bellows or blow-pipes and produced some waste slag, though not in the same quantities as iron smelting. Crucibles may have been used as part of 'the initial reduction of ore minerals in a controlled smelting process' as well as 'in the refining and alloying of metal and in the casting of final metal' at later stages in the process (Comber 2008, 139). After smelting, the copper may have been purified by melting it in a clay crucible and stirring it. Two lumps of metallic tin have also been found at Garranes (Ó Ríordáin 1942, 100-2). The smelted tin may have been added at this stage to form bronze and the metal was then ready to be cast in stone or more frequently clay moulds (Edwards 1990, 90).

Non-ferrous metal-working furnaces can be difficult to interpret when all that survives is a spread of burnt clay and charcoal and it can be easy to confuse this evidence with domestic hearths (Comber 2008, 135). Early medieval furnaces were typically of a primitive bowl type and could have been used for smelting or re-melting a range of metals and alloys (Comber 2008, 139). A metal-working area on the west side of Moynagh Lough produced a bowl-shaped furnace associated with five clay-nozzles fragments, 67 crucible sherds, three heating tray fragments, an antler motif and over 600 clay mould fragments and one kilogram of slag (Bradley 1993, 77-80). The excavator believed that it was used for *melting* copper rather than *smelting* copper, on the basis that there was very little slag on the site (Bradley 1993, 77-80) though Comber (2008, 138) has cautioned that 'a relatively pure ore does not produce a large amount of slag, while the melting of smelted and refined metal should produce very little'. A furnace at Movilla Abbey may also have been used for *melting* as it was found in association with crucibles and scrap copper alloy (Ivens 1984b, 77). Iron slag was definitely identified on the site (Yates 1983, 62), but it is less clear whether there was copper slag as well so it is difficult to establish if it was used for the smelting of metal ores. De Paor (1970) described the discovery of a 'bronze working furnace' at Iniscealtra. It was described as a scorched hollow with a clay dome associated with large quantities of 'cupric' slag (De Paor 1997, 62). No crucible or mould fragments are listed in association with the structure and the slag has not as yet been examined by a specialist. Copper globules, two copper fragments and a bar ingot were found at Castlefarm, County Meath but were not further reported on (O'Connell & Clark 2009, 52). A small fragment of slag from the melting of a zinc based copper alloy was also found at Dunnynell Island in association with crucibles (Young 2006a).

metal-working like Castlefarm (O'Connell & Clark 2009, 14) and Deer Park Farms (Bayley 2011, 346-251). Bar-shaped ingots are the most common form and typically measure between 5 and 10cm and 1cm in thickness (Comber 2008, 135). These could have been used as convenient forms for storage or trade or could either have been hammered out on an anvil to form sheets of metal or melted down in crucibles for pouring into clay moulds, from which various objects could be cast.

3.2.1: Crucibles

Crucibles are commonly found on early medieval settlements but were importantly specific to non-ferrous metal-working. A total of 55 settlements of the 62 sites with evidence for non-ferrous metal-working within the EMAP 2012 gazetteer had evidence for crucibles and in 37 cases this was the only evidence for this type of craft (Fig. 3.1; Appendix 1.2). Comber's analysis of ringfort and contemporary settlements identified 21 settlement sites with crucibles along with a further eight ecclesiastical sites. Estimating the number of crucibles per site is difficult as they are often given in publications as sherds or fragments rather than a minimum number of individual vessels. Therefore the numbers represented by fragments depends on the degree of fragmentation. This is in addition to those found at ecclesiastical sites such as Reask, Movilla Abbey, Clonmacnoise along with multiple locations in Armagh (Comber 2008). Crucibles from Armagh and Moynagh Lough bear the mark of tongs used to handle them. Many of these may have been represented by small numbers of sherds. The sites with no evidence for ferrous metal-working which contained crucibles had no excavated furnaces suggesting they could have been used in conjunction with domestic hearths.

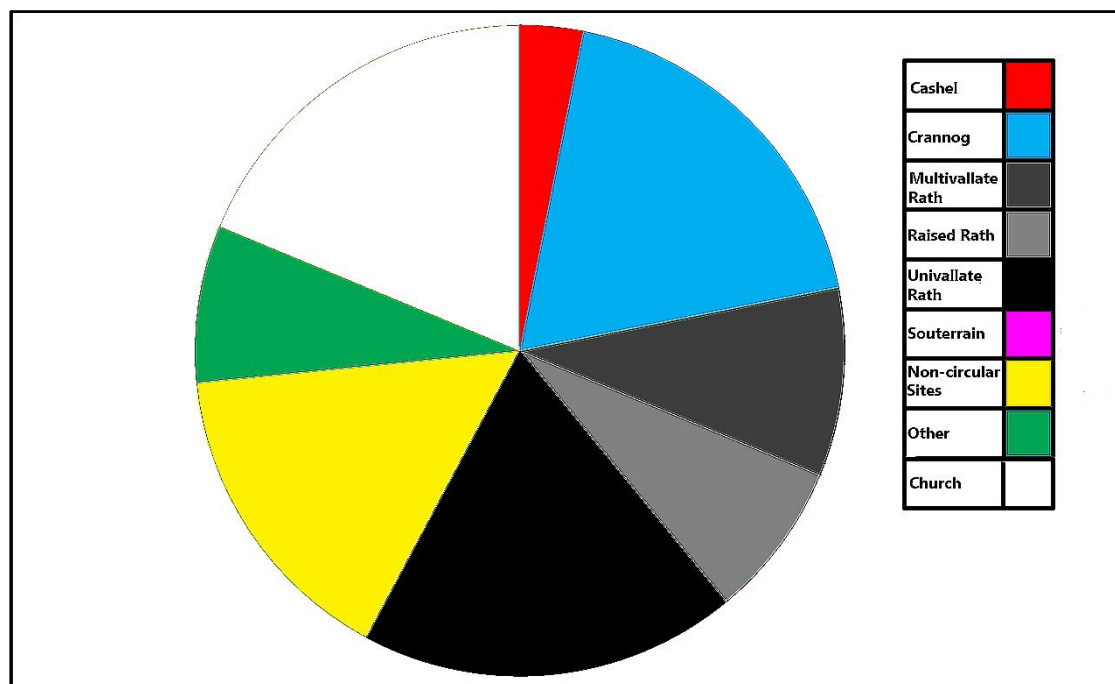


Figure 3.1: Crucibles found on different types of early medieval settlement (N=64)

Most crucibles were made of clay though stone examples are also known. Several different types have been identified (Laing 2006, 115-7): the most common type were small with triangular mouths (pyramidal type) though deeper, bag-shaped and shallow, round-bottomed and flat-bottomed crucibles are also known (Edwards 1990, 90). Some details are available on the manufacture of these objects. A total of 26 sherds were found at Clonfad, all pyramidal in form (Young 2009a, 8.1). They were made from clay with an organic temper, possibly hair.

Many crucibles have an internal glassy glaze was created when the hot contents combined with silicates and alumina in the wall of the vessel cool rapidly (Wallace 2009, 9). Relatively

little Irish work has been undertaken on the analysis of the glazes and residues apparent on crucible since the initial overview of the subject by Moss (1927), although the subject has most recently been summarised (Comber 2004, 33-6; 2008, 139-41). The most extensive study on crucible residue remains is for Lagore (Hencken 1950, 237-9). While a few of the crucibles revealed iron residue but not copper, most tended to show traces of iron along with copper (*ibid.*). Hencken, however, concluded that the traces of iron 'would have come into the crucibles as impurities in the crudely smelted copper' (1950, 239).

The use of Scanning Electron Microscopes and X-Ray Fluorescence is allowing more detailed analysis of crucible sherds. Analysis at Coonagh West revealed that the crucible had added quartz to strengthen the walls and contained copper and tin alloy along with traces of zinc, silver and gold (Wallace 2009, 8). Assessment of a crucible from Moynagh Lough revealed copper alloyed with tin as did a pyramidal example from Borris (Wallace & Anguilano 2010a, 22). Residues of metal were found in the interior of a bronze-working crucible from Lagore and crucibles and heating trays with significant residues of copper, silver and smaller amounts of gold have been found at Knowth (Barton & Bayley 2012, 527) and Clonmacnoise (King 2009, 338). Analysis of a lidded crucible from Deer Park showed the presence of copper, tin and lead (Bayley 2011, 348). Scott (1991, 3), however, suggests that crucibles may have occasionally been used in ironworking at this time. Indeed pyramidal crucibles from sites such as Clonfad and Gortnahown 2 indicate that copper alloy was used in the brazing process and on both sites crucibles were found which may be linked to the finishing of iron objects (Young 2009a and Young 2009b).

3.2.2: Heating trays:

There has been some discussion of the possible uses of 'heating trays', 'hot-plates' or 'cupels' which are sometimes found associated with crucibles at various sites such as Woodstown (Young 2006, 3-4, Young 2008, 2) Garranes (Ó Ríordáin 1942, 134-9); Knowth (Eogan 1977, 74); Moynagh Lough (Bradley 1993, 75-9), and Lagore (Craddock 1990, 185). These objects are produced out of fired clay and were utilized for heating objects that could not be directly placed into a fire or furnace. Comber (2008, 140) has suggested that they were most useful 'during the final fabrication of an object, enabling the melting of solder during filigree application or the evaporation of mercury during gilding'. The majority of identifiable crucible fragments from Kilgobbin were of this type and thin section analysis revealed that they were used for assaying silver (Bolger 2008, 99). Two open heating trays from Deer Park farms suggested that they had been used to heat copper and tin (Bayley 2011, 348). It is also suggested that heating plates were also used in the production of enamel (see glass-working Chapter 4). Examination of the assemblage from Dunnyneil led Young to suggest that a sub-group exists within flat bottomed crucibles (Young 2006a, 1-9). He distinguished between dish like vessels and flat bottomed vessels which on analysis had high levels of lead and silver and variable amounts of copper. While the differing use of these vessels is not entirely clear it has been suggested that they are likely to have been used to assay silver. In this process small piece of silver would be melted along with a larger amount of lead producing a refined metal button in the middle of the vessel which would leave a circular scar (Young 2006a). The scar resulting from the removal of this button has been interpreted in the past as demonstrating that these vessels were crucible stands. Assessment of the dish like crucibles from Dunnyneil indicated they were used for assaying silver with high levels of lead present (*ibid.* 3).

3.2.3: Moulds

Both stone and clay moulds were used in early medieval Ireland though the latter were more popular and easier to shape than their stone equivalents. Stone moulds were most commonly used to produce bar or oblong-shaped ingots. These were easily carved into a stone block and may have often been manufactured in 'open' stone moulds though bivalve examples are also known. Many stone blocks have multiple moulds for ingots. One of the examples from Knowth had cruciform carved into one of the mould bases (Barton & Bayley 2012, 527). A copper-alloy ingot from Garranes actually fitted into an ingot mould found at the site (Ó Ríordáin 1942, 100, 108-9) and a soapstone ingot mould from High Street, Dublin, contained

a matrix for casting Thor's hammer symbols (Ó Ríordáin 1984, 137). Other stone ingot moulds are known from various sites, including Lagore (Hencken 1950, 170-1); Moynagh Lough (Craddock 1990, 182); Ballinderry II (Hencken 1942, 65); Garranes (Ó Ríordáin 1942, 108-9); Roestown (O'Hara 2009b, 62); Clonmacnoise (King 2009, 343); Cathedral Hill, Armagh (Gaskell-Brown & Harper 1984, 125); Clonfad (Stevens 2007, 43; 2010, 91) and Temple Bar West, Scandinavian Dublin (Simpson 1999, 33), Faughart Lower, County Louth (Schuster & Jones 2012, 46-47). A stone mould for dress-pins was recorded at Caherconnell cashel (Hull and Comber 2008, 31); a possible stone mould for casting small rings was found at Reask (Fanning 1981, 126) while another possible example for pewter bowls was found at Woodstown 6 (O'Brien & Russell 2005, 119).

Clay moulds were used for producing finer objects such as ringed-pins and penannular brooches (Doyle *infra*, Section 3). It appears that only bivalve or 'two-piece' clay moulds were used to produce these (Comber 2008, 141). However, most of these are in a fragmentary state as they were usually broken in order to extract the casting. Once the cast objects were removed from their moulds, they were finished by filing away the rough edges and polishing. They were then ready for assembly and for further decoration such as millefiori, enamel or the insertion of glass or amber studs (Edwards 1990, 91). Clay moulds associated with metal-working activity are known from at least 15 settlements and nine ecclesiastical sites (Appendix 1; O'Connor 2005). They are highly friable and therefore easily broken, a factor which may contribute to their discovery and distribution. Most of the settlement sites are represented by very small numbers of moulds (less than eight). These are predominantly high status raths, crannogs and ecclesiastical sites or settlements with burials (Fig. 3.2).

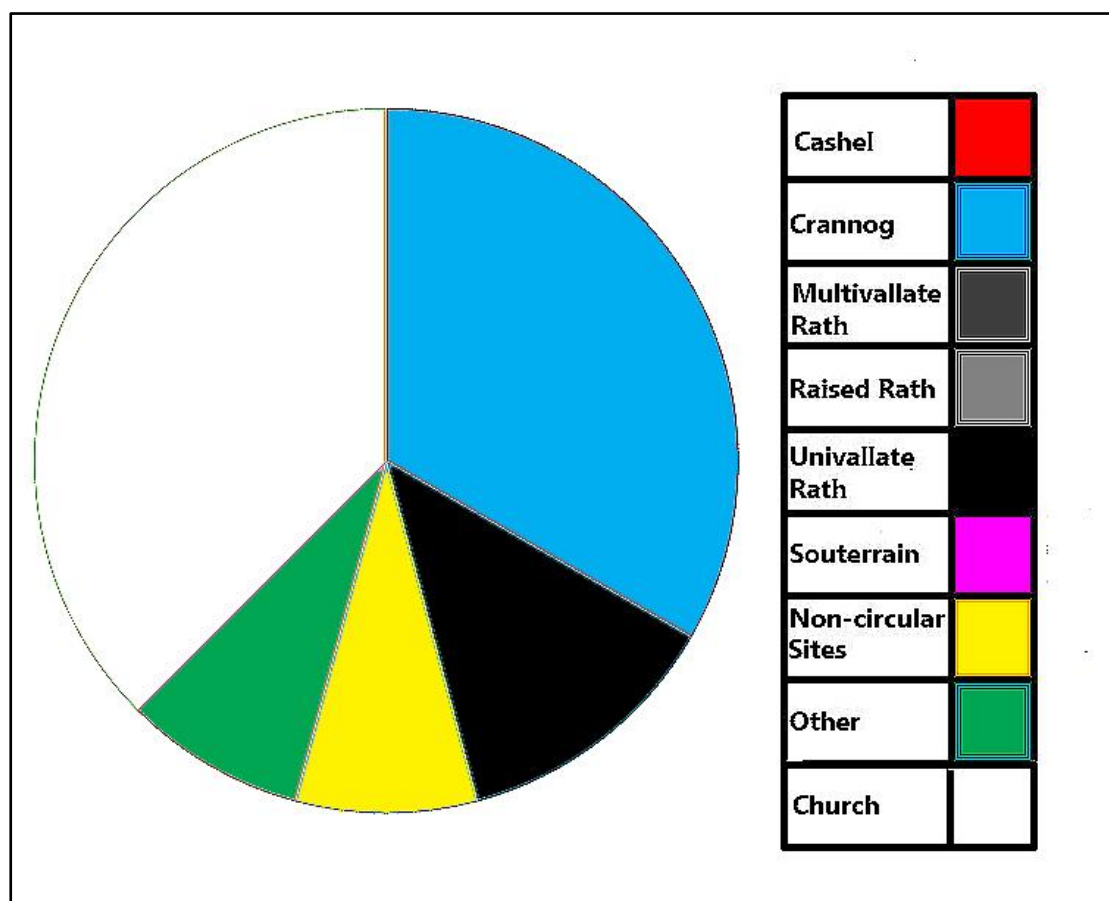


Fig. 3.2: Moulds on different types of Irish early medieval settlements (N=22)

3.2.4: Motif-pieces

Stone, antler, bone and occasionally wooden motif-pieces are frequently found in metal-working areas. These are generally regarded as trial-pieces used for practising patterns prior to reproducing them on metalwork or for circulating designs. Motif-pieces have been recorded at several sites (See O'Meadhra 1987, 1997); and examples include seven ecclesiastical sites, one enclosure with burial and settlement, three high status crannogs or settlements, the Hiberno-Norse towns at Dublin and Waterford and four other settlements (Appendix 1.2).

3.2.5: Scrap metal

Scrap metal has been found on a large number of sites and presumably was destined for recycling and re-melting, and this is the likely one of the reasons for the presence of stone ingot moulds on several sites. The importance of scrap and recycling is shown most strikingly by the metalworker's hoard from the Shanmullagh, on the River Blackwater (Bourke 1998, 30) which contained a collection of cut-up pieces of ecclesiastical objects. It is possible that some of the decorated bronze scrap found at Clonmacnoise (King 2009, 343) may also have come from ecclesiastical objects. Filing from non-ferrous metal at Deer Park farms may have been placed in a clay 'package' for melting which allowed for maximum re-use of resources (Bayley 2011, 348).

3.2.6: Precious Metals

Gold and silver were also used in ornamental metal-working. Gold was very scarce and was used sparingly in the form of leaf, gilding, filigree and granulation. There is almost no archaeological evidence for gold-working in early medieval Ireland as it was too precious a commodity to be wasted or discarded. Moynagh Lough (Bradley 1993) and Movilla Abbey (Ivens 1984b, 95) have produced tiny fragments of gold filigree wire and a gold ingot was also found at the former site. Clogher produced a gold rubbing stone, perhaps used for gold leaf and a crucible with a gold residue dating from the sixth to eighth century (Craddock 1990, 209-10). Evidence for gold-working was also present at Knowth (Barton and Bayley 2012, 526-33) and Clonmacnoise (Ó Floinn and King 1998, 123). The outer face of the twisted gold fragment from the latter site was flattened as if gripped by pincers or tongs (*ibid.* 123). At Lowpark a folded piece of filigree gold was found within a pit and, although there is no evidence for non-ferrous metal-working on site, it is likely to have been intended for re-cycling (Gillespie 2009, 166-167).

Silver was an important currency within early Irish law tracts and was suitable as payment for specified fines (Kelly 1988, 115). Some have suggested that the term *cerd* refers to a silversmith as distinct from a coppersmith (*ibid.* 63). There is little evidence for silver-working though surviving objects indicate that the metal became more common during the eighth century. However, it was the coming of the Vikings in the ninth century that brought a massive influx of imported silver into Ireland in the form of objects and coin and bullion hoards (Edwards 1990, 92). Sources of silver of the pre-Viking Age remain to be identified though native ores may have been exploited. Apart from the traces of silver recorded in crucibles and heating trays (see above) evidence primarily comes in the form of silver objects. A silver hoard from Carraig Aille II contained ingots and fragments cut from silver bracelets and may indicate that it was probably a stock-pile intended for use in the production of luxury items on the site (Ó Ríordáin 1949a, 62-4). A silver ingot and four nodules of silver-melt debris were recovered in the topsoil soil at the Hiberno-Scandinavian longphort at Woodstown, indicating that silver was being worked/smelted and exchanged at the site (O'Brien & Russell 2005, 119). The site also produced over thirty-six pieces of hack silver, most of them hacked ingots, from the top soil (*ibid.* 122). Silvered bronze clippings were associated with the burial and settlement site at Knoxpark, which appears to have had Hiberno-Norse activity (Mount 2010, 209, Kelly 2009, 485-497). Excavations at Faughart Lower, County Louth within a series of enclosures used for settlement and burial found a stone ingot mould and a matching silver ingot indicates the possibility of silver working on

site (Schuster and Jones 2012, 46-47). Silver ingots were also found at Carraig Aille 1, (Ó Ríordáin 1949a, 89-91), Feiltrim Hill (Hartnett & Eogan 1964) and 200m from the settlement at Cherrywood which had a range of Hiberno-Norse objects (O' Neill 2012, 17).

3.2.7: Lead

Lead was important for alloying with other metals. Little is known about the sourcing of this metal in the early medieval period. Lead models for objects were found at the crannogs of Lagore and Moylurg (Comber 1997, 107). Small lead bars have been found on a number of sites including at Glebe, Ratoath and Woodstown 6 (Seaver 2011, 150; Wallace 2010, 304, O'Brien & Russell 2005, 119-22). Tin was also vital as the principal alloy for use with copper in the production of Bronze. The mechanics of the sourcing of tin are unknown and it is often thought that the majority of it was imported through contacts with south-western Britain. Qualitative chemical analysis of non-ferrous artefacts have a considerable role to play in determining the origins of raw materials, the types of alloys and techniques used in the production of metals. A study of metalwork in the 'Celtic West' showed that bronze continued to be used in Ireland up to the tenth century when Hiberno-Norse metalworkers introduced the production of brass as a significant copper alloy (Craddock *et al.* 2001, 117-124).

3.3: Metal-working tools

A wide range of tools were utilised in the later stages of the fabrication of metal objects. An iron anvil with a very small working space and a spike projecting from its base is known from Garryduff (O'Kelly 1963, 56-7) and may have been used in the working of highly ornate items. Various other tools such as iron awls; punches; chisels; files; stone and iron-hammer-heads; bronze tweezers and styli; and whetstones used for sharpening metal objects are known from various sites and may have been used in these final stages of metal-working (Comber 2008, 144). An iron stake used in the beating of sheet metal was recovered from a metal-working area (1) at Moynagh Lough (Bradley 1993, 76) and three tiny needles of bronze were interpreted as possible compass points at Kilpatrick (Swan 1995).

3.4: The contexts of non-ferrous metal-working

Evidence for fine metal-working is clearly present on a significant number of different types of early medieval sites although the greatest evidence is generally confined to ecclesiastical and high status secular sites. Bronze and copper-alloy working has been identified at a range of ecclesiastical site, from small western monasteries (e.g. Reask and Illaunloughan), to established important centres such as Armagh, Downpatrick, Clonmacnoise, Nendrum and Movilla. Fine metal-working can be regarded as a consistent feature of the large monasteries (Ryan 1988). Some enclosure sites with settlement and burials, such as Dooey (Ó Ríordáin & Rynne 1961, 61-62) and Dunmisk (Ivens 1989, 28-36) also seem to have been important in fine metal-working with evidence for the making of brooches and other objects. This evidence can be paralleled with material from high status settlement enclosures and crannogs such as Garranes (Ó Ríordáin 1942), Lagore (Hencken 1950, 234-41) and Moynagh crannog (Bradley 1993, 77-80). At least eight other crannogs have revealed significant number of crucibles, clay moulds and ingot moulds (Appendix 1.2).

Excavations within enclosed settlements indicate that metal-working was usually undertaken within the enclosure but away from habitation areas or ecclesiastical buildings, reflecting concerns about the toxic and flammable character of the activity while conscious of exploiting the shelter and security afforded by the enclosing elements (Comber 2008, 146). The location of craftworking within enclosed settlements generally depends on the size of the site (Comber 2008, 146) but both activities can be found together in the same areas at smaller sites such as Reask (Fanning 1981, 89), as well as some larger sites such as Nendrum (McErlean 2007a, 378), Kilpatrick (Swan 1994/95, 8-11) and Woodstown (O'Brien & Russell 2005, 119). However, the early documentary sources indicate a clear distinction between blacksmiths and craftsmen involved in working bronze and other precious metals (Scott 1991, 184). This is

supported by the evidence on most large settlement sites where there is clear evidence for a physical separation between both activities (Comber 2008, 146-8). For instance, the bronze-working area at Knowth was found in the southern half of the site but the iron-working evidence was found in the northern portion (Eogan 1977, 73-4), while the northeast quadrant at Dunmisk was used for non-ferrous and glass-working with iron-working undertaken in the southwest area (Ivens 1989, 57-8).

Bronze-working appears to have been undertaken in the open-air mostly in sheltered locations in enclosure ditches or near enclosing banks as evidenced at Woodstown and Cathedral Hill, Armagh. Sometimes the metal-working may have been partially enclosed by wooden shelters as indicated at Kilpatrick (Swan 1994/95, 8-9) and Moynagh Lough (Bradley 1993, 79). However, it was also practised indoors at Reask (Fanning 1981, 89) and appears to have been associated with wooden or stone structures at Cathedral Hill, Armagh (Gaskell-Brown & Harper 1984), Illaunloughan (Marshall and Walsh 2005), Tullylish (Ivens 1987), Iniscealtra (De Paor 1974), Nendrum (McErlean 2007a) Letterkeen (Ó Ríordáin & McDermott 1952, 114) and Roestown (O'Hara 2007, 149). In contrast to iron-working non-ferrous metallurgy was clearly undertaken within Scandinavian Dublin (Wallace 1987).

Specialist craftspeople of different kinds were involved in non-ferrous metal-working. The word *umaige* is used to distinguish the coppersmith in the law tracts while *cerd* could refer to a silversmith (Kelly 1988, 63). Archaeological evidence of their place of work is found on numerous sites. On early medieval settlements, locations of metalwork workshop usually consist of structural remains in association with finds of slag, crucibles and moulds and other metal-working material (Comber 2008, 138-9). Several secular and ecclesiastical sites have produced evidence for the various processes involved in copper and copper-alloy working. Ecclesiastical examples included Garranes, Garryduff I, Clogher, Roestown, Lagore, Moynagh Lough, Armagh (Cathedral Hill), Clonmacnoise, Illaunloughan, Nendrum and Movilla Abbey. An excavated portion of the ditch, which may have enclosed the summit of Cathedral Hill in Armagh, revealed considerable metal- and glass-working debris. The remains of four large post-holes were interpreted as forming part of a workshop structure immediately inside the ditch. This area had been burnt twice: the lower clay floor produced evidence for glass- and enamel-working and the upper layer contained various finds such as crucibles, and slate motif-pieces. The waste clay moulds and crucibles from these activities had been dumped into the adjacent ditch (Gaskell-Brown & Harper 1984, 157-9; Edwards 1990). The copper-alloy working area at Garranes was undertaken against the bank on the south side of the interior of the rath (Ó Ríordáin 1942, 140-1). Small lumps of tin, crucibles, clay and stone moulds, unfinished copper-alloy objects, waste from the casting process and glass-working evidence was found in a black layer in this area. A stone foundation arc of a hut was also found in this area and though it was in a fragmentary condition, it may have been associated with the metal-working activity (*ibid.* 86).

The metal-working at Moynagh Lough took place in two separate areas either side of a centrally located timber round house (Bradley 1993, 76). One area contained mould fragments, crucibles, motif-pieces and an iron tool and the second comprised a bowl-shaped furnace, two surfaced areas and metal-working debris. A random post-hole scatter perhaps represented the remains of a screen which sheltered a spread of burnt clay close-by (*ibid.* 79) and another pebbled area may have operated as a stacking area for the moulds as they cooled. A circular structure at Roestown was interpreted as a possible metallurgy workshop as it produced a crucible fragment while other metal-working artefacts such as an ingot mould and bone motif-piece were found in the backfilled deposits of enclosure (1) immediately to the west of this structure (O'Hara 2009b, 66). The structure was located immediately outside the main enclosure (1) and was dated to the seventh century (*ibid.* 58-61). Unlike iron-working evidence, there is considerable bronze-working in Scandinavian Dublin. One site at High Street produced trial-pieces, baked-clay crucibles-fragments, slag and vitreous material in association with a workshop-hearth (Ó Ríordáin 1971, 76). A number of hearths and a deep deposit of vitrified burnt clay with slag dumped in a heap were excavated at Upper Exchange Street/Copper Alley. Small paved areas were set beside a

number of hearths and were interpreted as platforms for anvils (Simpson 1999, 30). Small quantities of tin ore have also been found within the town (Wallace 1987, 217) implying the manufacture of the bronze from its constituent parts.

Woodstown produced considerable manufacturing evidence for iron, copper alloy, silver, glass and perhaps lead. A sheltered portion of one of the enclosing ditch terminals at the northern end was used for metal-working (iron, lead, silver, copper and copper-alloy). The main feature consisted of a smithing hearth/furnace with a chimney structure set around a central firing area which produced *in situ* metal-working (O'Brien & Russell 2005, 119). One furnace fill was radiocarbon-dated to between the early fifth and early seventh-century although subsequent re-evaluation suggests that the feature may be contemporary with the remainder of the Hiberno-Norse material (Harrison *pers. comm.*). The furnace was sealed when a deposit containing waste and finished artefacts, dating to the seventh century, were dumped into the ditch (*ibid.* 119). A furnace outside the enclosing ditch was also possibly used for the smelting of lead or silver. Three post-holes around the circumference may have supported a clay-lined shaft. The recovery of a tiny lead weight from the oxidised clay of the furnace indicates that it may have been used for smelting lead or silver ingots, or possibly the forging of lead-weight. The discovery of 208 pan lead weights across the site would support this suggestion (O'Brien & Russell 2005, 122).

A sod-walled hut (C) on the southern edge and most exposed location of the monastic island at Illaunloughan appears to have been used as a non-ferrous workshop though it is uncertain if this was its primary function (Marshall & Walsh 2005, 16-21). An area of metal-working debris covered the hut and revealed evidence for the designing and casting of copper-/bronze-alloy brooches and pins as well as over 80 fragments of clay moulds, crucibles, part of a *tuyère* and a carved bone motif. Hut C was the earliest structure on the site and dated to the mid-seventh/mid-eighth centuries. A small single-celled sub-circular clochán (Hut G) in the northwest sector of the monastery at Reask produced evidence for both iron- and non-ferrous working (Fanning 1981, 97-8, 108-10). The hut contained two internal pits which appear to have been initially used for smelting iron ore, before being infilled and re-used as a large hearth. Finds from these features included a substantial quantity of slag, clay lining, *tuyères* pieces and crucible fragments. The basal courses of the primary enclosure wall were tied in with the surviving courses of Hut (G) and indicate that both were roughly contemporary and were one of the earliest structures built at the monastery.

A timber-built workshop defined by stone packed post-holes and settings cut into a ditch surrounding the monastery at Tullylish (Ivens 1987, 60-1). A deposit of industrial debris accumulated while the structure was in use and a large hearth, hot-plates and mould fragments were found near these remains. Evidence for a forging area, two iron-smelting furnaces and non-ferrous metal-working material and equipment were found in the southern sector of Kilpatrick monastery and lay south of and almost contiguous to, the footing trench of a house or shelter (Swan 1994/95, 8-11). Two areas in the 'New Graveyard' to the east of the ecclesiastical buildings at Clonmacnoise produced evidence for copper-alloy working (King 2009, 432-43). A deep layer of burnt clay and charcoal in the south side of the 'New Graveyard' produced crucibles, moulds, scraps of metal and a green stained cattle rib while another area produced a small circular hearth surrounded by over 1m of red clay containing charcoal, broken moulds, crucibles as well as a cache of scrap-metal objects and two fragments of gauge bronze wire nearby.

At Nendrum, there was evidence for ferrous and non-ferrous metal-working from the 'hut circles' in the south-western sector of the middle enclosure (Bourke 2007, 407, 419). A roughly horse-shoe shaped platform (No. 5) was labelled the bronze foundry or brazier's workshop as the finds from inside and around this house included 'innumerable fragments of crucibles for bronze-working' (Lawlor 1925, 142). The stone rectangular house (No. 8) described as 'the monastic school' produced the most interesting finds including 30 slate motif-pieces, four iron styli for use on wax tablets, four short knife blades, probably for bone and wood-carving, approximately 13 stone discs, 16 bone beads and one bronze and one iron

needle (*ibid.* 144-49). However, McErlean (2007a, 376) cautioned that this building might be much later than the adjacent round houses in the middle enclosure and that many of these artefacts may relate to an occupation layer below this building. Other finds from within and around these buildings included lumps of iron slag, a copper-alloy ingot, clay moulds, stone crucible stands and crucibles with nodules of bronze droppings (Bourke 2007, 407, 419) suggesting ferrous and non-ferrous metal-working in the area (McErlean 2007a, 378).

3.5: Levels of metal-working

There is no apparent difference between the wealth and range of metal items being manufactured on high status secular and ecclesiastical sites and finds and mould evidence indicates that pins and brooches were the most common type of metal artefact produced on both sites (Doyle *infra*, Section 3). Although religious items such as metal chalices and crosiers were also undoubtedly manufactured on ecclesiastical sites, these were mostly composite in nature and were formed largely of sheet metal, ornamented with separate panels (Comber 2008, 147).

Comber (2008, 148-9) has divided the metal-working evidence from early medieval settlements into three general levels of activity. A number of high status secular and ecclesiastical settlements such as Carraig Aille, Garranes, Lagore, Moynagh Lough, Clogher, Clonmacnoise, Armagh, Dunmisk and Dooley have revealed large quantities of metal-working waste and finished items which may indicate the activities of a resident highly-trained *cerd* working in a permanent workshop. This term could denote a silversmith or a goldsmith (Kelly 1988, 63). In contrast, other sites such as Lissue, Seacash, Rathmullan, Raheennamdra and Tullylish have produced levels of minimal or low-levels of metal-working evidence. It is likely that many of these smaller sites such as Reask had to rely on the talents of their own communities or perhaps the seasonal work of an itinerant metalworker.

Like with the evidence for ferrous metal-working there are an even larger range of sites with no evidence for non-ferrous metal working. While this is clearly sometimes the result of the scale of investigation extensive excavations such as Raystown (Seaver 2009), Baronstown (Linnane 2009) and Dowdstown (Cagney *et al.* 2009) had no evidence for non-ferrous metal working. These communities must have engaged with other local centres to provide the copper alloy objects found on these sites. Excavations and research in recent years has added to the evidence summarised by Comber (2008) and others. The greatest level of additional evidence pertains to sites at the lowest levels of non-ferrous metallurgy. Evidence for the minimal level of non-ferrous metal working can be seen in the numbers of crucibles present. Twenty four of the settlements with crucibles had two or less of them with many of them only having a single example or fragment.

Sites such as Roestown (O' Hara 2009a) and Deer Park farms (Bayley 2011) hint that there may have been an intermediate level of non-ferrous metallurgy with a small workshop occasionally used for this practice. Both sites have fragments of a small range of crucibles of different types (three and four respectively), trial pieces and ingots but no moulds (Fig. 3.3). Other specialist uses of bronze in the ironworking process are also coming to light. The possibility of the use for crucibles in brazing iron objects as may have been the case with bell production at Clonfad (Young 2009a) and Gortnahown 2 (Young 2009b) suggests that this practice may have been more widespread. Both of these sites incorporate ceramic brazing shrouds with fabric impressions also indicates that closer attention needs to be paid to fired clay fragments on early medieval sites. Interestingly enigmatic clay fragments with fabric impressions were also found at Cathedral Hill, Armagh and were termed crucibles at the time (Gaskell-Brown & Harper 1984, 147-148). A fragment of a clay wrap probably used in the brazing of iron objects was recently recognised at Deer Park farms (Bayley 2011, 348). To this range of more recent sites we can add the coastal and estuarine sites which may have had specialised purposes in assaying silver and other metals such as Dunnynail (McCormick & Macdonald 2004, 8, Young 2006a) along with the Viking trading/settlement site at Woodstown 6 (Young 2006b).

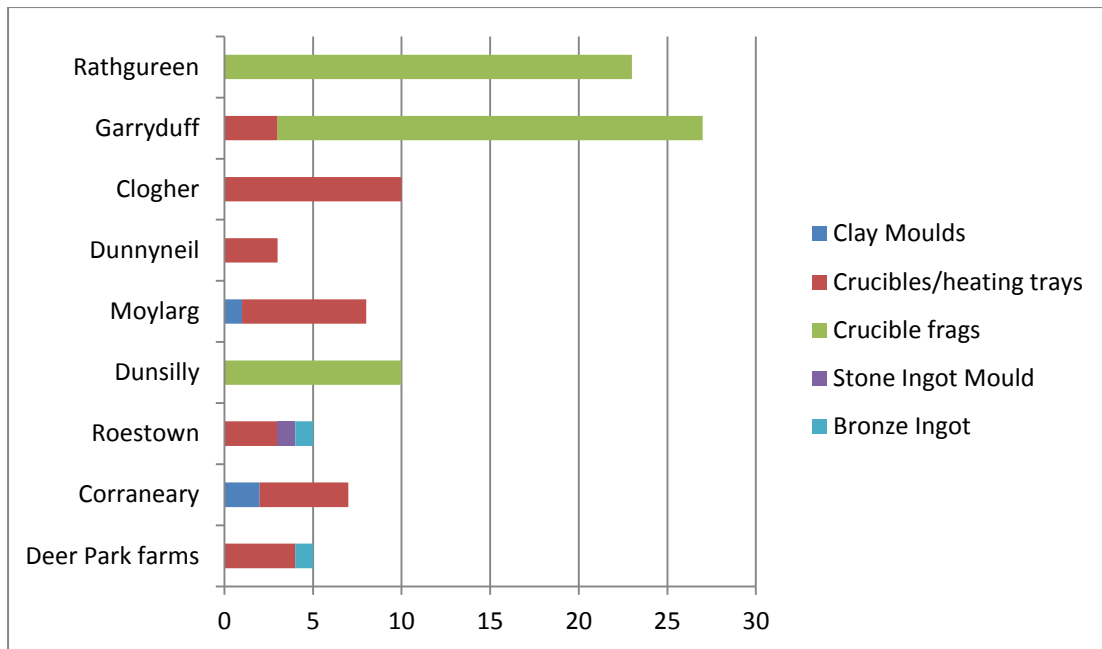


Fig. 3.3: Settlement sites (Non-ecclesiastical) with moderate levels of clay moulds, crucibles or ingots and stone moulds.

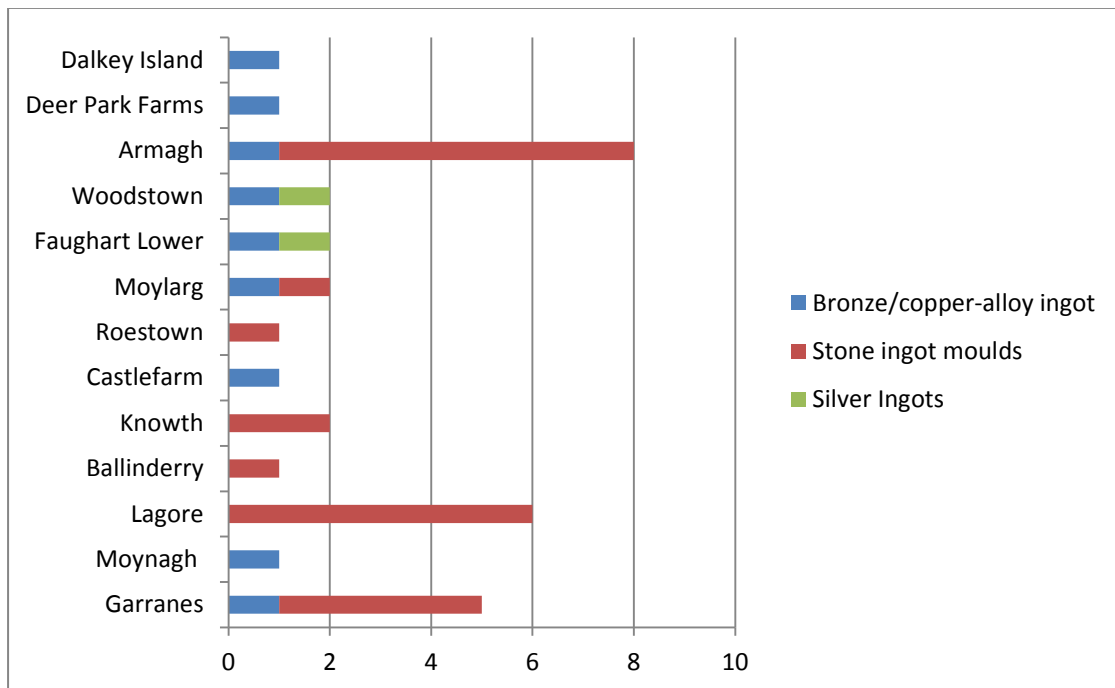


Figure 3.4: Stone Ingot moulds, Bronze Ingots and Silver Ingots from a range of settlement sites with Armagh included for contrast

At the upper end of the scale are sites which clearly have evidence for many different stages of non-ferrous metal-working including moulds, crucible and raw materials. In this regard new sites have, to date, added little to Comber's list of extensive evidence. Excavations at Kilgobbin (Bolger 2008, 85-112) have indicated another prominent ecclesiastical site with extensive manufacturing evidence and three further older sites at Kilpatrick (Swan 1994-5, 5), Kiltiernan (Waddell & Clyne 1995, 195-196) and Iniscealtra (Ryan 1988, 44). Crannog sites like Moylurg (Buick 1894, 315-331), Corraneary (Davies 1942, 27-28) and Lough Faughan (Collins 1955, 58-74) where both moulds and significant numbers of crucibles were found all were likely to have had higher levels of non-ferrous metal-working. Some of these sites clearly had relatively small excavated areas and their true position in a scale of non-

ferrous metal-working relative to some of the others is unclear. These serve to emphasise the role of communities on some crannogs in fine metal-working. At the highest end of the spectrum there are clear differences in the numbers of moulds, crucibles and crucible fragments which could in the case of Armagh result from extent of excavation or could be genuine differences in manufacturing of cast as opposed to composite objects (Fig. 3.4). It is equally striking how Knowth produced relatively little evidence for non-ferrous metal-working when compared to other important centres of power (Barton & Bayley 2012, 526-33). While Lagore produced much greater numbers of crucibles than Knowth the numbers of clay moulds from both is very low in comparison to Moynagh and Garranes (Fig. 3.5). By way of an urban contrast the excavations in Viking Dublin revealed 1700 crucibles or fragments thereof, large numbers of ingot moulds mostly copper alloy but with lead, gold, pewter and silver examples (Bayley 2005/6, 4). Interestingly there were small numbers of 'scrappy' clay moulds. Once again was this an issue of preservation of moulds or other techniques used to construct objects at that particular workshop.

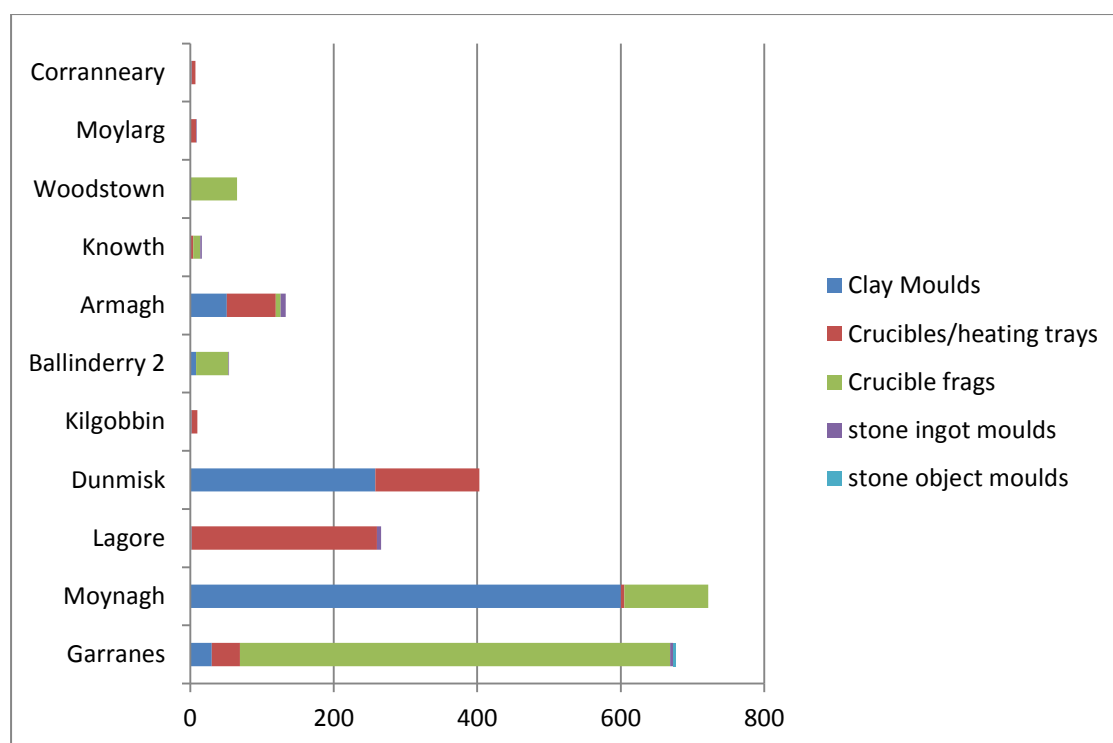


Figure 3.5: Settlements with clay moulds, crucibles and stone moulds. Armagh, Kilgobbin and Dumisk included as ecclesiastical sites for comparison.

3.6: Conclusion:

Non-ferrous metal-working clearly had an impact on economy and society. The making of important liturgical, ritual or symbolic objects tied secular and ecclesiastical lords together. The manufacture of such objects would have a price throughout society in the levels of tribute required to procure raw materials and produce them. At lower levels the production and wearing of copper alloy pins and brooches and other objects was a widespread and important practice (Doyle *infra*, Section 3). Given the limited distribution of moulds despite the extensive excavations of recent decades it seems likely that their production and acquisition was tightly controlled. The frequently found crucibles on many sites which have no other non-ferrous evidence suggest that craftsmen must have travelled to settlements. They must in turn have had access to sources of raw materials or scrap metal and the networks that controlled them.

Chapter 4: Glass, Enamel and Milliefiori-Working

4.1: Introduction

Vitreous materials such as glass, enamel and millefiori were closely associated with metalworking and along with amber were often used as settings for decorating metalwork, particularly copper-alloy but occasionally iron, in early medieval Ireland. In the earlier part of the early medieval period, insets of millefiori and red enamel were used to decorate penannular brooches, hand-pins and latchets (Doyle *infra*, Section 3). More complex metal objects decorated with multi-coloured enamel and glass studs appeared in the eighth century but amber settings became more common on brooches and other artefacts after this period (Comber 2008, 126). It has been noted that glass-working or glass-workers are not mentioned in any of the early Irish literary sources which may indicate either 'a limited industry or the production of glass etc. by other artisans, primarily the fine metalworker' (Comber 2008, 131).

4.2: Glass Artefacts

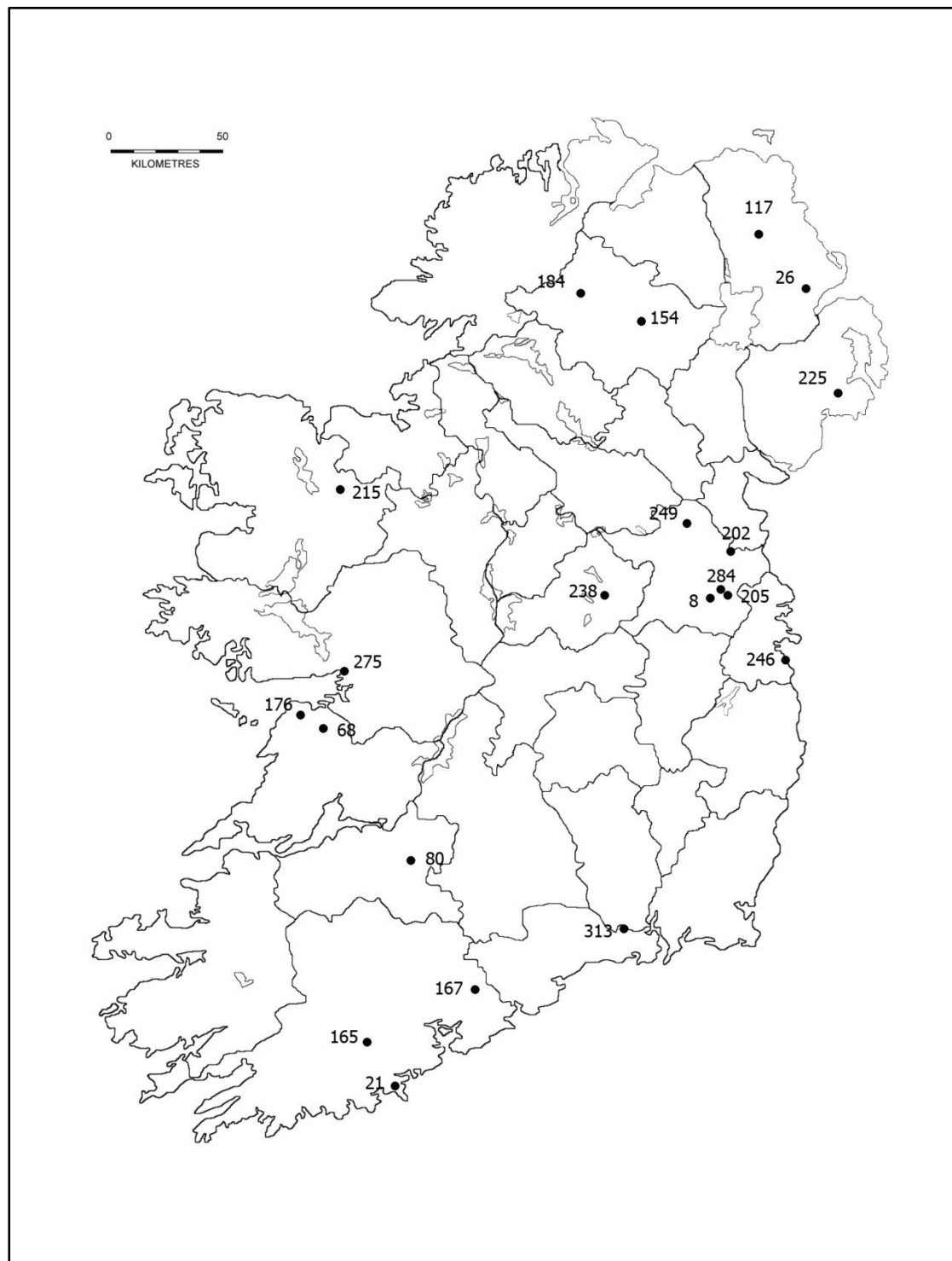
There is no evidence that glass *vessels* were produced from raw materials in Ireland. It has long been thought that glass-working in Ireland comprised the recycling of old scrap glass or cullet (Harden 1956, 151-2), although at sites such as Dunmisk, glass-working was clearly carried out. However closer inspection has revealed that these small pieces presumed to be scrap glass or cullet at Garranes, Ballycatteen, Carraig Aille II, Dalkey and Lagore were in fact fragments of vessels such as beakers and palm cups imported into Ireland. Fragments of vessel glass were also found at the site of an *emporium* at Dunnyneil island and belonged to vessels from the Anglo-Saxon (seventh or eighth century) and Mediterranean world (fifth or sixth century) (McCormick and MacDonald 2010, 52-3). It is likely then that glass mostly reached sites in Ireland as complete 'luxury item' glass vessels (Edwards 1990, 92; Bourke 1994, 180; Campbell 2007; Comber 2008, 127). These vessels were naturally very fragile and had a very short life-span and when they broke the glass was often simply recycled. Intact early medieval glass vessels rarely survive. Two complete phials of yellowish or yellow-green glass were recovered from a seventh-century context at Moynagh Lough (Bourke 1994, 168), and a similar phial was recovered from an undated context in a souterrain at Mullaroe (Harden 1956, 154).

Glass has also been discovered in the form of studs, beads and artefacts described variously as bangles, bracelets or armlets and these all appear to have been manufactured in Ireland. Several glass beads have been recovered from Lagore (Hencken 1950, 132-45) and provide considerable information about the variety of plain and polychrome glass beads in early medieval Ireland. Small dark blue beads constituted most of the plain examples but melon-shaped, tubular, segmented, dumb-bell or toggle beads were also known. The polychrome glass beads could be decorated with twisted cables, spiralled knobs, spots or insets of millefiori (Edwards 1990, 94). A Viking necklace of 71 glass beads was found hidden inside a cave at Glencurran and a number of its beads were segmented and foil-covered, similar to examples recovered from Kilmainham and the trading site at Birka, Sweden (Dowd 2007, 39). Glass beads and bangles have been recorded at numerous settlements and their quantities, distribution and types are considered in Doyle *infra*, Section 3.

4.3: Raw materials, processes, manufacturing

There is evidence for the working of glass, enamel and milliefiori at early medieval settlements in the form of tools, scrap vessel fragments – probably intended for re-use, remnants of glass-working rods or canes and clay moulds (Map 4.1, Appendix 1.3). Enamel and glass-working required much of the same equipment as metalworking, such as hearths, crucibles and tongs. The furnaces used in metalworking could have also been utilised for glass-working, especially as enamel, millefiori and glass ornament were frequently applied to metal artefacts (Comber 2008, 128). Iron ladles have been recovered on a number of sites such as Ballinderry I (Hencken 1936, 137, 172), Ballinderry II (Hencken 1942, 46), and Lagore and Garryduff (Craddock 1990, 204). The latter two sites have produced evidence of

glass-working which might suggest that these were used for melting glass (Craddock 1990, 204).).



Map 4.1: Map of Ireland showing distribution on sites with evidence for working glass, enamel and millifiori (numbers refer to EMAP 2012 gazetteer)

Glass-working rods or canes have been found at Movilla Abbey (Henderson 1984, 100); Cathedral Hill, Upper English Street (Crothers 1999, 63) and Scotch Street (Lynn 1988e, 82), Armagh; Dunmisk (Henderson 1988b, 116-17); Moynagh Lough (Bradley 1990/91, 29); Ballycatteen (Ó Ríordáin and Hartnett 1943, 26) and Garranes (Ó Ríordáin 1942, 121). Small lumps of glass at Lagore and Movilla Abbey have been interpreted as glass spilled while in a

molten state (Comber 2008, 128). There is limited evidence for unfinished glass objects on early medieval Irish settlements. Glass beads are a common find on settlements but there is meagre evidence for workshops related to bead-making. Bead-making was possibly identified at Garryduff I in the form of two small glass blobs with possible partial perforations (O'Kelly 1963, 72, 77). Henderson (1984, 98) has suggested that two fragments of twisted green glass rods at Movilla Abbey may have been produced during the production of glass beads. A small amount of blue glass was found in a small mould for multi-coloured glass studs at Lagore and indicate the manufacture of these objects at this site (Hencken 1950, 132). A glass piece from Cahercommaun contained the traces of two perforations. The object was slightly curved and may represent a glass bracelet damaged in its production (Hencken 1938, 39). A now lost clay mould at Nendrum is said to have contained a matrix for either a glass or metal stud (Bourke 2007, 407, 419). Some crucibles at Clonmacnoise appear to have been used for glass-working and at least two droplets of green glass could indicate that it was worked in the 'New Graveyard' (King 2009, 344).

The glass-working at Dunmisk was concentrated in the northeast quadrant of the site (Ivens 1989, 57). Several hearths were uncovered in this area and were associated with a layer of charcoal covering the area. One of these hearths contained pieces of glass-working remains and produced a radiocarbon date ranging from the late sixth to late ninth century, from the charcoal spread (Henderson 1988b, 115). The glass-working remains included 'a broken glass stud, a melted drop of glass, fragments of ribbed blue rod, small fragments of dirty (discarded) green glass, and remnants from the manufacture of a cable-bead and of glass-bearing crucibles' (*ibid.*). At the *longphort* at Woodstown, a sub-rectangular structure defined by a slot-trench (10.44m by 7.1m at its greatest extent) was uncovered in the south-western field (Harrison *et al.* 2007, 67-71, 80-2) and contained a number of floor surfaces and a possible western entrance. Two external metalised pathways appear to have led to additional structures to the west. A considerable quantity of crucibles, hone stones, a *tuyère* fragment and rotary sharpening/polishing stones indicate an industrial function for this structure and there was evidence - glass beads, droplets and slag - that glass was worked in the immediate area, and probably within the structure itself (*ibid.* 71). Wallace (1984, 124) has also suggested that the production of glass beads was undertaken in Scandinavian Dublin as solidified hemispherical-shaped glass drops have been identified on house floors.

Enamel also circulated in the form of lumps and rods. The enamel was ground into a fine powder with the use of a mortar and pestle and the powder was then fused onto the metal object by firing in a clay crucible or heating tray. A flame directed on the surface of the object would affect an adhesion between the metal and enamel and create a smooth, durable, vitreous coating. Once cooled, the enamel was finished by polishing with an abrasive (Bateson 1981, 87ff; Harden 1984, 135-6). A stick of opaque-yellow enamel was found at Cathedral Hill, Armagh (Harden 1984, 136) and other blocks of enamel are known from Moynagh Lough (Craddock 1990, 201) and in a stray find between Tara and Kilmessan (*ibid.*). Garranes produced several pieces of decayed enamel and two fragments of crucibles with droplets of red enamel still attached (Ó Ríordáin 1942, 121). Clay crucibles were recovered from Craigwarren crannóg and some of these had red vitreous matter on its surface which was possibly the remains of melted enamel (Coffey 1906, 116). Several metal objects were found within a souterrain at Mullagharlin/Haggardstown near Dundalk and one of these contained traces of enamel (McLoughlin 1999). Millefiori was produced by fusing several different coloured glass canes or rods together to form a pattern. These were rolled and drawn out to form a single long thin rod preserving the pattern while they were still hot and pliable. A thin slice was then cut off the end of the rod and was either fused directly into a metal object (similar to enamelling) or was laid in a bed of enamel that was held in position when fused to the metal (Edwards 1990, 93). Rods of millefiori have been found at Lagore, Garranes and Scotch Street, Armagh (Craddock 1990, 202-3). Two fragments of a blue glass cane at Lagore could either indicate the manufacture of millefiori rods though they may have also been used for glass insets or for ornamenting beads (Hencken 1950, 132). A small millefiori rod with a blue and white chequer pattern was also found and confirms that the decoration of metalwork with millefiori was definitely taking place at the site (Edwards 1990,

93). One decorated millefiori rod at Garranes was found *in situ* inside a copper-alloy tube which securely held the glass while slices were cut off (Ó Ríordáin 1942, 120).

In one of the very few studies on the subject, Henderson (1988a, 1988b) has investigated the technological and scientific aspect of glass-working and its organisation in early medieval Ireland in the context of his discussion of the evidence from Dunmisk. On the basis of glass residues on crucible at Dunmisk, he (1988b, 120-23) established that glass was not only worked but also manufactured from its constituent components at this early medieval Irish site. He noted that the crucible residues were composed of raw materials, particularly silica and tin oxide, which were used in glass-making. Bronze- and glass-working were found in the same part of the site (Ivens 1989, 57), and it is likely that similar crucible types were used for both. Further analysis of crucible residues from other sites is needed to provide more information on the manufacturing process. Recent scientific analysis of red enamel from Ireland and Britain suggests that it was made using re-used metallurgical slag or copper making waste reheated in a crucible rather than as a result of the glass making process. The blocks of enamel found from Kilmessan and Tara are now thought to be of earlier origin and the results of a different technical process (Stapleton, Freestone and Bowman 1999, 913-921).

4.4: Contexts of glass-working

Although evidence for glass-making is limited (Henderson 1988b), evidence for glass-working has been found on a growing number of ecclesiastical sites including Movilla Abbey (Henderson 1984, 98-9); Dunmisk (Ivens 1989, 57), and Cathedral Hill (Harden 1984, 135) and Scotch Street (Lynn and McDowell 1988b, 60-1), both in Armagh. Most of the evidence comprised glass rods, globules, scrap and occasionally crucibles. Comber (2008, 131) has noted that where concentrations of glass-working evidence occur together, it was usually undertaken in industrial quarters away from domestic structures. The craft was also spatially and functionally associated with fine metalworking, using much of the same equipment, tools and structural features. Glass-workers do not feature in any of the early Irish literary sources which might suggest either a limited industry or more likely the manufacture of glass by craft-workers of other disciplines, such as the fine metalworker (*ibid.* 131).

Both crafts have been found together at a number of sites. The glass and non-ferrous metalworking at Dunmisk were concentrated in the northeast quadrant of the site but ironworking was found primarily in the southwestern area. The furnaces used in metalworking were probably employed in the working of vitreous materials and both crafts have been found together just inside the southern quadrant of Garranes (Ó Ríordáin 1942, 86), in the eastern section at Lagore (Hencken 1950, 234) and the southern side of Cathedral Hill, Armagh (Gaskell-Brown and Harper 1984, 111). Fine metalworking and enamelling were undertaken together on the southern side of the Neolithic passage-tomb at Knowth and on the west of the slope of the site (Eogan 1977, 74). The principal area consisted of a roughly circular area of charcoal, c. 1.70m in diameter, against and spreading out from a small rectangular stone set on edge (0.30m in length and 0.12m in height) that may have provided some form of shelter for the fire. Finds consisted of two complete heating trays and a fragment of another and parts of clay crucibles.

4.5: Levels of glass-working

Comber (2008, 131-2) has noted that this craftwork can be divided into three standard levels of activity. A number of sites such as Seacash, Lissue and Rathbeg produced minimal evidence for this craft, perhaps indicating the use and occasional repair of finished glass artefacts such as beads and bangles. The most extensive evidence has been found at Lagore, Moynagh Lough, Garryduff and Dunmisk. Garryduff and Lagore have produced the most evidence with the latter site producing tools, beads, armlets, cullet, studs and their moulds, millefiori remains and melted lumps and fragment of glass.

Chapter 5: Bone, Antler and Horn-Working

5.1: Introduction

Skeletal materials in the form of bone, antler and horn were widely used in the early medieval period to produce domestic, personal and craft-working objects. Items of bone included spindle-whorls, needles, beads, pins, knife handles and motif-pieces; antler was also used for knife handles and combs and evidence for the working of horn comes in the form of drinking horns (Edwards 1990, 83). Bone is a by-product of animal husbandry and was therefore readily available when required but antler tines were gathered when red deer shed their antlers in the woods in the late winter and early spring. Both bone- and antler-working are frequently found in the same sites and may have been undertaken in conjunction with each other (Edwards 1990, 83). The early literary sources suggest that the worker of skeletal material did not hold a very high social position. The *Uraicecht Brecc* mentions a craftsman, identified as a 'wool-comber' by MacNeill (1923), and a 'comb-maker' by Kelly (1988, 63) with an honour price of just half a *seét*. The tools used by these bone- and antler-workers were probably similar to those used in woodworking and included axes and saws for cutting; hammers, knives, draw-knives, punches, chisels, gouges, awls, lathes and drills for effecting the incised or carved decoration and abrasives for the polishing of the completed object.

5.2: Artefacts

A total of 113 sites within the EMAP 2012 gazetteer contained evidence for bone artefacts with 34 having antler objects. At least 71 sites had direct evidence for the manufacture of bone objects while a further 20 had direct indications of antler working. The most common bone and antler objects comprise pins and bone combs, and a wide diversity of polished and shaped pins, with decorated heads and occasionally decorated shanks, has been noted. The wearing and use of bone pins is discussed in Section 3.

A wide variety of bone combs are known and a scheme for the different types was outlined by Dunlevy and summarised by Laing (Dunlevy 1988 341-422, Laing 2006, 83-4). A collection of intact antler combs from Lagore (Hencken 1950, 184-90) demonstrates the different types available in pre-Viking Ireland and included a small one-piece, single-sided comb with rounded back and simple ring-and-dot ornament and a number of single- and double-sided composite combs frequently decorated with ring-and-dot motifs or more occasionally complex fret, spiral or interlace designs (Edwards 1990, 84-5). In the Viking Age, Scandinavian types become more prevalent and primarily comprised long single-sided composite combs, sometimes in bone rather than antler. These are known at a number of rural sites including Knowth (Eogan 1974, 100-2) and the Scandinavian towns (Edwards 1990, 85, Riddler and Trzaska-Nartowski, forthcoming). Combs would have been an obligatory personal item as hair appears to have been worn long by both man and woman (Edwards 1990, 85-6). It has also been suggested that short single-sided combs and some bone pins may have been used as hair ornaments (Lucas 1965, 101-2).

Bone and antler gaming pieces and dices were recorded at numerous sites, including Parcnahown, (Riddler and Trzaska-Nartowski 2009e, 290), Dowdstown (Riddler and Trzaska-Nartowski 2009d, 4), Lagore (Hencken 1950, 196) and Ballinderry II (Hencken 1942, 55). Bone and antler was also widely employed to produce cylindrical handles for tanged knives and other similar implements and such evidence has been discovered at numerous sites, including Coonagh West (Taylor 2007, 78); Rathgurreen (Comber 2002, 176); Rathmullan (1981/82, 138); Cathedral Hill, Armagh (Gaskell-Brown and Harper 1984, 127-8) and Lagore (Hencken 1950, 196). Beads, buttons, needles and motif-pieces were produced from bone and antler. Drinking horns rarely survive but their presence is indicated by metal attachments such as those found at Moynagh Lough (Bradley 1993, 76), Ballinderry II (Hencken 1942, 45), and Carraig Aille II (Ó Ríordáin 1949a, 64-7). A recent spectacular silver example was found at Ballyvass, Co. Kildare (Clark and Doyle 2011).

(Hencken 1942, 53) and in the Scandinavian towns of Dublin (Bourke 2007, 414, 421), Waterford (Hurley 1997d, 685) and Cork (Kelleher 2002). The excavations in Waterford have produced a wide variety of bone and antler artefacts, including casket mounts, gaming-pieces, spindle-whorls, needles, needle-case, pin-beaters, pins, handles, toggles, drinking horns, tuning pegs, a flute and whistle – all of which were recovered primarily from ditch fills, house floors and associated backyards, and pits of twelfth and early thirteenth century date (Hurley 1997d, 652-5).

At least 106 examples of an artefact known as a socketed longbone point have been recovered from Irish early medieval sites (Mullins 2007, 35). Known variously as scoops or gouges they were interpreted as socketed bone spearheads based on international comparisons (*ibid.* 57). Bone was also used for sword pommels as seen in the early example made from whalebone at Collierstown (Riddler and Trzaska-Nartowski 2009, 4-7). A bone stamp was recovered from Roestown and may have been used to stamp leather (Riddler and Trzaska-Nartowski 2009b, 7).

5.3: Raw materials, processes, manufacturing

Bone:

Large quantities of animal bone are regularly recovered from early medieval settlements and much would have been easily accessible and suitable for bone-working. In fact, the waterlogged conditions at Lagore preserved 50,000 lbs of animal bone (Hencken 1950, 241), indicating that large midden heaps and butchery areas developed within settlements. However as bone is an organic material, actual evidence for the working of this raw-material survives only in a small number of sites in the form of unfinished and completed objects and antler and bone off-cuts. It is likely that some objects such as pig-fibula pins could be produced with relatively little skill though others such as antler combs and decorated pins would have required much more expertise and were probably the work of semi-professionals (MacGregor 1985, 55-72; Edwards 1990, 84). The evidence for the manufacture and use of bone and antler pins were discussed in an as yet unpublished doctoral thesis (Boyle 2009). Though bone was occasionally used for combs, antler was the preferred option since it was more durable and pliable. Evidence for the various stages in the manufacture of antler combs, indicated by the presence of cut antler-tines, flat rectangular blanks and finished artefacts, and perforated bone discs or buttons were found at Clonfad, particularly from the fills of the outer enclosure ditch (Stevens 2007, 43, 2010, 91). Similar evidence for the production of bone buttons or discs was found at Raystown, while other evidence also included a small number of antler tines, bone combs, toggles and two knife handles (Seaver 2010, 277).

Antler:

Fragments from composite bone or antler combs – a roughed-out incomplete bone pin and the remains of a finished polished bone pin – were recovered from a midden at Illaunloughan (Marshall and Walsh 2005, 185-7). Evidence for bone-working at Roestown consisted of roughly-shaped and finished bone pins and other objects and four partially complete bone combs (O'Hara 2007; 2009b, 69, 81) mostly from the enclosure ditches and bone combs and various pieces of worked antler, including a knife handle with ring-and-dot decoration, were found in similar contexts at Castlefarm (O'Connell 2009a, 47, 54). At Johnstown I, animal bone was used to fashion seven pins, two unfinished pin shafts, two combs, a bead and a sewing needle (Clarke 2010, 69). Two roughly worked bone pieces – probably in the process of being worked into spearheads from marrow-scoops – were recorded at Raheennamadra (Stenberger 1966, 47-8) and a polished or worked bone piece, possibly used as a scoop or knife was found at Bowling Green (Fanning 1970, 16).

Evidence for the manufacture of antler knife handles has been identified at Cathedral Hill, Armagh (Gaskell-Brown and Harper 1984, 125-8) and comprised two partially smoothed

handles, some smoothed and undecorated and others with cross-hatching or ring-and-dot ornamented motifs (Edwards 1990, 86). Fragments of sawn antler indicative of comb-making were also uncovered in the Scotch Street excavations in the same city (Lynn & McDowell 1988b, 60). In the 'New Graveyard' at Clonmacnoise, excavations uncovered an abandoned well filled with antler waste, including shavings, partly sawn fragments and cut antler points and indicate the presence of an antler workshop in the vicinity (King 2009, 339). Cut antler pieces were also uncovered in two different areas near St. Ciaran's National School to the southwest of Clonmacnoise (Ó Floinn and King 1998, 124; Murphy 2003, 2). The coastal site at Dooley produced a large quantity of antler waste in the form of cut, sawn and partly worked tines. Incomplete lathe-turned bone spindle-whorls and bone pins were also found at various stages of manufacture comprising partially-shaped bones from which the pins were worked; roughed-out pins; and pins which had yet to be polished (Ó Ríordáin and Rynne 1961, 61; Edwards 1990, 83).

Numerous other 'rural' sites have produced evidence for antler off-cuts, waste fragments (including tines) and worked pieces which included at least 34 other sites (Appendix 1.3). Many of these sites have revealed small numbers of fragments however significant assemblages have been found at places like Castlefarm where twenty fragments were found in a range of contexts (Riddler & Trzaska-Nartowski 2009c, 1-4) and Killoteran with 27 fragments (Owen 2011, 79). This can be contrasted with sites like Deer Park Farms with six fragments (Hurl et al 2011, 258), Raystown with four fragments (Seaver 2010, 35-36). While no waste antler was found at Killickaweeny, two antler picks were found within the ditch and an antler spindle whorl was also found on site (Walsh 2008, 48-49). In Scandinavian Dublin, antler workshops were located on High Street as well as Christchurch Place. Antler combs were made on an industrial scale and many motif pieces were found in this area (Murray 1983, 54; Wallace 1984, 123-4). The excavations at Christchurch Place, for example, produced evidence for comb making in the form of antler waste and unfinished tooth plates, while single-sided decorated combs and one example of a double-sided comb –possibly made of whale bone – were also found (Ó Ríordáin 1971, 75; 1974). In Scandinavian Waterford, quantities of antler and bone waste including modified antler tines and horn cores were recovered from late-eleventh and twelfth-century deposits in the defensive ditches and extramural dumping areas (Hurley 1997a, 650). Concentrations of antler tines and off-cuts were uncovered in two house plots at the western end of Peter Street in association with comb-making materials (Hurley 1997e, 898; 1997d, 681). In Scandinavian Cork, a fragment of modified antler tine was recovered from a later twelfth century layer inside a sill-beam house at Hanover Street (Cleary & Hurley 2003, 344). A range of artefacts, including bone combs from 11-13 Washington Street (Cleary & Hurley 2003, 335) and 40-48 South Main Street/Old Post Office Lane (Ní Loingsigh 2003), and cut bone hollow cylinders, from Hanover Street (Cleary 2003, 38) and Washington Street (Kelleher 2002), indicate twelfth century bone-production elsewhere. Similar evidence for the working of antler and bone, in the form of finished and unfinished articles such as combs, was forthcoming in Wexford (Bourke 1995, 36).

Ivory/whale-bone

There is less evidence for horn- or ivory-working. A ram horn-core cleanly chopped at its base was retrieved from millpond of mill 2 at Nendrum and it is likely that the horn had been removed from its core for some form of industrial processing (Murphy 2007, 270-1). The partially cut and broken tip of a sheep or goat horn was recovered at Knowth (Eogan 1974, 103); a perforated and polished boar's tusk was found at Rathgurreen (Comber 2002, 174); sawn antler off-cuts and chopped cattle horn-core were noted at the ecclesiastical enclosure at Moyne (McCormick 1987); an unfinished horn handle was discovered at the settlement/cemetery at Johnstown I (Clarke 2010, 69) and a number of knife handles, made of horn, were identified at Moylurg (Buick 1894, 324). A bracelet made of three joined pieces of boar's tusk was recorded at Ballinderry II (Hencken 1942, 56). Horn cores were recovered from late eleventh and twelfth century contexts in Scandinavian Waterford (Hurley 1997d, 650), and Scandinavian Wexford produced evidence for worked goat horn-cores (Bourke

1995, 36). A collection of walrus ivory pins (including the butchered skull of a walrus) at Essex Street West/Lower Exchange Street (Simpson 1999, 26) and walrus skull fragments at Fishamble Street (Wallace 1987, 216) may indicate ivory-working in Scandinavian Dublin and a piece of walrus ivory decorated on its outer surface by a series of incised concentric circles and a central perforation was found at Cloghermore Cave (Connolly and Coyne 2005, 189). At Inishkea North, the shoulder blade of a whale was found outside the door of a structure (House C, Site 2) and bore numerous cut-marks suggesting its use as a chopping block (Henry 1945, 136). A roughly oval whalebone disc with perforations was found in a nearby structure (House A, Site 2) and two cut-ribs of whale were identified on either side of the door of another structure (House A, Site, 3) (Henry 1952). A whalebone sword handle was found at Collierstown (O'Hara 2009), a whalebone plaque was also recovered from the rural Viking site at Cherrywood (Ó Néill 2006). A perforated whale tooth was also found at Knowth Site M and at Lough Faughan Crannóg (Stout & Stout 2008, 64, Collins 1955); and part of the vertebra of a whale was recorded at Downpatrick where it found a final use as a slab in an early medieval pavement (Brannon 1988, 63).

5.4: Contexts of bone-, antler- and horn-working

As bone and antler are organic materials, Comber (2008, 94) has noted that it is difficult to identify craft-working areas due to the relatively few known workshops or concentrations of working debris (unfinished artefacts and waste) within early medieval settlements. She has suggested that bone- or antler-working was not undertaken on a large-scale nor confined to any particular designated areas within a settlement (*ibid.*). Much of the evidence for bone- and antler-working (waste and unfinished objects) was found within enclosure ditches at Clonfad, Armagh and Roestown and Scandinavian Waterford or disposed in a well close to a workshop area to the east of the monastic buildings at Clonmacnoise. At Raystown the working of pig fibulae for needles largely took place in one area to the north of the cemetery close to a number of souterrains while a cache of bone blanks was dumped in a disused millrace distant from the main settlement (Seaver 2010, 35-36). Likewise sawn antler tines were dumped within deposits in a disused mill race as was the case at the mill at Killoteran (*ibid.*, 36, Owen 2008, 75). The incomplete and finished bone and antler pins and composite combs at Illaunloughan were recovered from a midden outside a hut (D) on the southwestern side of the small island away from the ecclesiastical structures (Marshall and Walsh 2005, 149-51, 186-7). There is evidence that particular buildings and areas along streets in Scandinavian Dublin (High Street & Christchurch Place) and Waterford (Peter Street) were specialising in bone-working. These buildings in the latter site were close to the ramparts on the periphery of the city and it appears that large quantities of antler and bone waste from the habitation deposits may have been dumped within and outside the nearby enclosing fosses (Hurley 1997e, 653). Comber (2008, 94) has suggested that the bone and antler may have been retrieved from butchery areas or midden heaps within settlements but the actual final working and completion of the bone or antler artefacts may have been undertaken away from these unpleasant places. At Cahercommaun, Hencken (1938, 67-9) noted that most of the evidence for comb-working and a range of bone and antler artefacts (spindle-whorls, spear-heads, pins, points) were found in the northeast quadrant in 'the part of the fort occupied by its owners' though most worked fragment of bone and antler and the primary ironworking features were found in the southwest quadrant area described by the excavator as 'a poor area'.

5.5: Levels of bone-, antler- and horn-working

Evidence for bone and antler working has been found across a range of sites both ecclesiastical and secular (Comber 2008, 95). With the exception of comb-making, bone-working does not appear to have been a specialist activity requiring much expertise and many people may have had the capacity to produce artefacts such as pig-fibula pins, beads and needles on a subsistence basis. Quantifying how much of a craft this represents at any one time is difficult as many of the sites have different periods of occupation. Likewise while many bone objects were made on site others were clearly imported for example a bone

comb of Scottish origin at Castlefarm (Riddler & Trzaska-Nartowski 2009, 7). Equally there are problems with terminology when comparing different artefacts such as pins, needles. Comber used the presence of finished artefacts, bone working tools and unfinished artefacts on ringforts, crannogs, monastic and miscellaneous sites to determine the scale of craftworking with bone (2008, 94-95). She identified five settlements with extensive evidence for bone working; Cahercommaun, Garryduff, Nendrum, Ballinderry 2 and Carraig Aille (*ibid.* 95). Eight had average evidence while twenty three sites had minimal evidence.

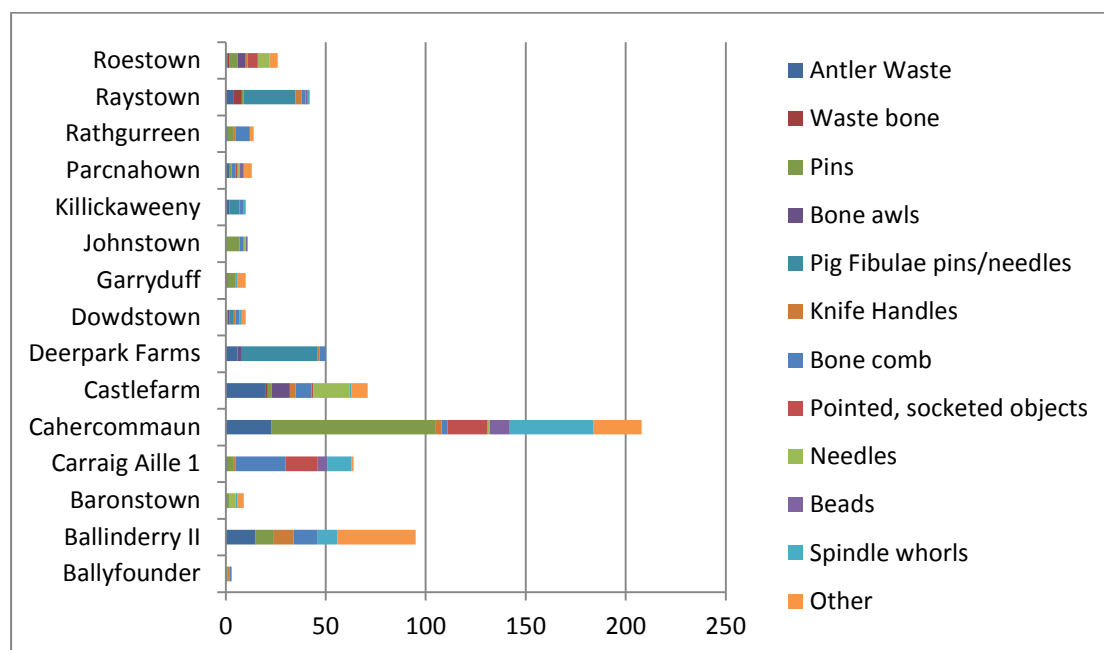


Figure 5.1: Evidence for bone objects from recently excavated sites alongside settlements ranked within Combers survey (2008, 95) like Rathgurreen (ranked average), Carraig Aille I, Cahercommaun, Garryduff, Ballinderry II (ranked extensive) and Ballyfounder (ranked minimal).

A brief look at a sample of recently excavated sites which were extensively excavated indicates the numbers and types of bone artefacts present (Fig. 5.1). Sites like Carraig Aille and Cahercommaun while both ranked by Comber as having extensive bone working evidence clearly have considerable differences in the range and scale of objects made and used over time. Garryduff had a relatively low number of objects but was ranked as having extensive bone working because it had iron tools and unfinished bone objects. Recently extensively excavated sites like Castlefarm would certainly belong alongside or even above Carraig Aille in terms of significance. Raystown and Deer Park Park farms would seem to have produced approximately equivalent quantities on a lower scale. The latter sites had a similar range of objects such as an emphasis on pig fibulae pins and needles, small numbers of spindle whorls, bone combs and bone handles. Rath complexes like Baronstown and Dowdstown seem to have had low levels of bone objects. Many ecclesiastical sites appear to have also specialised in bone- and antler-working and there is much evidence from Armagh, Clonfad, Clonmacnoise, Iniscealtra, Moyne and smaller monasteries like Illaunloughan, Co. Kerry. Actual archaeological evidence for antler-working on an industrial scale has been confined to urban Dublin and Waterford. In Dublin, large deposits of antler waste were found in Viking levels in High Street and Christ Church Place (Anonymous 1973, 15). The Waterford deposits dated to the late eleventh and twelfth centuries. While it might be assumed that the antler for these workshops would have been acquired from their rural hinterland, the presence of roe deer amongst the Waterford assemblage suggests that at least some of the antler was imported (McCormick 1997, 837).

There are a growing number of qualitative specialist studies of animal bone from a significant number of individual settlement sites. This combined with fine-tuned dating of archaeological

contexts, osteological analysis has the potential to inform large scale quantitative studies which should change our understanding of the exploitation and exchange of animal bone, horn and antler in early medieval Ireland.

Chapter 6: Early medieval stone-working

Introduction

As one of the most basic raw materials, stone was widely exploited in early medieval Ireland. A range of stones were used, including granite, limestone and sandstone as well as chert, flint, jet and lignite. The latter two may have been imported into Ireland though there are extensive deposits of lignite in Co. Antrim and around Lough Neagh (Comber 2008, 59). Stone was utilised as a building material for houses, walls, souterrains and other structures and for the manufacture of a wide range of objects such as querns, mill-stones, bullauns, grave-markers, whet-stones, spindle-whorls, lamps and beads throughout the early medieval period. The earliest sources make no reference to specialised stone-masons, stone-cutters and sculptors. However, the evolution of the *sáer* from primarily describing a carpenter in the earliest, original eighth century texts of the *Uraicecht Brecc* into a stone mason in later texts and other sources, indicates the increasing importance of the stone sculptor around the turn of the first millennium A.D. (MacLean 1995, 125, 129). While the technical ability was probably available to most people to manufacture simple everyday domestic items, the sculptors and masons who carved the high crosses and supervised the construction of stone structures must have been highly experienced. A range of tools such as stone axes, hammer-stones, iron hammers and wooden mallets used in conjunction with chisels, punches and wedges were part of the stone mason's tool-kit and Comber (2008, 63) has discussed the finds of these tools at early medieval settlement sites. Ornament could also be inscribed on stone monuments such as the carved high crosses, stone lamps and quern stones. Iron dividers were found at Garryduff (O'Kelly 1963, 47) and these may have been used as a form of a compass for achieving this decoration (Comber 2008, 64).

6.1: Building material

As a building material, stone appears to have been most widely exploited towards the turn of the first millennium A.D. on both secular and ecclesiastical sites. The drystone corbelled clocháns and oratories were one of the earliest stone-built structures which had appeared by at least the eighth or ninth century (Marshall and Walsh 2005, 103-24). These were probably contemporary with a small set of mortared shrine chapels such as Temple Ciaran at Clonmacnoise that emerged in the same period. (Ó Carragáin 2003, 132) with masonry churches and round towers appearing in the tenth century but becoming more common in the eleventh and twelfth (O'Keeffe 2003, 72; Ó Carragáin 2005b, 138; Manning 2009, 277). On both ecclesiastical and secular sites, rectangular houses, often constructed using low drystone walls or kerbs of boulders on edge became common from the tenth century (Lynn 1994, 92; O'Sullivan 2008, 231-2; O'Sullivan and Nicholls 2011). The main use of souterrains also appears to have occurred in the last quarter of the first millennium and the first century or two of the second millennium A.D. (Clinton 2001, 95). The various schools of stone carved high crosses date mainly from the later eighth- tenth century with a further revival during the twelfth century (Edwards 1990, 164-8) and sculpted cross-slabs also became more prevalent at the turn of the second millennium. The evidence for over 700 carved cross-slabs, 6 high crosses and a large collection of domestic and religious stone artefacts at Clonmacnoise would indicate that some of the larger monasteries supported a number of highly-skilled master masons and apprentices in this period (King 2009, 339-41).

6.2: Artefacts

A total of 158 settlements within the EMAP 2012 gazetteer had evidence for the use of stone artefacts while 99 were associated with objects of lignite. 35 sites had evidence for the working or manufacture of stone artefacts while only 7 were associated with the working of lignite. Stone was widely used in the manufacture of equipment used in contemporary early medieval crafts such as moulds and motif-pieces. Metal objects were often finished and sharpened using whet-stones/hone-stones and grind-stones (Comber 2008, 60). Whetstones are one of the most common early medieval artefacts and have been recorded on the

Grindstones are circular stones with a central perforation for rotation on a wooden axle which have been noted at Ballinderry I (Hencken 1936, 147, Fig. 15A); Lagore (Hencken 1950, 173); Seacash (Lynn 1978b, 67, 69); Gragan West (Cotter 1990); Killickaweeny (Walsh 2008, 47-8); Carraig Aille I and II (Ó Ríordáin 1949a, 86, 100); Ballyegan (Byrne 1991, 28); Knowth (Eogan 1974, 110); Nendrum (Bourke 2007, 416, 421); 'Killederdadrum' (Manning 1984, 258); Raystown (Seaver 2010, 277); Woodstown (O'Brien *et al.* 2005, 62) and Scandinavian Waterford (McCutcheon 1997c, 421). A fragment of sandstone which appears to have been intended as a small grindstone, though broken during the course of its manufacture, was recorded at Beginish (O'Kelly 1956, 181). Pounding or rubbing stones are also common finds and 36 of these were recorded at Cahercommaun (Hencken 1938, 58). Rounded stone pebbles are also found and an example from Garryduff I bore 'one striated flattened face due to abrasive rubbing on another stone' (O'Kelly 1963, 88).

Stone was also used to produce spindle-whorls, loom-weights, and linen or leather smoothers for leather and textile production as well as other multi-purpose objects such as hammerstones and axeheads (Comber 2008, 61). The ubiquity of flint and chert flakes, scrapers, blades, cores, points and strike-a-lights on early medieval settlement enclosures, crannógs and ecclesiastical sites (See Comber 2008, 66-67) indicates that they were worked on the sites and should not all be considered residual prehistoric deposits. It is possible that some of these flint and chert implements may have formed part of larger objects such as lathe cutting-tools or drills (Comber 2008, 61). A wear on a flint point from Reask (Fanning 1981, 138) suggests it functioned as a boring implement. The upland settlement at Ballyutoag produced a large quantity of flint nodules and fragments and evidence for platform cores, indicative of early medieval flint knapping (Williams 1984, 41-6).

Jet, lignite and shale were widely used for the production of early medieval bracelets, rings and pendants. The several stages in the production of hand-carved jet/lignite bracelets or rings have been discussed by Ivens (1987). The first step involved identifying a suitable slab or nodule of raw lignite and trimming it into a disc shape, somewhat larger and thicker than the desired end-product. The interior or central core was then removed by cutting a 'V'-shaped groove with a narrow chisel on either side of the disc before finally the bracelet was finally finished by smoothing and polishing (Edwards 1990, 96). Un-worked jet lumps have been found at Fishamble Street, Dublin (Wallace 1987, 215-6). These were sourced near Whitby, in Yorkshire (*ibid.*), and it is possible that this may represent the origin of most Irish jet pieces. Much of the evidence for lignite bracelet production is present in the form of the disc-shaped central waste cores which have been recorded at Oldcourt (Murphy and O'Cuileanain 1961, 84-7); Ballybrolly (Lynn 1983a, 50); Cahercommaun (Hencken 1938, 40-2) and Feltrim Hill (Hartnett and Eogan 1964, 28-9). Other partially worked lignite bracelets have been noted at Lagore (Hencken 1950, 150); 'Lislear' rath (Simpson 1987) and Tullylish (Ivens 1987, 108-9) and may indicate manufacture of the objects at these sites. Parts of thirteen lignite objects were found at Blackchurch, Co. Kildare and were thought by the excavator to represent a manufacturing site (Anon, 2006).

Excavations at Armoyle church produced evidence for a specialised lignite working or dump area (outside) a largely infilled ecclesiastical enclosure ditch (Nelis 2005). The truncated remains of a number of structures were recovered in association with several hundred fragments of lignite, entirely comprised of cores or bracelet centres and broken bracelets which related to the final stages of bracelet production. There were no finished pieces and no lignite was recovered that was unrelated to the final stage of completion of curated rough-outs. Evidence for partly finished lignite bracelets, waste cores from the production of the bracelets, fragments of finished bracelets, beads and one gaming piece was recorded at Clonmacnoise (King 2009, 341). Some bracelets could also be manufactured and finished on a lathe and unfinished lignite bracelets and waste discs with perforations - where they were held on the lathe - have been recorded at Cathedral Hill, Armagh (Gaskell-Brown and Harper 1984, 136-7) with the same site also producing evidence for a jet bracelet decorated with rectilinear ornament and two small fragments of a lathe-turned bowl decorated with spiral pattern (Edwards 1990, 96). Excavations elsewhere in the same city produced hundreds of

fragments of lignite from armlet manufacture at 50-56 Scotch Street (Lynn and McDowell 1988b, 60) and unfinished lignite objects at English street (Crothers 1999, 63, 66).

Amber was used to produce beads, studs and other decorative features on brooches and other metal objects. While 27 sites in the EMAP 2012 gazetteer had amber artefacts only four settlements had any evidence for their manufacture. It would be tempting to interpret the presence of amber in Ireland as either evidence for Viking trading, or even as evidence for Hiberno-Norse settlement. The vast majority of the amber found in Ireland comes from the excavations at Fishamble Street in Dublin – over 4,000 pieces were recovered from workshops in this area (Wallace 1987, 215) – and this may represent the source of much of the rest of the amber found in Ireland. In recent years evidence for craftsmanship with amber was found at the Hiberno-Norse settlement at Woodstown (McNamara 2005). However, amber – mostly in the form of beads - has been found on rural sites such as Lagore (Hencken 1950, 150-1); Ballinderry II (Hencken 1942, 13, 51); Ballycatteen (Ó Ríordáin and Hartnett 1943, 27); Garranes (Ó Ríordáin 1942, 121); Garryduff I (O'Kelly 1963, 77-8); Carraig Aille (Ó Ríordáin 1949a); Cahercommaun (Hencken 1938, 40); Lough Faughan (Collins 1955, 65) and Nendrum (Bourke 1997, 415) and many of these sites (particularly their early phases) may pre-date the arrival of the Vikings. It must, therefore, be assumed that there was some low level importation of amber into Ireland from the Baltic area before A.D. 800 but this may have been accomplished through middle-men in Saxon England. Amber-working evidence in rural Ireland is indicated by hundreds of chips of amber at Scotch Street, Armagh (Lynn and McDowell 1988b, 60) and a small quantity of amber chips and an amber bead at Moynagh Lough (Bradley 1993, 80). There was also possible amber-working evidence at Lagore (Hencken 1950, 150-1) where a number of finished and possibly unfinished amber beads and studs were also found. At Rathinaun a number of amber fragments were found (Raftery 1957) while the rath at Lisduggan had an unworked piece of amber (Twohig 1990). Amber appears to have become popular as decorative settings on brooches and other metal artefacts from after the eighth century and replaced the more ornate and intricate polychrome glass studs in this period (Comber 2008, 126).

Porphyry has been found on a number of Irish sites and has been discussed by Lynn (Lynn 1984). All examples were green in colour, and were sourced to Greece, with the exception of a single piece of red porphyry from Armagh sourced to Egypt (*ibid.* 19). Lynn noted that fragments have been found at the ecclesiastical sites of Armagh, Downpatrick, Movilla Abbey and Killeel. Generally, they were found in contexts that post-dated A.D. 1000. Since Lynn's survey, further examples of green porphyry have been found at Clonmacnoise (King 1992), Derrynaflan (Ó Floinn 1985), and Christ Church Place, Dublin (Wallace 1987, 220). Porphyry is found almost exclusively on ecclesiastical sites (with the exception of Fishamble Street, Dublin (Wallace 1987, 220), suggesting that it was imported for the beautification of the church, or possibly for inclusion in portable altars. Slate was also possibly utilised as a building material in early medieval Ireland. Several hundred perforated slates of shale were found at Ballycatteen and it was suggested that they may have formed part a pegged slate roof, possibly for one of the site's souterrains (Ó Ríordáin and Hartnett 1943, 31-3; Comber 2008, 62). Soapstone (steatite) vessels are known from a number of sites at Beginish and Scandinavian Dublin (Wallace 1987, 218); part of a steatite ring was recorded at Dalkey Island promontory fort (Liversage 1968, 117) and the habitation sites at Inishkea North produced soapstone spindle-whorls (Henry 1951a, 75). The presence of soapstone vessels, walrus ivory (available only in the Arctic Circle) and amber (Baltic area) indicates that trade was maintained with Scandinavia and the Scottish islands, particularly in the Viking-Age period.

Stone was also widely employed to produce a range of other domestic artefacts, including spindlewhorls, querns, mortars and pestles and lamps. Spindlewhorls are commonly found and evidence for unfinished examples at Carraig Aille II (Ó Ríordáin 1949a, 86), Cush (Ó Ríordáin 1940, 158), Garranes (Ó Ríordáin 1942a), Castleskreen II (Dickinson and Waterman 1959, 80) and Garryduff I (O'Kelly 1963, 89), Rathmullan (Lynn 1981-2, 44-45) can suggest on-site manufacture of these objects. A few chlorite spindlewhorls were found at Inishkea

North and appear to have been discarded when they split during the drilling of the central perforations (Henry 1952, 172) and incompletely perforated stone spindle whorls were recorded at Cahercommaun (Hencken 1938, 43-4). At Reask, a stone spindle-whorl was apparently discarded or lost before use, as the marks of the boring tools in the hour-glass perforation and the marks of the polisher were still evident (Fanning 1981, 125). Rotary querns are commonly found and consisted of two roughly circular stones, the upper of which is rotated atop the lower through inserting a wooden handle in the top stone. Larger stones were used in mills and provided the same functions as their smaller, manual counterparts (Comber 2008, 61). They were often made of materials such as granite which required sourcing and transport over considerable distance. Some sites such as Lagore (Hencken 1950, 174), Moynagh Lough (Bradley 1982/83, 28; 1994/95, 160, 165), Lisnagun (O'Sullivan *et al*, 52), Holywood (Proudfoot 1959, 105), Ballyegan (Byrne 1991, 28) and Knowth (Eogan 1977, 74) have produced evidence for unfinished quernstones.

Stone gaming boards have been noted at Movilla Abbey (Yates 1983, 62-3), Roestown (O'Hara 2009b, 73), Lagore (Hencken 1950, 176-77) and Garryduff I (O'Kelly 1963, 88-89 & 91) and these most likely represent a common early medieval game known as *hnefatafl* 'King's table' in Norse or *fidchell* in Irish. A second type of game known as merels was also identified at Roestown and at Borris (Riddler and Trzaska-Nartowski 2010, 200-201). It can be paralleled with an example from a ninth century horizon at Fishamble Street, Dublin (O'Hara 2009b, 73). These incised stone boards were probably the belongings of the lower classes with ornately-decorated carved examples such as the tenth century wooden board game from Ballinderry I part of the material-culture of the lordly-classes (O'Hara 2009b, 72).

6.3: Contexts of stone-working

Very few early medieval sites have produced actual evidence for the sourcing and working of stone. Raw stone was abundant and waste is often difficult to identify (Comber 2008, 65). Generally, local sources of rock were exploited. Chlorite was used at a site on Inishkea North and it was widely available on the island's shoreline. Some work has been done in identifying the provenance of millstones and quern stones on sites in counties' Down and Wicklow. The stones at Nendrum have been traced to the upper reaches of Bloody Bridge River, in the Mourne Mountains, in south county Down (Meighan 2007, 205); a quernstone from Ballynarry Rath, has also been traced to the Mourne Mountains (Davison 1961/62, 73); and one of the millstones from Rathmullan was sourced to Scrabo Hill, in north county Down (Lynn 1981/82, 136). These stones were quarried and transported across different polities, suggesting that some form of mutual exchange was involved in their procurement, rather than the compulsion of the local secular or religious authority.

Corlett (2010) has identified a number of unfinished and broken hand and water-powered millstones in the granite-rich upland area of west Wicklow and suggests that this particular region may have supplied millstones to the Leinster region in the early medieval period. These millstones provide important information about the sequence of steps involved in their manufacture from the extraction and fashioning of rough-outs at the outcrop, to the perforation of the central hole and finally the dressing of the grinding surfaces. Corlett has observed that millstones at Kilbeg, Ballynascullogh Upper and Knocknadroose appear to have been manufactured at the source of the granite outcrop itself and not at their intended destinations. This corroborates a passage in *Cogitosus'* Life of Bridget which describes the sourcing of a millstone for the monastic site of Kildare at the summit of a mountain (Connolly and Picard 1987, 24-5) and recounts how they selected a big stone on the summit. 'And cutting it all the way round, they fashioned it into a circular and perforated millstone'. Unable to bring the stone down from the summit, they decided to topple it down the slope and through the intercession of St. Brigit, it landed at the base of the mountain without one single fragment breaking off. However in other cases, unfinished millstones appear to be associated with settlement enclosures and ecclesiastical sites and may represent on-site manufacture, though it is possible that they were brought to these places as rough-outs which were fashioned into a basic form at the source (Corlett 2010, 19).

It is difficult to identify stone-working areas at settlements as evidence for this craft is rarely found. At Inishkea North, there was evidence for the working of lumps of chlorite inside a timber structure (also used for dye-production) to the northwest of an early monastery, not far from an area of metalworking (Henry 1952, 172; Comber 2008, 62, 64). Comber (2008, 64) has noted that stone-working was a noisy activity and may have been undertaken away from the domestic area for this reason. Approximately 30 stone motif-pieces were recovered from a rectangular building termed the 'school' on the southwest side of the middle enclosure at Nendrum (Lawlor 1925, 143-4; Bourke 2007, 409, 420). At Cahercommaun, 50 of the 53 fragments of lignite rings and lignite discs were identified in the northwest quadrant; the same area which contained the largest quantity of domestic objects, tools and weapons while the primary ironworking evidence was found in the southeast area and the highest concentration of querns in the southwest of the site (Hencken 1938, 67-9).

Very few sites have produced evidence for actual stone-working and therefore it is difficult to identify different levels of craft activity (Comber 2008, 65-7). The occupants of all settlements probably had the technical ability to produce a range of simple domestic stone tools and implements such as whetstones. Evidence for the production of semi-luxury lignite or jet bracelets have been found at fewer sites and it appears that many sites such as Cahercommaun may have been exporting these objects and may represent internal trading centres (Comber 2008, 159). The sheer number of quernstones from Moynagh Lough (e.g. Bradley 1982/83, 28), Lagore (43 quern fragments) (Hencken 1950, 173-5), Cahercommaun (37 fragments) (Hencken 1938, 59-60) and the nearby cashels at Carraig Aille I (12 fragments) and II (41 fragments) (Ó Ríordáin 1949a, 83-6, 94, 100) may indicate that these items were exported from these sites. Lawlor (1925, 18) also reported 'a great many fragments of querns' at Nendrum but only one of these is now identifiable (Bourke 1997, 416, 421). Evidence for 'specialist' stone-working is primarily found on higher status sites, particularly monasteries, where groups of highly skilled master masons and apprentices were undoubtedly responsible for the manufacture and construction of highly sophisticated and elaborate stone crosses, grave-slabs and buildings.

APPENDIX 1

Site	Site type	Metalworking features	Residue/Artefacts	Reference
Aghadegnan, Co. Longford	Univallate Rath	'Two phases of iron-working' 1 metalworking hearth	Iron Slag	Carroll 1991:0091.
Aghaloo, Rousky, Co. Tyrone	Ecclesiastical		Slag, smithing hearth cakes and hammerscale and a hearth ceramic (lining or tuyère)	Carver 2007, 85-86. Young 2007, 94-96.
Aghavea, Co. Fermanagh	Ecclesiastical	Bowl Furnaces	Slag	Ó Baoill 2000:0352; Anon. 2000, 4.
Ahanaglogh, Co. Waterford	Other; Hearths	3 Furnaces, 3 smithing hearths A.D. 660-990 (2 Σ)	45kg, Slag, anvil stone; smithing waste; furnace bottoms, tuyère frags	Tierney & Elliot 2008, 101-106.
Altanagh, Co. Tyrone	Univallate Rath	10 Furnaces	Iron slag, hammerscale 6 furnace bottoms	Williams 1986, 51-58.
Ardcloon, Co. Mayo	Univallate Rath	None excavated	Iron Slag	Rynne 1956, 208.
Armagh: English Street, Co. Armagh	Ecclesiastical		Slag; tuyères	Crothers 1999, 64, 69, 77.
Armo, Co. Antrim	Ecclesiastical		Slag	Nelis 2005:0007
Augherskea, Co. Meath	Settlement/cemetery	hearth-bottoms	Iron slag, charcoal fuel	Baker 2010, 6-7
Balgatheran, Co. Louth	Univallate Enclosure		Iron slag	Chapple 2000:0638.
Ballinderry (I), Co. Offaly	Crannog		Iron slag, Iron anvil found at Ballinderry 2	Hencken 1936, 161.
Ballyaghagan 1, Co. Antrim	Univallate Rath	1 hearth with 'smelting debris'	Iron slag	Scott 1991, 221
Ballyarra, Co. Cork	Souterrain		Iron slag	Fahy 1953, 58.
Ballybrit, Co. Galway	Univallate Rath		Iron slag	Waddell 1971, 79.
Ballycasey, Co. Clare	Univallate Enclosure		Iron slag, Tuyère frags	O'Neill 2002:0079.
Ballycatteen, Co. Cork	Multivallate Rath	None	13.64kg Iron slag, furnace bottoms	Ó Ríordáin & Hartnett 1943, 30.
Ballyduff, Co. Antrim	Multivallate Rath (bivallate)		Iron cinders	Avery 1970:01
Ballyfounder, Co. Down	Raised Rath		Iron slag, Iron chisel	Waterman 1958b, 49.
Ballyhamage, Co. Antrim	Univallate enclosure and Souterrain		Iron slag	Crothers 2003:0004
Ballyhenry, Co. Antrim	Univallate Rath		Ore – haematite	Scott 1991, 154.
Ballyhill Lower, Co. Antrim	Univallate Rath		Iron ore	Williams 1985:02
Ballymacash, Co. Antrim	Univallate Rath		Slag	Jope & Ivens 1998
Ballymacrea	Other; unenclosed		Iron slag	
Ballynagallagh, Co. Limerick	Univallate Rath		Iron smelting slag (65 kg), furnace bottom	Cleary 2006
Ballynakelly, Co. Dublin	Non-circular enclosure		Iron slag	McCarthy 2011
Ballyrea, Co. Armagh	Souterrain		Iron slag	Crothers 1992:004
Ballyrenan, Co. Down	Rath		Iron slag	McManus 1997:074
Ballyvullen, Co. Antrim	Rath		Iron slag (170kg), 3 tuyères, Iron punch	Williams 1985b, 96-99; Scott 1991, 221.
Ballyvourney, (St Gobnet's) Co. Cork	House site/ Ecclesiastical	Pits	Furnace bottoms (57); tuyères, bog ore	O'Kelly 1952, 32-35. Scott 1991, 154
Ballywee, Co. Antrim	Settlement		Iron slag,	Scott 1991, 221.
Ballrigan, Co. Louth	Settlement/ Cemetery	Industrial area, iron ore roasting oven	113.5kg Slag, fragments of a furnace wall "probable remains of shaft" Iron punch	Delaney & Roycroft 2003, 19. Delaney 2010, 97-8.
Baronstown, Co. Meath	Non-circular	Furnace lining	Iron slag (3.36kg),	Linnane 2009

Site	Site type	Metalworking features	Residue/Artefacts	Reference
	enclosure		Smithing	
Beal Boru	Univallate Rath		Iron slag	O'Kelly 1962
Beginish, Co. Kerry	House site		Slag, tuyère	O'Kelly 1956, 182.
Big Glebe, Co. Londonderry	Raised rath		Iron slag	Scott 1991, 222.
Bighouse	Souterrain		Iron slag	Evans 1945
Bofeenaun, Co. Sligo	Crannog	Possible furnace	Iron slag (74kg), hammerstones, Iron chisel	O'Sullivan A 1998a, 122
Boho, Co. Fermanagh	Univallate Rath	2 hearths one with iron slag	Iron slag	Proudfoot 1953, 55.
Borris, Co. Tipperary	Univallate Rath with earlier enclosures	6 smithing hearths; 2 smelting furnaces, sunken smithing areas	Iron slag (143 kg), tuyères, hammerscale	Ó Droma 2006:1933; Wallace 2010
Boyerstown, Co. Meath	Non-circular enclosure		Iron slag (2.43 kg), Smithing	Clarke 2009
Brigown, Co. Cork	Multivallate Rath	Possible furnace/metallurgical hearth	Iron slag	O'Callaghan 2003
Brokerstown, Co. Antrim	Univallate Rath		Iron slag	Dunlop 2009
Bushmills Distillery, Co. Antrim	Souterrain		Iron slag	Keery 2012
Butterfield, Co. Dublin	Ecclesiastical		Iron slag	Carroll 1997:0184
Cabinteely, Mount Offaly, Co. Dublin	Settlement/cemetery	Furnace	Iron slag	Conway 1999, 39.
Cahircalla, Co. Clare	Enclosure		16.6kg, Iron slag	Taylor 2004:0141 Hull & Taylor 2005, 38-9.
Cahercommaun, Co. Clare	Cashel		Iron slag	Hencken 1938, 54-5.
Cahergal, Co. Kerry	Cashel		Iron slag and tuyère	Manning 1990:0067
Caherlehillan, Co. Kerry	Ecclesiastical		Iron slag	Sheehan 1996:0165
Cahircalla More, Co. Clare	Univallate Rath	Four smithing hearths	Iron slag (16.6 kg), stone anvil, lump iron ore haematite, Iron chisel	Taylor 2004, 2006
Calliaghstown, Co. Meath	Non circular	Furnace lining	Iron slag (0.168 kg) Furnace lining	Reilly <i>et al.</i> 2008
Camus, Co. Londonderry	Ecclesiastical?	Furnace		May 1958
Caraun More, Co. Galway	Univallate Rath	Bowl furnaces	Iron slag	Seaver & Conran 2009
Carn, Co. Fermanagh	Cashel		Iron slag	Brannon 1981-82b, 64
Carnmore West, Co. Galway	Cashel	Furnace lining	0.14kg Iron dense slag from smelting	Sutton 2008, 2011
Carraig Aille I, Co. Limerick	Cashel		Iron slag, Iron punch	Ó Ríordáin 1948-50
Carraig Aille II, Co. Limerick	Cashel		Iron slag, Iron chisel	Ó Ríordáin 1948-50
Carrigatogher Harding, Co. Tipperary	Multivallate	2 metallurgical hearths/furnaces	750kg Iron slag; tuyère	Taylor 2010
Carrigoran, Co. Clare	Cashel	2 smithing hearths, 1 furnace	30.4kg Iron slag,	Reilly 2000
Carrowkeel Co. Mayo	Univallate Rath		Iron slag	Walsh & Zajac 2004
Castlefarm, Co. Meath	Settlement/cemetery	Three smithing hearths	75.6kg smithing slag, tuyère	O'Connell 2006, 2009; O'Connell & Clark 2009
Cavanapole, Co. Armagh	Univallate Rath		Iron slag,	Crothers 1996:0015.
Chapelizod, Co. Dublin	Ecclesiastical	Furnace and smithing hearth	Slag	Walsh 2002:0492.
Cherrywood, Co. Dublin	Settlement/cemetery?		Iron slag (small frags)	Ó Néill 1999, 2006
Church Island, Co. Kerry	Ecclesiastical	Pit furnace/ smithing furnace	Iron slag, hammerstones	O'Kelly 1958, 69; Scott 1991, 167.
Clogher, Co. Tyrone	Multivallate	Two smelting furnaces, 1 stone and	Iron slag	Warner 1971:032, 1972:031, 1973:033,

Site	Site type	Metalworking features	Residue/Artefacts	Reference
		clay lined smithing hearth. Flat 'anvil' stone		1973, 1974:037, 1975:035, 1979, 2000
Clogher, Co. Kerry	Settlement/cemetery	1 metallurgical hearth/furnace	Iron slag	Coyne 2007
Cloghermore Cave, Co. Kerry	Cave and burials		Iron slag, Iron anvil	Connolly, Coyne and Lynch 2005
Clonfad, Co. Westmeath	Ecclesiastical		1500kg slag from bloom smithing and clay brazing shrouds.	Stevens 2006, 11; 2007, 42; 2010, 85-94
Clonfeacle, Co. Tyrone	Ecclesiastical	Smithing hearths/furnaces	Iron slag, possible tuyère fragment	McHugh <i>et al.</i> 2004, 61-63
Clonmacnoise, New Graveyard, Co. Offaly	Ecclesiastical		Slag, furnace bottoms.	King 1992, 13-14; King 1993:0187
Clonmacnoise, (Visitors centre) Co. Offaly	Ecclesiastical		Iron slag, tuyère fragments	Manning 1989:0078.
Clonmacnoise, National School, Co. Offaly	Ecclesiastical	Bowl furnace	Iron slag (4kg), tuyère, furnace bottom	Ó Floinn & King 1998, 130-32.
Clonmacnoise, Co. Offaly	Early medieval bridge		Iron slag	O'Sullivan & Boland 1997:0447.
Cloonafinneala	Isolated smelting site		520kg iron slag (sample) smelting and bloomsmithing	Young 2012
Cloongownagh, Co. Roscommon	Univallate Rath		Iron slag	Lennon & Henry 2000, 2001
Collierstown, Co. Meath	Settlement/cemetery		Iron slag (0.588 kg)	O'Hara 2008, 2009a, 2009b
Colp West, Co. Meath	Non-circular enclosure	Furnace bottom	Iron slag	Clarke & Murphy 2001; Murphy 2011
Conva, Co. Cork	Enclosures		Furnace bottoms; 15kg iron slag	Doody 1992:0021; Doody 2008, 602-05.
Coolagh, Co. Galway	Cashel		Smithing slag (2.25 kg)	Hardy 2008
Coolahollaga, Co. Tipperary			Iron slag	Murphy & Clarke 2001
Coolcran, Co. Fermanagh	Univallate Rath	3 Iron working furnaces – 1 with stake built structure	Furnace bottoms; iron slag (large quantity), Tuyères	Williams 1985a, 71, 77.
Cooltubbrid, Co. Waterford	Hearths	2 furnaces – size suggests shaft furnace.	7kg Bloomery slag	Tierney 2008, 107.
Coonagh West, Co. Limerick	Univallate Rath		Iron slag	Taylor 2007, 77.
Corcagh Demense, Co. Dublin	Settlement and burials		Iron slag	Carroll 2001:0340.
Croom East, Co. Limerick	Univallate Rath		Iron slag; furnace bottom	Shee-Twohig 1977, 32.
Curraheen, Co. Cork	Univallate Rath		Iron slag	Danaher 2011
Cush, Co. Limerick	Univallate Raths 4, 6 and 7		7.25kg Iron Slag	Ó Ríordáin 1940, 83.
Dalkey Island, Co. Dublin	Promontory fort	Iron smelting pit	Slag; tuyère	Liversage 1968, 135-6.
Danesfort	Isolated pits	1 furnace	Iron Slag (Large quantity)	Jennings2009
Deer Park Farms, Co. Antrim	Raised rath	1 smithing hearth	38kg Iron Slag, mostly smithing, tuyère	Scott 1991, 221; Lynn & McDowell 2011
Deerfin, Co. Antrim	Rath	5 Iron working hearths	Large quantity Iron slag	Bratt 1975:0004.
Derrinsallagh 3, Co. Laois	Rath	Four smelting furnaces and two possible smithing hearths	Iron slag (60 kg+)	Lennon 2009
Derryhowlagh East, Co. Fermanagh	Crannog		Iron slag	Williams 1993:0105.
Derryloran, Co. Tyrone	Ecclesiastical	Smelting furnace?	Slag	MacManus 2003:1843.
Dollas Lower, Co. Limerick	Isolated metal-working site	Bowl furnace	Iron slag; hammerscale	Dowling & Taylor 2007, 273-74.
Dooley, Co. Donegal	Sand hill site, industrial		Iron slag, Iron chisel, Iron tongs	Ó Ríordáin & Rynne 1961, 61.

Site	Site type	Metalworking features	Residue/Artefacts	Reference
Doonmore, Co. Antrim	Rath		Iron bloom	Childe 1938
Doras, Co. Tyrone	Ecclesiastical		Iron slag	McDowell 1987, 153.
Dowdstown, Co. Meath	Non-circular enclosure	Furnace lining	1.31kg Iron slag, smithing	Cagney et al 2008; Cagney & O'Hara 2008
Downview Park, Belfast, Co. Antrim	Souterrains		Slag	Collins <i>et al.</i> 1964, 127.
Dressogagh, Co. Armagh	Multivallate Rath	1 Smelting hearth	Large quantity iron slag	Collins 1966, 119.
Dromore, Co. Antrim	Raised rath		Iron slag	Scott 1991, 221.
Dromthacker, Co. Kerry	Univallate Rath		Iron slag	Cleary 2008
Drumnakill, Co. Antrim	Souterrain		Iron slag & tuyère	Evans 1945, 26.
Drumnakill, Co. Antrim	Sand hill site		Slag	Evans 1945, 26.
Dun Emer, Lusk, Co. Dublin	Non-circular enclosure		Bloomery slag (6 kg)	Giacometti 2007, 2011
Dún Eoghanachta, Inis Mor, Co. Galway	Stone fort		Iron slag	Cotter 1995:0117.
Dunbell 5, Co. Kilkenny	Univallate Rath	Furnace (iron-working?)	Iron slag	Cassidy 1991, 19.
Dunbell 6, Co. Kilkenny	Univallate Rath		Iron slag	Foley 1972
Dunlo, Co. Galway	Industrial site	2 smithing hearths, 2 smelting furnaces	Slag; Smithing (8.8 kg); Smelting (0.256 kg). Possible stone anvil, hammerscale, tuyères	O'Driscoll 2009:394; Young 2010
Dunmisk, Co. Tyrone	Burial and settlement		Slag, tuyère	Ivens 1989, 55.
Dunneineill, Co. Down	Island trading post		16kg Iron slag (smithing), Furnace lining,	McCormick and Macdonald 2004, 8; McCormick & Macdonald 2010, 53.
Dunsilly, Co. Antrim	Univallate Rath		Furnace bottom	McNeill 1991-92, 105.
Dunsilly 2, Co. Antrim	Univallate Rath	Possible workshop		Keery 2012
Ennisnag, Co. Kilkenny	Metal-working area and ditch		Iron slag (large quantity), Furnace bottoms	Jennings 2008
Farrest, Co. Tyrone	Univallate Rath		Iron bloom and slag, Furnace bottoms	Lynn 1983
Faughart, Co. Louth	Settlement/cemetery		19.04kg Iron slag, Smithing Hearth bottoms	Buckley and Conway 2010, 51-52.
Feerwore, Co. Galway	Univallate Rath		Iron slag	Raftery 1944
Feltrim Hill, Co. Dublin	Cashel		Iron slag	Hartnett & Eogan 1964, 27.
Galgorm, Co. Antrim	Souterrain		Iron slag	Evans 1946, 82-83.
Gallen Priory, Co. Offaly	Ecclesiastical		Slag; 'ore crushing basin'	Kendrick 1939, 5.
Garranes, Co. Cork	Multivallate Rath		Iron slag (Large quantity); furnace bottoms, Iron tongs	Ó Ríordáin 1942a, 105-7; Scott 1991, 162.
Garretstown, Co. Meath	Non-circular enclosure		Iron slag (small quantity)	Rathbone 2009
Garryduff, Co. Cork	Univallate Rath	7 metallurgical hearths/furnaces	44 Furnace bottoms; tuyères, ore, large quantity slag, 8 tuyères, iron anvil, iron hammer head, Iron chisel	O'Kelly 1963, 99-103.
Garrynamona, Co. Clare	Univallate Rath		Iron slag	Rynne 1962
Glebe, Co. Dublin	Univallate Rath		5.20kg Iron slag, smithing and bloom smithing	Seaver 2011
Gortnahoon, Co. Galway	Sunken stone structures		Iron slag (28 kg)	O'Carroll & Péterváry 2009.
Gortnahoon, Co. Cork	Univallate Rath	2 smithing hearths, 2 smelting furnaces,	Smelting slag (37 kg) Smithing slag (79 kg),	Kiely & O'Donoghue 2011

Site	Site type	Metalworking features	Residue/Artefacts	Reference
		charcoal pits, circular workshop	Clay shrouds for bells, hammerstones	
Gortybrigane, Co. Tipperary	Rath	1 Smithing hearth?	Iron slag (11 kg), hammerscale, tuyères	Clark & Long 2010
Gragan West, Co. Clare	Mound		Iron slag – date uncertain	Cotter 1988:0004.
Grange West, Co. Sligo	Isolated houses		Iron slag	Burenhult 1987
Grange, Co. Limerick	Univallate Rath		Iron slag, hammerstones	Ó Ríordain 1949b, 133.
Griffinstown, Co. Meath	Industrial site	1 smithing hearth, Charcoal pit	3.74kg smithing slag, furnace bottom	
Haggardstown, Co. Louth	Industrial site		Iron slag	Campbell 1994:180; McConway 1995:220; McLoughlin 1999:610; Moore 2001:858; O'Carroll 1999:544; Walsh 2002:1348
Hardwood II, Co. Meath	Industrial site	Charcoal production pits	Bowl furnace (C033) (possible)	Murphy 2002:1465; Murphy 2008, 7; Carlin 2008, 88.
Hardwood III	Industrial Site	3 bloom smithing hearths	Iron slag, unworked bloom	Murphy 2004
Harristown, Co. Louth	Univallate Rath?		Iron slag	Murphy 1994:0181.
Iniscealtra, Co. Clare	Ecclesiastical	Iron reduction pits		de Paor 1970:0006
Iniskea North, Co. Mayo	Ecclesiastical?		Iron slag	Scott 1991, 167.
Island McHugh, Co. Tyrone	Crannog		Iron slag	Davies 1950, 44.
Johnstown I, Co. Meath	Settlement/ cemetery	13 smelting furnaces, 5 smithing hearths	2200kg Iron slag; artefacts made on site, tuyères, iron chisel and punch	Clarke & Carlin 2008, 73-75; Photos-Jones 2008a
Keelloguesbeg, Co. Galway	Ecclesiastical?	Bowl furnace	Iron slag	Tierney 2001:0519.
Kells, Townpark, Co. Meath	Ecclesiastical		Slag; furnace bottom?	Byrne 1987:0041; 1988:0057.
Kilgobbin, Stepside, Co. Dublin	Ecclesiastical		Iron slag, smelting and smithing	Larsson 2004:0645. Bolger, 2008, 85-112
Kilkieran, Co. Kilkenny	Ecclesiastical		Iron slag	Hurley 1988b, 131.
Kill St Lawrence, Co. Waterford	Ecclesiastical		Slag	O'Connell 2004, 49.
Killanully, Co. Cork	Rath		Iron slag (large quantity), tuyère, iron ore	Mount 1995, 138-40, 146.
Killederdadrum, Co. Tipperary	Univallate Rath		Iron slag	Manning 1984
Killickaweeney (I), Co. Meath	Enclosure	5 smithing hearths, 5 smelting furnaces in two separate areas	86kg Smelting/smithing slags, hammerscale, tuyères, unfinished iron object, iron chisel	Walsh 2008, 40-44; Photos-Jones 2008b.
Killoran, Co. Tipperary	Ecclesiastical	Iron-working area	Furnace bottoms; slag	Stevens 1998:0615.
Kilpatrick, Corbetstown, Co. Meath	Ecclesiastical	Forging area, furnaces	Tuyères, slag, Iron chisel and punch	Swan 1994-95, 8-11; Scott 1991, 158-63.
Kilree, Co. Kilkenny	Multivallate	3 smithing hearths	29.5kg Iron slag, smithing and smelting. Iron anvil in souterrain	Coughlan 2009, 2011
Kiltenan South, Co. Limerick	Isolated metal-working site	Bowl furnace	Slag	Dennehy 2007, 291.
Kiltera, Co. Kilkenny	Ecclesiastical?	Possible furnace	Slag, iron anvil,	Macalister 1935, 5.
Kiltiernan, Co. Galway	Ecclesiastical		Slag (unstratified)	Waddell & Clyne 1995, 180.
Kiltrough, Co. Meath	Rath complex		1.2kg Iron slag	Gallagher 2011
Knockadrina,	Univallate Rath		Iron slag	Coughlan 2009, 2011;

Site	Site type	Metalworking features	Residue/Artefacts	Reference
Co. Kilkenny				Eogan 2011
Knockea, Co. Limerick	Cemetery?		Iron slag	O'Kelly 1967, 93.
Knowth, Co. Meath	Enclosed settlement	Furnaces	341kg Iron Slag	Eogan 1977, 73-74; Scott 1991, 161.
Knowth 'M', Co. Meath	Settlement/cemetery		Iron slag	Stout & Stout 2008
Knoxspark, Co. Sligo	Promontory fort		Iron slag (40 kg), Eight complete furnace bottoms	Mount 2002, 2010
Labbamolaga Middle, Co. Cork	Ecclesiastical		Iron slag	Cleary 1995:0035; Cleary 2000, 37-41.
Lagore, Co. Meath	Crannog	Smithing hearths	Iron slag & tuyère fragments. Iron Hammer head, Iron chisel	Hencken 1950; Lynn 1985-6
Lahard, Co. Kerry	Univallate Rath		Iron slag	Connolly 1994:0127.
Larrybane, Co. Antrim	Promontory fort		Iron slag	Childe 1936, 192
Leacanabuaile, Co. Kerry	Cashel		Iron slag, hammerstones	Ó Ríordáin & Foy 1941, 93
Leggetsra, Co. Kilkenny	Multivallate Rath		Iron slag	Lennon 2005, 2006a-b, 2011
Liathmore, Co. Tipperary	Ecclesiastical		Iron slag	Leask & Macalister 1946, 1-14.
Lisanisk, Co. Monaghan	Multivallate Rath	2 smelting furnaces, 1 smithing hearth. Two separate sunken areas	826.6kg Iron slag, 3 furnace bottoms tuyère fragments, hammerscale	Coughlan 2011
Lislackagh, Co. Mayo	Rath	Iron-smelting pit furnace	Furnace bottoms; smelted, but un-forged, iron.	Walsh 1992:0146; Walsh 1995, 8.
Lisleagh I, Co. Cork	Multivallate	Furnace bottoms	Iron slag (1,000 kg)	Monk 1993
Lisleagh II, Co. Cork	Univallate Rath	Iron-working area, bowl furnace	Iron slag (800kg)	Monk 1991:0026; Scott 1991, 160-63.
Lisnagade (2), Co. Down	Multivallate Rath		Slag	Proudfoot 1961, 106.
Lisnagun, Co. Cork	Univallate Rath		Iron slag, hammerstones	O'Sullivan <i>et al.</i> 1998, 54.
Lissue, Co. Antrim	Univallate Rath		Iron slag	Bersu 1947, 50.
Lough Faughan, Co. Down	Crannog	Metallurgical hearth/furnace	Bog ore, iron slag and iron blooms	Collins 1955, 75.
Lough Island Reeve, Co. Down	Crannog		Iron slag	Gaffikin & Davies 1938, 202.
Loughbown 1, Co. Galway	Multivallate	3 Smithing hearths	Iron slag (130 kg)	Bower 2009
Loughboy, Co. Kilkenny	Settlement/Cemetery	Iron-working hearth	Iron slag	Cotter 1999
Loughlackagh, Co. Roscommon	Souterrain		Iron slag	Lavelle 1994:202
Lowpark, Co. Mayo	Univallate Rath and Palisaded enclosure	11 smithing hearths in four iron-processing workshops	Iron slag (1360 kg), smithing, tuyères, anvil stone, Hammerscale	Gillespie 2011
Mackney, Co. Galway	Univallate Rath	1 furnace and 2 smithing hearths	Iron slag (42 kg), anvil stone	Delaney 2009
Maghera, Co. Down	Ecclesiastical		Iron-working debris, slag, tuyeres (context not stated)	Hamlin 2008, 308; Lynn 1984-6:0086.
Magheramenagh, Co. Londonderry	Souterrain		Iron slag	Reilly 1999:130
Marlinstown, Co. Westmeath	Settlement and cemetery	Furnace (iron-working?)	Iron slag	Keeley 1991:0126.
Marshes Upper, Co. Louth	Enclosure complex	Furnace bottoms	Iron slag (14.5 kg), bloom smelting waste, hammerstones	Gower 1992
Meadowbank Rath, Jordanstown, Co. Antrim	Raised rath	1 metallurgical hearth	Iron slag (large quantity); tuyère	Halpin & Crothers 1995:0007.
Moathill 1, Co. Meath	Enclosure complex	1 metallurgical hearth	Iron slag (15 kg), smithing waste, tuyère	Giacometti 2007

Site	Site type	Metalworking features	Residue/Artefacts	Reference
Mount Offaly, Co. Dublin	Settlement/ Cemetery	Iron-working furnace	Iron slag, Iron punch, Iron chisel	Conway 1999
Movilla, Co. Down	Ecclesiastical		Iron slag	Yates 1983, 62.
Moyle Big, Co. Carlow	Industrial site		Iron slag	Hughes 2006:195; Kyle <i>et al.</i> 2009
Moylederg, Co. Donegal	Crannog		Iron slag, Tuyère	Davies 1946a, 98.
Moynagh, Co. Meath	Crannog	1 metallurgical hearth	Iron slag, Iron tongs	Bradley 2010
Moyne, Co. Mayo	Univallate Rath		Iron slag	Manning 1987
Moyvalley (2), Co. Meath	Occupation		Slag	Carlin 2008, 88.
Mullaghbane, Co. Tyrone	Univallate Rath		Iron slag (large quantity from bog ore) furnace bottom	Harper 1972a, 43.
Narraghmore, Co. Kildare	Multivallate		Iron slag	Fanning 1972
Nendrum, Co. Down (Watermill)	Ecclesiastical		Iron slag; tuyère	Bourke 2007, 407
Nendrum, Co. Down	Ecclesiastical		Iron slag; ironstone nodules, Iron tongs	Bourke 2007, 407; Scott 1991, 154; Lawlor 1925, 136.
Nevinstown, Co. Meath	Souterrain	Bloomery hearth	Iron slag and bloom	Cahill 1977/79:059
Newcastle (2), Co Meath	Industrial site	Bowl furnace, oval slag pit and spread	Iron slag (11.267kg) furnace bottoms	O'Hara 2002:1499; O'Hara 2008; Photos-Jones 2008d; Carlin 2008, 88
Newtownlow, Co. Westmeath	Crannog	Metallurgical hearth	Iron slag	Scott 1991, 223.
Ninch, Co. Meath	Enclosures		Iron slag	McConway 2002, 2010.
Oldcourt, Co. Cork	Univallate Rath		Iron ore (limonite); iron slag (large quantity), 1 complete and 8 frags furnace bottom, Iron chisel	Murphy & Ó Cuileanáin 1961, 90.
Owenbristly, Co. Galway	Settlement/ cemetery		Iron slag (5 kg)	Lehane & Delaney 2010; McCarthy 2010
Park, Co. Tipperary	Enclosure	1 smelting furnace	Iron slag (12.8kg) smithing and smelting, hammerscale	Mullins 2011
Parknahown, Co. Laois	Settlement Cemetery	Discarded stone smithing hearth base	100kg Iron slag, smithing and smelting	O'Neill 2010, 251
Peter Street, Waterford	Urban – mid-12 th century	Possible furnace	Iron slag; hammerscale	Scully & McCutcheon 1997, 104.
Platin, Co. Meath	Open settlement, structures		1.6kg Iron slag; tuyères	Lynch 2000:0774, 2001:1022, 2002; Conway 2001:1019
Poulacapple, Co. Clare	Univallate Rath		Iron slag	Reynolds 1972:0030.
Raheens I, Co. Cork	Multivallate		Large amounts of charcoal	Lennon 1993
Rampark, Co. Louth	Settlement/Cemetery	Iron-smelting furnace	Iron slag	Campbell 2004:1122
Rathgureen, Co. Galway	Multivallate Rath	2 Bowl furnaces	23kg Iron slag, furnace bottoms, Tuyère, Possible anvil stone	Comber 2002, 153, 170.
Rathmullen, Co. Down	Raised rath		Iron slag (possible)	Scott 1991, 222.
Ratoath, Co. Meath.	Enclosure, cemetery, field systems		73kg Iron smithing slag	Wallace 2010, 301, 303, 304
Raystown, Co. Meath	Settlement and Cemetery		10kg Iron slag, frags. Furnace hearth bottoms, charcoal pits, Iron chisel and punch	Seaver 2005, 2006, 2010
Reask, Co. Kerry	Ecclesiastical	Smelting and smithing furnace	Iron slag, hammerstones	Fanning 1981, 105-10; Scott 1981, 168-70.
Ringmackilroy, Co. Down	Rath		Iron slag	Crothers 1992:037
Rinnaraw,	Cashel	Pit within possible	30kg Iron slag,	Comber 2006, 103.

Site	Site type	Metalworking features	Residue/Artefacts	Reference
Co. Donegal		lean –to structure	furnace bottom, tuyère?	
Roestown, Co. Meath	Enclosure complex		Iron slag (10.35 kg), stone anvil	O'Hara 2007, 2009a-b
Rosepark, Balrothery, Co. Dublin	Enclosures		Iron slag	Carroll 2008, 98
Rossan (4), Co. Meath	Hearth	Smithing hearth	0.331kg Iron slag	Carlin 2008, 88.
Sallymount, Co. Limerick	Univallate enclosure with annexes	Smithing hearths, Rectangular structure	Iron slag (265 kg), furnace bottoms, hammerscale, tuyère	Clark & Long 2009
Shallon 1, Co. Meath	Isolated metal-working site	Furnace and pit A.D. 240-540 (2Σ)		Russell 2001:1052.
Sheephouse 2, Co. Meath			0.13kg Iron slag	Moore 2001:1055
Shane's Castle, Co. Antrim	Univallate Rath		Iron slag	Warhurst 1971, 63.
Simonstown, Co. Meath	Univallate Rath	Smelting activity	Large Quantity Iron Slag	Kelly 1975:0033.
Skellig Michael, Co. Kerry	Ecclesiastical		Slag	Scott 1991, 222.
Sluggary, Co. Limerick	Bivallate Rath		4 Furnace bottoms	Shee-Twohig 2000, 12.
Sroove, Co. Sligo	Crannog	1 smithing hearth	Slag, possible anvil stone	Fredengren 2002, 237.
Stranure, Co. Offaly	Ecclesiastical		Iron slag; furnace bottoms	Delany 2001:1104.
St. Gobnet's, Co. Cork	House	Bloomery hearth in structure	Iron slag, Tuyère, 57 furnace bottoms, 12 frags clay furnace covers	O'Kelly 1951-2
Tallaght, Co. Dublin	Ecclesiastical		Iron slag	O'Brien 1990:0043.
Terryhoogan, Co. Armagh	House site		Iron slag	McSparron 2007, 121.
The Spectacles, Co. Limerick	Cashel		Iron slag	Ó Ríordáin 1948–50
Towlaght, Co. Meath	Hearth, pits	Bowl shaped scorched hearth	No Iron slag found	Carlin 2008, 88.
Treanbaun, Co. Galway	Settlement and Cemetery		Iron slag	Pérez, M. M. 2009
Tullahedy, Co. Tipperary	Univallate Rath		Iron slag	Murphy & Clarke 2011
Tullykevin, Co. Down	Raised rath		Iron slag	Sloan 2008
Tullylish, Co. Down	Ecclesiastical	Hearth, furnaces?	Tuyères (possible); slag	Ivens 1987, 72, 76, 104-6.
Turnarobert, Co. Antrim	Souterrain		Furnace bottom	Williams 1991:0011.
Urney, Co. Tyrone	Rath		Slag	Scott 1971:0034.
Whiterath, Co. Louth	Souterrain		Iron slag	Ó Drisceoil 2000:0721.
Woodstown, Co. Waterford	Viking settlement	1 smelting furnace with possible frontal arch	272kg Iron Slag Furnace bottom; slag, tuyère, Iron punch, Iron files	Russell 2003:1915; O'Brien & Russell 2005, 119-22.

Table A1.1: Evidence for Iron-Working from Early Medieval sites

Site	Site type	Metal-working features	Artefacts	Reference
Ardcloon, Co. Mayo	Univallate Rath	Hearth/furnace?	Lead ore	Rynne 1956, 208.
Armagh: Cathedral Hill, Co. Armagh	Ecclesiastical	Workshop area and hearths	Slag, 7 ingot moulds, 6 clay moulds and 45 frags, 52 triangular and 9 flat crucibles and 7 others, tuyères, scrap bronze, motif pieces	Gaskell-Brown & Harper 1984, 119, 124-51.
Armagh: English Street Co. Armagh	Ecclesiastical		6 Crucible fragments	Crothers 1999, 63; 67.
Armagh: Scotch Street, Co. Armagh	Ecclesiastical		1 tiny crucible frag, copper wire	Lynn 1988, 82. Lynn & McDowell 1988, 60.
Augherskea, Co. Meath	Cemetery and settlement		2 crucible fragments	Baker 2005
Ballinderry (II), Co. Offaly	Crannog		43 frags. Crucibles, 8 clay moulds, stone ingot mould, motif piece	Hencken 1942, 50-51, 65-66.
Ballycasey More, Co. Clare	Enclosures		Clay mould	O'Neill 2002:0079, 2003
Ballycatteen, Co. Cork	Multivallate Rath		9 frags. Crucibles	Ó Ríordáin & Hartnett 1943, 35.
Ballyduff, Co. Antrim	Multivallate Rath		1 Crucible fragment	Avery 1970:01
Ballynagallagh, Co. Limerick	Univallate Enclosure		Clay mould	Cleary 2006
Ballywee, Co. Antrim	Enclosure		Bronze-smelting crucibles	Lynn 1988; Crothers 1994
Ballyvourney, Co. Cork	House site/ ecclesiastical		Crucible	O'Kelly 1952, 27.
Balriggeran, Co. Louth	Settlement/ cemetery		1 Crucible fragment	Delaney 2010
Baronstown, Co. Meath	Multivallate Enclosure		single unphased copper alloy globule	Linnane 2009; Linnane & Kinsella 2007
Beal Boru, Co. Clare	Earthwork		Motif piece	O'Kelly 1962, 8-9
Borris, Co. Tipperary	Univallate enclosure and annexes		1 pyramidal crucible	Wallace and Anguilano 2010a, 22
Carraig Aille (II), Co. Limerick	Cashel		3 Crucibles, 50 fragments and a silver ingot	Ó Ríordáin 1949a, 91-92
Castlefarm, Co. Meath	Settlement/ cemetery		Copper globules and ingot	O'Connell & Clark 2009; O'Connell 2009
Castle Skreen (2), Co. Down	Univallate Rath		1 Pyramidal crucible and frags.	Dickinson & Waterman 1959, 75-76.
Cathair Fionnúrach, Co. Galway	Cashel	Possible anvil stone, furnace pit (not stated what metal)	1 Crucible	Gibbons 1994:0116; Gibbons 1997:0228.
Cathedral Hill, Downpatrick, Co. Down	Ecclesiastical		Mould and crucible fragments, bronze ingots, molten lead splashed	Ryan 1988, 43
Cavanapole, Co. Armagh	Univallate Rath		Crucible fragments, tuyère	Crothers 1996:0015
Cherryhound, Co. Dublin	Industrial		Crucibles, fragments of copper and copper alloy	McGowan 2004:0483.
Cherrywood, Co. Dublin	Cemetery and Settlement		Silver Ingot	Ó Néill, J. 2012, 62-72
Clea Lakes, Co. Down	Crannog		Two crucible fragments	Collins & Proudfoot 1959, 86.
Clogher, Co. Tyrone	Rath within earlier hill-fort		Crucibles (including ten flat bottomed examples), gold rubbing stone, lead pin, unfinished bronze	Warner 1973, 10; Warner 1979, 37; Youngs 1990, 186-87, 195, 198. Young 2006, 3

Site	Site type	Metal-working features	Artefacts	Reference
			brooch	
Cloghermore, Co. Kerry	Cave		1 stone vessel/crucible	Connolly 2000; Connolly & Coyne 2000; Connolly <i>et al.</i> 2005
Clonfad, Co. Westmeath	Ecclesiastical		Non-ferrous coating of iron bells, crucibles, stone and clay bell shrouds	Stevens 2006, 10.
Clonmacnoise, New Graveyard, Co. Offaly	Ecclesiastical		Crucibles, slag, moulds, tuyères, bronze off-cuts including decorated scrap, stone ingot moulds, motif pieces. Iron punch	King 2009, 341-43; King 1990:097; 1992:157; 1993:0187; 1994:0197; 1995:0240; 1996:0324; 1997:0448; 1998:0548
Clonmacnoise, National School, Co. Offaly	Ecclesiastical		Crucible, clay mould, copper alloy ingot, gold scrap	Ó Floinn & King 1998, 123-24.
Coolagh, Co. Galway	Cashel		2 Crucibles	Hardy 2008
Cooltubbrid, Co. Waterford	Industrial	2 hearths, 1 with stone base.	7kg Slag with copper particles	Tierney 2008, 108.
Coonagh West, Co. Limerick	Rath		1 Crucible.	Taylor 2007, 77
Corranneary, Co. Cavan	Crannog		Five crucibles; two mould fragments	Davies 1942, 27-28.
Craigyarren, Co. Antrim	Crannog		Two crucible fragments (enamel residues)	Coffey, G. 1906
Dalkey Island, Co. Dublin	Promontory fort.		Bronze Ingot, 40 Crucible frags (residues of copper and tin), clay from copper smelting	Liversage 1968, 91, 186.
Deer Park Farms, Co. Antrim	Raised rath		Fragments of four Crucibles, Clay 'wrap'. Clay 'package' copper-alloy ingot	Lynn & McDowell 2011, Bayley 2011, 346-251
Dooley, Co. Donegal	Settlement/ Cemetery		Crucibles, moulds, motif piece, Iron tongs, hammerhead	Ó Ríordáin & Rynne 1961, 61.
Dublin: Christchurch Place, Dublin	Urban		Crucibles	Ó Ríordáin 1974:0014.
Dublin: High Street & Christchurch Place.	Urban		Crucibles, heating trays, moulds, unfinished bronze pins.	Anon 1973, 14-15. Fanning 1994, 114-23. Ó Riordain 1971:0016; 1974:0014; 1975:0015.
Dunmisk, Co. Tyrone	Settlement/ Cemetery	Metal working hearths and furnaces	145 sherds crucibles, 258 clay moulds, tuyères, slag	Ivens 1989, 28-36, 54-55.
Dunynneill, Co. Down	Island trading post		Dish like cupel frag, 2 flat bottomed crucible frags, fragment of copper slag	McCormick & Macdonald 2004, 8.
Dunsilly, Co. Antrim	Raised Rath		10 Crucible fragments	McNeill 1991-2, 104.
Dunsilly 2, Co. Antrim	Univallate Rath		Stone crucible	Keery 2012
Faughart Lower, Co. Louth	Settlement/. Cemetery		1 Crucible, silver ingot, stone ingot mould	Buckley & McConway 2010, Bowen 2008
Feerwore, Co. Galway	Rath		1 pyramidal Crucible	Raftery 1944
Feltrim Hill, Co. Dublin	Cashel		Silver ingot	Hartnett & Eogan 1964
Garranes, Co. Cork	Multivallate Rath	Workshop debris area	Unfinished brooch and pin, lumps of tin, 30 clay moulds, 4 stone object moulds, 4 stone ingot moulds, 39	Ó Ríordáin 1942a, 86, 93, 98, 107-09, 121-22, 134-39.

Site	Site type	Metal-working features	Artefacts	Reference
			complete and 2500 sherds crucibles, tuyères.	
Garryduff, Co. Cork	Univallate Rath	Paving and hearth?	3 Complete crucibles, 24 fragments, 'blow pipe', 9 stone trial pieces	O'Kelly 1963, 95-99.
Glebe, Co. Dublin	Univallate ringfort		Pyramidal crucible	Seaver 2011, 51-64
Gortnahown, Co. Cork	Univallate rath		Brazing shrouds, bronze/copper-alloy slag, 3 sherds of crucible (2 pyramidal)	Young 2009b
Granagh, Co. Galway	Inauguration site?		Crucible	Rynne 1971:0018.
Gransha, Co. Down	Raised rath		Moulds, motif pieces, crucible	Lynn 1985, 88.
Illaunloghan, Co. Kerry	Ecclesiastical		Motif piece, moulds, tuyère, Iron punch	Marshall & Walsh 2005, 19.
Iniscealtra, Co. Clare	Ecclesiastical	Copper-working area and furnace	Motif-piece	Ryan 1988, 44.
Island McHugh, Co. Tyrone	Crannog		Crucibles	Davies 1950, 44
Kilgobbin, Stepside, Co. Dublin	Ecclesiastical		Crucibles – 7 frags. Flat bottomed, 5 indeterminable, slags (type un-stated), clay mould	Bolger 2004:0647 Bolger 2008, 85-112
Kilpatrick, Corbetstown, Co. Meath	Ecclesiastical	Non-ferrous- and iron-working in same area	Mould, crucible, iron punch	Swan 1994-5, 5.
Kiltiernan, Co. Galway	Ecclesiastical	None	Crucibles, slag?, hammerstones	Waddell & Clyne 1995, 195-196.
Knockea, Co. Limerick	Raised settlement and adjacent cemetery		1 Crucible	O'Kelly, 1967
Knowth, Co. Meath	Enclosed settlement	Metal-working hearth	Frgs of 10 Crucibles (one for gold work), 3 heating trays, 2 stone ingot moulds, 1 two part clay mould. Scrap metal, lead disc, crozier frag	Eogan 1977, 74. Barton-Murray and Bayley 2012, 526-533.
Knoxspark, Co. Sligo	Promontory fort		Silvered bronze clippings	Mount 2002, 2010
Lagore, Co. Meath	Crannog		263 Crucibles (including frags), motif pieces, 2 clay mould, 6 stone ingot moulds, tuyères, copper ore, copper wire, lead model for ringed pin	Hencken 1950 126, 170-73, 240-41; Comber 2004, 137-78. Comber 1997, 101-114
Letterkeen, Co. Mayo.	Univallate Rath	Burnt spread associated with possible stone structure	1 base and small crucible frags. Heavily burnt and glazed clay	Ó Ríordáin & McDermott 1952, 114.
Lisdoo, Co. Fermanagh	Univallate Rath		6 frags of at least 2 Crucibles	Brannon 1981-2a, 57.
Lisduggan (2), Co. Cork	Univallate Rath		1 fragment crucible	Twohig 1990, 19.
Lisleagh I, Co. Cork	Multivallate		Bronze-working debris	Monk 1988, 1993
Lissue, Co. Antrim	Univallate Rath		Slate trial-piece	Bersu 1947, 1948
Lough Faughan, Co. Down	Crannog		1 pyramidal crucible and frags of others (traces of copper and tin), 1 clay mould, slag (copper).	Collins 1955, 58-59, 66, 74.
Marlinstown, Co. Westmeath	Settlement/ Cemetery		3 Fragments crucibles	Keeley 1990:0113; Keeley 1991:0126
Cabinteely, Mount Offaly, Co. Dublin	Settlement/ Cemetery		Slag	Conway 1999, 39.

Site	Site type	Metal-working features	Artefacts	Reference
Movilla, Co. Down	Ecclesiastical	Possible furnace base	Crucibles, scrap copper alloy, slag	Ivens 1984, 77-78, 93; Yates 1983, 61.
Moylurg, Co. Antrim	Crannog		7 crucibles, lead ring, bronze ingot, clay mould	Buick 1893, 27-43 Buick 1894, 315-331
Moynagh, Co. Meath	Crannog	Two metal-working area and furnace	5 complete and 117 sherds crucibles, 600 clay moulds, 1 kg copper slag, 3 motif pieces, tuyère, clipped and hammered gold, gold wire, bronze ingot	Bradley 1982-83, 24-28; 1993, 79-80; 1994-95, 160-66; Youngs 1990, 178-84.
Nendrum, Co. Down	Ecclesiastical		Crucibles, ingot, bronze nodules, clay mould, motif pieces	Bourke 2007, 406-11.
Newtownlow, Co. Westmeath	Crannog		Crucible fragments	Bourke 1985:058; Bourke 1986:078
Parknahown, Co. Laois	Settlement/Cemetery		1 Crucible fragment	O'Neill 2007, 2008, 2009
Platin, Co. Meath	Occupation site		Pyramidal Crucible and tuyère fragments, 1 clay mould	Lynch 2000:0774. Young and Kearns 2010, 1-10
Raheennamadra, Co. Limerick	Univallate Rath		1 Crucible	Stenberger 1966, 49
Rathgureen, Co. Galway	Bivallate Rath	Ironworking furnace	23 frags. Crucibles, tuyère?	Comber 2002, 171.
Rathinaun, Co. Sligo	Crannog		Crucibles and mould fragments	Comber 2008, 131.
Rathmullen, Co. Down	Raised rath		1 Crucible fragment	Lynn 1981-2, 145.
Ratoath, Co. Meath	Settlement/Cemetery		Slag, 1 crucibles/heating tray, lead ingot	Wallace 2004:1324
Reask, Co. Kerry	Ecclesiastical	Metal-working areas, furnaces	Crucibles, slag, furnace bottoms, tuyères	Fanning 1981, 105-10, 117-20.
Roestown 2, Co. Meath	Enclosures		3 Crucible fragments of pyramidal and flat bottomed example, 1 stone ingot mould, and bone trial pieces	O'Hara 2007, 149.
Sluggary, Co. Limerick	Bivallate Rath		Possible clay mould	Shee-Twohig 1974:0029.
St Gobnet's, Co. Cork	House (wooden phase)		2 Crucibles with copper residue, lengths of bronze wire	O'Kelly 1951-2
Tullylish, Co. Down	Ecclesiastical	Hearth, furnaces?	Crucibles, moulds, tuyères	Ivens 1987, 72, 76, 104-06.
Woodstown, Co. Waterford	Viking Settlement	Hearths/furnaces	tuyère, 65 fragments of crucibles, slag, lead/silver ingots, 1 bronze ingot, silver casting waste	Russell 2003:1915; O'Brien & Russell 2005, 119-22.

Table A1.2: Evidence for Non-Ferrous Metal-Working from Early Medieval sites

Site	Site type	Evidence	Reference
Armagh: Cathedral Hill, Co. Armagh	Ecclesiastical	Enamel and glass rods	Gaskell-Brown & Harper 1984, 122, 135.
Armagh: English Street, Co. Armagh	Ecclesiastical	Glass rods	Crothers, 1999, 63.
Armagh: Scotch Street, Co. Armagh	Ecclesiastical	Glass bead manufacturing waste	Lynn & McDowell 1988, 60.
Augherskea, Co. Meath	Settlement cemetery	Evidence not stated	Baker 2010, 18
Ballycatteen, Co. Cork	Rath	Blue glass rod, scrap of Roman or sub-Roman glass	Ó Ríordáin & Hartnett 1943, 26. Burke 1994, 196.
Cabinteely, Mount Offaly, Co. Dublin	Settlement/ cemetery	Fragment of a blue glass rod	Conway 1999, 39.
Cahercommaun, Co. Clare	Cashel	Fragment of bangle with traces of two perforations – possibly broken during manufacture, hammerstones	Hencken 1938, 39.
Carraig Aille (II), Co. Clare	Cashel	Flattened tear-drop shaped piece of glass, glass vessel fragments – scrap?, Hammerstones	Ó Ríordáin 1949a, 91, 102.
Craigwarren, Co. Antrim	Crannog	Enamel deposit on crucible	Coffey 1906
Dunmisk, Co. Tyrone	Settlement/ cemetery	A failed glass stud, failed glass beads, monochrome glass rods, reticella rods, scrap glass, glass making crucible fragments for making opaque yellow glass.	Henderson 1988, 115-17, 122.
Garranes, Co. Cork	Rath	Millefiori glass rod, millefiori glass attached to bronze tube, Several small pieces of glass vessel – scrap? Lumps of enamel that had cooled after being molten.	Ó Ríordáin 1942a, 118-19, 121.
Garryduff, Co. Cork	Rath	Blob of blue glass. Glass vessel fragment – scrap?	O’Kelly 1963, 77.
Gragan West, Co. Clare		Melted glass bead, hammerstones	Cotter 1990
Island McHugh, Co. Tyrone	Crannog	Crucibles with enamel residue	Ivens & Simpson 1986
Knowth, Co. Meath	Settlement site	Enamel working crucibles?	Eogan 1977, 74.
Lagore, Co. Meath	Crannog	Moulds for glass studs, blue glass rods, millefiori glass rod, scrap glass? Roman or post Roman.	Hencken 1950, 127-30, 132
Lislackagh, Co. Mayo	Rath	Unfinished glass bead	Walsh 1993
Lough Faughan, Co. Down	Crannog	Glass vessel fragment – scrap?	Collins 1955, 63.
Marlinstown, Co. Westmeath	Multivallate	Vitreous material	Kiely 1990:113; 1991:126.
Movilla, Co. Down	Ecclesiastical	Glass rods, glass globules	Ivens 1984b, 100.
Moynagh, Co. Meath	Crannog	Lump of yellow enamel	Bradley 1987:0039.
Roestown, Co. Meath	Enclosure	Crucible with glazed residue	O’Hara 2007, 2009a-b
Woodstown, Co. Waterford	Longfort	Molten glass droplets	Russell <i>et al.</i> 2007

Table A1.3: Evidence for Glass-Working from Early Medieval sites

Site name	Evidence	Reference
Armagh: Cathedral Hill, Co. Armagh	Sawn antler waste	McCormick & Murray 2007, 196.
Ballinderry I, Co. Westmeath	Antler points	Hencken 1942
Ballinderry II, Co. Offaly	15 fragments of worked antler	Hencken 1942
Ballyarra, Co. Cork	Three pieces of worked antler	Fahy 1953
Baronstown, Co. Meath	Worked antler mount	Linnane 2009; Linnane & Kinsella 2007
Cabinteely, <i>Mount Offaly</i> , Co. Dublin	Antler tines and burrs	Conway 1999, 39.
Cahercommaun, Co. Clare	Antler off-cuts	Hencken 1938, 63
Castlefarm, Co. Meath	Antler waste	
Clonfad, Co. Westmeath	Bone off-cuts	Stevens 2006, 11; Stevens 2010.
Clonmacnoise, Co. Offaly	Antler off-cuts	McCormick & Murray 2007, 217.
Collierstown, Co. Meath	Antler waste	O'Connell & Clark 2009; O'Connell 2009
Coonagh West, Co. Limerick	Antler cores	Taylor 2007
Cormac's Chapel, Cashel, Co. Tipperary	Traces of antler-working	Hodkinson 1994, 171.
Deer Park Farms, Co. Antrim	Antler off-cuts	McCormick & Murray 2007, 221.
Derrynaflan, Co. Tipperary	Cut antler	Ó Floinn 1986:0070.
Dooley, Co. Donegal	Worked/un-worked antler	Ó Ríordáin & Rynne 1961
Doonloughan, Co. Galway	Worked antler	Murray & McCormick 2011
Dublin: High Street/ Christchurch Place, Co. Dublin	Antler-comb blanks and waste	Anon 1973, 15; Ó Ríordáin 1974:0014.
Dún Eoghanachta, Inis Mór, Co. Galway	Antler waste fragments	McCormick & Murray 2007, 237.
Illaunloughan, Co. Kerry	Antler waste	McCormick & Murray 2007, 239.
Inishcealtra, Co. Clare	Comb blanks	De Paor 1971:0010
Kilgreany, Co. Waterford	Worked antler	Movius 1935
Killederdadrum, Co. Tipperary	Worked antler	Manning 1984
Killickaweeny, Co. Kildare	25 fragments of antler	Walsh 2005; Walsh 2008
Kilpatrick, Co. Westmeath	Discarded portions of antler	Swan 1994-5, 6.
Knowth, Co. Meath	Cut and polished antler fragments	Eogan 2012
Lisleagh I, Co. Cork	Deer antler fragments	Monk 1988, 1993
Lough Faughan, Co. Down	Antler waste	McCormick & Murray 2007, 251.
Moynagh, Co. Meath	Cut pieces of antler	Bradley 2010
Moyne, Co. Mayo	Sawn antler off cuts and chopped cattle horn-core	McCormick & Murray 2007, 261.
Oughtymore, Co. Londonderry	Antler ring and spindle whorl	Mallory & Woodman 1984
Parknahown, Co. Laois	Antler waste/ unfinished knife handle	O'Neill 2007, 2008, 2009
Rathgureen, Co. Galway	Antler off-cuts	McCormick & Murray 2007, 265.
Raystown, Co. Meath	Antler off cuts	Seaver 2009
Roestown, Co. Meath	Comb blanks, Antler bone handle	O'Hara 2007, 148.
Tullahedy, Co. Tipperary	Cut antler	Murphy & Clarke 2001
Uisneach, Co. Westmeath	Cut antler	Macalister & Praeger 1928
Waterford: Peter's Street, Co. Waterford	Large deposits of antler waste	McCormick 1997, 837-38; Hurley 1997, 651-53.

Table A1.4: Evidence for Antler-Working from Early Medieval sites

Site name	Evidence	Reference
Athlumney, Co. Meath	Bone pins	Jones 1999
Ballinderry I, Co. Westmeath	Bone pins	Hencken 1942
Ballinderry II, Co. Offaly	Bone pins	Hencken 1942
Ballyegan, Co. Kerry	Bone gouge	Byrne 1991
Ballyvass, Co. Kildare	Cut bone waste	Clark & Doyle 2011
Baronstown, Co. Meath	Incomplete bone comb; bone pins	Linnane 2009; Linnane & Kinsella 2007
Beginish, Co. Kerry	Three bone points	O'Kelly 1955
Boho, Co. Fermanagh	Bone pin	Proudfoot 1953
Borris, Co. Tipperary	Bone point	Ó Droma, M. 2006:1933
Bowling Green, Co. Tipperary	Bone needle	Fanning 1970
Boyerstown, Co. Meath	Polished un-worked bone	Clarke 2009
Cahercommaun, Co. Clare	Worked bone pieces; 82 bone pins	Hencken 1938
Caraun More, Co. Galway	Bone toggles	Seaver & Conran 2009
Carmmore West, Co. Galway	Bone peg	Sutton 2008, 2011
Carraig Aille (I), Co. Limerick	Bone pins	Ó Ríordáin 1949a
Carraig Aille (II), Co. Limerick	5 unfinished bone pins	Ó Ríordáin 1949a, 83
Carrowkeel, Co. Mayo	Bone weaving tool	Walsh & Zajac 2004; Zagac 2011
Castlefarm, Co. Meath	Un-worked pig fibula; bone pin	O'Connell & Clark 2009; O'Connell 2009
Castleskreen, Co. Down	Bone pin	Dickinson & Waterman 1959
Cherrywood, Co. Dublin	Bone needle	Ó Néill 1999, 2006
Clea Lakes, Co. Down	Bone pins	Collins & Proudfoot 1959
Cloghermore, Co. Kerry	Bone pins	Connolly <i>et al.</i> 2005
Cloncowan, Co. Meath	Bone pins	Baker 2007a-b
Clonfad, Co. Westmeath	Bone off-cuts	Stevens 2006, 11; Stevens 2010.
Colp West, Co. Meath	Bone knife-handle rough-outs	Murphy 2011
Coonagh West, Co. Limerick	Horn cores	Taylor 2007
Deer Park Farms, Co. Antrim	Bone pins	Lynn & McDowell 2011
Dooley, Co. Donegal	Bone knife-handles, large number of pig fibula and other bone pins	Ó Ríordáin & Rynne 1961
Dowdstown, Co. Meath	Bone pins	Cagney <i>et al.</i> 2008; Cagney & O'Hara 2009
Dublin: Essex Street/ Lower Exchange St. Co. Dublin	Butchered walrus-skull	Simpson 1997:0124.
Dublin: Fishamble Street. Co. Dublin	Walrus-skull fragment	Wallace 1987a, 216
Dublin: High Street/ Christchurch Place, Co. Dublin	Antler-comb blanks and waste	Anon 1973, 15; Ó Ríordáin 1974:0014.
Dunbell Big 6, Co. Kilkenny	Bone pin	Foley 1972
Dunynneill Island, Co. Down	Worked bone fragments	McCormick <i>et al.</i> 2002; McCormick & Macdonald 2003; McCormick & Macdonald 2004
Feerwore, Co. Galway	Bone knife handles	Raftery 1944
Feltrim Hill, Co. Dublin	Bone pins	Hartnett & Eogan 1964
Garryduff, Co. Cork	Bone pins	O'Kelly 1963
Glebe, Co. Dublin	Bone pins	Seaver 2005, 2007, 2011
Inishcealtra, Co. Clare	Comb blanks	De Paor 1971:0010
Johnstown, Co. Meath	Bone pins	Clarke & Carlin 2008
Kilgobbin, Co. Dublin	Bone pins	Bolger 2008
Kilgreany, Co. Waterford	Worked bone	Movius 1935
Killickaweeny, Co. Kildare	Bone pin	Walsh 2005; Walsh 2008
Killyliss,	Sawn bone waste	Ivens 1984a, 29.

Co. Tyrone		
Knockea, Co. Limerick	Bone pins	O’Kelly 1967
Knowth, Co. Meath	Cut and polished waste fragments; five strips of button waste	Eogan 2012
Lagore, Co. Meath	Bone pins	Hencken 1950
Larrybane, Co. Antrim	Pointed bone tool	Childe 1936; Proudfoot & Wilson 1961-2
Mackney, Co. Galway	Bone toggles	Delaney 2009
Marshes Upper, Co. Louth	Bone handles	Gowen 1992
Meadowbank, Co. Antrim	Bone pins	Crothers 1995
Moathill 1, Co. Meath	Bone pin	Giacometti 2007
Mount Offaly, Co. Dublin	Bone comb blanks	Conway 1999
Moynagh, Co. Meath	Cut pieces of bone	Bradley 2010
Moyne, Co. Mayo	Chopped cattle horn-core	McCormick & Murray 2007, 261.
Nevinstown, Co. Meath	Bone needles	Cahill 1977/79:059
Ninch, Co. Meath	Bone peg	Conway 2002, 2010
Park North, Co. Cork	Bone pins	Coleman 1941-2
Parknahown, Co. Laois	Bone pin	O’Neill 2007
Rahally, Co. Galway	Unfinished bone comb or handle	Mullins 2009
Raheennamadra, Co. Limerick	Worked bones	Stenberger 1966
Rathinaun, Co. Sligo	Bone pins	Raftery undated
Ratoath, Co. Meath	Bone pins	Wallace 2010
Raystown, Co. Meath	Bone buttons, pig fibulae	Seaver 2005, 2006, 2010
Roestown, Co. Meath	Comb blanks	O’Hara 2007, 148.
Rosepark, Co. Dublin	Bone points	Carroll 2008
Sroove, Co. Sligo	Bone pins	Fredengren 1998, 2001, 2002
The Spectacles, Co. Limerick	Bone scoops/gouges	Ó Ríordáin 1949a
Tulsk, Co. Roscommon	Bone pins	Brady 2008
Uisneach, Co. Westmeath	Bone pin	Macalister & Praeger 1928

Table A1.5: Evidence for Bone-Working from Early Medieval sites

Site	Site type	Evidence	Reference
Armagh: Cathedral Hill, Co. Armagh	Ecclesiastical	Unfinished lignite bracelets, lignite central waste pieces	Gaskell-Brown & Harper 1984, 136-7.
Armagh: English Street, Co. Armagh	Ecclesiastical	Unfinished lignite objects and off-cuts	Crothers 1999, 63, 66.
Armagh: Scotch Street, Co. Armagh	Ecclesiastical	Hundreds of fragments of lignite from armlet manufacture.	Lynn & McDowell 1988, 60.
Armoy, Co. Antrim	Ecclesiastical	Lignite working debris, broken bracelets and cores, rough-outs	Nelis 2005:0007.
Ballybrolly, Co. Armagh	Enclosure	Lignite central waste pieces	Lynn 1983a, 50.
Blackchurch, Co. Kildare	Enclosures	13 fragments of lignite bracelets	Anon 2006
Coolagh, Co. Galway	Cashel	Pounding & polishing stones	Hardy 2008
Cush, Co. Limerick	Enclosures	Un-finished jet objects	Ó Ríordáin 1940.
Doonmore, Co. Antrim	Raised rath	Shale/lignite cores	Childe 1938
Dublin: Fishamble Street, Co. Dublin	Urban	Un-worked nodules of lignite.	Wallace 1987a, 215-16.
Dunbell Big 5, Co. Kilkenny	Rath	Lignite fragments?	Cassidy 1990
Feltrim Hill, Co. Dublin	Cashel	Lignite central waste pieces	Hartnett & Eogan 1964, 28-29
Galgorm, Co. Antrim	Souterrain	Lignite remains – fuel?	Evans 1946
Lagore, Co. Meath	Crannog	Lignite cone	Hencken 1950
Lisleair, Co. Tyrone	Rath	Unfinished lignite bracelet fragment	Simpson 1987:0046.
Oldcourt, Co. Cork	Rath	Jet core	Murphy & Ó Cuileanáin 1961, 84.
Tullylish, Co. Down	Ecclesiastical	Unfinished lignite rings	Ivens 1987, 107-08; Ivens 1988b, 55-56.

Table A1.6: Evidence for shale/lignite-Working from Early Medieval sites

Site	Site type	Evidence	Reference
Armagh: Scotch Street, Co. Armagh	Ecclesiastical	Hundreds of chips of amber	Lynn & McDowell 1988, 60.
Dublin: Fishamble Street, Co. Dublin	Urban	Amber workshop	Wallace 1987a, 215-16.
Lisduggan, Co. Cork	Rath	Un-worked piece of amber	Twohig 1990
Moynagh, Co. Meath	Crannog	Five amber chips	Bradley 2010
Rathinaun, Co. Sligo	Crannog	Amber pieces	Raftery undated
Woodstown	Longfort	Amber fragment	Russell <i>et al.</i> 2007

Table A1.7: Evidence for Amber-Working from Early Medieval sites

Site	Site type	Evidence	Reference
Ballinderry II, Co. Offaly	Crannog	192 whetstones	Hencken 1942
Ballycatteen, Co. Cork	Multivallate	20 whetstones	Ó Ríordáin & Hartnett 1943,
Ballyegan, Co. Kerry	Cashel	Unfinished quern stone	Byrne 1991, 28.
Ballyutoag, Co. Antrim	Enclosures	Flint cores	Williams 1984
Barrees Valley, Co. Kerry	Hut	Stone discs	O'Brien 2009
Cahercommaun, Co. Clare	Cashel	Incompletely perforated stone spindle whorls; whetstones	Hencken 1938, 41-44.
Carraigh Aille I, Co. Limerick	Cashel	55 whetstones	Ó Ríordáin 1949a
Carraigh Aille II, Co. Limerick	Cashel	Unfinished spindle whorls & quern stones. 33 whetstones	Ó Ríordáin 1949a, 86.
Castleskreen, Co. Down	Rath/motte	Unfinished spindle whorls.	Dickinson & Waterman 1959, 80.
Clea Lakes, Co. Down	Crannog	Whetstone rough-outs	Collins & Proudfoot 1959
Cush, Co. Limerick	Raths	Unfinished spindle whorl	Ó Ríordáin 1940, 158.
Dunalis, Co. Londonderry	Souterrain	Drill-holes in wall/ possible drill	Lindsay 1934-5
Garranes, Co. Cork	Multivallate	25 whetstones, unfinished spindle whorls	Ó Ríordáin 1942a
Garryduff, Co. Cork	Rath	Unfinished spindle whorls	O'Kelly 1963, 89.
Holywood, Co. Down	Rath	Unfinished quern stone	Proudfoot 1959
Inishkea North, Co. Mayo	Ecclesiastical	Spindle whorls broken during drilling. Chlorite waste. Quern stone fragments.	Henry 1951b, 75-76. Henry 1952, 172.
Killederdadrum, Co. Tipperary	Rath	Rough-outs for spindle whorls	Manning 1984
Knowth, Co. Meath	Raised	Unfinished quern stones, grindstones and spindle whorls (3)	Eogan 2012
Lagore, Co. Meath.	Crannog	Unfinished quern stone	Hencken 1950, 174.
Lisnagun, Co. Cork	Rath	Unfinished quern stones/ stone settings	O'Sullivan <i>et al.</i> 1998
Lough Faughan, Co. Down	Crannog	17+ whetstones	Collins 1955
Moynagh, Co. Meath	Crannog	Unfinished quern stones	Bradley 1982-3, 28; Bradley 1994-5, 160, 165.
Rathmullan, Co. Down	Raised	Unfinished spindle whorls	Lynn, C. J. 1981-2. 44-45, 65-171.
Reask, Co. Kerry	Ecclesiastical	Spindle whorl discarded before use.	Fanning 1981, 125.
Rinnaraw, Co. Donegal	House	Perforated stones and stone discs	Comber 2006
St Gobnet's, Co. Cork	House	17 whetstones	O'Kelly 1951-2

Table A1.8: Evidence for Stone-Working from Early Medieval sites

Site name	Evidence	Reference
Ballinderry II, Co. Offaly	250+ leather fragments	Hencken 1942
Ballintemple, Co. Offaly	Leather fragments	IAWU 2004
Baronstown, Co. Meath	Three fragments of sheep/goat leather	Linnane 2009; Linnane & Kinsella 2007
Cahercommaun, Co. Clare	Leather fragment	Hencken 1938
Castlefarm, Co. Meath	Shoe leather	O'Connell & Clark 2009; O'Connell 2009
Craigwarren, Co. Antrim	Shoe leather	Coffey 1906
Deer Park Farms, Co. Antrim	Wooden lasts, leather shoe fragments	Neil 2001, 14-15.
Dooley, Co. Donegal	Leather-working tools	Ó Ríordáin & Rynne 1961
Dublin: High Street, Co. Dublin	Leather waste layer (1m thick)	Anon. 1973, 16.
Kilcloghans, Co. Galway	Pronged leather-working tool?	McKinstry 2008
Killyliss, Co. Tyrone	Leather shoe fragments	Ivens 1984
Lagore, Co. Meath	Cone-shaped lathe turning wasters, rough out bowl, leather scraps add shoe last	Hencken 1950, 157, 165, 167, 181.
Lissue, Co. Antrim	Leather shoe	Bersu 1947, 1948
Marlinstown, Co. Westmeath	Leather-working tool	Kiely 1990:113; 1991:126.
Moynagh, Co. Meath	Leather shoe	Bradley 2010
Rathinaun, Co. Sligo	Leather shoes	Raftery undated
Seacash, Co. Antrim	Leather scrap	Lynn 1978b, 67, 69.
Sroove, Co. Sligo	Large numbers of smooth white stones – perhaps used to stretch leather	Fredengren 1998, 2001, 2002
Waterford: Insula North, Co. Waterford	Dump of leather scraps and off-cuts	McCutcheon & Hurley 1997, 161.

Table A1.9: Evidence for Leather-Working from Early Medieval sites

Site name	Evidence	Reference
Antiville, Co. Antrim	Yew stave-built vessels	Waterman 1971
Ballinderry II, Co. Offaly	Wooden mallet	Hencken 1942
Baronstown, Co. Meath	Yew stave manufacture; blackthorn handle; hazel withies	Linnane 2009; Linnane & Kinsella 2007
Cahercommaun, Co. Clare	Drawknives (wood-working tool)	Hencken 1938
Carraig Aille I, Co. Limerick	Saw	Ó Ríordáin 1949a
Carraig Aille II, Co. Limerick	Saw	Ó Ríordáin 1949a
Castlefarm, Co. Meath	Cooper's tool	O'Connell & Clark 2009; O'Connell 2009
Clea Lakes, Co. Down	Iron gouge used in wood-turning	Collins & Proudfoot 1959
Deer Park Farms, Co. Antrim	Wood-working tools	Lynn & McDowell 2011
Dooney, Co. Donegal	Wood-working tools	Ó Ríordáin & Rynne 1961
Feltrim Hill, Co. Dublin	Wood-working tools	Hartnett & Eogan 1964
Garryduff, Co. Cork	Saws	O'Kelly 1963
Johnstown, Co. Meath	Wooden objects	Clarke & Carlin 2008
Killederdadrum, Co. Tipperary	Axe	Manning 1984
Killickaweeny, Co. Kildare	Wooden vessels	Walsh 2005; Walsh 2008
Knowth, Co. Meath	Augurs	Eogan 2012
Lagore, Co. Meath	Cone-shaped lathe turning wasters, rough out bowl, leather scraps add shoe last	Hencken 1950, 157, 165, 167, 181.
Larrybane, Co. Antrim	Yew stave-built vessels	Childe 1936; Proudfoot & Wilson 1961-2
Lissue, Co. Antrim	Waste fragments of oak and birch from wood-turning	Bersu 1947, 54-55.
Lough Faughan, Co. Down	Thatcher's tool (?); lathe-turned bowl	Collins 1955
Mount Offaly, Co. Dublin	Wood-working tools	Conway 1999
Raystown, Co. Meath	Cut-marked timbers	Seaver 2005, 2006, 2010
Roestown, Co. Meath	Iron awl	O'Hara 2007, 148.
Sluggary, Co. Limerick	Possible saw	Shee Twohig 2000
Spittle Ballee, Co. Down	Pulley wheel for wood drill?	Waterman 1958
Woodstown, Co. Waterford	Wood-working tools	Russell <i>et al.</i> 2007

Table A1.10: Evidence for Wood-Working from Early Medieval sites

Site name	Evidence	Reference
Aghadegnan, Co. Longford	Loom weight	Carroll 1991, 1992, 1993
Athlumney, Co. Meath	Spindle whorl	Jones 1999
Ballinarry, Co. Down	Possible spindle whorl	Davison 1962
Ballinderry (I), Co. Westmeath	Stone spindle whorls? (3)	Hencken 1936, 146-47.
Ballinderry (II), Co. Offaly	Bone (6) and stone (4) spindle whorls; five spindles; loom-weight	Hencken 1942, 55, 64.
Ballyaghagan, Co. Antrim	Smoothing stone; loom-weight; pin-beater (2)	Proudfoot 1958, 30-1
Ballybrolly, Co. Armagh	Stone spindle whorl (1)	Lynn 1983a, 62-3.
Ballycasey More, Co. Clare	Weaving plaque	O'Neill 2003
Ballycatteen, Co. Cork	Stone spindle whorl (1)	Ó Ríordáin & Hartnett 1943, 31.
Ballyfounder, Co. Down	Stone spindle whorls	Waterman 1958b, 49.
Ballymacash, Co. Antrim	Stone spindle whorl (1)	Joep & Ivens 1998, 120.
Ballynakelly, Co. Dublin	Loom weight	McCarthy 2011
Ballyvas, Co. Kildare	Bone weaving tools	Clark & Doyle 2011
Ballyvourney, <i>St Gobnet's House</i> , Co. Cork	Spindle whorl (1)	O'Kelly 1952, 31.
Ballywee, Co. Antrim	Spindle whorl	Lynn 1988
Ballywillwill, Co. Down	Stone whorl (1)	Waterman & Collins 1952, 81.
Balrigan, Co. Louth	Spindle whorl	Delaney 2003:1226; Delaney 2010
Baronstown, Co. Meath	Spindle whorl, pin-beater, and loom weight	Linnane 2009; Linnane & Kinsella 2007
Beginish, Co. Kerry	Bone pin beaters?	O'Kelly 1954-6
Boho, Co. Fermanagh	Madder seeds – dye	Proudfoot 1953
Bowling Green, Co. Tipperary.	Stone whorl (1)	Fanning 1970, 14-15.
Boyerstown, Co. Meath	Flax seed; loom weight	Clarke 2009
Cabinteely, <i>Mount Offaly</i> , Co. Dublin	Spindle whorls, bone pin-beaters and iron shears	Conway 1999, 39.
Cahercommaun, Co. Clare	Spindle whorls of stone, antler and bone (55); pin-beaters (20)	Hencken 1938, 43-44
Caherlehillan, Co. Kerry	Spindle whorls	Sheehan 1993:0118; Sheehan 2009
Carn, Co. Fermanagh	Bone spindle whorl (1)	Brannon 1981-82, 63.
<i>Carraig Aille</i> (I), Co. Limerick	Bone spindle whorls (12), stone whorls (10); pin-beaters (16)	Ó Ríordáin 1949a, 83, 86, 94, 99-100.
<i>Carraig Aille</i> (II), Co. Limerick	Bone spindle whorls (12), stone whorls (14) ; pin-beaters (8)	Ó Ríordáin 1949a, 83
Carrigatogher (Harding), Co. Tipperary	Spindle whorl	Taylor 2010
Carrowkeel, Co. Mayo	Spindle whorl and weaving tool (?)	Walsh & Zajac 2004; Zagac 2011
Castlefarm, Co. Meath	Flax seeds, retting ponds, rubbing stone, loom weight, spindle whorls	O'Connell & Clark 2009; O'Connell 2009
Castlegar, Co. Mayo	Loom weight, spindle whorl	Walsh & Zajac 2004
Castleskreen (I), Co. Down	Stone whorl (1)	Dickinson & Waterman, 1960, 72.
Castleskreen (II), Co. Down	Stone spindle whorls (Phase 2) (5 – three unfinished)	Dickinson & Waterman 1959, 79-80.
Cherrywood, Co. Dublin	Spindle whorl	Ó Néill 1999, 2006
Church Island, Co. Kerry	Stone whorl (1)	O'Kelly 1958, 113.
Clea Lakes, Co. Down	Stone whorls (2); loom-weight; linen-smoother	Collins & Proudfoot 1959, 98.
Cloghermore, Co. Kerry	Spindle whorls	Connolly <i>et al.</i> 2005
Cloncowan, Co. Meath	Spindle whorl	Baker 2007a-b
Clonmacnoise, New Graveyard, Co. Offaly	Spindle whorls	King 2009, 341.
Coarhabeg, Co. Kerry	Stone spindle whorls	Hayden 1994:0119.
Colp West, Co. Meath	Rubbing stone?	Murphy 2011

Site name	Evidence	Reference
Coonagh West, Co. Limerick	Spindle whorl	Taylor 2007
Craigwarren, Co. Antrim	Spindle whorl, loom weight	Coffey 1906
Cush, Co. Limerick	Stone whorls (4), loom weights (2)	Ó Ríordáin 1940, 158.
Dalkey Island, Co Dublin	Spindle whorl	Liversage 1968
Deer Park Farms, Co. Antrim	Spindle whorls, shears, leather weaving tablet	Lynn & McDowell 2011
Dooley, Co. Donegal	Spindle whorls, <i>Nucella lapillus</i> shells	Ó Ríordáin & Rynne 1961
Doonloughan, Co. Galway	<i>Nucella lapillus</i> shells	Murray & McCormick 2011
Dowdstown, Co. Meath	Loom weights, spindle whorls	Cagney et al. 2008; Cagney & O'Hara 2009
Downpatrick, Co. Down	Possible spinle-whorl	Proudfoot 1954
Dressogagh, Co. Armagh	Bone spindle whorl (1)	Collins 1966, 125-26.
Drumroad, White Fort, Co. Down	Stone spindle whorl (1)	Waterman 1956a, 86.
Drumadoon, Co. Antrim	Flax seeds	McSparron & Williams 2009
Dublin: High Street/Winetavern Street, Co. Dublin	Spindle whorls	Ó Ríordáin 1970:0017.
Dublin: Christchurch Place, Co. Dublin	Weaving tablets and bone spindle whorls	Ó Ríordáin 1974:0014.
Dunbeg, Co. Kerry	Spindle whorl	Barry 1981
Dunmisk, Co. Tyrone	Spindle whorl	Ivens 1989
Dunsilly, Co. Antrim	Stone spindle whorls (2)	McNeill 1991, 105.
Farrandreg, Co. Louth	Bone needles	Murphy 1998:463
Faughart Lower, Co. Louth	Spindle whorls	Bowen 2008
Feltrim Hill, Co. Dublin	Stone spindle whorls (2); pin-beaters (5)	Hartnett & Eogan 1964, 32.
Frenchgrove, Co. Mayo	Spindle whorl	McDermott 1998:0488.
Garranes, Co. Cork	Stone spindle whorls (3) and loom weights? (3)	Ó Ríordáin 1942a, 111.
Garryduff, Co. Cork	Spindle whorls (27 stone and 1 bone) including unfinished stone spindle whorls	O'Kelly 1963, 89-90.
Glebe, Co. Dublin	Spindle whorl	Seaver 2005, 2007, 2011
Glencurran, Co. Clare	Spindle whorl	Dowd 2004, 2005, 2007
Gortybrigane, Co. Tipperary	Loom weight	Clark & Long 2010
Gragan West, Co. Clare	Spindle whorls, loom weights, iron needle	Cotter 1990
Grange, Co. Limerick	Spindle whorl (1)	Ó Ríordáin 1949b, 133.
Grannagh, Co. Galway	Bone spindle whorl	Rynne 1971:0018.
Gransha, Co. Down	Spindle whorls (number unspecified)	Lynn 1985, 88.
Haggardstown, Co. Louth	Loom weight	McLoughlin 1999:610.
Illaunloughan, Co. Kerry	Stone spindle whorls (3)	Marshall & Walsh 2005, 193.
Iniskea North, Co. Mayo	Bone (1) and stone spindle whorls (1)	Henry 1945, 136; 139.
Kells, Co. Meath	Stone spindle whorl	Byrne 1988:0057.
Kilcloghans, Co. Galway	Pronged cloth-making tool	McKinstry 2008
Kilgobbin, Co. Dublin	Spindle whorl, needle	Bolger 2008
Kilgreany, Co. Waterford	Spindle whorl	Movius 1935
Killanully, Co. Cork	Iron shears	Mount 1995
Killealy, Co. Antrim	Textile	Harper 1970
Killederdadrum, Co. Tipperary	Stone spindle whorls (2)	Manning 1984, 258.
Killickaweeny, Co. Meath	Antler (1) and stone (1) whorls	Walsh 2008, 44.
Kilscobin, Co. Tipperary	Spindle whorl	Kavanagh 2007
Knockea, Co. Limerick	Iron needle	O'Kelly 1967
Knowth (M), Co. Meath	Spindle whorl – material unstated (1)	Stout & Stout 2008, 65, 111.
Knowth, Co. Meath	Spindle whorls	Eogan 1991, 120.
Lagore, Co. Meath	Stone (8) and bone spindle whorls (20); spindles (10); loom-weights (2); pin-beaters (16); textile	Hencken 1950, 175, 194.
Leacanabuaile, Co. Kerry	Stone spindle whorl (1), loom weight (1)	Ó Ríordáin & Foy 1941, 93

Site name	Evidence	Reference
Leggetsra, Co. Kilkenny	Bones needles, loom weight	Lennon 2006, 2011
Lisduggan (I), Co. Cork	Stone spindle whorls	Twohig 1990, 17.
Lisleagh II, Co. Cork	Flax seeds	Monk 1993, 1995, 1998
Lismahon, Co. Down	Stone spindle whorls (6)	Waterman 1959c, 164.
Lisnagun, Co. Cork	Flax seeds	O'Sullivan <i>et al.</i> 1998
Lissachigell, Co. Louth	Stone spindle whorl (1)	Davies 1939, 225.
Lough Faughan, Co. Down	Stone spindle whorls (4); loom-weights (2); spindle	Collins 1955, 68.
Loughbown 1, Co. Galway	Bone weaving tool	Bower 2009
Marlinstown, Co. Westmeath	Leather scorer/weaving tool	Kiely 1990:113; 1991:126.
Marshes Upper, Co. Louth	Spindle whorl	Gowen 1992
Millockstown, Co. Louth	Stone spindle whorl (1)	Manning 1986, 160.
Moynagh Lough, Co. Meath	Spindle whorls	Bradley 1994-95, 162.
Moyne, Co. Mayo	Shears	Manning 1987
Narraghmore, Co. Kildare	Stone spindle whorl (1)	Fanning 1972, 175-6.
Nendrum, Co. Down	Spindle whorls	Lawlor 1925, 140.
Nevinstown, Co. Meath	Needles	Cahill 1977/79:059
Newtownlow, Co. Westmeath	Spindle whorls	Bourke 1985:058, 1986:078
Ninch, Co. Meath	Needles	McConway 2002, 2010
Oughtymore, Co. Londonderry	Antler spindle whorl (1)	Mallory & Woodman 1984, 53-54.
Owenbristly, Co. Galway	Spindle whorl, loomweight	Lehane & Delaney 2010
Park North, Co. Cork	Spindle whorl, needle	Coleman 1941-2
Parknahown, Co. Laois	Bone weaving implement	O'Neill 2007, 2008, 2009
Raheennamadra, Co. Limerick	Pin-beaters (2)	Stenberger 1967
Raheens II, Co. Cork	Spindle whorls?	Lennon 1994
Rathbeg, Co. Antrim	Stone spindle whorl? (1)	Warhurst 1969, 96-97.
Rathgurreen, Co. Galway	<i>Nucella lapillus</i> shells	Comber 2002
Rathmullen, Co. Down	Stone spindle whorls (8) and possible loom weights (2)	Lynn 1981-2, 132-34.
Rathtinaun, Co. Sligo	Spindle whorls	Raftery undated
Ratoath, Co. Meath	Spindle whorls, rubbing stones	Wallace 2004:1324; Wallace 2010
Raystown, Co. Meath	Bone spindle whorl	Seaver 2004:1334. Seaver 2010
Rinnaraw, Co. Donegal	Loom weights?	Comber 2006
Rochfort Demesne, Co. Westmeath	Needles	Channing 2007
Roestown, Co. Meath	Shears, knitting needle, spindle whorl, loom weight	O'Hara 2007, 2009a-b
Rosepark, Co. Dublin	Spindle whorl/loomweight, needle	Carroll 2008
Sallymount, Co. Limerick	Spindle whorl, needle	Clarke & Long 2009
Seacash, Co. Antrim	Stone spindle whorl (1)	Lynn 1978b, 67, 69.
Sluggary, Co. Limerick	Iron needles	Shee Twohig 2000
Smithstown, Co. Meath	Bone spindle whorl	Gowen 1998:0055.
Spittle Ballee, Co. Down.	Stone spindle whorl (1)	Waterman 1958a, 63.
Sroove, Co. Sligo	Needle	Fredengren 1998, 2001, 2002
St Gobnet's, Co. Cork	Spindle whorl	O'Kelly 1951-2
<i>The Spectacles</i> , Co. Limerick	Stone spindle whorls (3); pin-beaters (2)	Ó Ríordáin 1949a, 106.
Treanbaun, Co. Galway	Bone spindle whorl	Lehane <i>et al.</i> 2010
Uisneach, Co. Westmeath	Stone spindle whorl (1); pin-beater (1)	Macalister & Praeger 1928, 117.
White Fort, Co. down	Spindle whorl (1)	Waterman 1956
Woodstown, Co. Waterford	Fishing weight/spindle whorl	McNamara 2005, 126-27.

Table A1.11: Evidence for Textile-Working from Early Medieval sites

Townland/Site Name	Site Type	Comments	Reference
Aghavea, Co. Fermanagh	Ecclesiastical	Early Christian coarse domestic pottery	Ó Baoill 2000:0352; Anon. 2004, 4.
Aird, Co. Antrim	Souterrain	Three sherds of souterrain ware	Collins <i>et al.</i> 1964, 121-23.
Antiville, Co. Antrim	Habitation Site	Sherds of souterrain ware	Waterman 1971, 71-72. .
Antrim (Civic Offices), Co. Antrim	Rath	Sherds of souterrain ware	MacManus 2003:0001.
Ardee (28 Castle Street), Co. Louth	Near medieval towerhouse	Sherd of 'early medieval pottery'	O'Carroll 2002:1284
Armagh: Abbey Street , Co. Armagh	Ecclesiastical	Sherds of souterrain ware	Lynn 1977-79:0009.
Armagh: Cathedral Hill, Co. Armagh	Ecclesiastical	Six sherds of souterrain ware	Gaskell-Brown & Harper 1984, 143-44.
Armagh: English St./Abbey Street, Co. Armagh	Ecclesiastical	15 sherds of souterrain ware; 28 sherds of misc early Christian and medieval wares	Hurl 2003; Gahan 2003, 110-112.
Armagh: English St./Market Sq., Co. Armagh	Ecclesiastical	Sherds of souterrain ware	Lynn 1990:0006.
Armagh: Market Street, Co. Armagh	Ecclesiastical	Sherds of souterrain ware	Gilmore 1998:008.
Armagh: 16 Scotch Street, Co. Armagh	Ecclesiastical	Sherds of souterrain ware	Lynn 1977-79:0010.
Armagh City: 46-48 Scotch Street, Corporation td. Co. Armagh	Ecclesiastical	Sherds of souterrain ware	McDowell 1980-84:0035; Lynn 1988a, 82.
Armagh: Upper English St., Co. Armagh	Ecclesiastical	30 sherds of souterrain ware	Gahan 1999, 70-73, 78.
Armoy, Glebe, Co. Antrim	Ecclesiastical	Sherds of souterrain ware	Ó Néill 2004:0008.
Aughnamullan, Co. Antrim	Habitation Site?	Sherds of cordoned souterrain ware	McSparron 2000:0021.
Ballintemple, Co. Londonderry	Souterrain	Sherd of souterrain ware	May & Cooper 1939, 88.
Ballintoy: Park Cave, Co. Antrim	Cave Habitation		Jackson 1933, 230-32
Ballintoy: 'Potter's Cave', Co. Antrim	Cave Habitation		Jackson 1934, 104-14. Jackson 1938, 107-22.
Ballyaghagan, Shaneen Park, Co. Antrim	Rath	Thousands of sherds of souterrain ware	Evans 1950, 22-23; Proudfoot 1958, 23-28.
Ballybarrack, Co. Louth	Souterrain	Sherd of souterrain ware	Kelly 1977-79:0052 Gosling 1991, 244-46; McCormick & Crone 2000, 560
Ballyboley, Co. Antrim	Souterrain and settlement	Large portions of several souterrain-ware vessels	Lynn 1977-79:0001.
Ballybrolly, Co. Armagh	Enclosure	Five sherds of souterrain ware	Lynn 1983a, 50.
Ballyfounder, Co. Down	Rath	Sherd of souterrain ware	Waterman 1958b, 46-47.
Ballygalley Hill, Co. Antrim	Rath	Sherds of souterrain ware	Trump 1958, 218; Collins 1978, 23.
Ballygalley, Co. Antrim	Souterrain and habitation	Early Christian pottery	Farrimond 2002:0004.
Ballygolan, Co. Antrim	Rath	'Crannog ware'	Bigger 1901, 196
Ballygortgarve, Co. Antrim	Rath	Sherd of souterrain ware	Lynn 1978c, 75-77.
Ballyhamage, Co. Antrim	Enclosure and Souterrain	Sherds of souterrain ware	Crothers 2003:0004.
Ballyhenry I,	Rath	745 sherds of souterrain ware	Lynn 1983c, 73-75.

Co. Antrim			
Ballyhenry II, Co. Antrim	Rath	201 sherds of souterrain ware	Lynn 1983c, 85
Ballyhill Lower, Co. Antrim	Rath	Sherds of souterrain ware	Williams 1985:0002.
Ballykennedy, Co. Antrim	Rath	17 sherds of souterrain ware	Brannon 1980b, 69.
Ballykennedy, Co. Antrim	Rath	Sherds of souterrain ware	Lawlor 1916, 47-48.
Ballyknock, Co. Armagh	Rath		(Unpublished) Woodman (<i>Pers. Comm.</i>)
Ballylessant, <i>Farrell's Fort</i> , Co. Down	Rath	Sherds of souterrain ware	Collins 1970:0013.
Ballymacash, Co. Antrim	Rath	Over 3,000 sherds of souterrain ware	Jope 1966, 134; Jope & Ivens 1998, 114-17.
Ballymacpeake Upper, Co. Londonderry	Rath	Quantity of souterrain ware	Warner 1973:0010.
Ballymacrea Lower, Co. Antrim	Sandhills Site	Sherds of souterrain ware	Flanagan 1966, 115-16.
Ballymurphy, Co. Antrim	Rath	Sherds of souterrain ware	Lynn 1977-79:0003.
Ballynarry, Co. Down	Rath	209 sherds of souterrain ware	Davison 1961-62, 62-65.
Ballynoe, Co. Antrim	Enclosure	Over 50 sherds of souterrain ware	Lynn 1980a, 36.
Ballyrea, Co. Armagh	Linear Ditch	Sherds of souterrain ware	Crothers 1992:0004.
Ballyrickardmore, Co. Antrim	Rath with souterrain	Sherds of souterrain ware	Lawlor 1916, 47.
Ballyroney, Co. Down	Motte	Sherds of souterrain ware	Waterman 1955, 99.
Ballyshanaghill, Co. Antrim	Rath	Sherds of souterrain ware	Halpin 1991:0003.
Ballyutoag, Co. Antrim	Upland huts and field systems	229 sherds of souterrain ware	Williams 1984, 40-46.
Ballyvollen, Co. Antrim	Habitation Site?	Sherds of souterrain ware	Williams 1985b, 91-102.
Ballywee, Co. Antrim	Rath with souterrain	Sherds of souterrain ware	Lynn 1988c, 32-35.
Ballywillwill I, Co. Down	Rath	Sherds of bucket-shaped pots	Waterman & Collins 1952, 78-79.
Ballywillwill II, Co. Down	Rath	Sherds of bucket-shaped pots	Waterman & Collins 1952, 78-79.
Balrigan 1, Co. Louth	Settlement/Cemetery	Over 800 sherds of souterrain ware	Delaney 2002:1291, 2002:1295, 2003:1226 Roycroft 2005, 77; Delaney 2010, 98
Belfast: Malone, Co. Antrim	Habitation site	Sherds of souterrain ware	Quinn 1930, 48.
Belfast: Mount Royal, Co. Antrim	Rath	Several dozen sherds of souterrain ware.	Evans 1952, 86
Belfast: Stranmillis, Co. Antrim	Rath (?) destroyed		Woodman (<i>Pers. Comm.</i>)
Belfast: Town Parks td. Castle Street, Co. Antrim		Possible piece of souterrain ware	Brannon 1980-84:0007.
Big Glebe, Co. Londonderry	Mound	Sherds of souterrain ware	Bratt & Lynn 1976:0012; Lynn 1988e, 41-44.
Bighouse, Co. Antrim	Hut Site	Sherds of souterrain ware	Evans 1945, 26.
Boghead, Co. Antrim	Souterrain	Sherds of souterrain ware	Lawlor 1916, 40.
British and Seacash, Co. Antrim	Mound	Sherds of souterrain ware	Crothers 1998:0004.
Camus, Co. Londonderry	Series of pits	Sherds of souterrain ware	May & May 1945, 60-62.
Carlingford (Back Lane), Co. Louth	Pit	Sherds of 'early medieval pottery'	Moore 1998:0419

Carn More, Faughart, Co. Louth	Rath and souterrain	Over 200 sherds of souterrain ware	Delaney 2003:1272. Roycroft 2005, 80.
Carnacavill, <i>Maghera</i> , Co. Down	Ecclesiastical	Sherds of souterrain ware	Lynn 1980-84:0086.
Carnalbanagh East, Co. Down	Enclosure	Sherds of souterrain ware	Brannon 1979a, 31-33.
Carnmoney, Co. Antrim	Rath	'Quantity of pottery' in stratified contexts	Avery 1970:0001
Carnreagh, Co. Down	Habitation Site	'Several sherds of early Christian pottery'	Large 2003:0445
Carrigrohane, Co. Cork	Ringfort	Sherd of souterrain ware	Moloney 2003:0188.
Carryduff, <i>Queen's Fort</i> , Co. Down	Rath	Sherds of souterrain ware	Jope 1966, 154-55. Lynn 1981-82, 169.
Cashel (td.?), Co. Antrim	'Tumulus'		Grainger Coll., Ulster Museum (unpublished)
Castle Skreen I, Co. Down	Rath	Sherds of souterrain ware	Dickinson & Waterman 1960, 71.
Castle Skreen II, Co. Down	Rath	402 sherds of souterrain ware	Dickinson & Waterman 1959, 74-75.
Cavanapole, Co. Armagh	Ditch	Sherd of souterrain ware	Crothers 1996:0015.
Cherryhound, Co. Dublin	Industrial Site	Possible sherd of souterrain ware	McGowan 2004:0483.
Clanrolla, Co. Armagh	Rath		Chart 1940, 61; Waterman 1959c, 165.
Clea Lakes, Co. Down	Crannog	61 sherds of souterrain ware	Collins & Proudfoot 1959, 95.
Cloughorr, Co. Antrim	Souterrain	Ten sherds of souterrain ware	Harper 1972b, 59-61.
Coleraine, Co. Londonderry	?		(Unpublished) Ex Grainger Coll. U.M. Reg. No. K 18. 3943
Coleraine: Cross Lane, Co. Londonderry	?	Sherds of souterrain ware	Brannon 1977-79:0018.
Coleraine: <i>Mount Sandel</i> , Co. Londonderry	Mesolithic site	Sherds of souterrain ware	Woodman 1974:0011; Woodman 1976:0015
Coleraine: Stone Row, Co. Londonderry	?	Sherds of souterrain ware	Gahan 1993:0036.
Coney Island, Co. Antrim	Habitation Site	Sherds of souterrain ware	Addyman 1965, 87-89, 98.
Connor (Rectory Field), Co. Antrim	Ecclesiastical Site	Sherds of souterrain ware	Brannon 1986:0002.
Cormeen, Co. Meath	Rath and souterrain	Sherds of souterrain ware	McConway & Halpin 1992:150.
Corrstown, Co. Londonderry	Rath and souterrain	Sherds of souterrain ware	Conway 2002:0387
Craighill, Co. Antrim	House and souterrain	Sherds of souterrain ware	Waterman 1956b, 91.
Craigyarren, Co. Antrim	Crannog	Five sherds of souterrain ware	Coffey 1906, 116.
Crossnacreevy, Co. Down	Rath	Much souterrain ware	Harper 1971:0012; Harper 1973-74, 36-37.
Deer Park Farms, Co. Antrim	Rath	700 sherds of souterrain ware	Lynn & McDowell 1988b, 7.
Demesne, Church Bay, Rathlin Island, Co. Antrim	Bronze Age Burials	Sherds of souterrain ware	Wiggins 2000b, 59-61.
Derry, Co. Down	Ecclesiastical Site	Sherds of souterrain ware	Waterman 1967b, 64.
Derryhollagh, Co. Antrim	Crannog	Sherd of souterrain ware	Reeves 1859, 149.
Derrymore, Co. Armagh	Rath	Sherd of souterrain ware	Halpin 2000:0025; Long 2001:0022
Donaghadee Vicinity, Co. Down	?		N.M.I. Reg. No. 1938:9215
Donaghmore A,	Souterrain		Gosling 1991, 244-46

Co. Louth			
Donegore, Co. Antrim	Souterrain	Sherds of souterrain ware	Lawlor 1916, 41.
Doonmore, Co. Antrim	Hillfort?	Sherds of probable souterrain ware	Childe 1938, 130-32; Armit 2007, 6
Doras, Co. Tyrone	Ecclesiastical	Sherds of souterrain ware	McDowell 1987, 151.
Dowdallshill, Co. Louth	Rectangular Fosse	Sherds of souterrain ware	Channing 1994:0169.
Dowdallshill, Co. Louth	Pit	Sherds of possible souterrain ware	O'Neill 2004:1080.
Downpatrick: Cathedral Hill, Co. Down	Ecclesiastical	Sherds of souterrain ware	Brannon 1986:0019.
Downpatrick: Cathedral Hill, Co. Down	Ecclesiastical	Sherds of souterrain ware	Brannon 1997:0071.
Downpatrick: Cathedral Hill, Co. Down	Ecclesiastical	Sherds of souterrain ware	Halpin 1998:0115.
Downpatrick: Cathedral Hill, Co. Down	Ecclesiastical	Sherds of souterrain ware	Ó Baoill 1992:0034.
Downpatrick: Cathedral Hill, Co. Down	Ecclesiastical	Two sherds of souterrain ware	Ó Baoill 1994:0040.
Downpatrick: Cathedral Hill, Co. Down	Ecclesiastical	Sherds of souterrain ware	Proudfoot 1954, 97-102; Proudfoot 1956, 57-72.
Downview Park West, Co. Antrim	3 Souterrains	209 sherds of souterrain ware	Collins <i>et al.</i> 1964, 126-27.
Dressogagh, Co. Antrim	Rath	Sherds of souterrain ware	Collins 1966, 123-24.
Drogheda: Peter Street, Co. Louth	Pre-medieval wall (Pottery Scatter)	Sherds of 'early medieval pottery'	Murphy 1995:0200
Dromiskin, Co. Louth	Souterrain and settlement	Sherds of souterrain ware	Halpin 1988:0045.
Dromore, Co. Down	'Cave' (Souterrain?)		N.M.I. Reg. Nos. WK. 459-533
Dromore, Co. Antrim	Rath	Sherds of souterrain ware	Collins 1968, 64-65.
Drumadonnel, Co. Down	Habitation Site	Sherds of souterrain ware	McSparron 2001, 48.
Drumadoon, Co. Antrim	Rath	Sherds of souterrain ware	McSparron & Williams 2004, 11; McSparron & Williams 2009, A35-A49.
Drumaheglis Marina, Co. Antrim	Ditch	Sherds of 'early medieval pottery'	Anon. 2003:0007
Drumaroad, White Fort, Co. Down	House and souterrain within cashel	Sherds of souterrain ware	Waterman 1956a, 83-84.
Drumena, Co. Down	Cashel and souterrain		Berry 1926-27, 46-55
Dunalis, Co. Londonderry	Souterrain		Lindsay 1934-5, 61-70.
Dunbeg, Co. Down	Hillfort	50 sherds of souterrain ware	Inskeep & Proudfoot 1957, 111-12.
Dundrum Castle, Co. Down	Pre-Castle Occupation	Sherds of souterrain ware	Waterman 1951, 25-26.
Dundrum Site I, Co. Down	Sandhills Habitation	Around 200 sherds of souterrain ware	Collins 1952, 10-12.
Dundrum Site VI, Co. Down	Sandhills Habitation	Sherds of souterrain ware – some cordoned	Collins 1952, 19
Dundrum, Co. Down	?		N.M.I. Reg. No. 1939:703
Dundrum, Site IV, Co. Down	Sandhills Habitation	198 sherds of souterrain ware	Collins 1959a, 11.
Dundrum, Site V, Co. Down	Sandhills Habitation	50 sherds of souterrain ware	Collins 1959a, 11.
Duneight, Co. Down	Earthworks	Sherds of Souterrain Ware	Waterman 1963b, 72-74.
Dunnyneil Island,	Island trading post	Large assemblage of cordoned	McCormick &

Co. Down		souterrain ware	Macdonald 2004, 5-10; McCormick & Macdonald 2010, 53
Dunsilly, Co. Antrim	Rath	420 sherds of souterrain ware in stratified contexts excluding post-medieval ones.	McNeill 1991, 100-04.
Farrandreg, Co. Louth	Souterrain and pits	Sherds of souterrain ware	Bolger 2000:0674
Farrandreg, Co. Louth	Souterrain	19 souterrain ware sherds and remains of souterrain ware vessel	Murphy 1998, 271-75.
Farranfadh, <i>Piper's Fort</i> , Co. Down	Rath	Sherds of souterrain ware	Waterman 1959b, 83-87.
Finkiltagh, Co. Antrim	Rath	Sherds of souterrain ware	Williams 1973:0003.
Galgorm, Co. Antrim	Souterrain	Sherds of souterrain ware	Evans 1946, 83.
Gartree, <i>Langford Lodge</i> , Co. Antrim	Rath	Sherds of souterrain ware	Waterman 1963a, 51-52.
Glengormley, Co. Antrim	Rath	Sherds of souterrain ware	Brannon 1986:0005.
Glenloughan, Co. Down	Rath	Possible souterrain ware	Proudfoot 1961, 106.
Gortcrib, Co. Down	Habitation site	A vessel of 'souterrain ware' and several further sherds of this ware	Warner & Delaney 1970:0014.
Grange of Mallusk, Co. Antrim	Ecclesiastical Site	Sherds of souterrain ware	Crothers 1997, 34-35.
Grangemore, Co. Londonderry	Sandhills	Sherds of souterrain ware	Gormley 2004a, 11-12.
Gransha, Co. Down	Rath	Considerable quantity of souterrain ware	Lynn 1985, 81-90.
Greencastle, Co. Down	Pre-castle occupation	Two sherds of souterrain ware	Gaskell-Brown 1979, 57-60; Lynn 1977-79:0032
Haggardstown, Co. Louth	Ditch	Souterrain ware sherd. Undated pottery sherd in nearby souterrain	Moore 2001:0858. McKeown 2003, 272
Haggardstown, Co. Louth	Metalworking Site	Coarse early medieval pottery	Walsh 2002:1348
Hillsborough, Co. Down	Rath	Sherds of souterrain ware	Gaskell-Brown & Brannon 1978, 83-87.
Holywood, Croft Road, Co. Down	Rath	Over 150 sherds of souterrain ware	Proudfoot 1959, 105; Dunlop 2004:0436
Inch (Abbey), Co. Down	Ecclesiastical Site	Sherds of souterrain ware	Brannon 1980-4:0083.
Inch/Ballyrenan, Co. Down	Rath, multi-period landscape	Sherds of souterrain ware	MacManus 1997:0074, 1998:0114; McQuillan 1999:0151.
Jordanstown, <i>Meadowbank</i> , Co. Antrim	Rath	Sherds of souterrain ware	Halpin & Crothers 1995:007.
Kilcoo (parish of), Co. Down	Souterrain	Sherds of souterrain ware	Lawlor 1916, 45.
Killarn, Co. Down	Rath	One sherd of souterrain ware	Boal & Moffit 1959, 110.
Killegar, Co. Wicklow	Ecclesiastical site	7 sherds of possible souterrain ware	Raftery 1941, 306-08
Killroot, Co. Antrim	Ecclesiastical site	One sherd of souterrain ware	Ó Néill 2003:0016; McCormick & Macdonald 2003:0017.
Killyliss, Co. Tyrone	Rath	30 sherds of souterrain ware	Ivens 1984a, 24.
Kilmore, Co. Armagh	Ecclesiastical site	Considerable quantities of souterrain ware	Crothers 2002:0034.
Kilmoyle, Co. Antrim	?	?	N.M.I. Reg. Nos. Wk. 53 R. 139
Knock Dhu, Co. Antrim	Souterrain	Sherds of souterrain ware	Lawlor 1916, 33.
Knockans South, Rathlin Island, Co. Antrim	Late Neolithic	Possible souterrain ware sherds	Conway 1994:008.
Larrybane, Co. Antrim	Promontory Fort	Sherds of souterrain ware	Childe 1936, 188-91. Proudfoot & Wilson 1961-62, 97-103.
Lisanisk 1,	Pit near rath	Sherd of possible souterrain ware	Coughlan 2003:1489.

Co. Monaghan			
Lisleitrim, Co. Armagh	Crannog		Collins (<i>Pers. Comm.</i>)
Lismahon, Co. Down	Rath	Sherd of souterrain ware	Waterman 1959c, 157-58.
Lisnacrogher, Co. Antrim	Crannog	4 sherds of souterrain ware	Wakeman 1891, 675
Lisnagade II, Co. Down	Rath	Possible souterrain ware	Proudfoot 1961, 106
Lisnalinchy, Co. Antrim	Habitation site	Sherds of souterrain ware	Gilmore 2003:0020.
Lisnaskea, <i>Lisdoo Fort</i> , Co. Fermanagh	Rath	One sherd of souterrain ware	Brannon 1981-82a, 55-57.
Lissue, Co. Antrim	Rath	Sherds of souterrain ware	Bersu 1947, 51-52; Bersu 1948, 131-33.
Lissue, Co. Antrim	Pits	Sherds of decorated souterrain ware	Gahan 2000:0018.
Lough Faughan, Co. Down	Crannog	Over 200 sherds of souterrain ware	Collins 1955, 55-57.
Magheramenagh, Co. Londonderry	Souterrain	Sherds of souterrain ware	Gilmore 2000:0163.
Magheramenagh, Co. Londonderry	Souterrain	Sherds of souterrain ware	Reilly 1999:0130.
Markstown, Co. Antrim	Habitation site	Sherds of souterrain ware	McSparron 2001:0014.
Marshes Upper 1, Co. Louth	Souterrain and settlement	Over 55 sherds of souterrain ware	Gosling 1980-84:0137; Buteaux 1985:0040.
Marshes Upper 2, Co. Louth	Souterrain	50 sherds of souterrain ware	Gosling 1980-84:0138;
Marshes Upper 3-4, Co. Louth	5 souterrains and enclosures	Over 100 sherds of souterrain ware	Gowen 1992, 103.
Marshes Upper 5, Co. Louth	Enclosure and souterrain	15 sherds of souterrain ware	McCormick & Crone 2000, 555-60.
Marshes Upper 6, Co. Louth	Souterrain	Sherds of souterrain ware	McCormick & Crone 2000, 560
Marshes Upper, Co. Louth	Habitation site	Sherds of souterrain ware	Mossop 2002:1335; Mossop 2002:1341.
Middle Division, Co. Antrim	Prehistoric burnt mound	Several sherds of souterrain ware	Crothers 1996:0011.
Minnis North, Co. Antrim	Shell midden	Two sherds of souterrain ware	Simpson <i>et al.</i> 1993, 117.
Moneydorrugh More, <i>Kilhome</i> , Co. Down	Ecclesiastical	Two body sherds souterrain ware	Macdonald & McIlreavy 2007, 112.
Mooretown North, Swords, Co. Dublin	Enclosure	Sherd of possible souterrain ware	Halliday 2004:0651.
Movilla Abbey, Co. Down	Ecclesiastical	Sherds of souterrain ware	Yates 1983, 61, 65; Ivens 1984, 83-86.
Moyadam, Co. Antrim	Souterrain	One sherd of souterrain ware	Evans 1946, 79-80.
Moylurg, Co. Antrim	Crannóg		Buick 1893, 42-43. Buick 1894, 328.
Moyle Big, Co. Carlow	Pits and ditches	Sherds of souterrain ware	Kyle <i>et al.</i> 2009, 79
Mullagh, Co. Cavan	Ecclesiastical	Three sherds of 'early medieval pottery'	Russell 2005:1027
Mullagharlin/Haggardstown, Co. Louth	Souterrain and ditch	Several sherds of souterrain ware	McLoughlin 1999:0610.
Nendrum, Co. Down	Ecclesiastical	Sherds of souterrain ware	Lawlor 1925; Crothers & McErlean 2007, 369-70
Newtownbalregan, Co. Louth	Rath and souterrain	32 sherds of souterrain ware	Bayley 2003:1286; Roycroft 2005, 75.
Old Town Deer Park, <i>Bellaghy Bawn</i> , Co. Londonderry	Rath	Sherds of souterrain ware	Hurl 1995:0042.
Oughtymore, Co. Londonderry	Sandhills	20 Sherds of souterrain ware	Mallory & Woodman 1984, 53.
Poleglass, Co. Antrim	Rath	Sherds of souterrain ware	Harper 1971:0006.
Portbraddan,	Cave habitation	Sherds of souterrain ware	May 1943, 51-55.

Co. Antrim			
Portmuck, Islandmagee, Co. Antrim	Pottery scatter (pre-medieval rural site)	3 sherds of souterrain ware	Gormley 2004b, 87, 112.
Raholp (Craigaphuile I), Co. Down	Rath	Sherds of souterrain ware	Collins 1959b, 91
Raholp, Co. Down	Ecclesiastical	Few sherds of souterrain ware	Neill 1989:0020
Rampark, Co. Louth	Cemetery and souterrains	Sherds of souterrain ware	Campbell 2004:1122.
Rathbeg, Co. Antrim	Rath	Sherds of souterrain ware	Warhurst 1969, 96-97.
Rathmullan, Co. Down	Raised rath	Sherds of souterrain ware	Lynn 1981-82, 119-24.
Ringmackilroy, Co. Down	Rath	Sherds of souterrain ware	Crothers 1992:0037.
Sallagh Fort, Co. Antrim	Rath and souterrain	Sherds of souterrain ware	Davies 1938b, 33
Seacash, Co. Antrim	Rath	2885 sherds of souterrain ware	Lynn 1978b, 65-67.
Seafin, Co. Down	Rath? (Pre-Motte)	Sherd of souterrain ware	Waterman 1955, 86, 94.
Shane's Castle, Co. Antrim	Rath	Substantial quantity of souterrain ware	Warhurst 1971, 62-63.
Solar, Co. Antrim	Ecclesiastical	161 sherds of souterrain ware	Hurl 2002 Sandes 2002, 62-63.
Spittle Quarter, Co. Down	Souterrain	Sherd of souterrain ware	Brannon 1990:0028; Brannon 1990, 39-41.
<i>St Peter's</i> , Balrothery Co. Dublin	Ecclesiastical Site	3 sherds of souterrain ware	Murphy 2002:0472.
Tateetra, Co. Louth	Souterrain	Over 1,000 sherds of souterrain ware	Roycroft 2005, 76-77, 80; Hayes 2006, 57
Terryhoogan, Co. Armagh	Habitation Site	500 sherds of souterrain ware	McSparron 2007, 124-29.
Tray, <i>Haughey's Fort</i> , Co. Armagh	Bronze Age enclosure	Sherds of 'early Christian pottery'	Mallory 1995:0010
Tullagarley, Co. Antrim	Souterrain	Sherd of souterrain ware	McQuillan & Long 1999:0018.
Tully, Co. Antrim	Raised rath	Sherds of souterrain ware	Harper 1970:0003
Tullylish, Co. Down	Ecclesiastical	Sherds of souterrain ware	Ivens 1987, 87-95
Turnarobert, Co. Antrim	Souterrain	Sherds of souterrain ware	Williams 1991:0011.
Urney, Co. Tyrone	Rath	Sherd of souterrain ware	Scott 1970:0034.
Wattstown, <i>Soldiers' Hill</i> , Co. Londonderry	Habitation site	Sherds of souterrain ware	Stevens 2004:0375.
Whiterath, Site 1, Co. Louth	Near Rath (Site 2)	Sherds of souterrain ware	Ó Drisceoil 2000:0720.
Whiterath, Site 2, Co. Louth	Rath	Sherds of souterrain ware	Ó Drisceoil 2000:0721.

Table A1.12: Evidence for Pottery-Making (souterrain ware) from Early Medieval sites

Townland/Site Name	Site Type	Comments	Reference
Ballycatteen, Co. Cork	Rath	Single piece of dark red pottery with inclusions	Ó Ríordáin & Hartnett 1943, 37
Ballyeagh, Co. Kerry	Sandhills	Sherds of inferior quality red pottery – local attempts to copy imported Roman wares	Ó Ríordáin 1947, 66
Ballygerry, Co. Wexford	Habitation site	28 Sherds of Pottery which shared some similarities to the souterrain ware tradition	Henry 2004:1789.
Killegar, Co. Wexford	Ecclesiastical	Seven sherds of red pottery, possibly Iron Age	Raftery 1941, 306-8
Lagore Crannog, Co. Meath	Crannog	Sherd of black, coarse ware	Hencken 1950, 126
Moynagh Crannog, Co. Meath	Crannog	Sherds of ‘a coil-built pottery vessel of poorly fired white clay’	Bradley 1991, 18
Reask, Co. Kerry	Ecclesiastical	100 sherds of pottery - a light porous grass-tempered type; and a heavier type containing grits	Fanning 1981, 112

Table A1.12: Evidence for Pottery-Making (non-souterrain ware?) from Early Medieval sites

Section 3: Early medieval crafts and the manufacture and use of people's dress and ornament.

Maureen Doyle

This section explores what people in early medieval Ireland wore – clothing, accessories and ornaments – and examines the evidence from the sites detailed in the attached gazetteer for both the presence of these dress items, and for their manufacture. The first part considers what was worn in this period, and our sources for reconstructing the costume; and analyses the most common artefacts found, with reference to their location and other details. The second part considers the evidence for the crafts involved in making clothing and ornaments; this deals primarily with textile working, but includes brief assessments of working in other materials (metals, leather, glass, bone, jet/lignite) insofar as they relate specifically to personal ornaments. A broader consideration of these latter crafts was given in Section 2.

Chapter 7: Early medieval dress and ornament

Dress in early medieval Ireland was based around the main garments of the *léine* or tunic, the *brat* or cloak, the *ionar* (a type of jacket) and trousers or breeches (Dunleavy 1999). With the exception of the latter, the same garments were generally worn by both men and women; variations in length, quality and embellishment (embroidery, colour, etc.) provided the main distinguishing features of this basic costume. The basic garments were also accompanied by accessories, including shoes and belts. Few headdresses are known, other than caps and scarves from Viking Dublin, made of wool and silk. A wide range of ornaments was also used. Some, such as brooches and pins, were in the first instance functional, being used to fasten garments, especially the *brat*, although they also offered the opportunity for display. Others, such as bracelets, rings and beads, were more purely decorative. Taken together they offer an insight into the overall costume, and what it was used to convey to society in terms of statements of age, gender or status.

Literary evidence

Contemporary literature, including the law tracts, sagas, saints' *Lives* and other documents, gives considerable information on dress. The basic garments are taken for granted, and it is the details of the tunics and cloaks – colour, fabric, decoration, and how they are worn – which is the focus of attention. In *Táin Bó Cuailgne*, for example, varying lengths of tunic (to the knee, or to the feet) are described (O'Rahilly 1976, 125, 183). The extent to which we can rely on these texts varies; the law tracts, for example, dating originally from the seventh to eighth century but incorporating later glosses and corruptions (Kelly 1988, 1, 225-6, 232), are largely normative in nature, setting out what people of particular social ranks were entitled – or expected – to wear. Thus, for example, a late gloss on the law on fosterage prescribes different colours of clothes to be worn by children based on their fathers' social rank: the sons of kings may wear purple and blue, the sons of lords red, grey and brown, and commoners' sons may wear clothes of yellow, black, white or dun-colour. Similarly, noble children are permitted to wear silver brooches, while lower grades are restricted to lesser metals (Ní Chonail 2008, 14). While this law is specific to children in fosterage, similar restrictions may have been proposed for adults of the relevant ranks, at least in principle. Whether such sumptuary dictats actually operated in practice, they may 'reflect a general truth that the higher ranks wore more colourful clothing than those of lower rank' (Kelly 1997, 263). *The Annals of the Four Masters* include an early entry which supports this idea, suggesting that status was displayed through the number of colours worn: 'one colour in the clothes of slaves; two in the clothes of soldiers; three in the clothes of goodly heroes, or

young lords of territories; six in the clothes of ollavs; seven in the clothes of kings and queens' (O'Donovan 1848-51, i, 45).

Quantities of garments are occasionally referred to; in *Críth Gablach*, the *mruigfer* (landman) and his wife are described as having four costumes each among their possessions (MacNeill 1923, 291). There is also an implication of dress being differentiated for various purposes; costumes for special occasions are suggested, including the festival garment of a king, mentioned in *Bretha im Fhuillema Gell* (Kelly 1988, 166). A mention in a late legal gloss of the contents of a queen's work bag including a veil (Atkinson 1901, 383) hints at a possible secular use of such headdresses, although most evidence for veils occurs in religious texts, with reference to nuns. Quantities of garments, including tunics and a variety of cloaks, are also listed among the stipends and rents exchanged between kings and their underlings in *Lebor na Cert* (The Book of Rights) (Dillon 1962).

Sagas offer a broader view of dress and ornament, including descriptions of richly coloured clothing, fine fabrics, and elaborate ornaments of gold and silver set with jewels. These details also extend to accessories; in *The Wooing of Becfhola*, for example, the beautiful woman met by Diarmuid son of Aed Slane, king of Tara, wears 'two blunt shoes of white bronze, two gems of precious stones in them...' (Cross & Slover 1969, 533). Much of this, however, must be considered in the light of literary conventions: being largely written for an aristocratic audience (Ní Bhrolcháin 2009, 42) and usually dealing with the exploits of kings, heroes and other high-status individuals, it is not surprising that rich garments and ornaments are portrayed. More mundane items also appear, usually worn by churls or low-status persons, for example in *Cath Maige Tuired*, the Dagda wears shoes made of horsehide 'with the hair outside' (Gray 1982, 47).

Saints' *Lives* might not be expected to include much detail of dress, but they contain some interesting details of what holy people might wear; references to animal skin clothes, and a focus on white as an appropriate colour, both have biblical echoes. An extract from the *Rule of Ailbe*, which states what a monk's clothing should not be, also suggests what secular alternatives were in use: 'His feet should always be shod, but fringes of red leather are not to be worn. His clothing is to be without blue, red, or any kind of ornamentation' (Ó Maidin 1996, 19).

In terms of specific textiles, reference is made to garments of wool, linen and silk. Woollen cloaks are a common feature, and are worn by most types of characters; linen is occasionally mentioned in hagiography, especially in relation to shrouds (e.g. Connolly 1989, 30); references to silken garments appear from the ninth/tenth century in tales such as *Togail Buidne Uí Derga* (Dillon 1994 [1948], 25) and *Tocmharc Becfhola* (Whitfield 2006, 2), and increase (along with the range of figures shown wearing silk) by the twelfth century, when *Cogadh Gaedhil re Gallaibh* also refers to the presence of 'silk-clad young women' in Hiberno-Norse Limerick (Todd 1867, 79). Decoration of textiles, including embroidery, is implied by occasional references to embroideresses and their valuable needles in the law tracts (Kelly 1988, 78), and in saga descriptions such as the tunics with red embroidery mentioned in the *Táin* (O'Rahilly 1976, 125-6).

While different types of ornaments are mentioned in texts, the main focus, especially in the law tracts, is on brooches and their use to symbolise status. In *Críth Gablach*, for example, the *aire desa* is said to have *clothdelg n-ungae*, 'a precious brooch of an ounce' (MacNeill 1923, 297), which probably refers to its worth in silver rather than its weight (Kelly 1988, 114). The laws also refer to the method of wearing brooches; the seventh/eighth-century law tract *Bretha Étgid* exempted a man from liability for injuring another with the pin of his brooch provided he wore it properly, on the shoulder; a woman, however, was supposed to wear her brooch on her breast (Ó Floinn 2001a, 1; Kelly 1988, 150). These legal references, while limited, provide some important clues as to the use and meaning of brooches in early medieval Ireland – not least the fact that they were worn by both men and women. The apparent focus, however, on their use by lords and heads of families may obscure the

potential use of brooches of varying kinds, materials and intrinsic values across a broader swathe of society. Saints' *Lives* and other religious texts also occasionally mention brooches; for example, in one story Samthann is said to have taken a brooch from her mantle (Gwynn & Purton 1911, 150-1). One of the *Lives* of Brigid, *Bethu Brigitte*, records the use of a brooch as a pledge, and also notes the use of the brooch by various people of different status and gender (Ó hAodha 1978, 34).

Some other texts broaden the range of ornaments referred to. In *Lebor na Cert*, brooches, bracelets and rings are all mentioned as forming part of kingly gifts, suggesting their symbolic as well as functional use (Dillon 1962). Sagas refer to brooches and to other forms of ornament, mostly pins but also occasionally neck ornaments and arm-rings. Many of the heroes in *Táin Bó Cuailgne* wear elaborate brooches (e.g. O'Rahilly 1976, 221-3), and in the same tale Queen Medb offers brooches and bracelets as inducements to Fer Diad (*ibid.* 196-8); in *Cath Maige Tuired*, the king of the Fomoiré wears 'five circlets of gold around his neck' (Gray 1982, 27).

Pictorial evidence

Illuminated manuscripts provide one source of images of how people dressed, although the restricted nature of those depicted – mainly saints, Biblical figures and clerics – limits the social spread: few secular figures are included, and those which are shown are most likely of high status, so the reality and range of early medieval Irish costume is uncertain. Similarly, images on metalwork, such as shrines, are also subject to religious context and conventions, which affect the costumes shown. Stone carving, mainly but not exclusively on high crosses, is the third source of images. The scriptural crosses of the ninth century and later contain a wealth of figures, although most are small in size and limited in detail. Again, Biblical and ecclesiastical figures dominate, although a number of scenes have been interpreted as depicting contemporary secular figures. Most of the people shown in all three media are male; FitzGerald (1991, 78) estimated that just two per cent of figures were female. Children, too, are significantly under-represented, and again the focus is on Biblical figures.

Apart from the various conventions used in depiction, the media themselves have certain restrictions. Manuscripts offer the greatest potential for detail, including colour, although given the blue hair of St John the Evangelist in the St. Gall Gospel Book, this need not be wholly realistic. Although the uneven chronological distribution of the various sources, and the limited coverage of gender, age and social roles, offer an incomplete picture of the period, the iconographical evidence nevertheless shows evidence for the costume of at least some segments of society.

Details of dress depicted include different lengths of tunic, worn with cloaks which are sometimes fastened with brooches. One panel on the early tenth-century West Cross at Clonmacnoise depicts two men, usually interpreted as chieftains, wearing ankle-length *léine*, belted at the waist, with a *brat* held in place at the shoulder by a brooch. A second panel contains a secular figure, possibly that of King Flann mac Máel Sechnaill, wearing a shorter knee-length tunic and an ecclesiastic dressed in a ankle-length robe and an outer garment. The hems of the robe and tunic appear to be decorated, perhaps with tablet-woven borders (Edwards 1990, 83-4). Other figures from carved stone crosses indicate that some men may have worn short, tight, knee-length trews (these also appear in the *Book of Kells*) while the Scandinavians appear to have preferred trousers (McClintock 1950, 1-3, 11-4; Edwards 1990, 83). The depiction of the Virgin Mary in a long cloak and tunic in the *Book of Kells* may suggest that women were expected to dress in this fashion, although her particular status and the general absence of female figures from contemporary images limit the information which can be deduced in this regard. Manuscripts in particular offer evidence for shoes and boots, notably in the Books of Durrow, Dimma, Moling and MacDurnan's Gospels; some figures, however, are depicted as barefoot.

The only ornaments which appear in images are brooches. In the *Book of Kells*, the Virgin wears a lozenge-shaped brooch on her right shoulder (although this may be a symbol of the Word of God rather than an actual brooch (Richardson 1984, 32, 45)). Brooches are depicted on a number of high crosses, including a penannular brooch in the panel of the Arrest (or Mocking) of Christ on Muiredach's Cross, Monasterboice (Harbison 1999, 136), and two penannular brooches on the Baptism scene on the Broken Cross at Kells (Allen 1904, 225). Two figures on the Cross of the Scriptures at Clonmacnoise each have a circular brooch on one shoulder (Crawford 1980, 76). An interesting representation of a brooch occurs on a caryatid at White Island, Co. Fermanagh (Harbison 1999, 136); this brooch appears to be worn as an ornament rather than a fastener, and its pin points downwards, contrary to the legal text noted above. Some brooches also appear on metalwork figures, including possible cross-in-circle disc brooches on the shoulders of an ecclesiastic on the *Corp Naomh* bell shrine (Johnson 2005, 306) and similarly on a twelfth-century figure of an ecclesiastic (Wallace & Ó Floinn 2002, 224).

Material evidence of dress and ornament

Garments

The very limited amount of textile remains makes it difficult to verify the assertions of the texts regarding garments. Of 317 sites in the gazetteer, only six produced actual textiles. This scarcity must be contrary to the original distribution, and is primarily a result of limited preservation. For the most part, preservation due to water-logging means that textiles come either from the urban sites of Dublin (Heckett 2003), Waterford (Heckett 1997, 743-9) and Cork (Heckett 2010), or from crannógs such as Lagore (Start 1950), Ballinderry II (Hencken 1942, 57-8) and Island MacHugh (Davies 1950). Another small assemblage came from water-logged layers of a raised rath at Deer Park Farms (Wincott Heckett 2011, 354-61). Two tiny fragments, probably of wool cloth, were found at Knowth (FitzGerald 2012, 552, 557), and some fragments of charred linen were found in a kiln at Ballyvass (Clark & Doyle 2011). In addition, a single fragment of woollen cloth survived in a burial at Church Island, Co. Kerry (O'Kelly 1958, 92, 112). By far the largest single non-urban assemblage, consisting of 77 fragments, was found at Lagore, dating mainly to the initial occupation period (Start 1950, 204-5). Most of the textiles from rural sites are of plain tabby weave, but occasional twill-woven textiles occur, including one finely-woven piece from Lagore, possibly dyed with madder, which was interpreted as of Viking manufacture (Edwards 1990, 82). There is also one twill fragment from Island MacHugh (Davies 1950), and the fragment from Church Island is also of twill (O'Kelly 1958, 135). For the most part, however, twill weaves occur in Dublin and Waterford. Decorative textiles include a fringed tablet-woven piece from Lagore (Start 1950) which echoes some of the borders on garments which are implied in the iconographic sources.

Most of the textiles mentioned above were made of wool, or occasionally hair; only a few small fragments of cloth made of vegetable fibres (probably linen) have been found, at Deer Park Farms (Wincott Heckett 2011) and Ballyvass (Clark & Doyle 2011). Urban contexts have provided a wider range of textiles; over 200 fragments of textiles, cordage, basketry and raw fibres were found in the excavation of houses, ditches and cess/rubbish pits in Hiberno-Scandinavian Waterford (Heckett 1997, 743). These included fragments of woven cloth of silk, wool and linen in a wide range of qualities and weaves; a variety of cordage materials; knotted silk mesh filets; tablet-woven hair fibres and felted wads (*ibid.*). The excavations in Hiberno-Scandinavian Dublin likewise produced a variety of textiles, comprising over 2,000 pieces. These included 41 woollen and 27 silk textiles (of tabby weave fabric) from Fishamble Street and John's Lane, many of which were identified as fragments of head-coverings, caps, scarves and bands dating from the early tenth to late twelfth century (Heckett 2003, 1). Silk weaving on looms was not established in northwest Europe till the end of the medieval period (Heckett 1997, 753), so the evidence from the Irish towns might indicate links with trading networks which stretched as far as the Silk Road to China. The distribution and nature of the

remains are insufficient to offer a broad view of dress across society, but confirm the use of both wool and linen; silk, however, has not been found outside of Dublin and Waterford. Some of the textiles from Dublin have been identified as head-coverings in the form of caps or scarves (Wincott Heckett 2003), but there is little evidence from rural sites of such items. The small size of most of the rural fragments limits the possibility of reconstructing garments, although occasional details of hems and other stitching are found, including a finely-worked hem and decorative stitching on one fragment from Lagore, and a skilful darn on another (Edwards 1990, 83).

A small number of textiles offer evidence for the colours used in dress. As noted above, one pink textile from Lagore may have been dyed with madder, and analysis of a red textile from Deer Park Farms indicated the probable use of wild madder or bedstraw (Wincott Heckett 2011, 356). Analysis of textiles from Dublin showed the use in a few cases of imported madder *R. Tinctorum*, probable woad, and lichen purple (Wincott Heckett 2003, 128); madder and lichen purple were also found in textiles from Waterford, along with yellow weld and the use of tannins and barks to enhance natural brown colours (Wincott Heckett 1997, 747-750, 761). Apart from the textiles, occasional remains of animal or plant sources used for dyestuffs occur; these will be discussed later in the context of textile working. One site, Deer Park Farms, produced both dyed cloth and raw dyestuffs; however, the dyes involved were different (red from madder and blue from woad respectively).

Accessories

Leather shoes are preserved mainly in waterlogged conditions, and while complete examples occasionally occur, much of the artefactual evidence consists of fragments which may represent shoes, belts, garments or other items such as bags and satchels. A range of types of shoes was identified by Lucas (1956), who catalogued five types, of which the first four may date to the early medieval period. Both one-piece and composite shoes are known, the former at times elaborately decorated. Only fourteen of the sites in the gazetteer produced leather remains which may reflect shoes; sites with definite shoes (uppers, soles, heels, etc.) include Ballinderry II (two Lucas Type 1), Craigyarwarren (two Type 1 also), Deer Park Farms, Moynagh Lough, Lissue and Rathinaun (three Type 1). Large quantities of leather (268 fragments) including shoes were also found at Lagore.

As with textiles, the preservation conditions required for leather, and the fragmentary nature of most of the surviving remains, limit the potential for discussion of the original distribution of these artefacts. Six of the fourteen sites with leather remains are crannogs, but more localised waterlogging can occur in other site types, for example in ditches; the small sample size makes it futile to generalise about the extent of shoe-wearing, either in terms of geographical distribution or site types.

Fragments of leather might also represent the remains of belts, although the possibility of woven textile belts having been used must also be considered. The more usual evidence for belts occurs in the form of buckles. These are a relatively rare find on excavated sites, although some have been found in burials (e.g. Raheennamadra (Stenberger 1966, 44) and Cherrywood (Ó Néill 2006, 69)), where they have sometimes been interpreted as indicating intrusive, possibly Anglo-Saxon, elements (Ó Floinn 2002, 176; O'Brien 1999, 179-84). Twenty-seven sites in the gazetteer produced one or more buckles; most sites had just one or two examples, although some are recorded simply as 'plural'; Ballinderry I and Lagore each have three buckles, Cahercommaun possibly four (one bronze fragment, three possible iron), and Knowth nine (six iron and three bronze). Both copper alloy and iron are used in making buckles; most are quite plain (and often incomplete), but Lagore produced a highly-decorated bronze example from an unstratified context (Hencken 1950, 66 & fig 11, 323) while Ballywee has a silvered bronze example (Lynn 1988). It is interesting to note that the larger quantities of these finds come from the traditional 'high-status' (even royal sites) such as Lagore, Knowth, and Cahercommaun, although the general scarcity might suggest this was not a widespread ornament. This may confirm the sense that this is an unusual item,

perhaps adopted only by a minority (although further examination of distribution and chronology would be needed to assess this possibility), or may suggest that belts could have been fastened in other ways.

Ornaments

A broad range of ornaments is known from early medieval Ireland, not all of which come from excavated contexts or settlement sites. Personal ornaments are by their nature small, portable objects; as such it might be expected that they could be easily transported, traded or exchanged over distances. As noted above, only some of these items appear in the literary or pictorial sources; archaeological evidence provides significant additional information on the types and details, and potentially how they were used. However, it has also been noted that the artefactual evidence does not always support the literary descriptions, perhaps because of the use of specific conventions in the written texts; the precious metals in descriptions of brooches and pins in the *Táin*, for example, are in inverse proportion to those found in the artefactual evidence (Mallory 1986).

The distribution of personal ornaments is fairly wide, with examples occurring in 216 of the 317 sites in the gazetteer. The absence of personal ornaments from almost one-third of the total sites surveyed might perhaps reflect the extent of the excavations, or the nature of the sites; ornaments were found at only seven of 22 souterrain sites, for example, while all of the cemetery/settlement sites surveyed had some personal ornaments. But all of the site types are represented among those producing ornaments (see Fig. 7.1 below).

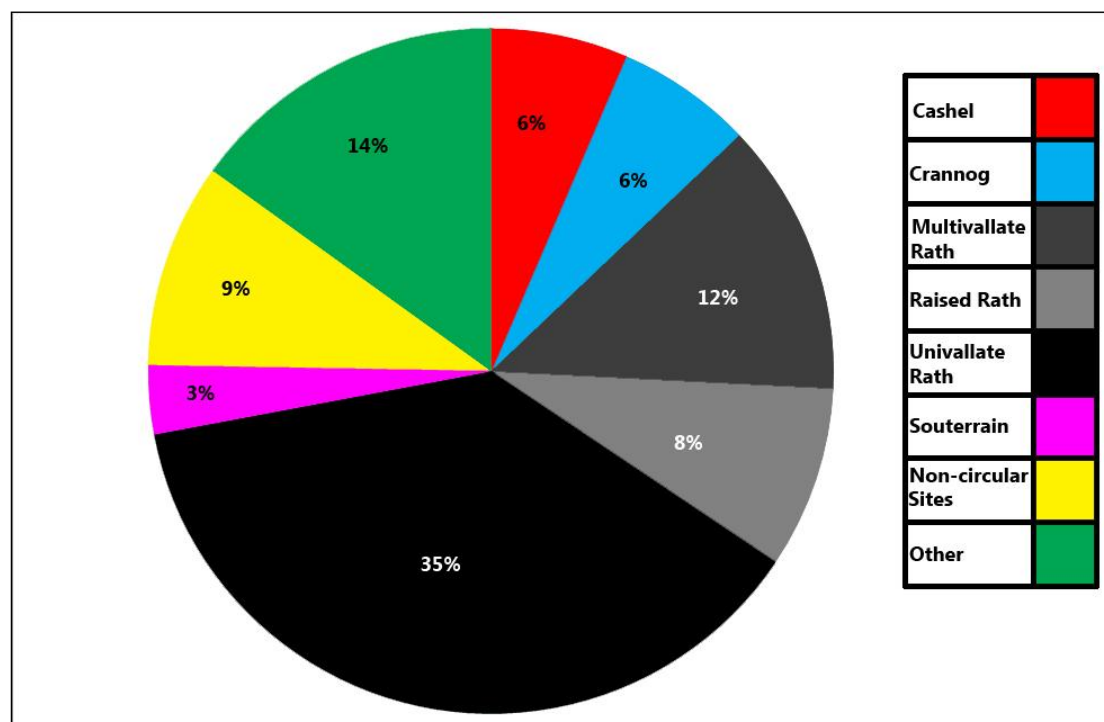


Fig. 7.1: Breakdown of the 216 sites with personal ornaments by site type

The contexts of the personal ornaments vary across the sites; for the most part excavated examples on settlement sites are not directly in contexts which suggest their use – occurring in ditches or pits, or as unstratified finds. One notable exception is Deer Park Farms, where several of the ornaments (including a brooch and several beads) were found not only within the houses, but in some cases in the bedding areas, allowing them to be considered directly in connection with the inhabitants and their daily lives (Lynn & McDowell 2011, 333). The degree of preservation on this site allows such associations to be made, which may not be apparent in other excavations. Ornaments in burials are rare, but occasional examples may

suggest dressed burials, or allow associations to be made between specific items and people, in terms of gender, age or other aspects of identity.

The range of ornaments found on different sites varies widely; many sites have just a single type, such as a pin or a bead, but others have multiple types and examples. Some 70 sites produced just a single ornament type (see Table 7.1), often represented by just a single item; the most common ornament type among these sites was the pin, followed by beads and bracelets.

Ornament type	Number of sites	Site names
Brooch	1	Kilree 3; Doonloughan
Pin	36	Ardcloon; Ballinarry; Ballyarra; Ballykennedy; Ballynakelly; Ballyrone; Banduff; Baunoguephlure; Beal Boru; Beginish; Big Glebe; Boho; Boyerstown; Cahircalla More; Carnalbanagh East; Cavanapole; Clonmoney West; Cloonaboy; Craig Hill; Deerfin; Dromiskin; Farrandreg; Gortnahoon; Holywood; Kilcloghans; Killederdadrum; Killyglen; Knockadrina; Leacanabuaile; Lisdoon; Loughbown 1; Marlhill 2; Moyne; Rathmorris; Sallymount; Sluggary
Buckle	1	Pollardstown
Bead	16	Balgatheran; Ballyduff; Ballyshanagh; Barrees Valley; Coarhabeg; Cross; Crossnacreevy; Dromthacker; Lisnagade 2; Lisnagun; Loher; Maynooth Castle; Rathbeg; Shane's Castle; Sheephouse; Treanbaun
Bracelet	12	Ballyrenan; Carnmore West; Carrigillihy; Cloongownagh; Coolcran; Dressogagh; Island MacHugh; Killarn; Killyliss; Langford Lodge; Oughtymore; Rinnaraw
Other	2	Croom East (ring); Poulacapple (amber button)

Table 7.1: sites producing just a single type of personal ornament

At the other end of the scale, a number of sites have a broad range of ornament types (Table 7.2 below). This table, based on sites in the gazetteer, highlights a number of issues. First, while some sites have exceptional quantities of ornaments, the range of types present even in smaller numbers may be of interest. Given that so many sites produce just one type of personal ornament, the presence of four or more ornament types on these 29 sites is interesting. The distinction between sites with range but not overall quantity, and those with both, needs further attention. Issues which may complicate the distribution include the presence of some ornaments in burials – such as a torc in a male burial at Owenbristly (Lehane & Delaney 2010, 35), beads and other items in both child and adult female burials at Parknahown (O'Neill 2010, 256-7), and a blue glass bead in an infant burial at Raystown (Seaver 2010, 271). In addition, evidence for manufacturing at Dooley and Clogher (see below) may also confuse the issue as to whether items found on site were made and/or used there.

Site	Type	Brooch	Pins	Beads	Bracelets	Buckles	Other
Ballinderry I, Co. Westmeath	Crannog	2	28	1	5	3	
Ballinderry II, Co. Offaly	Crannog	4+	27	30	3		
Ballycatteen, Co. Cork	Multivallate	1	3+	3	1		
Ballywee, Co. Antrim	Non-circular		Plural	Plural	Fragments	1	
Baronstown, Co. Meath	Non-circular	2	Plural	1	1		
Cahercommaun, Co. Clare	Cashel	3	98	17	52	4	2 pendants 1 ring
Carraig Aille II, Co. Limerick	Cashel	2	89	29	37		2 rings
Castlefarm, Co. Meath	Cemetery/ settlement	2	81	6	8		4 rings
Castleskreen, Co. Down	Univallate	1	1	2	1		

Clogher, Co. Tyrone	Multivallate	plural	1	1	1		
Cush, Co. Limerick	Non-circular	1	3	8	Plural		Pendant, head-ring
Dalkey Island, Co. Dublin	Other	1	10	4	Fragments		3 rings
Deer Park Farms, Co. Antrim	Raised	1	62	89	23		4 rings
Dooley, Co. Donegal	Other	Plural	c.100	Plural		Plural	2 rings
Dowdstown 2, Co. Meath	Non-circular	1	11	1	Fragments	1	
Feltrim Hill, Co. Dublin	Cashel		71+	10	17		1 ring
Feerwore, Co. Galway	Univallate	Plural	1	1			4 rings, earrings?
Garranes, Co. Cork	Multivallate	1	3	12			Ring?
Garryduff, Co. Cork	Univallate		35+	29	2		2 pendants, plural rings
Knowth, Co. Meath	Raised	3	223	89	84	9	5 rings
Lagore, Co. Meath	Crannog	10	221	161	116	3	6 rings, 1 pendant
Lough Faughan, Co. Down	Crannog	1	Plural	8	2		Ring & pendant
Moynagh Lough, Co. Meath	Crannog	2	23	plural	22		2 rings
Owenbristly, Co. Galway	Cemetery/settlement	1	2	4	2	2	Torc
Parknahown, Co. Laois	Cemetery/settlement	2	16+	16+	Fragments	1	Necklace fragment ?
Rathtinaun, Co. Sligo	Crannog	2	26+	9+	5+		Rings
Raystown, Co. Meath	Non-circular		29	8	4	2	Ring
Roestown 2, Co. Meath	Non-circular		67+	14+	7	1	
Uisneach, Co. Westmeath	Other	2	14		4	1	1 ring

Table 7.2: sites with multiple ornament types and quantities

Brooches

Brooches are frequently the most decorative of early medieval ornaments; they are also the most commonly depicted in texts and images. Several different types occur, with different chronological spreads. Zoomorphic penannular brooches are generally dated from the fifth to seventh centuries A.D., and the later annular/pseudo-penannular types to the eighth and ninth centuries; bossed penannular and 'thistle' brooches are both found mainly in the ninth/tenth century period, while kite brooches occur from this point in time through to the twelfth century. Disc brooches are extremely rare, at least until tenth/eleventh-century Hiberno-Scandinavian Dublin. Some types may overlap in reports with ringed-pins, notably the eighth/ninth-century 'brooch pin' (Youngs 1989, 214); some call these ring brooches (Laing 2006, 154; Fanning 1994, 5), but this term may cause confusion with the later medieval ring brooches (see Deevy 1998).

Brooches of different materials are known, ranging from just two gold examples to the more common use of silver or copper alloy, with also some iron and (later) pewter examples. While some of these brooches are further ornamented with gilding or tinning, enamel, glass or amber studs, others are relatively plain, although cast or incised ornament may add to the decorative effect.

A difficulty in discussing the use and distribution of brooches is that significant numbers in collections derive from old/stray finds, and are therefore lacking in context. Many of the most

elaborate and best-known brooches, including the 'Tara' brooch, fall into this category, and it can be difficult to trace their original context (Whitfield 1974). Certain types of brooch are more affected by this than others; no thistle or bossed penannular brooches have been found in excavations, for example. Of the 216 sites which produced personal ornaments in this survey, just 40 sites produced brooches. Of these, 23 sites had just a single brooch, while the others ranged from two to ten brooches, with some unspecified plurals (see Table 7.3). In terms of brooch types, only limited details are available in some cases, but most appear to be penannular brooches, with rare disc brooches (one apiece) found at Lagore and Togherstown (Hencken 1950, 67; Macalister & Praeger 1931, 79-80). An interesting feature is the discovery of a bird-headed penannular brooch at each of the sites of Lagore (Hencken 1950, 61), Moynagh Lough (Bradley 1994-5, 166), Baronstown (Linnane & Kinsella 2007, 59) and Parknahown (O'Neill 2007, 136, 138); this type is often seen as influenced by Anglo-Saxon designs, but was probably mediated through Dunadd in Scotland (Lane & Campbell 2000, 106, 239; Ó Floinn 2009, 245).

Site	Site type	Brooch	Materials	Reference
Ballinderry I, Co. Westmeath	Crannog	2	1 silver, 1 copper alloy	Hencken 1936, 144, 154
Baronstown, Co. Meath	Non-circular	2	2 copper alloy	Linnane & Kinsella 2009, iv
Carraig Aille II, Co. Limerick	Cashel	2	2 copper alloy (1 gilded)	Ó Ríordáin 1948-50, 69
Castlefarm, Co. Meath	Cemetery/ settlement	2	2 copper alloy	O'Connell & Clark 2009, 38
Clogher, Co. Tyrone	Multivallate	2	2 copper alloy	Warner 1973
Coonagh West, Co. Limerick	Univallate	2	2 copper alloy	Taylor 2007, 78
Millockstown, Co. Louth	Multivallate	2	1 copper alloy, 1 iron (fragment)	Manning 1986, 154, 157
Moynagh Lough, Co. Meath	Crannog	2	2 copper alloy	Bradley 2011, 16
Parknahown, Co. Laois	Cemetery/ settlement	2	2 copper alloy	O'Neill 2007, 136
Rathinaun, Co. Sligo	Crannog	2	1 copper alloy, 1 iron	Raftery undated
Uisneach, Co. Westmeath	Other	2	1 copper alloy, 1 iron	Macalister & Praeger 1928, 119, 121
Cahercommaun, Co. Clare	Cashel	3	1 silver, 1 copper alloy, 1 iron	Hencken 1938, 27-34
Knowth, Co. Meath	Raised	3	3 copper alloy	Eogan 2012, 258-70
Ballinderry II, Co. Offaly	Crannog	4	4 copper alloy	Hencken 1942, 34-42
Lagore, Co. Meath	Crannog	10	8 copper alloy, 2 iron	Hencken 1950, 59-64, 99-100
Dooley, Co. Donegal	Other	Plural	Copper alloy & iron	Ó Ríordáin & Rynne 1961
Feerwore, Co. Galway	Univallate	plural	Iron	Raftery 1944, 34-5, 39, 41

Table 7.3: sites with multiple brooches

While crannogs account for five of the seventeen sites listed above, brooches are well distributed across all site types (see Fig. 7.2 for distribution across all forty sites). The geographical distribution is also broad (Fig. 7.3); differences in the proportions across the modern provinces may be related to the extent of excavation, rather than original presence.

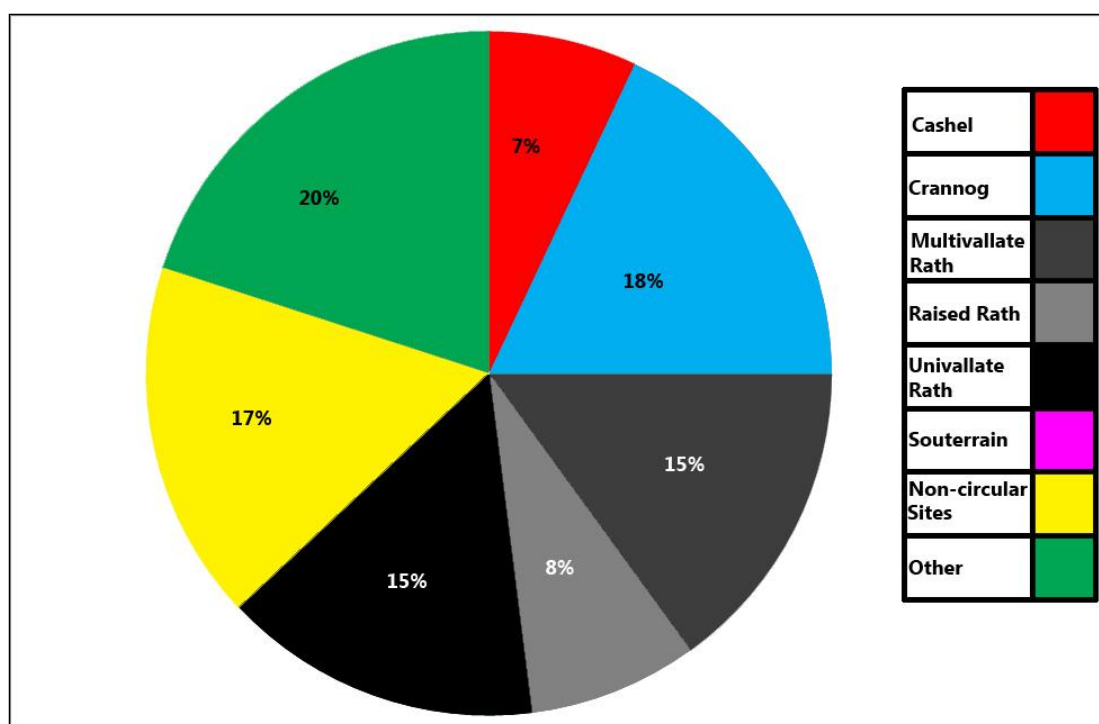


Fig. 7.2: brooches by site types (40 sites; no brooches were found in sites consisting only of souterrains)

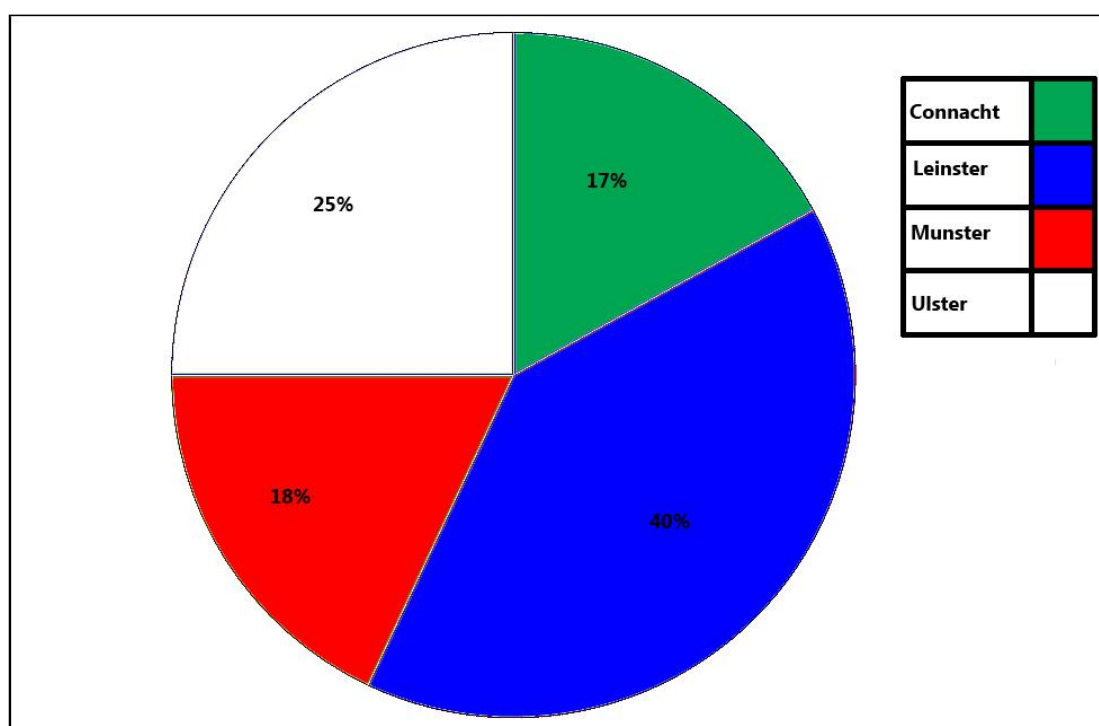


Fig. 7.3: Geographical distribution of sites with brooches (by modern province)

Copper alloy is the most common material used in excavated brooches. Twenty-eight of the sites had brooches of copper alloy only, and four had iron only (Altanagh, Ballyegan, Feerwore and Rathgurreen). Five sites had brooches of both materials (Dooey, Lagore, Millockstown, Uisneach and Rathtinaun). As noted in Table 7.3, several sites with two or more brooches saw the use of both copper alloy and iron in these ornaments, indicating access to multiple metals in many cases.

Pins

Pins have been called ‘the universal metal dress-fastener’ of early medieval Ireland, and were probably used as such by most of the population (Youngs 1989, 22; Edwards 1990, 141). Many different types are known, several of which overlap chronologically; some types dating back into the Iron Age, including Omega pins, ibex-headed pins and projecting ring-headed pins, also occur occasionally on early medieval sites. The vast majority of pins, however, fall into two main categories of ring-headed pins and stick pins. Pins are generally less decorative than brooches, being smaller in surface area, but may yet display high-quality workmanship and skilled craft in their making. A broader range of material is used in pins than for brooches – not only the various metals, but also significant quantities of bone/antler and, in a few cases, wood (the scarcity of which may be linked to preservation conditions).

Pins were found on 152 of the 216 sites which produced personal ornaments. Of these, 63 sites produced just a single pin; 66 had between two and ten pins; and 23 had more than ten pins (see Table 7.4). Distribution across difference site types is indicated in Fig. 7.4.

Site	Total	Copper alloy	Iron	Bone/antler	Wood	Other
Dowdstown	11	5	3	3		
Killickaweeny	11	1	6	4		
Carraig Aille I	13	5	5	3		
Uisneach	14	4	9	1		
Cloghermore	15	6	1	8		
Parknahown	At least 16	13	1	Plural		
Newtownlow	20	20				
Rathmullan Lower	21	3	1	17		
Moynagh Lough	23	7	4	12		
Rathtinaun	At least 26	9+	2	12+	3+	
Ballinderry II	27	10	1	9	7	
Ballinderry I	28	17	2	6	3	
Raystown	29	11	12	6		
Garryduff	At least 37	15	20	Plural		
Deer Park Farms	62	5	14	36	7	
Roestown 2	At least 67	32	8	27+		
Feltrim Hill	At least 73	Plural	23	48		
Castlefarm	81	27	15	17		22 iron-&-copper alloy
Carraig Aille II	89	19	31	39		
Cahercommaun	98	5	11	82		
Dooley	c. 100	c. 50	plural	plural		
Lagore	221	31	12	164	13	1 silver
Knowth	223	145	25	51		2 leaded gunmetal

Table 7.4: Sites with more than ten pins, with materials

Copper alloy was the most widely represented material for pins: 128 sites had copper alloy pins, either alone or with other materials, and of these, 66 had copper alloy pins only. A total of 63 sites produced iron pins; nine of these had only iron pins, the rest had other materials also. Fifty-four sites produced bone pins, of which just seven had bone pins only (Boho, Castleskreen, Dunbell Big 6, Moathill 1, Owenbristly, Park North and Ratoath; of these only Boho has no other ornaments). Just one site (Lagore) produced a silver pin. No site produced only wooden pins, but a small number (five) had wooden examples among their pin assemblages. Four of these were crannogs – Ballinderry I, Ballinderry II, Lagore and Rathtinaun – and the fifth a waterlogged raised rath (Deer Park Farms), so preservation conditions may be a key element here, although it does not explain their absence from other crannogs. Twenty-four sites had pins of three different materials, namely copper alloy, iron and bone; these were Cahercommaun, Carraig Aille I, Carraig Aille II, Castlefarm,

Cloghermore, Dalkey Island, Dooey, Dowdstown, Faughart Lower, Feltrim Hill, Garryduff, Johnstown, Kilgobbin, Kilgreany, Killickaweeny, Lough Faughan, Meadowbank, Moynagh Lough, Parknahown, Raystown, Rosepark, The Spectacles, Tusk and Uisneach). Seven sites had four materials (of these Deer Park Farms, Ballinderry I, Ballinderry II and Rathtinaun had copper alloy, iron, bone and wood; Knowth had iron, bronze, bone and gunmetal; Baronstown, Rathmullan Lower and Roestown 2 had bone, iron, bronze and antler (not always counted separately from bone in reports). As noted in Table 7.4, Lagore along had pins of five different materials, as well as the second-highest overall number.

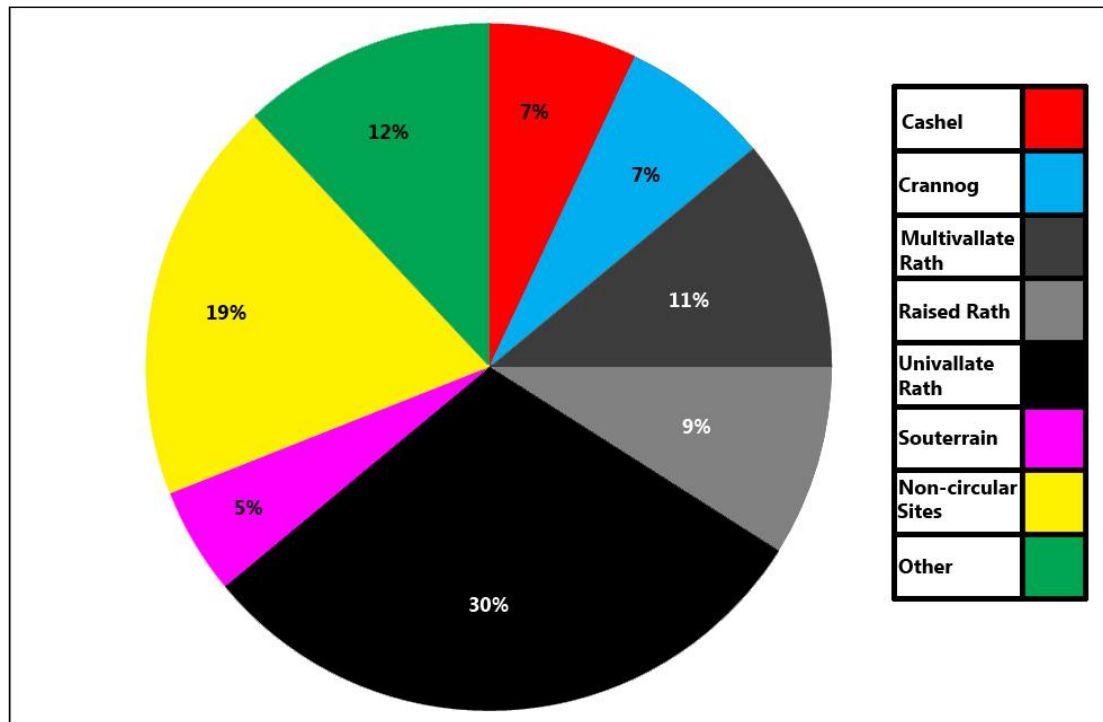


Fig. 7.4: pins by site types (152 sites)

The different materials used in pins (copper alloy, iron and bone/antler) occur on all site types (Fig. 7.5). Copper alloy, as the most common material, dominates most site types, although this trend is reversed at cashels, where more sites have iron pins than copper alloy pins; in addition, the numbers of cemetery/settlement sites with iron pins is equal to that with copper alloy pins. Whether this reflects issues relating to these types of sites in general, or the specific examples examined in this report, is unclear, but may warrant further examination.

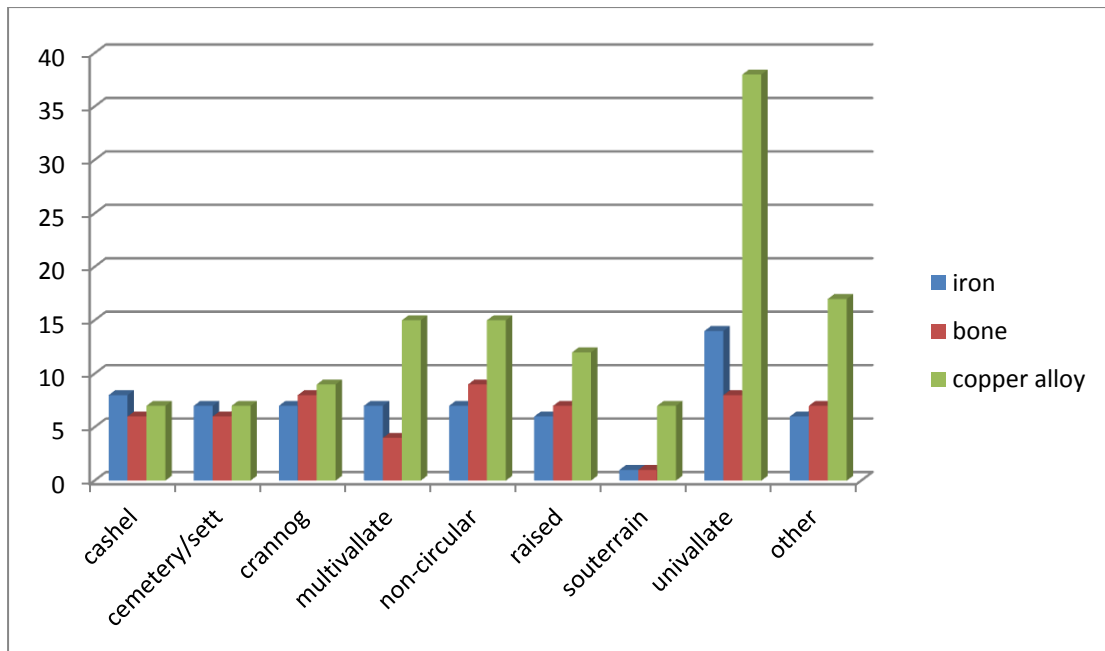


Fig. 7.5: number of sites with pins in the three main materials

Neck ornaments and beads

Very few metal neck ornaments occur on the sites examined; an iron torc was found in a male burial at Owenbristy (Lehane & Delaney 2010, 35), a fragmentary twisted copper alloy necklet from a ditch in the cemetery at Collierstown 1 (O'Hara 2009, 12) and a copper alloy neck-ring accompanied a female burial at Ratoath (Wallace 2010, 305). Parknahown also produced a bronze 'necklace fragment', also called a bead (O'Neill 2009). Pendants are slightly more common, as shown in Table 7.5.

Site	County	Number and material	Reference
Ballynagallagh	Limerick	1 lignite	Cleary 2006, 30
Cahercommaun	Clare	1 antler & 1 bone	Hencken 1938, 41
Carraig Aille I	Limerick	1 stone	Ó Ríordáin 1949, 101
Cloncowan	Meath	1 bone (fragment)	Baker 2007, 71
Cush	Limerick	1 stone (sandstone)	Ó Ríordáin 1939/40, 164
Garryduff	Cork	2 stone (shale)	O'Kelly 1963, 86
Knowth Site M	Meath	1 sperm whale ivory	Stout & Stout 2008
Knoxspark	Sligo	1 copper alloy	Mount 2010, 208
Lagore	Meath	1 amber	Hencken 1950, 151
Lough Faughan	Down	1 sperm whale ivory	Collins 1955, 63
Newtownlow	Westmeath	1 jet cross	Kerr <i>et al.</i> 2010, 713

Table 7.5: Sites with pendants (number and material)

There is far more evidence for neck ornament in the form of beads made in various materials. It is of course an assumption that beads were worn in the form of necklaces, as was common in other contemporary societies (Anglo-Saxon England, Scandinavia), but only a couple of Irish early medieval burials - Parknahown (O'Neill 2008) and Killeany (Wiggins 2006a, 2006b) – have provided evidence of beads in the neck area of female skeletons which can with confidence be interpreted as necklaces (although the former might have been worn in the hair rather than on the neck). Other possibilities include sewing beads to adorn clothing, as evidenced at Birka in Sweden (Ewing 2006, 65) or threading them on the rings of pins, as in an old find from Lagore (Hencken 1950, 72 & fig. 14A). Of more interest is the range of materials used in beads; while glass beads are the most colourful, and most plentiful, comprising around 72% of the total number of beads, around 15% of beads are of bone, with amber accounting for some 9%, with smaller quantities made of stone, jet/lignite/shale, faience/ceramic, clay, wood, lead, silver, gold and carnelian (Doyle 2010).

Of the 216 sites with personal ornaments, 136 produced one or more beads. Fifty-one of these produced just a single bead, but others had larger quantities – in some cases considerably larger, as shown in Table 7.6. All site types produced beads (see Fig. 7.6), and the geographical distribution includes all four modern provinces (Fig. 7.7).

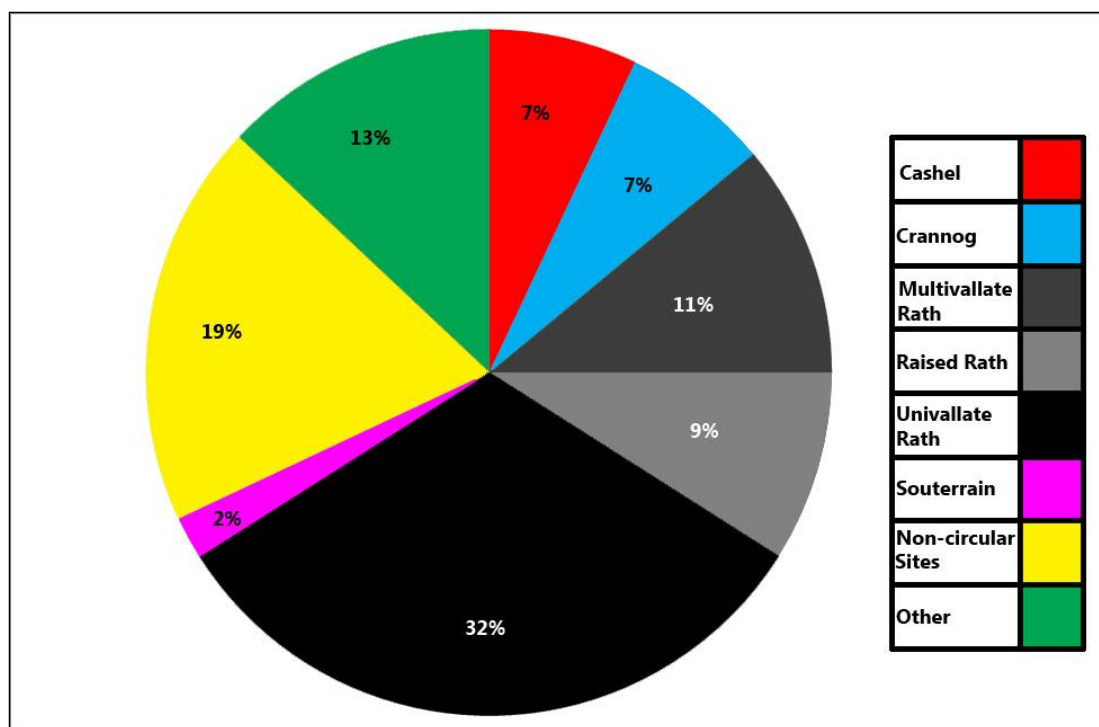


Fig. 7.6: beads by site types (136 sites)

Site	Site type	Beads	Reference
Lagore, Co. Meath	crannog	161 (136 glass, 1 lignite, 2 shale, 16 amber, 6 bone)	Hencken 1950, 132-45, 150-1, 170, 175, 196
Deer Park Farms, Co. Antrim	Raised	89 (86 glass, 3 amber)	Lynn & McDowell 2011, 330-9
Knowth, Co. Meath	Raised	89 (48 glass, 6 stone, 6 amber, 29 bone)	Barton-Murray 2012, 244-7, 251-6
Glencurran, Co. Clare	other	69 glass	Dowd 2005
Ballinderry II, Co. Offaly	crannog	30 (14 glass & 16 amber)	Hencken 1942, 13, 51-2
Garryduff, Co. Cork	Univallate	29 (28 glass, 1 amber)	O'Kelly 1963, 70-2, 74-8
Carraig Aille II, Co. Limerick	Cashel	29 (25 glass, 2 bone, 1 stone, 1 jet)	Ó Ríordáin 1949, 83, 87, 89-91, 95
Parknahown, Co. Laois	Cemetery/settlement	At least 17 (15 glass, bone plural)	O'Neill 2009
Cahercommaun, Co. Clare	cashel	17 (6 glass, 1 lignite, 3 shale, 5 bone, 2 antler)	Hencken 1938, 38-41
Whiterath 2, Co. Louth	multivallate	16 (14 bone, 2 amber)	Ó Drisceoil 2000
Moynagh Lough, Co. Meath	Crannog	At least 15 (at least 14 glass, 1 amber)	Bradley 2011, 16, 22, 25-6
Cloghermore, Co. Kerry	Other	14 (3 glass, 1 stone, 6 amber, 1 ivory, 3 bone)	Connolly & Coyne 2005
Roestown, Co. Meath	Non-circular	13 (12 glass, 1 amber)	O'Hara 2009
Garranes, Co. Cork	multivallate	12 (10 glass, 2 amber)	Ó Ríordáin 1942, 116-8, 121
Rathinaun, Co. Sligo	crannog	At least 10 (2 glass, 1 lead, 1 clay, amber plural, stone plural, bone plural)	Raftery undated
Dooley, Co. Donegal	other	At least 10 glass	Ó Ríordáin & Rynne 1961

Table 7.6: sites with large quantities of beads

As previously noted, beads occur in burials at Parknahown (and also at Raystown, where quantities were smaller); this is also the case at Cloghermore. The necklace of 69 Viking Age

beads from Glencurran may also be a variation from the more usual site assemblages. Leaving these aside, the range of site types with large numbers of beads is dominated by crannogs (four sites), with two examples each of cashels, raised and multivallate raths; it is also notable that several of these sites are those traditionally regarded as high-status or even royal sites (Lagore, Knowth), although the high standing of Deer Park Farms in the table, equalling Knowth and indeed exceeding it in terms of glass beads, although interpreted as just the home of a *mruigfer*, broadens our appreciation of the complex picture of early medieval society. Given the small sample in the table, it is also interesting that a reasonable geographical spread is indicated.

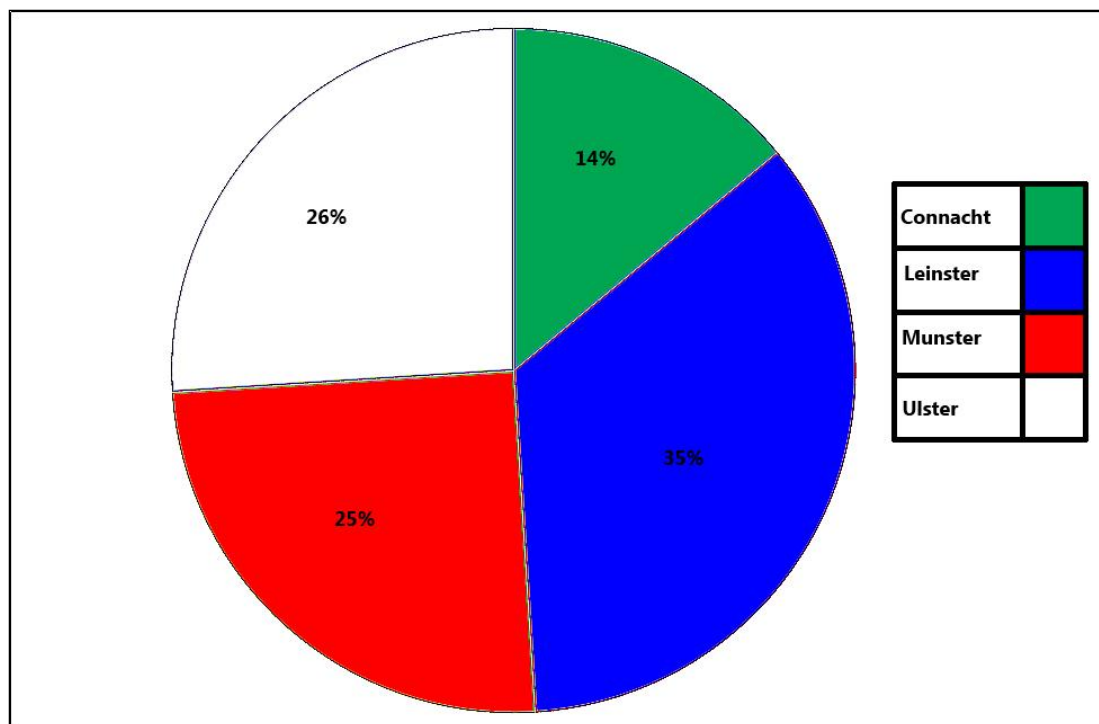


Fig. 7.7. Location of sites with beads (total sites: 136)

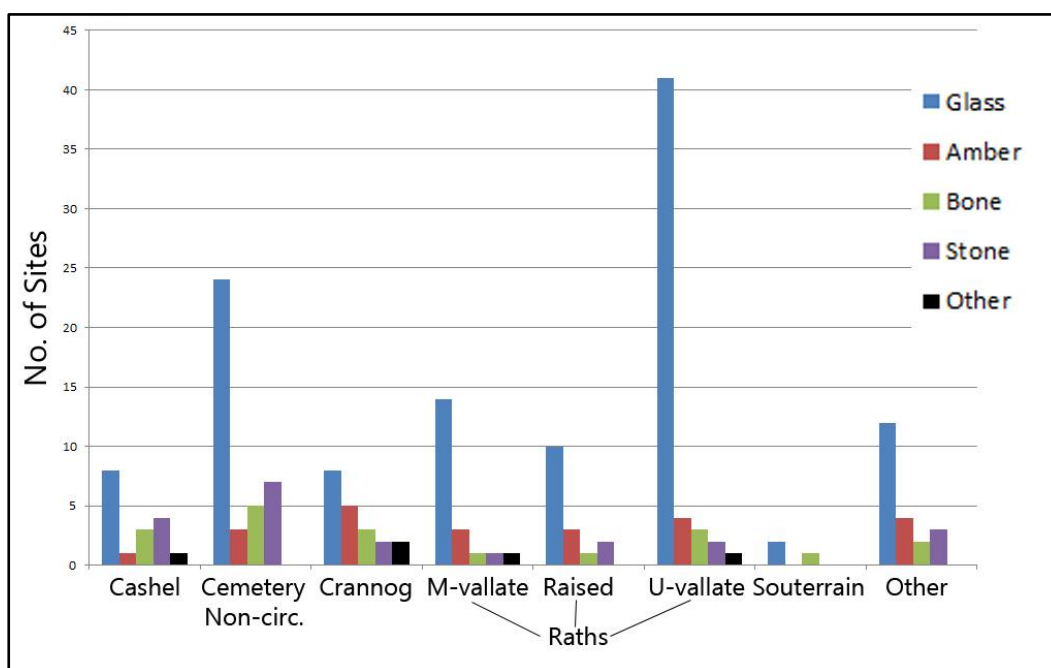


Fig. 7.8. Distribution of site with beads in the four main materials across site types

Glass is the most common material found in beads, featuring on 122 sites, but other materials noted include amber (23 sites), bone (18 sites), stone (14 sites), jet/lignite (seven sites), clay (five sites), bronze (two sites – Lisleagh and Parknahown – although the identification as beads as opposed to fragments of other items is not certain), ivory (two sites), and rock crystal, lead, antler and faience (one site each). As with the larger quantities above, there is a broad spread across site types, as shown in Fig. 7.8, which sets out the four main materials used in beads.

Bracelets

Bracelets were made from a range of materials including jet, lignite, shale, stone, antler and boar tusk, as well as glass, copper alloy, gold and silver. The last two are more representative of the Viking Age, but appear to reflect some of the descriptions found in contemporary texts. The most common type, those made from fossil wood (covering jet, lignite, and varieties of coal and shale) are found throughout the period from prehistory to the Norman era (Lanigan 1964, 60). The main use of glass bracelets, however, falls between the late seventh and the ninth century (Carroll 2001, 101, 105).

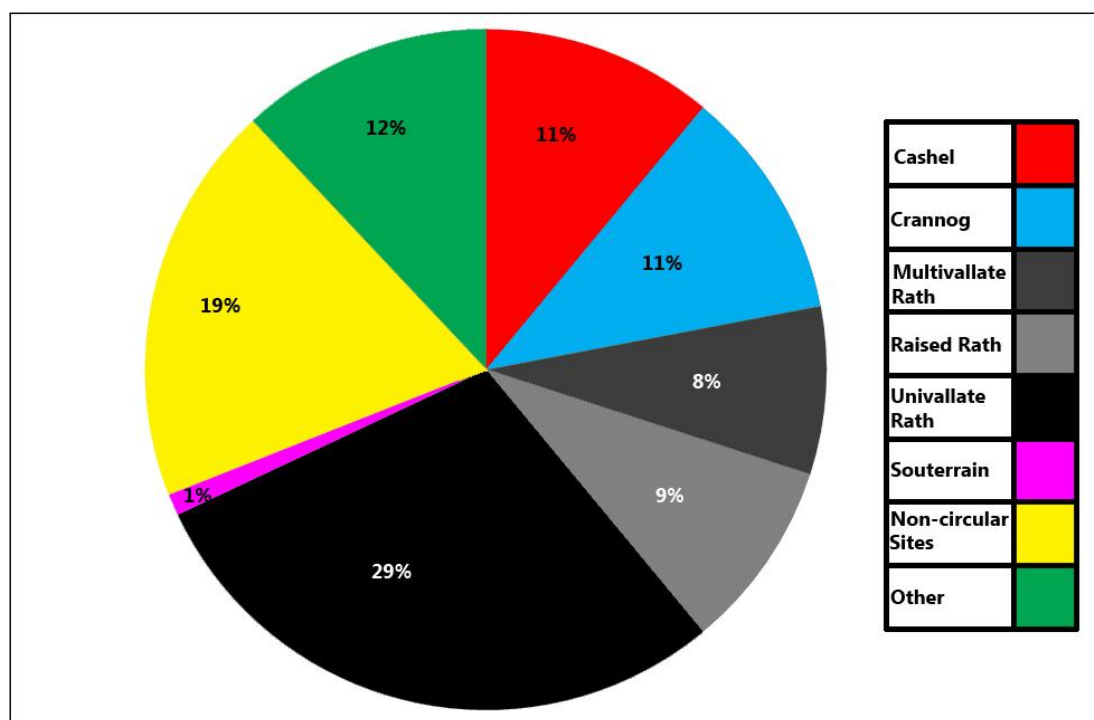


Fig. 7.9: Bracelets by site types (108 sites)

Of 216 sites with personal ornaments, 108 sites produced one or more bracelets; these are broken down by site type in Fig. 7.9. In most cases, bracelets are represented only by fragments, making it difficult to quantify how many of the ornaments were originally present. The most common material is jet/lignite (or variations thereof e.g. shale), appearing on some 93 sites (mostly alone, but sometimes in combination with other materials). Glass bracelets occur on 24 sites, stone bracelets on six sites (Ballinderry I, Carraig Aille II, Castlefarm, Coolcran, Raystown and Rinnaraw), and copper alloy bracelets on ten sites (Ballinderry II, Baronstown, Caraun More, Clogher (Co. Tyrone), Craigwarren, Knowth (two bracelets), Lagore (two examples), Marlinstown, Moathill 1 and Rathtinaun (plural)). A fragment of a silver bracelet was also found at Lagore. The range of materials used is added to by six bracelets made of petrified wood at Deer Park Farms, perhaps a localised version of the lignite or stone bracelets (though this site did have lignite bracelets also); and a boar's tusk bracelet at Ballinderry II.

The dominance of jet/lignite bracelets across all site types is shown in Fig. 7.10, along with the distribution of glass and copper alloy bracelets. The smaller quantities of the latter types may hinder the analysis, but their spread across a number of site types is notable. It is also interesting that crannog sites have a relatively more even representation of both the more common jet/lignite and the rarer glass and copper alloy bracelets. The waterlogged nature of these sites would not be a factor in the preservation of these particular materials, so perhaps this relates to other aspects of the sites, such as status. In terms of geographical distribution, jet/lignite bracelets are widespread; and a significant proportion of the glass bracelets occur around the modern county Meath (see manufacturing section for further details).

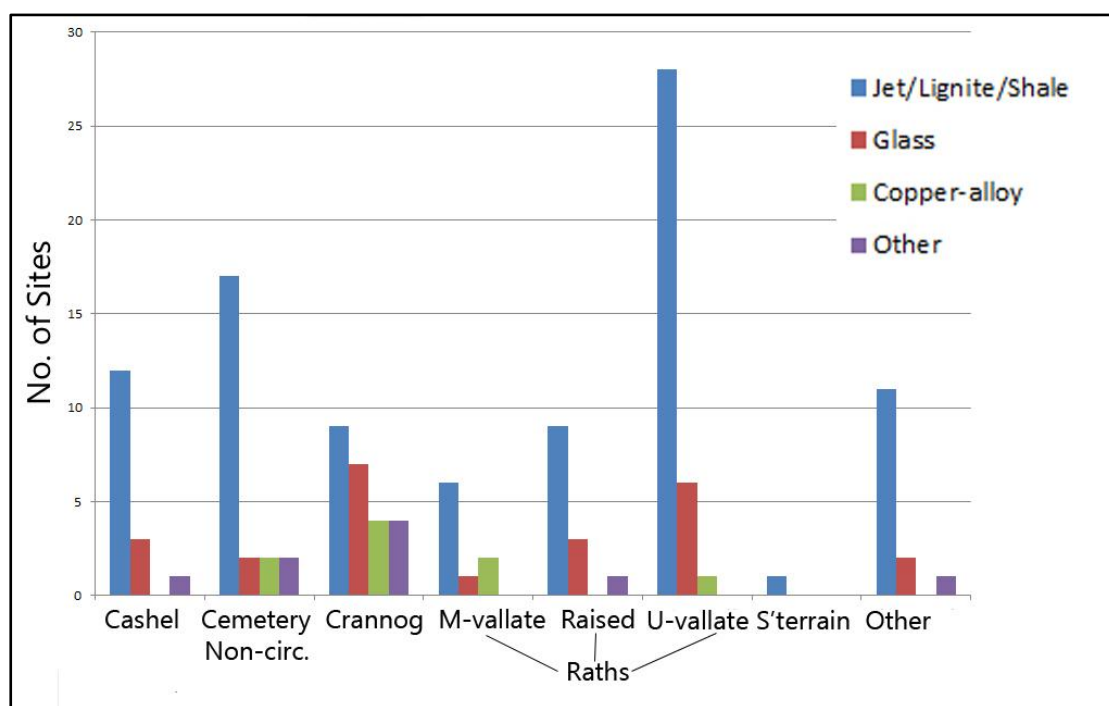


Fig. 7.10. Distribution of three bracelet materials over site types

Eight sites have three or more materials among their assemblages of bracelets; the combinations involved include glass, lignite and stone at Ballinderry I, Castlefarm and Carraig Aille II; glass, copper alloy and lignite at Rathtinaun and Knowth; glass, boar tusk and copper alloy at Ballinderry II; glass, lignite and petrified wood at Deer Park Farms; and silver, copper alloy, glass and lignite at Lagore. These ranges suggest access to materials but also perhaps multiple meanings; glass or metal ornaments, for example, are often considered as high-status materials, but in several cases (including 'royal' sites such as Knowth and Lagore) are found in combination with more common, mundane materials, which often make up the bulk of the assemblages.

Rings

Rings are also occasionally noted, although it is not always clear from reports whether these are definitely finger-rings or are rings from pins or brooches which have become detached from their pins. Thirty-four sites produced one or more rings. Most of these are metal rings, most frequently of copper alloy (23 sites); however, two sites produced iron rings, and one site each had silver and tinned rings. Non-metal rings include examples in amber, lignite/shale, glass and stone. Among the larger assemblage and mixes of material are Castlefarm and Deer Park Farms with four copper alloy rings apiece; Lagore, with five copper alloy rings and one of amber; Knowth with jet and amber rings; Dalkey Island, with rings of glass, stone and lignite; Feerwore, with three copper alloy rings and one of glass; and Dunsilly, with rings of lignite and stone.

Chapter 8: Manufacturing on Rural Settlement Sites

In looking at dress and ornament, we often focus on the finished products – the textile remnants which hint at the material, cut and colour of clothing; the brooches, beads, bracelets and other ornaments lost or hidden or otherwise left behind and subsequently discovered by the excavators. But while these may indicate the use of these items by people on a particular site, they may not speak to their place of manufacture. For that, the evidence required relates to the process of manufacture – the tools used to process, spin and weave wool or flax into thread and cloth; the furnaces, moulds, crucibles and other pre-requisites of metal or glass working; the waste products of bone or lignite working, occurring as waste cores, shavings, offcuts etc. The amount and range of such evidence from individual sites may help to clarify whether the people who lived there were self-sufficient in their dress requirements, or whether they acquired some items from elsewhere; evidence of larger-scale, more specialised working in particular materials or ornament types may suggest provisioning for a larger social group, or supply of markets or trading areas. Occasional references suggest this latter sense of manufacturing for distribution or trade beyond the site of production, but also with dress and ornaments being brought in from elsewhere. Thus, for example, cloaks were exported from Ireland to Cambridge in the tenth century (Fairweather 2005, 130), while the 'great market of foreigners' at the fair of Carmun sold gold and fine clothing (Kelly 1997, 459).

This section focuses primarily on the manufacture of textiles – presumably largely used in clothing – and also briefly addresses the manufacture of various types of ornaments (see other chapters for more detail on crafts in the materials involved here). Depending on the nature and material of the object, we might expect a degree of specialisation/centralisation in their manufacture. This applies particularly to the more elaborate metal brooches and pins, evidence for the making of which often occurs on high-status secular or ecclesiastical sites. It has been suggested that it was the wealth, prestige or power of the inhabitants of these sites which allowed them to control the resources for manufacture, including the services of the craftworkers. For some crafts, however, a degree of self-sufficiency in production might be expected on ordinary settlement sites. This may particularly be the case in relation to bone-working (although the more technically-demanding antler-working should not be absorbed into this), where the raw materials and tools required to make a plain dress pin would be readily available to all.

These issues of specialisation or common skills have implications in terms of contemporary recognition and valuation of craftworkers. Written texts suggest particular crafts were valued in early medieval Irish society, with their exponents being awarded high honour-prices in recognition of their skill and the importance of their products (Kelly 1998, 61-3). Yet some areas are conspicuous by their absence, notably in relation to female crafts. No honour-prices are given in the law tracts for practitioners in the areas of spinning, weaving or sewing, although some references to embroidery and the use of needles as pledges suggest a degree of recognition of the skill involved; thus, in *Bretha im Fhuillema Gell* it is said that 'the woman who embroiders earns more profit even than queens' (Kelly 1988, 78). MacNeill (1923) translated a craftsperson in the law-tracts as a 'wool-comber' but Kelly (1988) identified this individual instead as a 'comb-maker'. If Kelly is correct, this indicates that spinners and weavers were not mentioned in any of the early law tracts, suggesting that these tasks may have been purely domestic activities. Yet textiles are a fundamental material for many areas of society, not just dress. The silence of the texts might occlude the presence of female craftworkers on many settlement sites, or induce us to overlook their evidence. However, *Triad 76* includes 'the hand of a skilled woman', alongside those of 'a good carpenter' and 'a good smith' as the 'Three hands that are best in the world' (Meyer 1906, 11) – so there was some recognition of this importance (as this immediately follows another Triad referring to

thread, we can assume some textile reference here). Similarly, the law tract *Bretha Crólige* refers to a 'woman of profitable handicraft' who is entitled to have three judges assess her maintenance; this term is glossed as 'a woman who does profitable work with her hand, e.g. an embroideress and women who perform steeping and dressing [of flax], &c.' (Binchy 1938, 27).

Textiles

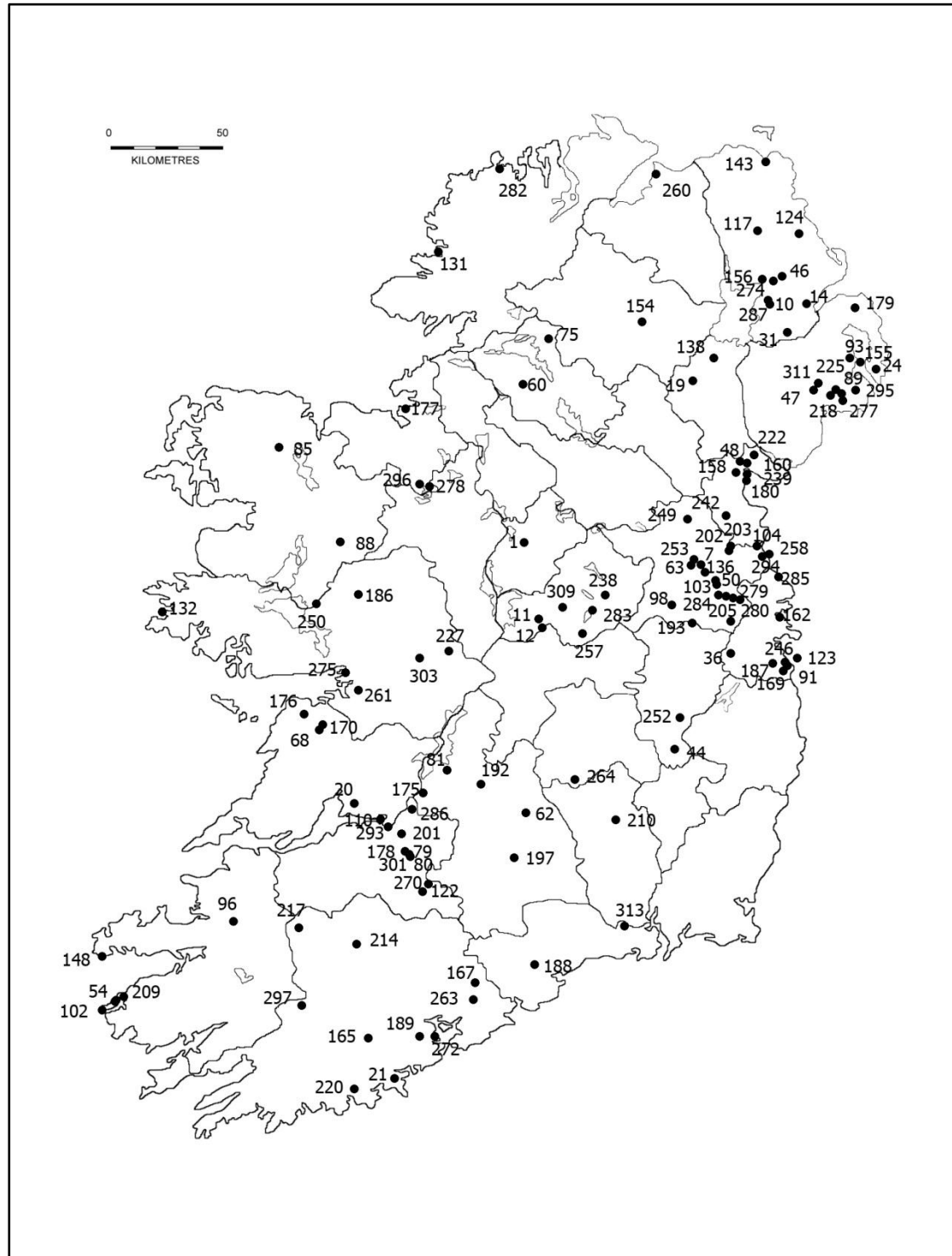
Textiles were used for many practical purposes in early medieval Ireland including clothing, carrying bags, packaging, sail-clothes, fishing, trapping nets and other load-bearing resources such as ropes. While this chapter deals specifically with clothing, some extant textiles may reflect other uses of cloth. Some of these are urban; coarse tabby-weave cloth from a late eleventh-century context from a site at South Main Street, Cork City appears to have been treated with resin tar and may have been used either as a tarpaulin to protect merchandise transported by land or sea or could have been applied as a form of waterproofing to damaged planks of a ship (Heckett 2010, 562). Similar evidence of caulking the seams of boats with fibrous materials was found at Fishamble Street, Dublin (McGrail 1993, 87; Heckett 2010, 559). Linen fragments from a cereal-drying kiln at Ballyvass may reflect the use of textiles as a base on which to lay the grain, or might suggest the use of sacks (Clark & Doyle 2011).

The manufacture of textiles is strongly associated with women in the written texts. Tools and items related to spinning, weaving and sewing are listed in the law tracts as the possessions of women (Kelly 1997, 451). The role of women, and the importance of textile-working, is also highlighted in the ninth-century *Triads*, where 'the slender thread over the hand of a skilled woman' is one of the 'three slender things that best support the world' (Meyer 1906, 11). Women are also associated with sheep, which in the seventh-century *Audacht Morainn* were valued for their fleece which was used 'for the garments of the people' (Kelly 1997, 67). This association with sheep and wool also appears in *Cáin Lánamna*, where the division of property in a divorce gave a wife one-sixth of any fleeces, but one-third of combed wool and half of any woven cloth – implying that it was her labour which processed the fleece to thread and textile (Kelly 1997, 449). Similar proportions apply in the division of flax, again rising from one-sixth of the flax in sheaves to increased shares of the processed fibres and finished cloth (*ibid.*).

While actual textile remains are scarce, the methods of processing from raw materials to finished cloth offer several opportunities for evidence of manufacture to be discerned. In most cases, this evidence will be of an indirect nature. Short of finding cloth *in situ* on a loom, thread on a spindle, or a needle and thread in an unfinished seam, we must extrapolate from the indirect evidence that these processes were undertaken on a site. This evidence ranges from raw or partially-processed materials (flax fibres, seeds, pollen; wool and fleece) to the tools associated with various processes. These tools include heckling and carding implements and tools used in the initial processing of the materials; spindle whorls, distaffs and spindles used in spinning thread; loom weights, pin beaters, weaving tablets, weaving tensioners and other weaving tools; and needles and shears used for cutting and sewing finished cloth.

There are issues in relation to the identification of artefacts/tools as relating to textile working. One example involves iron pronged/socketed items, which are variously attributed to either textile or leather working. Hencken suggested examples from Cahercommaun might be weaving combs (Hencken 1938, 53), but Stenberger described them as a type 'sometimes called "leather-scorers"' (Stenberger 1966, 46), an interpretation followed by Johnson (1999). Maria FitzGerald in her research into early Irish textile working (FitzGerald 2000) suggested that they might have been used for carding/combing wool prior to spinning. Bone pins or points are also open to a range of interpretations, ranging from scoops to spearheads to weaving tools, the last being favoured by Crowfoot (1945, 158), MacGregor (1985, 188) and Hodkinson (1987, 49-50), among others. While some bone implements may have served as

weft-beaters or other weaving-related tools (and some examples from Carraig Aille II would meet Hoffmann's (1964, 320) description of pin beaters), Mullins (2007, 53-4) favoured the interpretation of socketed longbone points in general as spearheads. This highlights the potential for simple tools, in particular, to be variously interpreted, which may affect the quantity of evidence recognised as relating to particular crafts/functions, including textile working.



Map 8.1: Evidence for textile-working in early medieval Ireland (numbers refer to EMAP 2012 gazetteer)

FitzGerald also suggested that small iron spikes found on a number of sites might be teeth from wool combs or heckles, i.e. the surviving parts of tools used in the initial processing of wool or flax (the wooden handles or boards on which the spikes were mounted not having survived) (FitzGerald 2000, i, 53). Again, this potentially increases the material evidence for craft-working on early medieval sites, causing us to reconsider our initial assumptions. In this re-interpretation of evidence, for example, the site of Cahercommaun offers not just a large quantity of spindle whorls, but also potentially the tools of flax heckling, wool combing, sewing and weaving, all of which may have been carried out on the site. There may be considerably more evidence existing for such crafts than previously recognised, and further specialised work is required to re-assess the situation.

As Map 8.1 shows, the distribution of this proxy evidence for textile working is considerable. It is relatively rare to find a site containing evidence for all stages of the process; however, material preservation plays a role in this regard. While stone and metal artefacts, and to a lesser extent bone, are reasonably well preserved in most conditions, wooden items are usually only preserved in waterlogged conditions; this limits our appreciation of the use of this material in the artefacts of cloth and clothing manufacture, and may skew our picture of the location and distribution of this work. Nevertheless, 120 sites in the gazetteer provide evidence for textile working.

The evidence does not necessarily imply that all stages of textile manufacture were carried out on all of these sites; different stages, from processing of raw materials to spinning to weaving, may have been separated and carried out at different site-types or by different groups of people. Of the 120 sites, three sites had dye evidence only (Boho, Doonlaughan and Rathgurreen), with no other evidence for textile working. Seventeen sites have evidence for preparation (mainly fibres/sources and processing); 84 have spinning evidence (primarily whorls); 58 have weaving evidence; 52 have sewing evidence (needles and shears) (see Fig. 8.1). There are 197 sites with no evidence of textile working – not even a single tool – and it is unknown whether this is related to issues of survival/extent of excavation, or to a genuine absence of this craft on those sites.

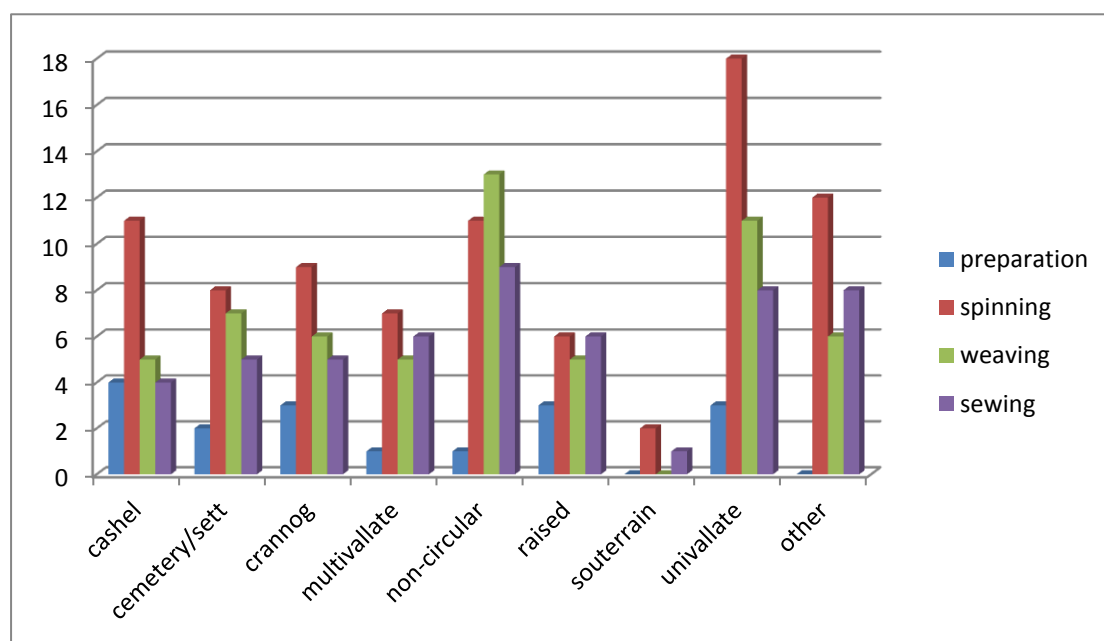


Fig. 8.1. The four textile-working processes by site type

Some interesting points arise from looking at the site types involved in each stage of textile working. In general, most site types have evidence for all four stages, with the exception of souterrain sites, where evidence for both preparation and weaving are absent. Those souterrain sites which have spinning and sewing tools may reflect the portability, or perhaps storage, of these tools rather than these processes being carried out there. No evidence for

the preparatory stage occurred in the 'other' group of sites. While evidence for spinning was more widespread, and generally surpassed the evidence for other stages on most site types, it is interesting that non-circular sites had more evidence for weaving than for spinning.

Raw materials

Evidence for the raw materials to produce the known wool, linen and silk textiles may be sought. In the case of silk, this was produced from silkworm cocoons which were not available in early medieval Ireland, so this raw material (if not also the finished textile) must have been imported. Wool however was widely available, as evidenced by the presence of sheep, whose bones are frequent finds on many excavated sites (McCormick *et al.*, 2011). Although wool might have been clipped from sheep using iron shears, which occur on a number of sites (see Table 8.12), it has been argued that Irish shears are generally too small for this purpose, so wool would instead have been plucked from the sheep (FitzGerald 2012, 553). Animal hair, probably from goats, was also used and some textile fragments from Lagore were made from a mixture of both (Start 1950). The wool or hair needed to be carefully cleaned and combed to draw the fibres parallel to one another prior to spinning; rare survivals at Lagore included pieces of wool fleece in the process of being carded, and also animal hair which was being spun or twisted into thread (Start 1950, 207). Plant materials including flax and possibly nettle could also provide fibres for textiles; surviving bolls and seeds of flax may suggest the manufacture of linen (although flax seeds could also be cultivated for their oil). Flax seeds have been identified at a range of sites including Deer Park Farms (Kenward & Allison 1994, 93), Carraig Aille II (Ó Ríordáin 1949a, 110) and Lisleagh II (Monk 1995, 113), as well as at Ballyegan, Boyerstown 3, Castlefarm, Collierstown, Drumadoon, Lisnagun, and Millockstown (McCormick *et al.* 2011). The additional survival of flax capsules and pollen at Deer Park Farms strengthens the evidence for flax cultivation and processing there (Wincott Heckett 2011, 360). Cultivated flax seeds have also been recorded in Scandinavian Waterford (Tierney 1997, 888-93) and Wexford (Bourke 1995, 36), suggesting that these were imported into the towns before being worked into fibres for spinning. While no nettle fibre textiles have been found, the possibility of the use of this material, as in other contemporary societies, was noted (Proudfoot 1958, 30), and recent evidence from the retting wells at Castlefarm supports this idea (O'Connell & Clark 2009, 25).

Processing tools

The range of tools associated with the manufacture of clothing includes some relating to the preparatory phases of processing the raw material: wool combs or carders, and tools for heckling or scutching flax. Flax was sown in March or April and was harvested five or six months later before the seeds had fully ripened. The plants were then dried and the seeds removed by pulling the heads through a coarse comb. Following this, the plants were immersed in water (retting) to soften the fibres before being dried, beaten and twisted into hanks in preparation for spinning (Edwards 1990, 81; Laing 2006, 91). Flat wooden beaters, possibly used for flax, have been recorded at Lagore and Ballinderry I and II (Laing 2006, 91). Maria FitzGerald (2000, iii, 289-90, 296-8) identified two wooden scutching knives at each of the crannógs of Lagore and Ballinderry I, suggesting the processing of flax for linen. She also suggested that iron spikes (one each at Carraig Aille II, Garryduff I and Cahercommaun (FitzGerald 2000, ii, 19-21) and two at Knowth (FitzGerald 2012, 553)) were possibly heckle teeth, which would originally have been set into wooden handles. Such wooden parts would only survive in waterlogged conditions; it has been suggested that slotted wooden beams found at Deer Park Farms could have formed the base of heckling posts for flax processing (Wincott Heckett 2011, 360). Possible wool carding combs were identified in the re-interpretation of material from Ballinderry I crannóg (Johnson 1999, 44, 46), and potential wool comb teeth have been found at Cahercommaun, Carraig Aille I and II, Garryduff, Lagore and Millockstown (FitzGerald 2000, v, 739-43, 745-51).

Overall, however, evidence for these preparatory stages is rare, being largely predicated on survival and identification; only seventeen sites in the gazetteer provide such evidence. In

addition to the tools noted above, evidence for the processing of raw materials has been included in this figure. This includes partially-processed wool fleece at Lagore, and retting wells at Castlefarm, as noted above, and a total of ten sites with flax seeds or other parts. Three of these sites (Drumadoon, Lisnagun and Lisleagh), however, had no other evidence for textile working.

The limited number of sites makes it difficult to draw conclusions about the extent and distribution of such preparatory work, which of necessity must have been carried out prior to further processing. The geographical distribution shows no sites in Connacht, with eight in Leinster (Louth, Meath, Offaly and Westmeath), seven in Munster (Clare, Cork, Kerry and Limerick) and two in Ulster (Antrim). This cannot accurately reflect early medieval practices, but rather issues of excavation locations, preservation for wooden tools in particular, and correct identification of parts of composite tools.

Spinning tools

The next step for both animal or vegetable fibres involved hand-spinning them into thread using a long wooden spike (spindle) and small circular-shaped, centrally-perforated objects known as spindle whorls (see O'Brien 2010). Spindles were usually made from wood, and therefore rarely survive, although examples have been identified in waterlogged sites at Deer Park Farms (Earwood 1993, 135), Lagore (Hencken 1950, 162), Ballinderry II (Hencken 1942, 60), Winetavern Street, Dublin (Heckett 2003, 89) and Waterford (Hurley & McCutcheon 1997, 588-9). A wooden spindle with a sandstone whorl still in place was found at the crannog of Moylurg, Co. Antrim (Buick 1893, 34). A wooden forked stick or distaff was used to hold the unspun fibres, keeping them untangled and therefore easing the process of spinning; very rare potential examples of wooden distaffs were found at Lough Faughan, Lagore, Ballinderry II (Patterson 1955, 81-2) and Waterford, and possible bone distaffs have been identified at Deer Park Farms (Wincott Heckett 2011, 364) and Raystown (Seaver 2010, 277). Spindle whorls are a far more frequent find, occurring on 84 of the sites in the gazetteer; these whorls could be manufactured from stone (soft sandstones, shales and chlorite) or bone (the rounded heads of ox femora) and also occasionally of antler and possibly wood (Edwards 1990, 81). A number of lead pan weights with central perforations recorded from Woodstown may also have functioned as whorls (O'Brien *et al.* 2005, 71). Whorls were generally disc-shaped or hemispherical, but bone and antler examples with a characteristic bowl-shape may have been turned on a lathe. One possible lathe-turned decorated antler whorl and a disc-shaped stone example were found at Killickaweeny, dating from the eighth to tenth century (Walsh 2008, 48).

Of the sites with spindle whorls/other spinning equipment, 46 produced just a single whorl, leaving 38 sites with larger quantities. Most of these were small, but larger numbers occurred at the sites in Table 8.1. Such quantities may suggest possible concentrations of spinning, or periods in which this process was carried out intensively (see Cotter 1999, 71 regarding Cahercommaun). It might also reflect the making of these tools, as some sites, notably Cahercommaun, Garryduff I and Knowth, also produced evidence for the manufacture of stone spindle whorls, usually in the form of roughouts, unfinished examples and those broken during the drilling of the central perforated hole.

Site	Number of whorls	Materials	Other spinning tools
Deer Park Farms	8	4 stone, 4 wood	Possible bone distaff
Woodstown 6	At least 10	8 possible lead, plural stone	---
Kilgreany	11	10 bone, 1 stone	---
Rathmullan Lower	At least 12	10 stone, plural antler	---
Garryduff	19	18 stone, 1 bone	---
Carraig Aille I	22	12 bone, 10 stone	---
Knowth	22	15 stone, 4 bone, 2 lead, 1 clay	---
Ballinderry II	22	16 stone, 6 bone	5 wooden spindles & 2 distaffs
Lagore	27	15 bone, 11 shale, 1 wood	10 wooden spindles & 2 distaffs

Carraig Aille II	33	18 stone, 15 bone	---
Cahercommaun	62	48 bone, 13 stone, 1 antler	---

Table 8.1: sites with larger quantities of spindle whorls

The distribution of sites with spinning evidence is more widespread than that for preparation; the types of sites involved are shown in Fig. 8.2, while Fig. 8.3 shows the distribution by modern province.

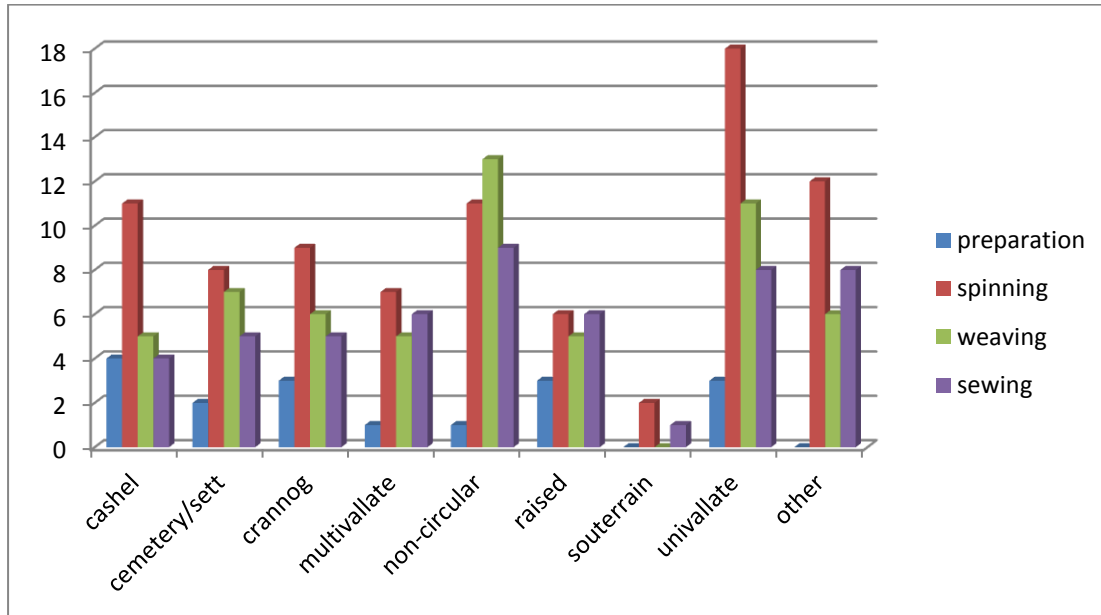


Fig. 8.2. The four textile-working processes by site type

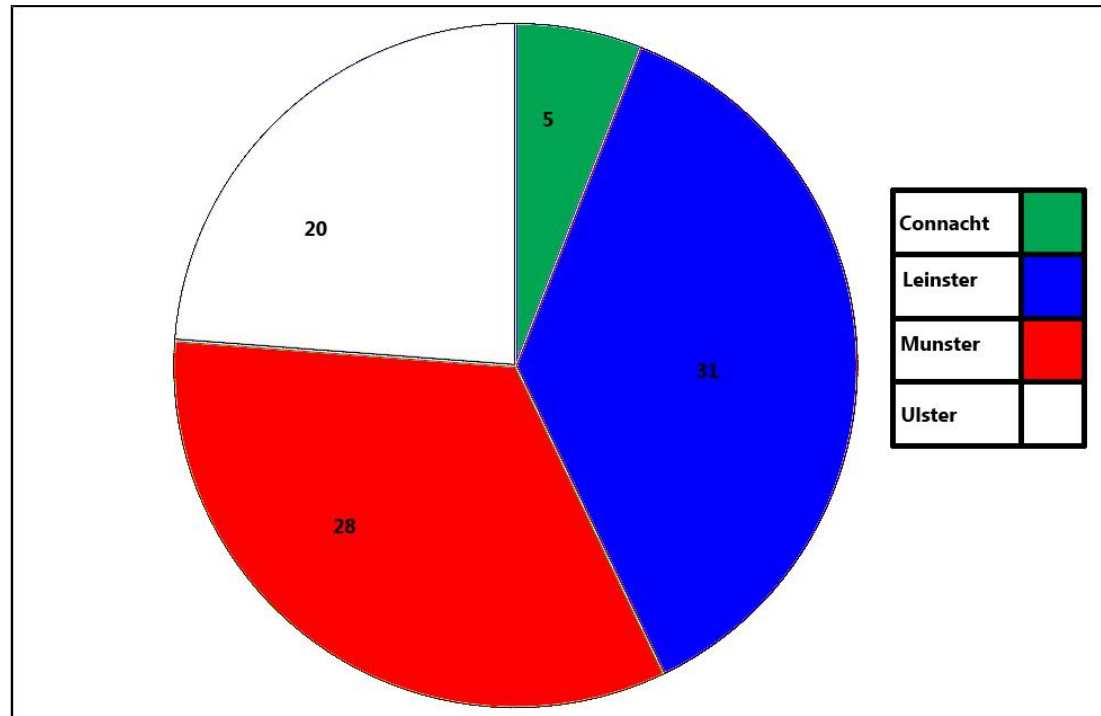


Fig. 8.2. Location of sites with spinning evidence (total sites: 84)

Weaving tools

The next step involved weaving the spun threads together to form a fabric. While small tools survive, there is an absence of larger equipment such as looms. Other than the possible

cross-beam of a light loom from Dublin Castle (Lynch & Manning 2001), and the possibility that a mortised timber from Lough Faughan might have been part of a loom frame (Collins 1955, 67), loom weights provide the best evidence for this important weaving apparatus. These stone weights with an hourglass-shaped perforation in the centre have been identified in the archaeological literature and imply the use of vertical warp-weighted looms in early medieval Ireland (Edwards 1990, 81). The weights would have held the vertical warp threads under tension to facilitate the interweaving of the weft threads or yarns. Hodkinson (1987, 49-50) compiled a catalogue of these objects; he noted, however, that with upwards of 20 loom weights required for a single warp-weighted loom (based on comparisons with Anglo-Saxon England), the scarcity of loom weights in Ireland, and the lack of complete collections from individual sites, did not seem to indicate the presence of these looms (*ibid.* 47; see also Table 8.8). He suggested instead that the early Irish used a different type of loom, and that the so-called 'loom weights' were used for another purpose such as sinkers for nets or lines (*ibid.* 48). Hekett (2003, 98-99) has also noted that possible 'loom weights' were found at Fishamble Street and John's Lane in Dublin, but these were of a shape and material unlike weights which are generally accepted as forming part of looms in the Anglo-Saxon and Scandinavian world. She concurred with Hodkinson that it is unlikely that 'wool fabrics were woven on the large warp-weighted vertical loom that was in general use in north-western Europe at least from the migration period (c. A.D. 350-800) until the end of the Viking Age' (*ibid.*).

As Table 8.2 shows, most sites have produced only one or two possible loom weights, and no complete sets of weights are known. The only possible exception is Rinnaraw, where ten perforated stones might be loom weights (Comber 2006, 102). However, there are issues over the correct identification of loom weights; in many cases such perforated stones might also serve as net sinkers or thatch weights (see e.g. Collins 1955, 69; FitzGerald 2012, 558), while at Garranes, one of the weights was recorded by the excavator as a mace head as it was 'too well-finished' to be a loom weight (Ó Ríordáin 1942, 111, 114). O'Brien (2010, 23) has also noted the possibility that some of the large perforated discs classified as loom weights might be functional spindle whorls. Notwithstanding such debates/uncertainties, we can assume that cloth was woven on at least some settlement sites.

Name	Site type	Quantity	Reference
Aghadegnan, Co. Longford	Univallate	1	Carroll 1993
Ballinderry II, Co. Offaly	Crannog	2	Hencken 1942, 65
Ballyaghagan, Co. Antrim	Univallate	1	Proudfoot 1958, 30
Ballynakelly/Rathcreedan, Co. Dublin	Non-circular	1	McCarthy 2007
Baronstown, Co. Meath	Non-circular	1	Linnane & Kinsella 2009, 8
Blackchurch, Co. Kildare	Medieval industrial	1 (lignite)	Duffy 2003
Castlefarm, Co. Meath	Cemetery/ settlement	1	O'Connell & Clark 2009, 72
Castlegar, Co. Mayo	Univallate	1	Zajac & Scully 2004, 27
Collierstown 1, Co. Meath	Cemetery/ settlement	1	Stirland 2009
Cush, Co. Limerick	Non-circular	2	Ó Ríordáin 1939/40, 158
Dowdstown 2, Co. Meath	Non-circular	2	Cagney et al 2009, 6
Garranes, Co. Cork	multivallate	3	Ó Ríordáin 1942, 111, 114
Gragan West, Co. Clare	Raised	1	Cotter 1988
Johnstown 1, Co Meath	Cemetery/ settlement	2 or more	Clarke & Carlin 2008
Knowth, Co. Meath	raised	2	FitzGerald 2012, 558
Lagore, Co. Meath	crannog	3 (possible)	Hencken 1950, 177
Leacanabuaile, Co. Kerry	Cashel	1	Ó Ríordáin & Foy 1941, 93
Leggatsrath West, Co. Kilkenny	Multivallate	1	Lennon 2006, 49
Lough Faughan, Co. Down	Crannog	2	Collins 1955, 69
Marshes Upper, Co. Louth	Non-circular	1 (flint nodule)	Gowen 1992
Millockstown, Co. Louth	Multivallate	1	Manning 1986, 160
Mullagharlin/Haggardstown, Co. Louth	Non-circular	1	McLoughlin 1999
Mullingar, Co. Westmeath	Rural industrial	1	Reed 2000
Rinnaraw, Co. Donegal	other	1 (unfinished); 10	Comber 2006, 102

		possible	
Roestown, Co Meath	Non-circular	1 (unfinished, possibly broken during production)	O'Hara 2009, 42
Rosepark, Balrothery, Co. Dublin	Non-circular	1	Carroll 2008, 53
Scholarstown, Co. Dublin	Ringfort	1	Keely 1985
Treanbaun, Co. Galway	Cemetery/ settlement	1	Lehane <i>et al</i> 2010, 146
Tully, Co. Antrim	ringfort	1	Harper 1970

Table 8.2: Examples of rural secular sites with 'loom weights'

The specific craft of tablet (or card) weaving is also attested, with finds of tablets from six sites (see Table 8.3). These tablets, which could be made of wood, bone, stone, leather or metal, contain a number of perforated holes through which warp threads were passed; the rotation of different tablets while the weft was threaded produced decorative patterned braids. While most tablets were square, like the example with worn holes from Rathtinaun crannog (Raftery undated), a possible triangular example with three perforations was identified at Lagore (Hencken 1950, 195-6). As with loom weights, multiple tablets would be used for decorative braids; however, the rural sites produced just one example each. Larger quantities occur on some urban sites, however; six wooden tablets were excavated at Fishamble Street and five bone tablets at High Street, Dublin (Pritchard 1988, 151), with additional examples at Christchurch Place, Dublin (Ó Ríordáin 1973 & 1974), and Bride Street, Wexford (Bourke 1995, 35). As with other textiles, surviving examples of the braids thus produced are limited. Two fragments of tablet-woven braid – one fringed and the other with a raised chevron pattern – were found at Lagore (Start 1950, 214-7). The Lagore braids were made of wool and hair, but more elaborate braids of wool, silver and gold thread and silk were found at Christchurch Place, Fishamble Street, High Street and John's Lane, Dublin (Pritchard 1988). It should be noted, however, that tablet-weaving could also be used to produce starting bands for loom-woven textiles (Wincott Heckett 2011, 362), so decorative braids need not be assumed.

Name	Site type	Number	Reference
Ballycasey More, Co. Clare	Univallate	1 (bone)	O'Neill 2003
Deer Park Farms, Co. Antrim	raised	1 (leather)	Wincott Heckett 2011, 361
Killederdrum, Co. Tipperary	Univallate	1 (stone)	Manning 1984, 257
Knowth, Co. Meath	Raised	1 (bone)	FitzGerald 2012, 559
Lagore, Co. Meath	Crannog	1 (bone)	Hencken 1950, 195-6
Rathtinaun, Co. Sligo	Crannog	1 (bone)	Raftery undated

Table 8.3: Examples of rural settlement sites with possible weaving tablets

Other implements connected with weaving include pin-beaters, made of thin rods of wood or of bones (metatarsals or tibia) with tapering ends; these tools could have been used to compact the weft threads in either a vertical warp-weighted loom or weaving tablets. Possible bone beater-pins have been recorded at various sites including Carraig Aille (Hodkinson 1987, 49); Shaneen Park, Ballyaghagan (Hodkinson 1987, 49); Raheennamadra (Hodkinson 1987, 50); Raystown (Seaver 2010, 277); Castlefarm (O'Connell 2009, 51); Clonfad (Stevens 2007, 43); Mount Offaly (Conway 1999); Scandinavian Dublin (Heckett 2003, 98) and Waterford (Scully 1997, 470). An antler single-ended pin-beater associated with the use of the two-beam vertical loom was recorded at Cloghermore cave (Connolly & Coyne 2005, 109), and was dated to the tenth-twelfth century based on similarities to items from Coppergate, York. A possible pin-beater or spindle from the foundation layer of the millpond of mill 2 at Nendrum finds its closest parallel with the largest of three examples from Deer Park Farms (Earwood 1993, 134-6; 2007, 231-2). Wooden weaving swords, used for beating up the weft threads, were found at Littleton Bog (Edwards 1990, 82), and at High Street, Dublin (Ó Ríordáin 1984, 137; Heckett 2003, 90). An iron flat-shaped weaver's sword was also recovered from the floor of a sunken building in Olaf Street in Scandinavian Waterford (Hurley 1997, 670). Six possible tenterhooks for stretching woollen cloth after it was woven were found at Knowth (FitzGerald 2012, 560-1).

Site	Site type	Quantity	Reference
Ballinderry I, Co. Westmeath	Crannog	1	Hencken 1936, 140
Cahercommaun, Co. Clare	Cashel	2	Hencken 1938, 53
Carraig Aille I, Co. Limerick	Cashel	2	Ó Riordáin 1949a, 98
Carraig Aille II, Co. Limerick	Cashel	4	Ó Riordáin 1949a, 78
Cherrywood, Co. Dublin	Other	2	Ó Néill 2006, 81
Dooley, Co. Donegal	Other	3	Ó Riordáin & Rynne 1961, 62
Garryduff, Co. Cork	Univallate	10	O'Kelly 1963, 49-50
Gransha, Co. Down	Raised	1	Lynn 1985, 88
Killickaweeny, Co. Kildare	Univallate	2	Walsh 2008, 45-6, 49
Lagore, Co. Meath	Crannog	1	Hencken 1950, 120
Marlinstown, Co. Westmeath	Multivallate	1 (described as a leather scorer)	Keely 1991
Movilla Abbey, Co. Down	Ecclesiastical	1	Yates & Hamlin 1983, 62
Raheenmadra, Co. Limerick	Univallate	1	Stenberger 1966, 46
Raystown, Co. Meath	Non-circular	1	Seaver 2010, 276
The Spectacles, Co. Limerick	Cashel	2 fastened together	Ó Riordáin 1949, 103

Table 8.4: Examples of sites producing pronged & socketed objects

Wool textiles were finished after weaving by a process called 'fulling', to thicken them and to eliminate oils, dirt, and other impurities. This involved two processes – scouring and milling (thickening). The first stage, 'scouring', involved cleaning the greasy wool by steeping it in cold water with detergent in the form of stale human urine or vegetable ash and trampling upon it to release the natural grease or lanolin. The next stage involved the thickening of the cloth by matting the fibres together to increase its strength and waterproofing (felting). When this was completed, water was used to rinse out the foul smelling liquor used during this cleansing process. The process often caused the cloth to shrink and therefore after the 'fulling' was complete, the wet cloth was often attached with tenterhooks to a frame known as a *tenter* to stretch the cloth. Tenterhooks have been noted at Knowth (FitzGerald 2012, 560-1) and in Scandinavian Waterford (Scully 1997, 486). Other possible artefacts relating to these processes might include the wooden trough and wicker frames from Deer Park Farms (Wincott Heckett 2011, 363). Linen (and possibly nettle) cloth was finished by smoothing with a polished stone. Examples of these have been recorded at Ballyaghagan (Proudfoot 1958, 30), Clea Lakes (Collins & Proudfoot 1959, 98) and Millockstown (Manning 1986, 161). A potash glass linen smoother was recorded within a Type 1 mid-eleventh to early-twelfth-century building in the Insula North, Waterford City (Bourke 1997, 389), and similar evidence has been found in pre-Norman Dublin (Bourke 1987). Two glass linen smoothers were also found at Ballinderry I crannog (Johnson 1999, 68). The presence of polishing stones may again be a matter of identification; it has been suggested that the many Neolithic polished stone axes found at Deer Park Farms might have been used for this purpose (Wincott Heckett 2011, 362).

Using a combination of the various tools noted above, a total of 58 sites produced evidence for weaving being carried out. The geographical distribution is given in Fig. 8.3. Forty-five sites had evidence for other textile working processes also, leaving thirteen sites with evidence for weaving only. Of these thirteen, just one (Ballyvass) had multiple tools (and also surviving textile; Ballyaghagan had both a loom weight and rubbing stones, while the remain had just a single type of tool: loom weights at Aghadegnan, Ballynakelly, Gortybrigane, Haggardstown, Killealy and Rinnaraw, pinbeaters at Beginish and Loughbown 1, rubbing stones at Colp West and socketed/pronged items at Kilcloghans and Marlinstown (in both cases, these were originally identified as relating to leather-working). This underlines the importance of the recognition and correct identification of artefacts as relating to particular crafts and uses. The case of loom weights is perhaps the most obvious example: 34 sites in all produced one or more loom weights (not all of them certain), but 23 of these had no other weaving-related tools.

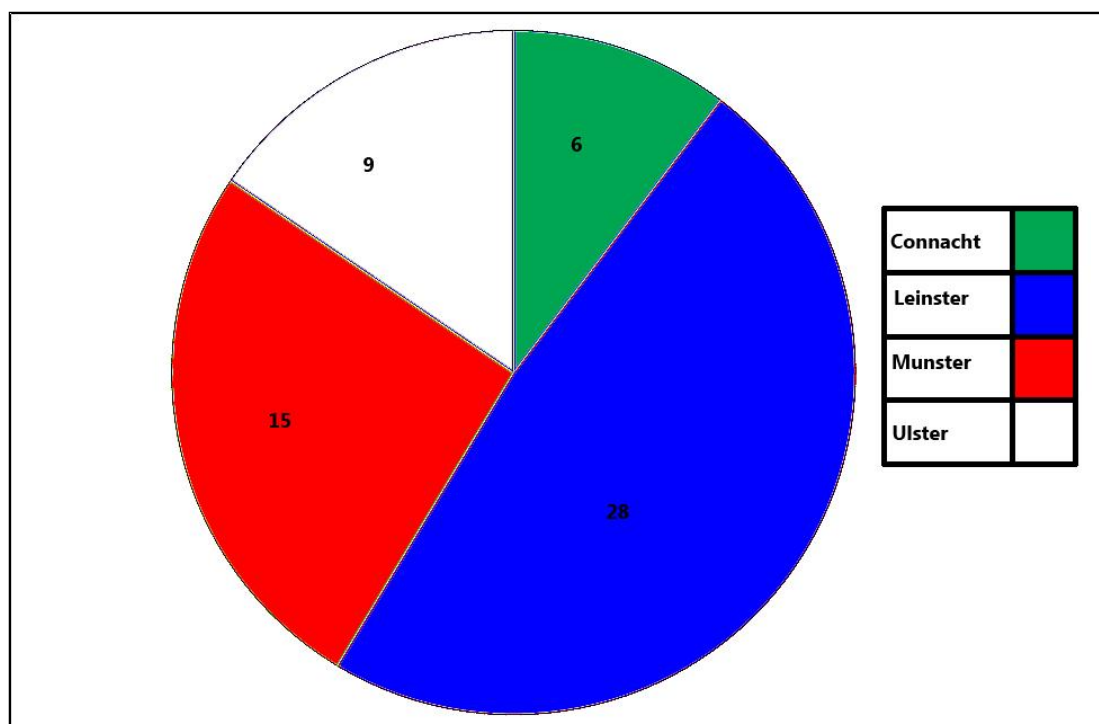


Fig. 8.3: Location of sites with evidence for weaving (total sites: 58)

Sewing tools

The final stage in processing textiles involved sewing pieces of cloth together with needle and thread to make garments and other items. The early written sources indicate that women were expected to be experts at spinning, weaving, sewing and embroidery (Kelly 1997, 449). In addition to basic sewing, embroidery was regarded as an occupation of high-status women (Kelly 1997, 451), and was one of the skills taught to noble-born girls in fosterage, along with sewing and cutting cloth (Kelly 1997, 452). While the presence of needles made of copper alloy, iron or bone may provide evidence for these tasks at early medieval sites (Table 8.5), it is not possible to distinguish the type of use made of these tools, e.g. whether for mundane or elaborate needlework, although the finer, copper alloy needles might be more suited for the latter. Furthermore, even the identification as a needle may be subject, particularly where bone is used as the raw material; 'bone pin/needles' is a frequent entry on finds lists, but the distinction is rarely followed up. It can be argued that in some cases where the perforated end of the item is widely splayed, it would be unlikely to have served as a needle other than for very coarse fabrics, as otherwise the broad end would have damaged or torn the weave of the cloth. Straight or tapering ends beyond the perforation are more clearly indicative of a needle, particularly for fine work.

Site	Site type	Copper-alloy	Iron	Bone	Reference
Baronstown, Co. Meath	Non-circular	Yes	Yes	Yes	Linnane & Kinsella 2009, 115
Bowling Green, Co. Tipperary	Univallate			Yes	Fanning 1970, 16
Carraig Aille I, Co. Limerick	Cashel		Yes		Ó Ríordáin 1949, 97
Castlefarm, Co. Meath	Cemetery/settlement	Yes			O'Connell 2009, 51
Cherrywood, Co. Dublin	Other			Yes	Ó Néill & Coughlan 2010, 242-3
Clonmacnoise, Co. Offaly	Monastic			Yes	Ó Floinn & King 1998, 124; King 2009, 339
Corbally, Co. Kildare	Cemetery/settlement			Yes	Coyne 2010, 83
Deer Park Farms, Co. Antrim	Raised		Yes	Yes	Lynn & McDowell 2011, 281; Hurl 2011, 259;
Dowdstown 2, Co. Meath	Non-circular			Yes	Cagney & O'Hara 2009, 132

Farrandreg, Co. Louth	Souterrain			Yes	Murphy 1998
Garryduff I, Co. Cork	Univallate	Yes			O'Kelly 1963, 40
Gragan West, Co. Clare	Raised		Yes		Cotter 1988
Johnstown 1, Co. Meath	Cemetery/ settlement			Yes	Clarke 2010, 69
Kells, Co. Meath	Monastic environs	Yes			Byrne 1987
Kilgreany Cave, Co. Waterford	Other			Yes	Dowd 2002, 87
Killegland, Ashbourne, Co. Meath	Medieval	Yes			Kavanagh 2006
Knowth, Co. Meath	Raised	Yes	Yes	Yes	FitzGerald 2012, 561
Leggetsra, Co. Kilkenny	Multivallate			Yes	Lennon 2006
Millockstown, Co. Louth	Multivallate		Yes		Manning 1986, 159
Moone, Co. Kildare	Monastic			Yes	Hackett 2008
Nendrum, Co. Down	Monastic	Yes			Lawlor 1925, 149; Bourke 2007, 407, 419
Nevinstown, Co. Meath	Raised			Yes	Cahill 1977/79
Ninch, Co. Meath	Non-circular			Yes	McConway 2001
Parknahown 5, Co. Laois	Cemetery/ settlement			Yes	O'Neill 2010, 256
Park North, Co. Cork	Other			Yes	Coleman 1942, 71
Randalstown, Co. Meath	Church/well			Yes	Kelly 1976
Ratoath, Co. Meath	Non-circular		Yes		Wallace 2010, 305

Table 8.5: Examples of sites where needles have been found

A range of other equipment used in sewing has also been identified including decorated needle cases at Winetavern Street in Scandinavian Dublin (Ó Ríordáin 1971), Clonmacnoise (King 2009, 343-4) and Knowth (FitzGerald 2012, 563). Other finds included 'sacking' needles and a wooden case for shears used in the cutting of fine cloth at 1-3 High Street in Dublin City (Murtagh 1989). Shears are a relatively common find (see Table 8.6), and as previously noted are more likely to be used in this stage of textile processing rather than sheep-shearing.

Name	Site type	Reference
Armagh, Co. Armagh	Monastic	Gaskell-Brown and Harper 1984, 128
Ballinderry II, Co. Offaly	Crannog	Hencken 1942, 46
Cahercommaun, Co. Clare	Cashel	Hencken 1938, 48
Carraig Aille II, Co. Limerick	Cashel	Ó Ríordáin 1949, 77
Cloghermore cave, Co. Kerry	Other	Connolly and Coyne 2005, 212-3
Clonfad, Co. Westmeath	Monastic	Stevens 2006, 11
Corbally, Limerick		Coyne 2010, 83
Deer Park Farms, Co. Antrim	Raised	Lynn 1988, 47
Dowdstown 2, Co. Meath	Non-circular	Cagney and O'Hara 2009, 130
Garranes, Co. Cork	Multivallate	Ó Ríordáin 1942, 102
Garryduff I, Co. Cork	Univallate	O'Kelly 1963, 44
Illaunloughan, Co. Kerry	Monastic	Marshall and Walsh 2005, 181
Killanully, Co. Cork	Univallate	Mount 1995, 139
Killederdadrum, Co. Tipperary	Univallate	Manning 1984, 254
Kilgobbin, Co. Dublin	Multivallate	Bolger 2004
Killickaweeny, Co. Kildare	Univallate	Walsh 2008, 45
Lagore, Co. Meath	Crannog	Hencken 1950, 112-3
Lough Faughan, Co. Down	Crannog	Collins 1955, 61
Moylurg, Co. Antrim	Crannog	Buick 1893, 36
Moyne, Co. Mayo	Univallate	Manning 1987, 54
Nevinstown, Co. Meath	Raised	Cahill 1977/79
Waterford, Co. Waterford	Urban, Hiberno- Scandinavian	Scully 1997, 458-9

Table 8.6: Examples of sites with evidence for iron shears

Slotted and pointed iron tools have been found at Raystown (Seaver 2010, 276), Killickaweeny (Walsh 2008, 46, 50), Oldcourt (Murphy & Ó Cuileanáin 1961, 88), Cahercommaun (Hencken 1938, 52-53), Gransha (Lynn 1985, 88), Lagore (where one was dated to the eighth century) (Hencken 1950, 118) and Dun Eoganachta (Cotter 1995). Edwards (1990, 88) has suggested that these tools may have been used for weaving rush

matting. Rush seeds were found in the basal fill of the well at Killickaweeny and it was suggested that the slotted and pointed iron tool recovered at the site may have been used in coiled basketry, with the rush or reed passed through the slot and the pointed end used to bring it around and between the coils (Walsh 2008, 50).

In all, 52 sites produced tools related to sewing and cutting of cloth, potentially for the manufacture of garments; a breakdown of the geographical distribution of these given in Fig. 8.4. Ten of these sites had evidence for this process only: three sites with just shears (Grange West, Killanully and Moyne), one with both needles and shears (Nevinstown), and six with needles only (Farrandreg, Knockea, Ninch, Rochfort Demesne, Sluggary and Sroove). Breaking down the tools, twenty-one sites in all produced shears (complete or fragmentary); those at Grange West, Killanully and Moyne had no other textile-related evidence, which could suggest alternative uses for these tools. Sites with multiple shears include Cahercommaun with five pairs, Lagore with six and Garryduff with seven; were all of these for textile working, and if so, do the quantities imply significant presence of the craft/workers?

Forty-five sites in all produced needles; just a single needle was recorded at 23 of these, leaving 22 sites with two or more needles. Significant quantities were found at Castlefarm (at least ten needles), Lagore (fourteen) and Knowth (34); interestingly, all of these sites are located in county Meath, but it is unclear whether this represents a concentration of this craftwork or more extensive excavations in this area. Only five of the sites with needles have no other evidence for textile processes: these are Knockea and Sluggary (where the iron needles could be pins), Ninch and Sroove with bone needles only, and Rochfort Demesne with iron, bronze and bone needles.

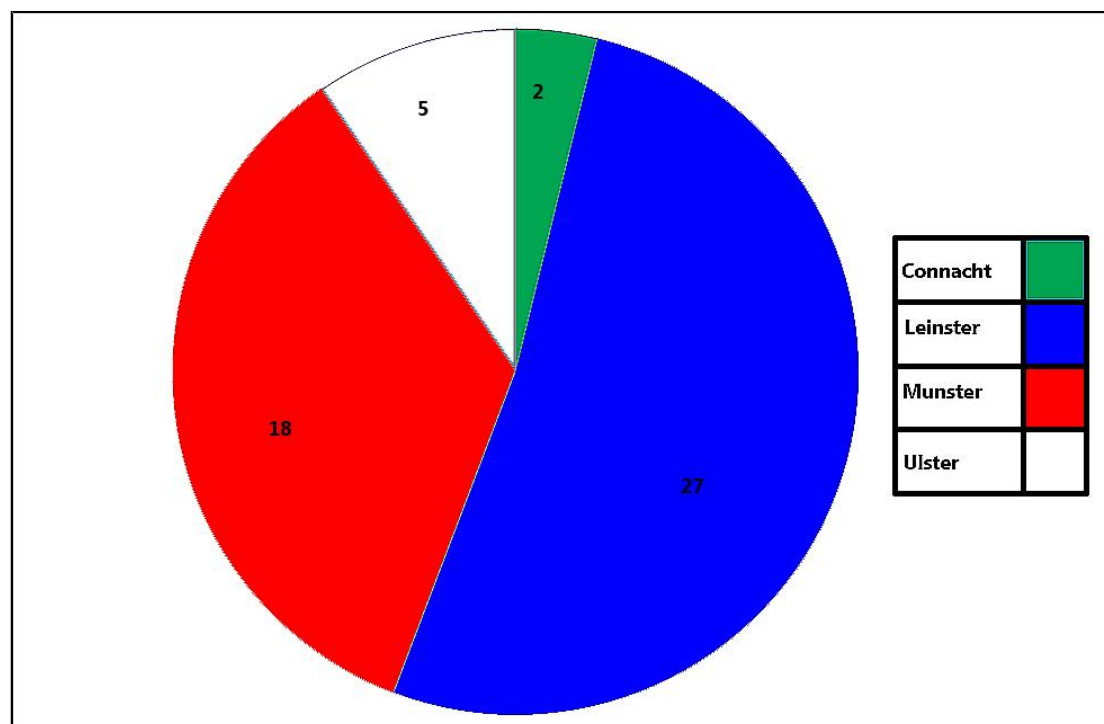


Fig. 8.4: Distribution of sites with evidence for sewing (total sites: 52)

The presence of these tools show that various stages of processing, perhaps to the final making of cloth and its formation into garments (suggested especially by needles), occurred on particular sites. It is important to note that the processes could be separate: spinning could be practised in- or outdoors, and accordingly, its tools need not be restricted to settlement sites (O'Brien 2010, 16). Weaving, in contrast, would be a more stationary craft, at least insofar as large wooden looms were concerned. As Hodkinson (1987) points out, however, evidence for these is limited, and the possibility of the use of back-beam looms,

together with the definite evidence for tablet weaving, offers a degree of mobility/flexibility in the location of these crafts, which again might minimise the evidence found on settlements.

Contexts of textile-working

It is possible that activities such as spinning and weaving were undertaken within or immediately adjacent to domestic structures, as these tasks were clean and relatively odourless. In contrast, it has been suggested that as dye-production was a dirty process, it was probably located in the industrial quarters away from the domestic area (Comber 2008, 108). However, it is interesting in this regard that one of the sites with evidence for dog-whelk dyes, Dooley, also had evidence for spinning, weaving and sewing on site. Deer Park Farms (with evidence for woad plants) also showed evidence for textile production from initial processing to finishing stages.

Proudfoot (1961) argued that weaving was an important element in the economy, but Comber (2008, 110) has queried this, arguing that the evidence instead suggests that not all sites were engaged in these activities, with only a select number supplying textiles to other sites in the early medieval period. This would appear to be borne out by the examination above, but further work is needed at the local level to identify particular networks of production and supply.

In some instances where tools of textile working have been found in cemeteries or burials, these may not indicate actual crafts carried at the site, but rather grave goods consisting of the personal possessions of those interred there. Examples of this include Cloghermore Cave, Co. Kerry, where spindle whorls were included among apparent grave goods and also with pyre remains (Connolly *et al.* 2005) and Ratoath, where a needle was found in a juvenile's burial (Wallace 2010, 305); broader examples of such finds from cemeteries, but not directly associated with individual burials, include Cloncowan II (Baker 2007, 71, 128-9). While such cases may be of use in looking at the gender of craftworkers, or indicating a person's perceived social role and the importance of this particular aspect of their life and work, it is more difficult to link them specifically with textile working in the immediate area.

Dyestuffs

The production of dye could also be regarded as evidence relating to cloth manufacture, although the activities need not have taken place on the same site. The early texts provide information about bleaching and dyeing and indicate that the juices of plants such as blackberries or lichens may have been used in this process. One plant source mentioned several times in the texts is woad, which provides both blue and pink dyes; the laws indicate that women were responsible for the processing of woad (Kelly 1997, 266), and its status may be implied by the reference to the queen of Tara owning a garden of woad plants (Kelly 1997, 265). The texts also suggest that there were taboos against the presence of men during this process, confirming that textile production was strongly the task of women in early Irish society (Kelly 1997, 449-50). Of 317 sites in the gazetteer, however, just five provided evidence of the presence (and presumably processing) of materials used as dyestuffs, namely dog-whelk (Dooley, Doonloughan and Rathgurreen), woad (Deer Park Farms) and madder (Boho); many dyes obtained from vegetation would not, however, leave recognisable evidence. Madder seeds were found at Boho (Morrison 1953, 53-4); traces of cultivated madder were found in an E-ware pot from Teeshan crannóg (Ó Ríordáin 1979, 30); and woad pods were discovered at Deer Park Farms (Lynn 1989, 197).

Much of the evidence for dyestuffs comes primarily from coastal sites, and involves a species of shellfish known as dog-whelk (*Nucella lapillus*); this species contains a liquid which, when exposed to the sun, turns purplish-red (Edwards 1990, 82). Several shellmidden sites at Doonloughan (McCormick and Murray 1997), Dog's Bay, Roundstone (O'Rourke 1945, 117) and Culfin, Lettergesh, Co. Galway (McCormick and Murray 2006), as well as Dooley (Ó Ríordáin and Rynne 1961, 61), and various settlement enclosures such as Raheens II

(Lennon 1994, 59), Rathgurreen (Comber 2002, 181) and Rathmullan (Lynn 1981/82, 81), have produced evidence for broken dog whelk shells. Rathgurreen and Dooey contained several shallow and deep pits which may have been used in dye manufacture (Comber 2008, 101), and a flat stone object at Rathgurreen was stained red on its flat surfaces (Comber 2002, 181). The best evidence for the extraction of dye from dog whelks was identified at Inishkea North, where a structure formed of timber and stone (House A, Site 3) was interpreted as a dye production workshop (Henry 1952, 177). The building measured c. 7.3m by 6m with an entrance at the eastern end and was probably made of wattle walls set on stone footings. On the west side was an annex, defined by upright stone slabs, in which was a pit; nearby was a pile of dog whelk shells. A hearth was found in the centre of the structure and a large stone-lined pit was located to the north-west of it. It was suggested that the dye may have been extracted by crushing the live shellfish in the pit before steeping them with salt and boiling the mixture for a long time (to reduce the amount of liquid) with pot-boilers (many of which were found on site). This dye-production may have been associated with textile-working as the site also produced evidence for the manufacture of chlorite spindle whorls (Edwards 1990, 83).

There is limited other evidence for dye-processing; it was suggested that a broken shale disc found at Lagore might have been used for grinding/mixing colours (Hencken 1950, 177), and possible pigment-grinding stones were identified at Lough Faughan (Collins 1955, 69), but whether these definitely relate to the dyeing of textiles is uncertain.

Leather working – shoes and belts

Accessories such as shoes and belts are also evidence of dress, and may be represented again either by surviving specimens or by evidence of leather-working. The larger scale processing or tanning of leather may in some cases be a more specialised, semi-industrial undertaking, but the cutting, shaping and at times decoration of leather – as seen in several instances in relation to shoes – could be carried out at individual settlement sites.

Of 317 sites in the gazetteer, just fourteen produced evidence of leather fragments and/or possible leather working. In some cases the remains included shoes or parts of shoes, recognisable by shape/form; sites involved included Ballinderry II, Castlefarm, Craigyarwarren, Deer Park Farms (Neill 2011, 368-73), Lagore, Lissue, Moynagh Lough and Rathtinaun, with possible shoes from Baronstown (Nicholls 2009, 2) and Seacash (Lynn 1978, 69). Leather-working tools might include shears, knives and awls; of these, the shears already referred to in relation to textile working could have been used for this craft also. Four sites with leather remains also produced shears, namely Ballinderry II, Cahercommaun, Deer Park Farms and Lagore. It has also been suggested that the socketed and pronged items referred to above might have been used for leather-working/scoring; while this is uncertain, the presence of such tools might potentially suggest leather-working at Dooey, Marlinstown and Kilcloghans, although no leather remains survived there. Artefacts definitely related to the manufacture/repair of shoes on site include shoe lasts; two wooden examples have been excavated, one from Lagore (Hencken 1950, 10, 170) and the other from Deer Park Farms (Neill 2011, 373).

Other dress accessories produced from leather working include belts; an interesting speculation would be whether the leather part of the belt would be made at a separate site from the metal buckles/strap ends – would the metal fittings perhaps have been bought in to fit a home-made belt?

Ornaments

The best evidence for manufacture of ornaments lies in the tools and other paraphernalia of working the particular material involved; only occasionally do unfinished/incomplete articles appear. Metal working may have produced several types of ornaments; moulds, unfinished or waste examples may clarify this. Should the types of ornament found on a site not match the

manufacturing evidence, this might simply result from the portable nature of these small items, or might suggest perhaps a circulation or exchange of ornaments between people in different locations. Indeed, the difficulty in matching ornaments to sites is exacerbated by the amount of non-excavated ornaments, or stray finds, which lack site-specific contexts. Non-ferrous metal-working involves different processes from iron-working, at least insofar as the stage of actually fashioning a brooch or pin is concerned, but much of the evidence for furnaces or hearths would be similar, and residues or slags would be needed to identify the metal worked there. Other crafts were involved in the production of ornaments: bone/antler working would have resulted in the bone pins which occur so frequently; lignite (and less frequently) stone working was involved in making bracelets, pendants and even rings; glass-working produced colourful beads and bangles. While specific tools may relate to different materials, in some cases there is potential for overlap - knives used for bone working might also serve to carve wood; lathes could be used for wood-working or for making lignite bracelets. Often, it is the evidence of waste material (lignite cores left over from the making of bracelets, bone and antler waste) or indeed the preparatory material (bone motif or trial pieces) which may be the most telling evidence for what was made at a particular site.

This variety of materials implies a range of crafts involved; metal pins, being part of the process of metal smelting/casting or forging, often involving moulds and other specialised equipment, are more easily seen as the produce of a skilled craftworker rather than a subsistence-level craft. Bone and wood, however, especially the simpler forms with less decoration, such as the common pig-fibula pins, might be argued as open to being crafted by anyone who had access to the raw material and a simple knife or other such tool. On that basis, the presence of such simple forms in easily-obtainable material might be considered as evidence of their manufacture and use on a site by its inhabitants, even if no obvious evidence of working in that material survives.

Iron-working

As noted above, iron is used for a considerable number of ornaments, including brooches, pins and buckles. Not all sites with iron ornaments have evidence of iron-working; those which do are set out in Table 8.7. In terms of site types, the breakdown of sites with both ornaments and iron-working is given in Fig. 8.5. While most of these site types include sites with ornaments but no evidence for iron-working, it may be significant that all eight cashels, and all seven non-circular sites, which produced iron ornaments also had evidence of iron working.

Actual evidence for the manufacture of iron ornaments is limited, with most of the iron-working evidence relating to earlier stages in the processing of the metal. Most iron items would be forged rather than made in moulds, which also limits the potential evidence for specific ornaments. However, it has been suggested that iron ringed pins were being produced at Deerfin (Bratt 1975), while the considerable amount of iron-working at Dooley probably included the manufacture of brooches, pins and buckles (Ó Ríordáin & Rynne 1961, 61-2).

Site	Site type	Ornaments	Manufacturing evidence
Aghadegnan	Univallate	1 pin	slag
Ballinderry I	Crannog	2 pins, 1 buckle	Iron-working refuse
Ballyarra	Souterrain	1 pin	slag & furnace bottom
Baronstown	Non-circular	Pins	Slag & possible furnace lining
Cahercommaun	Cashel	11 pins, 3 possible buckles	Smelting slag
Cahircalla More	Univallate	bronze pin with iron shank	slag, 4 smithing hearths, mini-anvil
Caraun More	Univallate	Pin	slag & bowl furnaces
Carraig Aille I	Cashel	5 pins	Slag
Carraig Aille II	Cashel	31 pins	Slag
Castlefarm	Cemetery/ settlement	15 pins, plus 22 pins mixing iron & bronze	3 smithing hearths, smelting slag

Cherrywood	Other	Pin	slag
Collierstown I	Cemetery/ settlement	Pin	Slag
Cush	Non-circular	Pin	Slag
Dalkey Island	Other	Ring-headed pin	Slag, tuyere
Deer Park Farms	Raised	14 pins (1 with blue glass head)	slag (some smelting but mostly smithing), tuyere fragments
Deerfin	Cashel	Pins	5 industrial hearths
Dooley	Other	brooches, pins & buckles	Slag
Dowdstown 2	Non-circular	3 pins	slag & furnace lining
Dun Eoganachta	Cashel	Pin	Slag
Dunbell Big 5	Univallate	Pin	Slag & furnace
Faughart Lower	Cemetery/ settlement	Pins	Slag
Feltrim Hill	Cashel	23 pins	slag
Garryduff	Univallate	20 pins	44 furnace bottoms, 1 furnace, ore, 8 tuyere fragments, slag, anvil
Johnstown	Cemetery/ settlement	2 pins	11 smelting furnaces, 5 smithing hearths, tuyere fragments, slag
Kilgobbin	Multivallate	Pins	slag – smelting & smithing
Killanully	Univallate	1 pin	ore, tuyere, kiln lining
Killickaweeny	Univallate	6 pins	slag – mostly smelting but some smithing
Knockadrina	Univallate	1 pin	Slag
Knockea	Raised	1 pin (or needle)	furnace bottoms & tuyere
Knowth	Raised	27 pins, 6 buckles	furnaces/hearths, smelting slag & mixed slag, smithing cakes, tuyere
Lagore	Crannog	12 pins	slag, tuyere fragments, smithing hearths
Leacanabuaile	Cashel	1 pin	slag
Lisleagh I	Multivallate	1 pin	slag, furnace bottoms, tuyere fragments
Lisleagh II	Univallate	1 pin	slag & bowl furnace
Lough Faughan	Crannog	Pins	Slag
Loughbown 1	Multivallate	Pin	Slag
Meadowbank	Raised	Pins	slag & tuyere fragments
Mount Offaly	Cemetery/ settlement	2 buckles	iron-working furnace & slag
Moybeg Lough	Crannog	4 pins	Furnaces & slag
Moyne	Univallate	Pin	Slag
Parknahown	Cemetery/ settlement	1 pin, 1 buckle	iron-working residue, principally smithing but also smelting
Rathgurreen	multivallate	brooch & pin	Slag & tuyeres
Raystown	Non-circular	12 pins, 1 buckle	Slag
Roestown 2	Non-circular	8 pins	smithing slag, stone anvil
Rosepark	Non-circular	Possible pin, 1 buckle	slag & furnace clay
Sallymount	Non-circular	2 pin shanks	slag, smelting slag, smithing hearths, furnace lining, hammerscale
Sluggary	Multivallate	Pins	4 furnace bottoms, 1 piece of slag
Sroove	Crannog	1 pin	bowl furnace
The Spectacles	Cashel	1 pin	slag

Table 8.7: Sites with iron ornaments and evidence of manufacturing

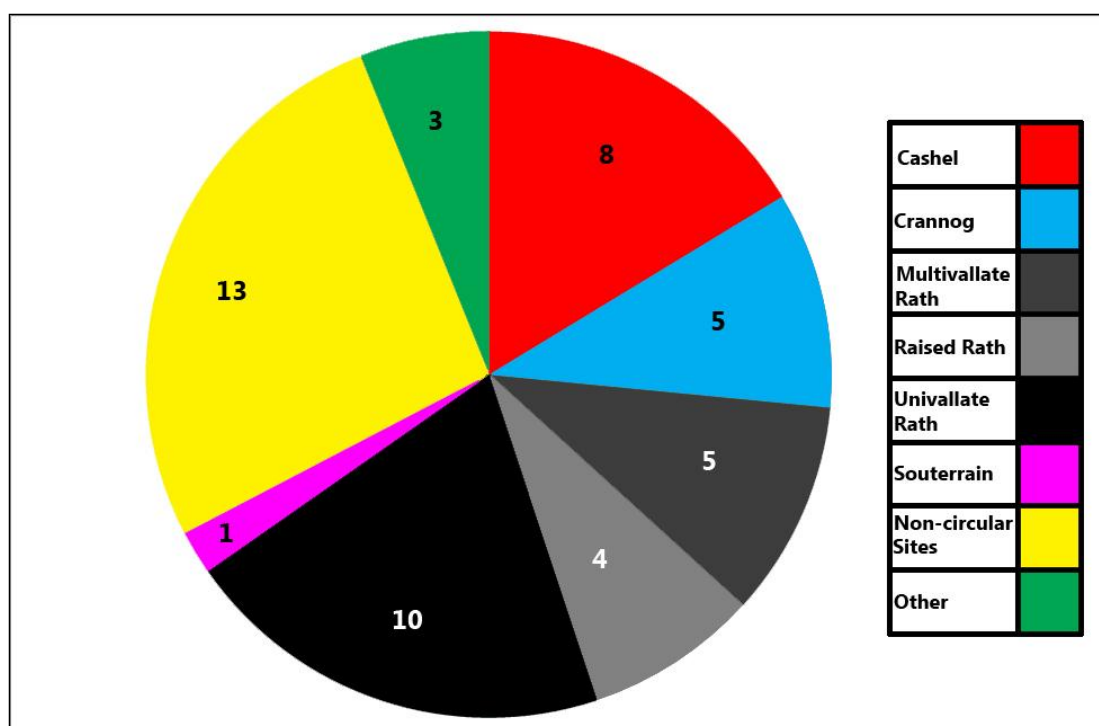


Fig. 8.5: Sites with iron ornaments and evidence of iron-working: number for each site type

Non-ferrous metalworking

While crucible residues and other traces are a useful indication of metals worked on site, mould fragments are a key part of the evidence for the manufacture of particular types of ornaments. Stone moulds occasionally provide such hints, for example a complete mould for 'dress-pins' from Caherconnell (O'Sullivan *et al.* 2010, i, 118). Clay mould fragments, broken open after casting to release the ornaments, may occasionally provide sufficient detail to allow brooch or pin types to be identified, which might potentially reflect the ornaments also found on site. Sheet metal working, however, can also be used for ornaments; this was the method used for the bird-headed brooches from Lagore and Moynagh Lough (see below).

While evidence for non-ferrous metal working occurs on forty-four sites which also produced personal ornaments (see Table 8.8), it is rarely possible to directly link the process and products. The possibility that ornaments found on these sites could have been made there remains, but is not conclusive. Some sites, however, have more convincing evidence for the manufacture of dress ornaments. At Garranes, both stone and clay moulds for casting pins and rings were found (Ó Ríordáin 1941-2, 110, 123-4), while a copper alloy pin was noted as being fresh from casting (*ibid.* 95). Evidence from Lagore included an unstratified mould for a ring-headed pin and a mould fragment showing part of a large ring, possibly for a brooch (Hencken 1950, 126, fig. 60 nos. 1517 & 872). The manufacture of copper alloy ornaments was also noted at Dooey (Ó Ríordáin & Rynne 1961, 62); evidence included quantities of both complete and fragmentary clay moulds, including one for a penannular brooch (*ibid.* Fig. 7). Finished personal ornaments from the site include around fifty bronze pins, along with brooches and buckles. At Lough Faughan, a clay mould for a flat-headed pin was found (Collins 1955, 59), although this type does not correspond with the actual pin found on site. The multivallate site of Clogher has been identified as a brooch factory, with two specific types of zoomorphic penannular brooches apparently being manufactured there, one of them by an individual craftsman (Kilbride-Jones 1980, 63). In addition to manufacturing evidence, the site has been proposed as the centre for dissemination of these particular brooch types (*ibid.* 66).

Significant evidence for metal-working was found at Moynagh Lough, including fragments of clay moulds, with at least three made for casting brooches (Bradley 1991, 20). One of these showed a bird's head terminal (Bradley 1994-5, 166); while the bird-headed penannular brooch found on the site was made of sheet metal, rather than cast (Ó Floinn 2009, 243-5), the mould might indicate the manufacture of such brooches here. While just seven examples of this brooch type are known (see Ó Floinn 2009, which does not include Baronstown), the small cluster in Meath (Lagore and Baronstown as well as Moynagh Lough), together with the evidence of the mould, might suggest a centralised location for the manufacture and dissemination of these brooches.

Site	Site type	Ornaments	Manufacturing evidence
Ballinderry II	Crannog	3 zoomorphic & 1 penannular brooch, 10 pins (1 enamelled), 1 bracelet, 2 rings	43 fragments of crucibles, 8 clay moulds, shale trial piece
Ballycasey More	Univallate	Ring pin	Clay mould
Ballycatteen	Multivallate	penannular brooch, handpin, 2 ringed pins, other pins	Clay crucible fragments
Ballywee	Non-circular	ringed pins & silvered bronze buckle	Crucibles
Balrigan	Non-circular	2 pin shafts	Crucible fragment
Baronstown	Non-circular	2 brooches, 1 pin, 1 bracelet	Copper alloy waste
Carraig Aille II	Cashel	gilt bronze & bronze brooches, 19 pins, 1 ring	3 crucibles & many fragments of same, some with green indicating copper working
Castlefarm	Cemetery/ settlement	2 brooches, 22 pins (with iron), 26 pins, 1 silvered bronze pin, 4 rings	Copper globules & ingot
Castleskreen	Univallate	Possible brooch	Crucibles
Cavanapole	Univallate	1 ring pin	Crucible fragments
Clea Lakes	Crannog	2 pins	2 crucibles with bronze stains
Clogher	multivallate	brooch, fragments of penannular brooches, handpin, bracelet	"brooch factory" - quantities of brooch fragments – bronze bracelet as possible scrap?
Cloghermore	Other	6 pins, buckle fragments	crucible
Coonagh West	Univallate	Pair of brooches and some pins	Crucible fragment
Dalkey Island	Other	penannular brooch, pins	Crucible fragments, lump of copper slag, copper ingot
Deer Park Farms	Raised	1 brooch, 5 pins, 4 rings	Crucible sherds, possible copper ingot
Dooley	Other	Brooches, pins, buckles	Crucibles; complete & fragmentary clay moulds, including 1 for penannular brooch
Dunmisk	Univallate	Ringpin	Hundreds of clay mould fragments, crucible sherds
Dunnyneill Island	Other	penannular brooch, 1 pin	Crucible fragment; copper fragments
Faughart Lower	Cemetery/ settlement	Pins	crucible
Feerwore	Univallate	pin & rings	Crucible fragment
Garranes	Multivallate	penannular brooch, 3 pins, possible ring	bronze casting fragment; clay & stone moulds for pins & rings; bronze pin (in frags) fresh from casting; 39 crucibles & 2500 fragments
Garryduff	Univallate	15 pins, rings	Complete & fragmentary crucibles
Gransha	Raised	penannular brooch, spiral ring pin	Motif pieces
Kilgobbin	Multivallate	3 pins	4 crucibles, 2 clay moulds, copper slag
Knowth	Raised	3 brooches, 145 pins, 3 buckles, 2 bracelets	One 2-piece clay mould
Knoxspark	Other	2 pin stems, 1 pendant	Clipped fragments of silvered bronze
Lagore	Crannog	8 brooches, 31 pins, 3 buckles, 2 bracelets, 5 rings	Moulds; molten bronze; 263 crucibles/fragments
Letterkeen	Univallate	Pin	crucibles

Lisduggan North	Univallate	Buckle	Crucible fragment
Lisleagh I	Multivallate	pin (with iron), buckle & bead	Bronze-working debris
Lissue	Univallate	Pin (with iron)	Slate motif piece
Lough Faughan	Crannog	penannular brooch, 1 pin	Crucibles, copper slag, clay mould
Marlinstown	multivallate	bracelet & ring	Crucible fragments
Moynagh Lough	Crannog	2 brooches, 7 pins, 2 rings	Crucible fragments; 600+ mould fragments, including 3 brooch moulds
Newtownlow	Crannog	20 pins	Crucible fragments
Parknahown	Cemetery/ settlement	2 brooches, 13 pins, 1 bead/necklace fragment	Crucible fragment
Platin	Multivallate	1 ringed pin	Crucible fragments
Raheenmadra	Univallate	Pin	crucible
Rathgurreen	Multivallate	Pin (with iron)	Crucibles
Rathtinaun	Crannog	1 brooch, at least 9 pins, bracelets, rings	crucibles
Ratoath	Non-circular	brooch & neck-ring	Crucible sherd
Roestown 2	Non-circular	32 pin fragments, 1 buckle	crucible fragments, copper alloy residue, bone motif pieces
Woodstown	Other	Pin	Crucible fragments

Table 8.8: Sites with copper-alloy ornaments and evidence of non-ferrous manufacturing

In three of the sites above – Cloghermore, Ratoath and Woodstown – the copper alloy ornaments were found in burial contexts; at Cloghermore, the crucible also was found with human remains. At that site at least, the evidence might suggest that one of the deceased interred in the cave was a metal-worker, rather than that metal-working was being carried out on site. In the case of Ratoath, the copper-alloy neck-ring has been identified as an Anglo-Saxon type which may have been imported to the site (O'Brien 2009).

While the focus here is primarily on copper alloy, other sites produced evidence of gold and silver working; few of these sites produced ornaments made of these metals, but the possibility of their use in embellishing copper-alloy ornaments should be borne in mind. Knowth had crucible evidence for both gold and silverworking, while a gold ingot at Moynagh Lough suggests this metal was being used there.

Glass-working

The centralised manufacture of various glass ornaments has been suggested, particularly in relation to the glass bangles, which may originally have been developed and produced in the kingdom of Brega, under royal patronage operating from the sites of Lagore, Knowth and Moynagh Lough (Carroll 2001, 107). One study showed that over half of all glass bangles were found in county Meath (Carroll 2001, 103; see Table 8.9 for update), with significant quantities from these high-status sites in particular. Two of these sites – Lagore and Moynagh Lough – are among the four sites with glass bracelets which also have evidence for glass working; the others are Garryduff and Island MacHugh. The evidence from the first two sites, both crannogs, is primarily in the form of glass stud moulds and glass rods, with an unfinished glass bead at Moynagh Lough; Garryduff produced a blob of molten glass, and Island MacHugh enamel residues in crucibles. While there was no direct evidence for the manufacture of glass bracelets there, the excavator of Lagore suggested it was probable (Hencken 1950, 12); such manufacture need not leave specific traces (see Carroll 2001, 103 for the process).

Modern Province	Modern county	Sites	Total bracelets
<i>Leinster</i>		<i>15</i>	<i>46</i>
	Louth	1	1
	Meath	6	29
	Westmeath	1	1
	Offaly	1	7
	Dublin	2	3
	Kildare	1	1
	Wicklow	1	2

	Kilkenny	1	1
	Longford	1	1
<i>Ulster</i>		<i>13</i>	<i>17</i>
	Antrim	6	7
	Down	4	7
	Derry	1	1
	Tyrone	1	1
	Monaghan	1	1
<i>Connacht</i>		<i>4</i>	<i>5</i>
	Mayo	3	4
	Sligo	1	1
<i>Munster</i>		<i>4</i>	<i>5</i>
	Cork	1	1
	Clare	1	2
	Limerick	2	2
<i>Ireland only</i>		<i>1</i>	<i>1</i>
TOTALS		37	74

Table 8.9: Distribution of glass bracelets (adapted from Doyle 2010)

Glass beads are more common than bangles, and a number of sites with these ornaments also have suggestions of glass working (see Table 8.10). In some cases, the link between the ornaments and craft evidence is tenuous; at Lagore, for example, while millefiori rods and glass stud moulds were found, the excavator noted there was no direct evidence for the manufacture of beads, although it was possible (Hencken 1950, 12). More conclusive evidence takes the form of unfinished or failed beads, examples of which occurred at Dunmisk, Gragan West, Lislackagh and Moynagh Lough.

Site	Site type	Glass beads	Glass working evidence
Ballycatteen	Multivallate	2 blue	glass rod (blue with white patches)
Ballyhenry	Univallate	3 (2 blue & 1 green)	disc of pale green glass – accidentally re-melted
Dunmisk	Univallate	Plural	6 crucibles with glass residue, failed blue glass stud, failed glass beads, glass rods, scrap glass
Garranes	Multivallate	10 (1 black & white, 3 blue, 1 bluish-green, 1 red & yellow, 1 red, 1 yellow, 1 black, 1 not specified)	3 glass rods, millefiori rod in bronze tube & 2 other millefiori pieces, glass vessel fragments
Garryduff	Univallate	28 (14 blue, 3 yellow, 2 green, 2 polychrome, 1 clear & yellow, 1 clear/brownish, 1 clear, 1 green & yellow, 1 red & yellow, 2 unspecified)	Blob of molten glass
Gragan West	Raised	1 yellow	melted glass bead
Lagore	Crannog	136 (78 blue, 10 white, 4 yellow, 2 khaki, 5 green, 1 blue-green, 1 red & white, 11 blue & white, 2 yellow & green, 1 green & black, 3 clear & yellow, 2 grey & yellow, 2 red, 1 blue & yellow, 4 polychrome, 1 amber, 1 black, 1 clear, others unspecified)	glass stud moulds, plain & millefiori glass rods
Lislackagh	Univallate	5 (4 blue & 1 yellow)	possibly unfinished glass bead
Moynagh Lough	Crannog	Plural (including 3 blue and 1 white & yellow)	glass rods, unfinished bead
Roestown 2	Non-circular	12 (6 blue, 3 blue-green, 2 yellow, 1 yellow-green)	crucible with glazed residue
Woodstown	Other	2 (1 blue, 1 clear)	molten glass droplets

Table 8.10: Sites with glass beads and evidence of glass working

Lignite/jet/shale working

A small number of sites have produced both ornaments in jet/lignite/shale and also evidence for the working of these materials. The main evidence for the manufacture of bracelets is usually interpreted as occurring in the form of the central cores removed in the process

(Childe 1938, 133). Six shale cores and four bracelet fragments were found at Doonmore (Childe 1938, 133). Oldcourt produced one jet core and three bracelet fragments (Murphy & Ó Cuileanáin 1961). Feltrim Hill produced a waste jet disc, a number of bracelet fragments and two jet beads (Hartnett & Eogan 1964, 31). However, two jet-like rough-outs from Knowth, which appear very similar to those from other sites, have recently been argued as 'unlikely to be the residual cores' of bracelets, but rather rough discs brought to the site for finishing into artefacts (Johnson 2012, 735). Indeed, it has been suggested that these rough-outs might have been used on site as gaming pieces (*ibid.* 230), suggesting that apparent waste products might have been useful items, rather than simply debris. For other evidence, fragments of bracelets may represent manufacture or may simply be broken ornaments; occasionally some are identified as having been broken in the course of manufacture, as at Cush (Ó Riordáin 1939-40, 151).

It is also interesting to look at sites which have evidence for working in these materials but no finished ornaments, such as Ballybrolly, which has a lignite core but no bracelets – indeed no personal ornaments at all. Another issue requiring further attention is the need for exact analysis of the jet/lignite/shale, which is often identified simply on appearance rather than a scientific basis; this would help to show if locally-available material is being used, which might support idea of local manufacture, or if either the material or the finished artefact is imported/traded from farther afield.

Bone-working

Bone pins are among the simplest of personal ornaments, in many cases being simple forms with limited modification and no decoration. While there have been some elaborately carved examples of bone pins, for example from Lagore, where one was anthropomorphic in form (Hencken 1950, 193, fig. 105), and Glebe, where a zoomorphic pin in the shape of a horse's head was found (Seaver 2007), many are quite plain, notably those made from pig fibulae. It has been noted that pig-fibula pins 'could have been manufactured with relatively little skill' but 'decorated pins were the work of professionals' (Edwards 1990, 84), while 'simple objects of stone, bone and wood' would have been made 'by those who needed them' (Mytum 1992, 211). The law tracts do not specify bone-working as a craft; the nearest equivalent is the comb-maker, whose honour price, at half a *set*, is significantly below that of any metal-worker (Kelly 1988, 63). However, comb-making might be considered a more skilled task, requiring both specialised equipment and experience (Hinton 2006, 160). Even still, the perceived low status of the comb-maker is reflected in a late ninth-century Triad which noted 'Three things that constitute a comb-maker: racing a hound in contending for a bone; straightening a ram's horn by his breath, without fire; chanting upon a dunghill so that all antlers and bones and horns that are below come to the top' (Meyer 1906, 17). By extension, the bone-worker making pins, beads or other items would not seem to have had a social value, perhaps supporting the idea of individual, domestic manufacture.

Site	Site type	Bone ornaments	Bone working
Athlumney	Souterrain	2 pins, 1 bead	Indirect
Ballinderry I	Crannog	6 pins	Indirect
Ballinderry II	Crannog	9 pins	Indirect
Ballyvass	Univallate	Pins	bone cut-off waste
Baronstown	Non-circular	2 pins	Indirect
Boho	Cashel	Pin	indirect
Boyerstown	Non-circular	Pins	polished unworked bone
Cahercommaun	Cashel	82 pins, 5 beads, 1 pendant	worked pieces of bone
Carraig Aille I	Cashel	3 pins	Indirect
Carraig Aille II	Cashel	39 pins, 2 beads	indirect
Carrigoran	Univallate	Bead	Indirect
Castlefarm	Cemetery/settlement	17 pins	unworked pig fibulae
Castleskreen	Univallate	Pin	indirect
Clea Lakes	Crannog	4 pins	Indirect
Cloghermore	Other	8 pins, 3 beads	indirect
Cloncowan	Cemetery/settlement	2 pins, fragment pendant	Indirect
Deer Park Farms	Raised	36 pins	Indirect

Dooley	Other	Pins	bone working evidence
Dowdstown	Non-circular	3 pins	indirect
Dunbell Big 6	Univallate	Pin	Indirect
Feltrim Hill	Cashel	48 pins, 3 beads	Indirect
Garryduff	Univallate	Pins	
Glebe	Univallate	Pin & bead	decorated cattle & pig bones
Johnstown	Cemetery/settlement	5 pins	
Kilgobbin	Multivallate	2 pins	Indirect
Kilgreany	Other	Pin	worked bone
Killickaweeny	Univallate	4 pins	
Knockea	Raised	Pins	indirect
Knowth	Raised	51 pins, 29 beads	cut & polished waste fragments; 5 strips of button/bead waste
Lagore	Crannog	164 pins, 6 beads	Indirect
Meadowbank	Raised	Pins	indirect
Moathill 1	Non-circular	Pin	Indirect
Moynagh Lough	Crannog	12 pins	cut pieces of bone
Moyne	Univallate	Pins (unfinished)	Unfinished pins
Ninch	Non-circular	Pins	Indirect
Park North	Other	2 pins	Indirect
Parknahown	Cemetery/settlement	Pins & beads	indirect
Rathtinaun	Crannog	at least 12 pins, plural beads	indirect
Ratoath	Non-circular	Pins	Indirect
Raystown	Non-circular	6 pins, 1 bead, plural 'buttons'	Bone 'buttons'
Roestown 2	Non-circular	25 pins	indirect
Rosepark	Non-circular	Pin	Indirect
Sroove	Crannog	Pins, 2 beads	Indirect
The Spectacles	Cashel	Pin	indirect
Tulsk	Raised	Pins	Indirect
Uisneach	Other	Pin	indirect

Table 8.11. Sites with bone ornaments and evidence for bone working

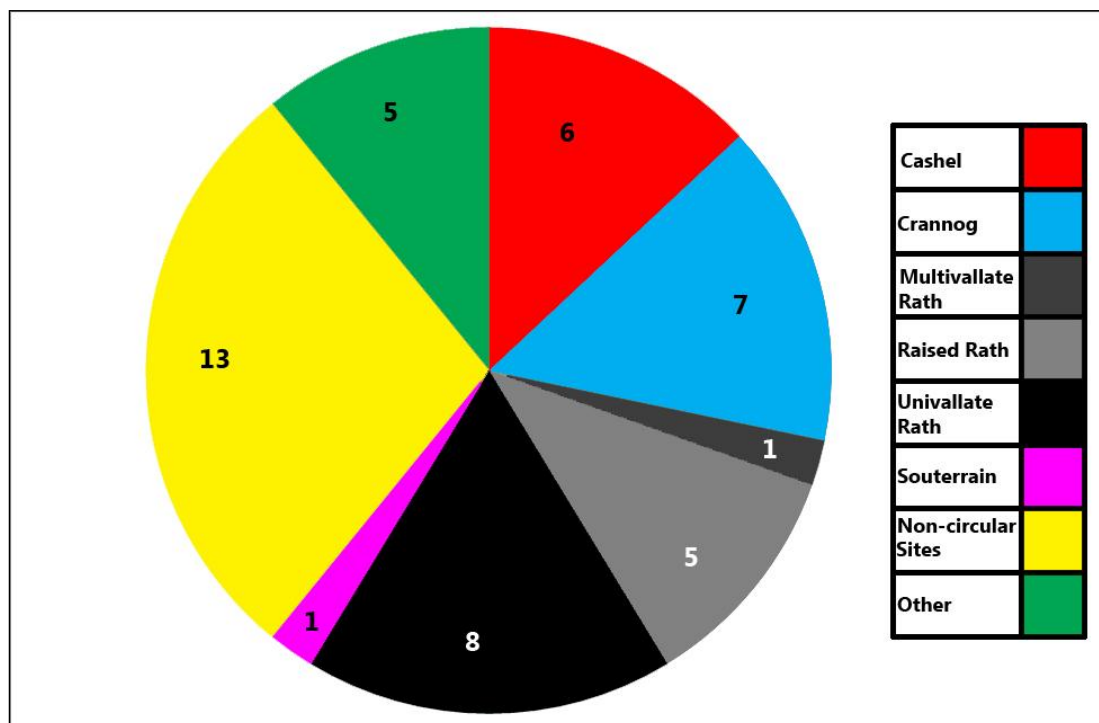


Fig. 8.6: Number of sites by site types, with bone ornaments and evidence for bone working

These suggestions of a possible self-sufficiency in the manufacture of such plain items may reflect not just the finished items, but also the simple tools required for their manufacture – a

knife or other blade – and the ubiquity of the raw material on most sites. This in turn may limit the potential to find evidence of their manufacture; carving a small piece of bone into a pin would be a mobile craft, not necessarily one restricted to a particular structure or area, and hence evidence might be dispersed and difficult to find and identify in excavations. This may explain the reliance on indirect evidence (bone ornaments and other finished bone items such as spindle whorls or combs) to suggest bone-working on the sites surveyed. If this does imply an unspecialised craft, it is interesting that some high-status sites, such as Lagore and Knowth, are included amongst the sites indicating bone-working (although the latter does have more direct evidence). Overall, direct evidence for bone-working is rarer, including unfinished bone pins at Moyne, as well as examples of worked and unworked, polished or cut bones (see Table 8.11).

APPENDIX 2

<i>Site</i>	<i>Site type</i>	<i>Preparation</i>	<i>Spinning</i>	<i>Weaving</i>	<i>Sewing/cutting</i>
Aghadegnan	Univallate			Y	
Athlumney	Souterrain		Y		
Ballinderry I	Crannog	Y	Y	Y	Y
Ballinderry II	Crannog	Y	Y	Y	Y
Ballyaghagan	Univallate			Y	
Ballycasey More	Univallate			Y	Y
Ballycatteen	Multivallate		Y		
Ballyegan	Cashel	Y	Y		
Ballymacash	Univallate		Y		
Ballynakelly	Non-circular			Y	
Ballyvass	Univallate			Y	
Ballywee	Non-circular		Y		
Ballywillwill	Multivallate		Y		
Balrigan	Non-circular		Y	Y	
Baronstown	Non-circular		Y	Y	Y
Beginish	Other			Y	
Boho	cashel				
Bowling Green	Univallate		Y		Y
Boyerstown	Non-circular	Y		Y	
Cahercommaun	Cashel	Y	Y	Y	Y
Carn	Cashel		Y		
Carraig Aille I	Cashel	Y	Y	Y	Y
Carraig Aille II	Cashel	Y	Y	Y	Y
Carrigatogher	Cemetery/ settlement		Y		
Carrowkeel	univallate		Y	Y	
Castlefarm	Cemetery/ settlement	Y	Y	Y	Y
Castlegar	univallate		Y	Y	
Castleskreen	univallate		Y		
Cherrywood	Other		Y	Y	Y
Clea Lakes	Crannog		Y	Y	
Cloghermore	Other		Y	Y	Y
Cloncowan	Cemetery/ settlement		Y		Y
Coarhabeg	Other		Y		
Collierstown 1	Cemetery/ settlement	Y		Y	
Colp West	Non-circular			Y	
Coonagh West	Univallate		Y		Y
Craigyarren	Crannog		Y	Y	
Cush	Non-circular		Y	Y	
Dalkey Island	Other		Y		
Deer Park Farms	Raised	Y	Y	Y	Y
Dooley	Other		Y	Y	Y

Doonlaughan	Other				
Dowdstown 2	Non-circular		Y	Y	Y
Dressogagh	Multivallate		Y		
Drumadoon	Raised	Y			
Dunbeg Fort	cashel		Y		
Dunmisk	univallate		Y		
Dunynneill Island	Other		Y		
Dunsilly	raised		Y		
Farrandreg	Souterrain				Y
Faughart Lower	Cemetery/ settlement		Y		
Feltrim Hill	cashel		Y		Y
Garranes	Multivallate		Y	Y	Y
Garryduff	Univallate	Y	Y	Y	Y
Glebe	Univallate		Y		
Glencurran	Other		Y		
Gortybrigane	Univallate			Y?	
Gragan West	raised		Y	Y	Y
Grange	Univallate		Y		
Grange West	Other				Y
Haggardstown 1	Non-circular			Y	
Island MacHugh	Crannog				
Johnstown	Cemetery/ settlement			Y	Y
Kilcloghans	Univallate			Y	
Kilgobbin	Multivallate		Y		Y
Kilgreany	Other		Y		Y
Killanully	Univallate				Y
Killealy	Raised			Y	
Killederdadrum	Univallate		Y	Y?	Y
Killickaweeny	Univallate		Y	Y	Y
Kilscobin	Univallate		Y		
Knockea	Raised				Y
Knowth	Raised	Y	Y	Y	Y
Knowth Site M	Cemetery/ settlement		Y		
Lagore	Crannog	Y	Y	Y	Y
Leacanabuaile	Cashel		Y	Y	
Leggetsrath	Multivallate			Y	Y
Lisduggan North	Univallate		Y		
Lisleagh II	Univallate	Y			
Lismahon	Raised		Y		
Lisnagun	Univallate	Y			
Lissachiggel	Cashel		Y		
Lough Faughan	crannog		Y	Y	Y
Loughbown 1	Multivallate			Y	
Marlinstown	Multivallate			Y?	

Marshes Upper	Non-circular		Y	Y	Y
Millockstown	Multivallate	Y	Y	Y	Y
Mount Offaly	Cemetery/ settlement		Y	Y	Y
Moynagh Lough	Crannog		Y		
Moyne	Univallate				Y
Narraghmore	Multivallate		Y		
Nevinstown	Raised				Y
Newtownlow	Crannog		Y		
Ninch	Non-circular				Y
Oughtymore	Other		Y		
Owenbristly	Cemetery/ settlement		Y	Y	
Park North	Other		Y		Y
Parknahown	Cemetery/ settlement			Y	Y
Raheens II	Univallate		Y		
Rathgurreen	Multivallate				
Rathmullan Lower	Raised		Y	Y	Y
Rathtinaun	Crannog		Y		
Ratoath	Non-circular		Y	Y	Y
Raystown	Non-circular		Y	Y	Y
Rinnaraw	Other			Y	
Rochfort Demesne	Multivallate			Y	
Roestown 2	Non-circular		Y	Y	Y
Rosepark	Non-circular		Y	Y	Y
Sallymount	Non-circular		Y		Y
Seacash	Univallate		Y		
Sluggary	Multivallate				Y
Smithstown	Souterrain		Y		
Spittle Ballee	Univallate		Y		
Sroove	Crannog				Y
St Gobnet's	Univallate		Y		
The Spectacles	Cashel		Y	Y	
Treanbaun	Cemetery/ settlement		Y	Y	
Uisneach	Other		Y		Y
White Fort	Cashel		Y		
Woodstown 6	Other		Y	Y	Y

Table A2.1: The four stages of textile working – summary of evidence

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