Research Repository UCD

Title	Early Medieval Dwellings and Settlements in Ireland, AD 400-1100: Vol. 1 Text.
Authors(s)	O'Sullivan, Aidan, McCormick, Finbar, Harney, Lorcan, et al.
Publication date	2010-12-01
Publication information	O'Sullivan, Aidan, Finbar McCormick, Lorcan Harney, and et al. "Early Medieval Dwellings and Settlements in Ireland, AD 400-1100: Vol. 1 Text." The Early Medieval Archaeology Project (EMAP), December 1, 2010.
Publisher	The Early Medieval Archaeology Project (EMAP)
Item record/more information	http://hdl.handle.net/10197/10187

Downloaded 2026-11-16 00:50:58

The UCD community has made this article openly available. Please share how this access benefits you. Your story matters! (@ucd_oa)

© Some rights reserved. For more information

Early Medieval Archaeology Project (EMAP)
Report 4.2

Early Medieval Dwellings and Settlements in Ireland, AD400-1100

Vol. 1: Text



Aidan O'Sullivan, Finbar McCormick, Lorcan Harney,
Jonathan Kinsella and Thomas Kerr

December 2010

Grant No. AR01055

UCD School of Archaeology

An Chomhairle Oidhreachta
The Heritage Council

Irish National Strategic Archaeological Research
(INSTAR) Programme 2010

Queen's University Belfast

Early Medieval Dwellings and Settlements in Ireland, AD 400-1100

Vol. I: Text

By
Aidan O'Sullivan, Finbar McCormick, Lorcan Harney, Jonathan Kinsella and Thomas Kerr

Early Medieval Archaeology Project (EMAP) Report 4.2

December 2010
submitted for

Irish National Strategic Archaeological Research (INSTAR) programme 2010
Ref: AR01055

Contents

Chapter One: Introduction 7

Introduction **7**

A brief historiographical analysis of early medieval settlement excavations in Ireland **8**

Origins: University and State-funded archaeological excavations in the mid-20th century 8

EU Membership and the origins and development of Commercial Archaeology 11

The 1990's: The establishment of new Protective Legislation and Codes of Practice for Archaeological Heritage 12

Digging through the Celtic Tiger boom: the mitigation of Infrastructural and Commercial Projects, c.1995-2010 13

Conclusions: changing excavation strategies and the development of the early medieval archaeological resource, 1930-2010 ..... **16**

Chapter Two: Early Medieval Houses and Buildings in Ireland 18

Introduction **18**

History of Research and Excavation **19**

Domestic Houses in Early Medieval Rural Settlement Enclosures **20**

Houses in early medieval rural settlement enclosures, c. A.D. 400-800 20

Houses in early medieval rural settlement enclosures, c. A.D. 800-1100 21

Storage buildings, workshops and outhouses in early medieval enclosed 'rural' contexts **22**

Sod-Walled Huts and Drystone-Built Clocháns in Western Ireland **23**

Houses at Early Medieval Unenclosed Settlements **26**

Dwellings structures at Coastal Occupations and Shell Midden Sites **28**

Caves as Early Medieval 'Houses'? **29**

Souterrains as Places of Underground Habitation, Refuge or Storage, c. 700-1100? **30**

Souterrains and Associated Houses, c. 700-1100 32

Early medieval rural settlement and social and ideological change: the evidence for houses and dwellings in the tenth-twelfth century **33**

Norse Houses and Buildings in Urban and Rural contexts, *c.*AD 800-1170 ..... **34**

Introduction 34

House types in Norse town 35

Possible Norse or Hiberno-Scandinavian houses and buildings in rural contexts 38

Hearths, Doorways, Occupation Floors, Beds and Other Furnishings **40**

Introduction 40

Hearths and fireplaces: Symbols of the household 40
Doorways 41
Internal furnishings 41
Occupation floors 42
Domestic Life: Artefactual and Paleoenvironmental Evidence from Houses 42
House Biographies and 'Special Deposits' 44
Introduction 44
Foundation deposits 44
Changing places 45
Protective or totemic items of the house 45
Marking the death of the house or structure 46
Identifying Houses of Different Social Grades in Early Medieval Ireland 48
Aristocratic Houses: Status and Kingship and early medieval houses 48
Dwellings of the 'middle class' 49
Dwellings of the poor and unfree 50
Domestic Space and Concepts of Privacy 50
Conclusions 51
Chapter 2: The organisation and layout of early medieval settlement spaces 52
Introduction 52
Early Medieval Settlement Enclosures 52
Raths, ringforts and cashels 52
Raised and platform settlement enclosures 53
Crannogs 53
Promontory forts 54
Settlement/Cemeteries 54
Defining Early Medieval Settlement Enclosures: Walls, Banks, Ditches, and Palisades 55
Enclosing Walls 55
Enclosing Banks 56
Enclosing Ditches 57
Enclosing wooden palisades, fences and revetments 58
Entrances and Gateways 60
Controlling Movement: Passageways and Pathways 62
The Layout and Organisation of Enclosed Settlement Spaces: Boundaries and Plots 63
Chronology, Change and Cultural Biographies 68

Table of Contents

The Early Medieval Church and Ecclesiastical Settlement Enclosures 71
Defining Early Medieval Ecclesiastical Enclosures – Walls, Banks and Ditches 72
Enclosing Walls 72
Enclosing Banks 72
Enclosing Ditches 72
Entrances and Gateways 72
Controlling Movement: Passageways, Pathways and Roads 73
The Layout and Organisation of Ecclesiastical Enclosures: Internal Spaces, Boundaries and Plots 73
Early Medieval Ecclesiastical Enclosures: Their Chronology and Cultural Biographies 75
Viking and Hiberno-Norse Enclosed Settlements: longphorts and towns 77
The Viking Longphort in Ireland 77
The Norse or Hiberno-Scandinavian town in Ireland 78
Defining Norse or Hiberno-Scandinavian urban settlements: Banks, Walls, Ditches and Revetments 78
Enclosing Banks and walls 78
Enclosing Ditches 80
Enclosing Revetments 80
The Lay-out and Organisation of Space within Norse or Hiberno-Scandinavian towns 81
Passageways, Pathways and Roads 81
Property plots and boundaries 82
Living conditions within Norse towns 83
Norse or Hiberno-Scandinavian towns: Chronology and Change 85
Conclusions 86
Chapter 3: Agriculture, economy and early medieval settlements 87
Introduction 87
Early Medieval Settlement Enclosures as Farmyards: Houses, Sheds, Livestock Pens, Dungheaps and Pits 87
The early medieval legal sources 87
Storage Buildings and Outhouses 88
Pits – industry and waste disposal 88
Internal Divisions Within Settlement Enclosures: the Spatial organisation of economic activities 89
External Gardens and Fields 90
Early medieval legal sources 90
Field boundaries 90

Miscellaneous Livestock Enclosures 92
Early medieval legal sources 93
Other enclosures 93
Upland Transhumance Settlements 94
Booleying and transhumance in early medieval Ireland 94
Unenclosed Settlements as Farmyards 95
Cereal-Drying Kilns and Horizontal Watermills – Arable Agriculture as Part of the Wider Settlement Landscape 95
The Celtic Tiger excavations and the identification of farming landscapes 95
The role of livestock and dairying 96
Crop cultivation, cereal-drying kilns and processing 96
Horizontal watermills 97
Transformations in early medieval agriculture 98
The Organisation of the Domestic Economy: Agricultural Labour, Food Production and Food Types 99
Farm labour 99
Technologies and materiality of agricultural labour 99
Food preparation 100
Food and Diet 101
The Evidence for Agricultural Economy in Relation to Norse towns 103
Conclusions 104
Chapter 4: Early medieval crafts and industry on settlements 106
Introduction 106
Early medieval Ironworking 106
Introduction 106
Artefacts 106
Raw materials, processes, manufacturing 107
Contexts of ironworking 111
Levels of ironworking 114
Early Medieval Non-Ferrous Metalworking 116
Introduction 116
Raw materials, processes, manufacturing 116
Levels of metalworking 121
Glass, Enamel and Milliefiori-Working 122
Introduction 122
Artefacts 122

Raw materials, processes, manufacturing 123
Scientific analysis of vitreous materials 124
Levels of glass-working 125
Stone-Working 125
Introduction 125
Building material 125
Artefacts 126
Contexts of stone-working 128
Carpentry and Wood-Working 129
Introduction 129
Wood-working tools 130
Artefacts and wood-working techniques 130
Contexts of wood-working 132
Bone, Antler and Horn-Working 133
Introduction 133
Artefacts 133
Raw materials, processes, manufacturing 134
Contexts of bone-, antler- and horn-working 136
Levels of bone-, antler- and horn-working 136
Textile Production 137
Introduction 137
Tools, raw materials, processes, manufacturing 137
Contexts of textile-working 141
Leather-Working 141
Introduction 141
Artefacts 142
Tools, raw materials, processes, manufacturing 142
Contexts of leather-working 143
Clay-Working, Pottery and Manufacturing Tools 143
Introduction 144
Tools 144
Clay as a resource 144
Raw materials, processes, manufacturing 145
Contexts of clay-working 146
Conclusions 147

Table of Contents

Conclusions 149
Bibliography..... 151

Chapter One: Introduction

Introduction

Early medieval settlement archaeology utterly dominates the record of excavations in Ireland, including settlement enclosures, complexes, landscapes and ecclesiastical sites (O'Sullivan, McCormick, Kerr & Harney 2009). For this reason, the INSTAR-funded Early Medieval Archaeology Project (EMAP) focused its research in 2009-2010, on dwellings and settlements (having previously provided a review of all early medieval archaeological excavations in Ireland). In 2009, EMAP first prepared a gazetteer of what we would regard as Ireland's key early medieval settlements and dwelling excavations, largely based on a detailed review of the original EMAP database, 1930-2004; amounting to a final gazetteer (see Vol II) of 241 early medieval settlements revealed through archaeological excavation, 1930-2009. The first draft of the Vol. II gazetteer was first completed in a five-month period between July and December 2009 (Kerr *et. al* 2009) and was edited and expanded in 2010. In 2010, EMAP built further on this achievement, to research and complete a vol. I interpretative text that would precede the Vol II gazetteer, thus providing a reflection and analysis of such themes as houses and buildings, the organisation of settlement enclosures, agricultural activity and crafts and industry. This two volume report, completed in December 2010, arguably represents the first compilation, analysis and discussion of early medieval settlement archaeology in Ireland, as revealed through excavations, 1930-2009.

The preparation of this EMAP report has required a substantial amount of work; gathering unpublished excavation reports, reviewing monographs and journals, collating data and preparing brief site syntheses. Between July-August 2009, EMAP staff carried out research on a large number of early medieval dwellings and settlements in a wide range of previously published sources (journals, books, etc) and also identified unpublished reports that were held in the National Monuments Service, DoEHLG, Republic of Ireland and in the Northern Ireland Environment Agency (NIEA). Contacts were made with the staff from these institutions and EMAP staff then contacted individual site directors and companies by email, letter and phone to request permission to read unpublished reports held in the NMS/NIEA and to use these reports in EMAP's research. It is striking that despite a severe economic downturn in late 2009 and 2010, all site directors and companies contacted were enormously supportive of the project and all site directors contacted gave full permissions to consult the reports – a measure of the profession's commitment to dissemination and research. In a few cases, it was impossible to locate or contact site directors (often due to staff redundancies in many companies). In such cases, EMAP researchers utilised the brief summaries already published in excavations.ie or in other publications. Between August-November 2009, EMAP staff then used these unpublished reports to prepare brief site descriptions for this gazetteer. and also a review of additional publications and reports, and the personal knowledge and research of EMAP members (e.g. Kerr on Ulster, Kinsella on NRA schemes, O'Sullivan on crannogs, etc). Each EMAP members was given responsibility for the preparation of each site summary, largely on a county-by-county basis, to maximise efficiency and production of reports. Working under the direction of the project Principal Investigators, Dr. Aidan O'Sullivan and Dr. Finbar McCormick, Dr. Thomas Kerr in QUB acted as the day-to-day co-ordinator of the preparation of site summaries, ensuring close version control (e.g. designation of 'top copies') and adherence to project timetables. These then required preliminary editing, while site plans, cross sections and other key illustrations were scanned from books, papers and unpublished reports and inserted in relevant locations in the gazetteer.

In 2010, EMAP secured further funding from the INSTAR programme and between July-August 2010, EMAP staff initially focused on compiling and rewriting a small number of additional site descriptions for the gazetteer (Vol. II). In total, 13 extra site summaries were written – and 3 sites re-written - in 2010 bringing the total number of sites described to 241 sites. The main priority between August-November 2010 then shifted towards drafting a report on early medieval dwellings and settlement in Ireland, A.D. 400-1100. EMAP focused on four major areas: early medieval houses and other

buildings; settlement enclosures; agriculture as part of the wider settlement landscape; and crafts and industrial activities on early medieval settlements. These chapters comprise an investigation of the physical character, social and economic organisation, and the chronology and biographies of settlements and their related domestic, economic, craft and industrial activities. It is hoped that this report and gazetteer will eventually form the basis of a two volume published tome on early medieval dwellings and settlement in Ireland.

In conclusion, the two volume report and gazetteer of early medieval dwellings and settlements is already a substantial and very valuable research report and has been a significant update and ambitious expansion of the existing EMAP research on early medieval excavations in Ireland. In themselves, both could be regarded as significant research resources. The volume I report offers the most up to-date discussion on the excavated evidence for dwelling and related agricultural, craft and industrial activities on early medieval settlements. The volume II gazetteer is significant as no such document of excavated early medieval settlement sites has ever been compiled before (and equally for other periods with less archaeological evidence or data). Both have now been prepared to advanced draft standard for submission to INSTAR in December 2010, but it is envisaged that, with further funding, they can be edited and brought to publication standard in 2011. We hope that such a work will be regarded as a key contribution to dwelling practices in early medieval Ireland.

A brief historiographical analysis of early medieval settlement excavations in Ireland

There is a long tradition of archaeological excavation of early medieval settlement sites in Ireland, stretching back into the earliest origins of the discipline in antiquarian exploration, through to the research programs of the Harvard Archaeological Expedition, the various universities, and, the salvage and conservation excavations by government archaeologists, until, finally, commercial sector excavations of recent decades. These changes partly reflect the 'professionalisation' of archaeology in Ireland – an overview of this is found in *Foundation Myths* (Waddell 2005) – but are also partly the product of changing political, historical and regional imperatives which were influential in framing research agendas and thus selecting sites for excavation. In particular, EU legislative change and major national economic growth have played the dominant role in directing archaeological excavation in recent decades with an almost seismic effect on early medieval archaeological and historical studies in Ireland. It is well-known that in recent decades, there was a considerable boom in archaeological excavations of early medieval Irish settlements and much of this evidence remains largely untapped. This report presents to the general public, with the generous support of Irish archaeologists, the first synthesis of early medieval settlement archaeological discoveries of recent times, hopefully providing a new opportunity to create better understandings of one of the most transformative periods of social, cultural and historical change in Ireland.

Origins: University and State-funded archaeological excavations in the mid-20th century

In the early decades of the twentieth century, the archaeological discipline was the preserve of a small number of individuals including university academics, museums curators and government archaeologists (especially the various incarnations of the Office of Public Works in the Republic of Ireland, and the Historic Monuments Branch in Northern Ireland). As such, only a handful of excavations were undertaken on an annual basis, and these were often limited to short summer excavation seasons. The vast majority of these excavations were focused on known standing monuments and, in the case of early medieval settlements (i.e. sites dating c. A.D. 400-1100), these tended to be concentrated on either ecclesiastical sites or settlement enclosures (whether earthen-banked 'raths' or stone-walled 'cashels'.

The earliest excavations in the 1920s and early 1930s were directed by university academics such as R.A.S. Macalister (1870-1950), Professor of Archaeology at University College, Dublin. His excavations at Uisneach, Co. Westmeath in 1925 (Macalister and Praeger 1928) and Killeen Cormac, Co. Kildare (Macalister and Praeger 1929), examined high-status Iron Age/Early Medieval transition period sites but these were often poorly done, lacking in any detailed information about stratigraphy and artefact contexts.

One of the key events in early medieval settlement studies was the arrival of the Harvard Archaeological Mission to Ireland (1932-36) under the leadership of Hallam Movius (1907-1987) and Hugh O'Neill Hencken (1902-1981). Hencken in particular carried out major excavations of important early medieval crannogs at Ballinderry No. 1, Co. Westmeath (Hencken 1936), Balllinderry No. 2, Co. Offaly (Hencken 1942) and Lagore, Co. Meath (Hencken 1950) and an early medieval cashel at Cahercommaun, Co. Clare (Hencken 1938). The expedition was the closest thing to a state-sponsored programme of 'validation by excavation' and was strongly supported and endorsed by the Irish Free State government, focusing largely on pre-Norman sites of high impact and historical importance such as royal sites. As important as the archaeological techniques used (which were not necessarily of a high standard in international terms), was the fact that the excavations were published in leading academic journals.

Following the precedent of the Harvard Mission, archaeologists in the mid-twentieth century tended to focus on high-status sites such as crannogs and enclosed settlements. This programme of excavations was particularly pioneered by Sean P. Ó Ríordáin (1905-1957), initially based in University College Cork and afterwards at the Dept. of Archaeology, University College Dublin. His excavations included those in the 1930s and 1940s mostly across Munster at sites such as Cush, Co. Limerick (1940), Garranes, Co. Cork (1942), 'The Spectacles' and Carrig Aille 1 & 2, Lough Gur, Co. Limerick (Ó Ríordáin 1949a), Letterkeen, Co. Mayo (Ó Ríordáin and MacDermott 1952), Ballycatteen, Co. Cork (Ó Ríordáin and Hartnett 1943) and Leacanabuaile, Co. Kerry (Ó Ríordáin and Foy 1941). Around the same time, the South African, Oliver Davies (1905-1986), lecturer in Ancient History at Queen's University, Belfast, undertook a number of early medieval excavations as part of archaeological surveys in the counties of south Ulster (Davies 1947). Michael J. O'Kelly (1915-1982), of University College, Cork, also helped to develop early medieval archaeology in the Republic of Ireland with his excavations at Garryduff, Co. Cork (1963).

These excavations tended to target impressive and probable high status enclosed secular settlements, and there was a very deliberate focus on aspects of defence (especially complex entrances) as well as on the artefactual remains. Excavations also tended to focus on narrow trenches placed across enclosure features or in small areas of the interior, so a good understanding of settlement orgnisation was not well developed and the exterior of sites was often ignored. We do not have a particularly good understanding, for example, of the interior occupation of Garranes – reputedly an early medieval royal residence. In terms of domestic occupation, many of the earliest excavated sites, including Garranes, Co. Cork (Ó Ríordáin 1942, 86-87) and Ballycatteen (Ó Ríordáin and Hartnett 1943, 12), both in Co Cork, only uncovered scatters of post-holes and stake-holes that did not produce coherent house plans. The poorer quality of early archaeological excavations of early medieval crannogs (e.g. Craigywarren, Lagore, Ballinderry crannogs Nos 1 & 2) also tended to obscure the numbers of houses known from such sites. However, more recent excavations at Moynagh Lough, Co. Meath (e.g. Bradley 1991) and Sroove, Co. Sligo (Fredengren 2002), have been more successful in recognising series of house plans. Nonetheless, the fieldwork of Hencken and Ó Ríordáin left an important legacy, laying the foundations of modern scientific excavation in Ireland while their prompt publications of excavated sites provided the key literature in the subject of early medieval settlements, which has largely yet to be surpassed.

However, Jerry O'Sullivan (1998, 182–4) has suggested that these excavations were hugely influential in the development of normative ideas about early Irish society as rural, pastoral and one largely based upon the activities of archetypal self-sufficient, small farming households that inhabited settlement enclosures (ringforts or raths). These ideas could be usefully portrayed (in terms of the socially conservative ethos of mid-twentieth Ireland) as living in a manner that was not entirely dissimilar to that of Irish rural communities in the 1930s and 1940s. Although archaeologists were aware of the possible existence of early medieval unenclosed settlements in the mid twentieth century, there were very little efforts to attempt to locate these less conspicuous settlements (e.g. souterrains, unenclosed buildings and industrial sites) of this period. However, exceptions did include 'The Spectacles, Lough Gur' (Ó Ríordain 1949a), Inishkea North, Co. Mayo (Henry 1951a; 1951b; 1952), Beginish, Co. Kerry (O'Kelly 1956), Craig Hill, Co. Antrim (Waterman 1956a) and Dooey, Co. Donegal (Ó Ríordain and Rynne 1961).

Oddly enough, few ecclesiastical sites were comprehensively excavated between 1920–80 with the exceptions of Nendrum, Co. Down (Lawlor 1925), Church Island (O'Kelly 1958) and Reask, Co. Kerry (Fanning 1981). However there were a number of more limited research excavations at other sites such as Killeen Cormac, Co. Kildare (Macalister and Praeger 1929), Gallen, Co. Offaly (Kendrick 1939), Dalkey Island (Liversage 1968), Kiltiernan, Co. Galway (Duignan 1951; Waddell and Clyne 1995), Temple-na-skellig at Glendalough (See Long 1994), Ballyvourney, Co. Cork (O'Kelly 1952) and Armagh City (See Lynn 1977). Other excavations in this period such as at Toureen Peakaun (See Waddell and Holland 1990) were part of conservation work on the ecclesiastical buildings and monuments and this trend has continued into recent times. Jerry O'Sullivan (1998) has observed that early church sites have been traditionally perceived by the Irish state bodies as 'enduring monuments' to be studied for their art and architecture, rather than places to be investigated as dwelling spaces within a complex landscape of settlements. Indeed, it could then be suggested that while contemporary secular settlements (e.g. raths) were frequently understood in terms of social organisation, dwelling practices and economy (Proudfoot 1961), the early Irish church was mainly interpreted in terms of its theology, belief and the art/architecture of its religious monuments.

In Northern Ireland, 'political self-consciousness' (Evans 1968, 7), also played an important role in defining the way in which archaeological excavation developed. Here the care of ancient monuments was entrusted to the Ministry of Finance, and although civil defence was a budget priority, an Advisory Committee (later an Advisory Council) was established in 1926 to deal with archaeology. The result of this was the creation in 1934 of the first regional archaeological survey in Ireland, which in turn led to the publication of 'A Preliminary Survey of the Ancient Monuments of Northern Ireland'' ('PSAMNI') (Chart 1940), which would form the basis for future archaeological surveys. State-funded excavations became an increasingly important aspect of archaeology in Northern Ireland from the 1950s onwards, and many of the excavations undertaken in the 1950s and early-1960s, by the archaeologists of the Historic Monuments Branch of the Ministry of Finance (N.I.), were focused on Co. Down in preparation for the production of the Archaeological Survey of Co. Down (Jope 1966). A similar excavation-strategy was planned at the same time to inform the recently published Archaeological Survey of Co. Armagh (Neill 2008), although only a handful of these were undertaken. In contrast to these research-led excavations, the excavations of early medieval sites including settlement enclosures at Rathbeg, Co. Antrim (Warhurst 1969) and Ballymurphy, Co. Antrim (Lynn 1977/79) in the late-1960s and 1970s were often development-driven in Northern Ireland, and were focused on the roadworks associated with the creation of the M2 motorway in south Co. Antrim and the A55 Belfast Outer Ring Road. In this sense they were prescient of the bulk of archaeological enquiries that would be undertaken thirty years later in the Republic.

State-funded excavations became an increasingly important aspect of archaeology in Northern Ireland from the 1950s onwards. Initially some of these, in the 1950s and early-1960s, were focused on Co. Down in preparation for the production of the *Archaeological Survey of Co. Down* (Jope 1966), with a similar excavation-strategy planned to inform the *Archaeological Survey of Co. Armagh* (to date unpublished), although only a handful of these were undertaken (Neill 2008). However, from the later 1960s, state-funded excavations on both sides of the border shifted more towards salvage excavations at traditional early medieval enclosed site-types, in advance of EU-supported farm improvement schemes, land reclamation projects and small-scale housing developments or road upgrades. The museums also regularly undertook limited rescue excavations, frequently following the discovery of unrecorded early medieval artefacts, burials, cemeteries and souterrains. Although these excavations were highly significant and often frequently promptly published in local and national journals, they again largely followed the earlier tradition of focusing on traditional early medieval recorded monuments such as enclosed raths, cashels, crannogs, souterrains and ecclesiastical sites. Since the 1980s, our perspective on early medieval settlement has been broadened by research and state-funded excavations at a variety of coastal and upland unenclosed house clusters at Ballutoag, Co. Antrim (Williams 1984), Bray Head, Co. Kerry (Mitchell, Hayden & Walsh 1998; Hayden 1998, 1999a, 2000a) and Barrees Valley, Co. Kerry (O'Brien 2009). George Eogan's large-scale mammoth excavations at Knowth, Co. Meath from the late 1960s to the late 1990s also produced substantial evidence for the morphological development of a royal settlement providing key chronological data about the evolution of house forms, the enclosed rath and the later unenclosed souterrain phase.

EU Membership and the origins and development of Commercial Archaeology

The Republic of Ireland's and the UK's membership of the European Economic Community (the EEC, latterly the European Union) has had a significant impact on archaeology on the island of Ireland since the 1970s. Much of this impact, particularly in the Republic of Ireland, was not fully established till the early 1990s, though EU-supported farm improvement schemes, land reclamation projects and small-scale housing developments provided the impetus for a rise in the number of state-funded rescue excavations on both sides of the border in the 1970s and 1980s. Throughout these decades, archaeologists from the National Monuments Service in Dublin were involved in various early medieval rescue excavations including those at a souterrain at Boolies Little, Co. Meath (Sweetman 1983); the ecclesiastical site at Lackenavorna, Co. Tipperary (Manning 1984); the settlement/cemetery at Millockstown, Co. Louth (Manning 1986) and the settlement enclosure at Dunbell Big 6, Co. Kilkenny (Foley 2006). Farm improvement grants from the European Economic Community also led to the full excavation of a number of highly significant enclosed settlement sites including Killyliss, Co. Tyrone (Ivens 1984a), Ballykennedy, Co. Antrim (Brannon 1980) and Coolcran, Co. Fermanagh (Williams 1985b) in Northern Ireland by archaeologists from the re-titled Historic Monuments and Buildings Branch, Department of Environment (N.I.). Staff from the Historic Monuments Branch also actively pursued important early medieval excavations on church-related settlements and many of these including Solar, Co. Antrim (Hurl 2002), Doras, Co. Tyrone (McDowell 1987), Dunmisk, Co. Tyrone (Ivens 1989) and Armagh (e.g. Gaskell-Brown and Harper 1984; Lynn 1988e). They were also subsequently published in the *Ulster Journal of Archaeology* and other journals.

Continuing a long tradition, the staff of the Ulster Museum and National Museum of Ireland also undertook small rescue excavations, frequently following the discovery of unrecorded early medieval artefacts, burials, cemeteries and souterrains (e.g. Kelly 1977a, 1977b). Of key importance was the fact that from the 1970s, urban redevelopment also began to reveal valuable information about the origins and topographical development of Ireland's major cities and towns. The National Museum's campaign of excavations of Viking and medieval Dublin at High Street, through the late 1960s and early 1970s (Ó Ríordáin 1971, 1974, 1984), culminated in the Woodquay and Fishamble Street excavations at the beginning of the 1980s in advance of the building of the Dublin Civic offices (Wallace 1984, 1987). A considerable area of the Scandinavian core of Waterford city was also excavated from 1982-1993 by archaeologists employed by Waterford Corporation and have been published collectively in a large monograph by Hurley, Scully & McCutcheon (1997). Urban redevelopment along Bride Street, in Wexford town, also revealed similar deposits (Bourke 1988/89, 1995; Bennett 2004/05) confirming Scandinavian settlement within the town. Urban redevelopment within the historic urban cores of Dublin, Waterford, Cork, Limerick and Wexford have transformed our understanding about the layout and development of plot boundaries, buildings, streetscapes, waterfront revetments and town defences at these sites.

Research excavations on early medieval settlements continued on through the 1970s and up into recent years, but never reached the scale that was witnessed by commercial archaeology in the Celtic Tiger boom years. Most early medieval research excavations were conducted by academics, often during summer over successive years, though staffs from the universities were increasingly drawn into commercially-led rescue excavations from the 1990s. University College Cork's tradition of investigating early medieval settlements has continued with excavations of settlement enclosures at Lisduggan North I, II & III (Twohig and O'Kelly 1972; Twohig 1990), Lisleagh I and II, Co. Cork (Monk 1988, 1995); a palisaded enclosure at Ballynagallagh, Co. Limerick (Cleary 2006), and at early church sites at Caherlehillan, Co. Kerry (Sheehan 2009) and Toureen Peakaun (e.g. Ó Carragáin 2006). UCD's George Eogan conducted highly significant excavations at Knowth, Co. Meath from the late 1960s till 2000 (e.g. Eogan 1968, 1973, 1974, 1977, 2004, 2007) while more recent research from the same university has focused on an early medieval (with Late Bronze Age and Iron Age occupation evidence) crannog at Coolure Demesne, Co. Westmeath (O'Sullivan, Sands and Kelly 2007). Some of the most prominent UCG research excavations included the investigation by Tom Fanning of an early medieval cashel at Rinnaraw, Co. Donegal (since published by Comber 2006). Various other Irish, British and American Universities have been involved in early medieval research excavations; and some examples include the University of Ulster's work at Nendrum, Co. Down

(McErlean and Crothers 2007) and the University of California, Berkeley's investigations at the monastery of Mainistir Chiaráin on Inis Mor, off county Galway (Ní Ghabhláin and Moran 1996; Ní Ghabhláin 1997, 1998, 1999).

The reform of EU structural funds in the later 1980s was a crucial development in Ireland as it received funding from EU Structural and Cohesion funds to support the upgrade of its infrastructure and regional development. These provided the financial support for a number of important large-scale infrastructural (e.g. Bord Gáis Gas Pipelines) and road projects, particularly in the south, leading ultimately to the first 'contract archaeology' excavations. From about the late 1980s, urban development and rural infrastructural development programmes began in earnest and, with the emergence of developer funding based on the "polluter pays" principle, archaeological companies devoted to mitigating development impacts were established or were expanded significantly.

For instance, the Bord Gáis Brownsbarn to Ballough Gas Pipeline (originally known as the Northeastern Pipeline) scheme in 1988 (and reinforcement works in 1999) led to the excavation of a series of previously unknown early medieval cemetery-related sites as well as souterrain complexes at Smithstown, Co. Meath (Gowen 1988b) and Dromiskin, Co. Louth (Halpin 1988). More recently, the pipeline to the west scheme has revealed a considerable range of early medieval sites from settlement enclosures at Cahernalee (Quinn 2002) and settlement/cemeteries at Gneevebeg, Co. Westmeath (Wallace 2002) and Augherskea, Co. Meath (Baker 2007). The M50 ring road in Co. Dublin was one of the earliest major road schemes in the Republic of Ireland. Since the mid 1980s, a variety of early medieval sites including enclosures at Scholarstown (Keeley 1985) and Glebe, Site 43 (Seaver 2005) have been excavated along its route. Work at various points along the N4 since the early 1990s has also led to the excavation of early medieval enclosures at Magheraboy, Co. Sligo (Ryan 2001; O'Neill 2003; MacDonagh 2005), Aghadegnan, Co. Longford (Carroll 1993), Cloongownagh, Co. Roscommon (Henry 1999; Lennon 2000), settlement/cemeteries at Marlinstown, Co. Westmeath (Keeley 1990, 1991) and Knoxspark, Co. Sligo (Mount 1994, 2002, 2010).

The 1990's: The establishment of new Protective Legislation and Codes of Practice for Archaeological Heritage

The European Convention on the Protection of the Archaeological Heritage, 1992 (commonly referred to as the Valetta Convention) attempted to place the archaeological resource of European Union member states under the protection of tighter planning legislation. This legislation was adopted and implemented by the Republic of Ireland (1997) and the United Kingdom (2000). It has had a massive impact on archaeological excavations on the island of Ireland, leading to the legislative incorporation of archaeology into the planning and pre-planning process; the standardisation of the licensing process in Northern Ireland and the Republic of Ireland, and the establishment of uniform codes of practice and conduct agreed with several state agencies as well as the commercial sector. The adoption of the Valletta Convention coincided with a massive upsurge in urban development and rural infrastructural construction in the Republic of Ireland, as the economy entered a phase of transformation (the 'Celtic Tiger' boom). New requirements of the planning process necessitated an increasing number of excavations as part of the mitigation of archaeological disturbance, the vast majority of which was undertaken by commercial companies. By the early-2000s, archaeology in the Republic had been utterly transformed from a largely academic or state-run profession, into a thriving commercial enterprise or professional industry, and archaeological practice had undergone a similar metamorphosis. The implications of the Valletta Convention have been less dramatic in Northern Ireland. This was partly because Northern Ireland did not fully benefit from the economic expansion of the 'Celtic Tiger', and also because the 'Troubles' (and their immediate aftermath) were brakes on internal investment and development.

Since the early 1990s, some of the universities established affiliated commercial excavation units and it is this development which has contributed towards the rise of university-related early medieval excavations in this period. University College Cork's Archaeological Excavation Unit has been the most prolific with notable early medieval excavations of settlement enclosures at Dromthacker, Co. Kerry (Cleary 2008) and Scrahane, Co. Kerry (O'Donnell 1997, 1998). In recent years, QUB's Centre for Archaeological Fieldwork have also undertaken excavations at various church sites, such as Boho, Co.

Fermanagh (Donnelly *et al* 2003) and Armoy, Co. Antrim (Ó Néill 2004b; Nelis 2005), and an early medieval unenclosed dwelling at Terryhoogan, Co. Armagh (McSparron 2007) in close proximity to an early ecclesiastical site. The now defunct UCD-established Irish Archaeological Wetland Unit surveyed and excavated a number of crannogs including Bofeenaun (Moloney and Keane 1992) and Frenchgrove, Co. Mayo (McDermott 1998a) from 1990-2005. Recent state-sponsored conservation and rescue works, at Clonmacnoise, Iniscealtra and Ardfert and research projects, at Illaunloughan and High Island, have also uncovered a wealth of new information about habitation, industry and agriculture at a variety of early medieval church sites from major establishments, dependent foundations to smaller hermitages and monasteries.

Digging through the Celtic Tiger boom: the mitigation of Infrastructural and Commercial Projects, c.1995-2010

During the years of the so-called 'Celtic Tiger' boom of the late 1990s to the mid 2000s, major residential, commercial and infrastructural projects occurred. Whereas previous excavations were small-scale and occasionally even seasonal, the massive physical scale and duration (several excavations running, non-stop, for years at a time) of archaeological excavations in advance of these infrastructural road and commercial projects has led to the discovery of an array of previously unknown early medieval archaeology, from unenclosed habitations, field systems, watermills, cereal-drying kilns and metalworking-related features, beyond the bounds of the traditionally excavated sites such as enclosed settlements and ecclesiastical sites. The construction of the various motorways (M1, M3, M4, M7, M8 and M9 for example) has particularly uncovered a whole array of early medieval settlements.

The construction of the M1 and M4 were two of the earliest of these major NRA-directed road schemes taking place in the early 2000s. A significant number of early medieval sites was excavated along the M1 (See Roycroft 2005), including enclosures and souterrains at Carn More, Faughart, Co. Louth (Delaney 2003), Newtownbalregan 6, Co. Louth (Bayley 2003) and Whiterath 2, Co. Louth (Ó Drisceoil 2000), Balgatheran 1 (Chapple 2000:0638), Tateetra, Co. Louth (Hayes 2006) and Sheephouse, Co. Meath (Moore 2001a), an early medieval unenclosed settlement/industrial site at Platin, Co. Meath (Conway 2001; Lynch 2000, 2001), settlement/cemeteries at Balriggan (Delaney and Roycroft 2003; Delaney 2010) and Faughart Lower, Co. Louth (Bowen 2008), as well as various other sites. Archaeological excavations along the route of the M3 Clonee-North of Kells road scheme (See Deevy 2005, 2006, 2008; Kinsella 2008) also revealed significant enclosed settlements in Co. Meath, such as at Roestown 2 (O'Hara 2007, 2009b), Baronstown 1 (Linnane and Kinsella 2009b), Dowdstown 2 (Cagney and O'Hara 2009), Castlefarm 1 (O'Connell 2006, 2009a) and Garretstown 2 (Rathbone 2007) and a souterrain and cereal-drying kilns at Lismullin 1 (O'Connell 2007a, b, 2009c). Many of the M3 sites have been published in interim format, revealing the dynamism and change that many early medieval settlement enclosures underwent between the sixth and the tenth centuries AD.

The construction of the Kilcock-Enfield-Kinnegad (KEK) M4 road scheme in the early 2000s uncovered early medieval enclosed settlement at Killickaweeny 1, Co. Kildare (Walsh and Harrison 2003; Walsh 2008), a settlement/cemetery at Johnstown 1, Co. Meath (Clarke and Carlin 2008; Clarke 2010). Recent archaeological investigations along sections of the M6 between Kinnegad, Kilbeggan, Athlone and Ballinsaloe uncovered the curing enclosing ditches of a significant ecclesiastical site at Clonfad 3, Co. Westmeath (Stevens 2006, 2007, 2010) and a multi-phase enclosed site at Cappydonnell Big, Co. Offaly (Coughlan 2007, 2009) while further west, the N6 Galway-Ballinasloe road improvement Scheme in county Galway (2005-06) has discovered earthen and stone settlement enclosures at Mackney (Jones 2004; Delaney 2005a, 2009), Coolagh (Hardy 2005), Rahally (Mullins 2005, 2008) and Lougbown (Delaney 2005b, 2005c; Dillon, Johnston and Tierney 2007) and settlement/cemeteries at Treanbaun and Carrowkeel, Co. Galway (O'Sullivan 2006, 2007a, 2007b; Wilkins and Lalonde 2008).

Excavations along the M7/M8 section (See Courtney 2006) have revealed a settlement/cemetery site at Parknahown 5 (O'Neill 2007, 2008, 2010), a possible previously unidentified ecclesiastical site at Killeany (Wiggins 2006) as well as other enclosed settlements and cereal-drying kilns in the townlands of Lismore/Bushfield, Derrinsallagh and Parknahown (See Desmond 2006, 2007 for

overview). Further west, the sections of the new M7 between Borris in Ossory, Roscrea and Nenagh and Limerick city have uncovered unrecorded early medieval enclosures and cereal-drying kilns at Killalane, Co. Limerick and Sallymount, Gortybrigane, Carrigatogher Harding and Killeisk, Co. Tipperary (O'Keeffe 2007; Roycroft 2008) and an early ecclesiastical site or settlement/cemetery at Camlin 3, Co. Tipperary (Flynn 2009). Previous to these excavations, unrecorded early medieval enclosures were also investigated at Newtown, Co. Limerick (Coyne and Collins 2003; Coyne 2006) and Coonagh West (Taylor 2007) in advance of the construction of the N7 Limerick City Southern Ring Road.

The route of the M8, from Cullahill in County Laois to Dunkettle in County Cork, has uncovered enclosed settlements at Hughes' Lot East/ Kilscobin, Co. Tipperary (Fairburn 2003), Skahanagh North 3, Co. Cork (Murphy 2003) and Ballybrowney, Co. Cork (Cotter 2005) and early medieval round houses and metalworking debris at Gortnahown 2 along the Mitchelstown bypass (Johnston and Tierney 2008). A link road for the M8 Culahill-Cashel Road Scheme has also recently revealed an early medieval settlement/cemetery at Twomileborris, Co. Tipperary (Ó Droma 2008). Archaeological investigations in advance of the N2 Finglas-Ashbourne road scheme (see Fitzgerald 2006a, 2006b) revealed an early medieval enclosure at Cookstown, Co. Meath (Clutterbuck 2004), an extensive settlement/cemetery at Raystown, Co. Meath (Seaver 2006, 2010) and a road realignment of another section of the N2 between Carrickmacross and Aclint led to the discovery of an enclosed settlement at Lisanisk 2, Site 108, Co. Monaghan (Coughlan 2003).

Recent archaeological investigations along the newly opened N9/N10 Kilcullen-Waterford Road Scheme has discovered early medieval settlement enclosures at Ballyvass, Co. Kildare (Doyle, 2008, 2009) and Ballybannon, Co. Carlow, and the curving enclosure ditch of an early ecclesiastical site at Busherstown, Co. Carlow (Dunne 2007). Other early medieval enclosed settlements have been excavated at Lislackagh (Walsh 1992), in advance of the N5 Swinford Bypass Road; Cloonaghboy and Lowpark along the N5 Charlestown Bypass (Gillespie 2007, 2009; Gillespie and Kerrigan 2010); Castlegar, Co. Mayo (Zajac and Scully 2004) along the N17 Knock-Claremorris Road Bypass; Kilcloghans, Co. Galway (McKinstry 2008) in advance of the N17 Tuam Bypass; Carrowkeel, Co. Mayo (Zajac 2002, 2003) along the N59 Moylaw-Crossmolina Road Realignment; Rochfort Demense, Co. Westmeath (Channing 2007) on the N52 Mullingar Belvedere Road Improvement Scheme; Ballynacarriga 1 (Noonan 2001; Noonan *et. al* 2004) along the N25 Youghal Bypass; Curraheen 1, Co. Cork (Danaher 2002, *forthcoming*) for the N22 Ballincollig Bypass and Leggetsrath West, Blanchfieldsland, Co. Kilkenny (Lennon 2006) for the N77 Kilkenny Ring Road Extension. A portion of an enclosed ecclesiastical site has been excavated at Kill St. Lawrence, Co. Waterford (O'Connell 2004), in advance of the R708 Waterford Airport road schemes and a Viking *longphort* at Woodstown 6 (O'Brien and Russell 2004, 2005; O'Brien *et al* 2005), in advance of the N25 Waterford Bypass Road. An early medieval enclosed site at Cahircalla More, Co. Clare was investigated along the route of the N18 Ennis Bypass and N85 Western Relief Road (See Hull & Taylor 2005, 2007), while a settlement/cemetery site at Owenbristy, Co. Galway and enclosures and kilns at Curtaun, Co. Galway (Delaney *et al* 2009) were uncovered in advance of the N18 Oranmore–Gort–Crusheen road schemes.

There have been a considerable number of excavations in Dublin city and county in advance of the construction of large-scale residential projects, industrial estates and urban redevelopment initiatives in recent years. Some notable early medieval excavations in advance of major industrial and residential developments include those at a settlement/cemetery at Mount Offaly, Cabinteely (Conway 1999); an early medieval cemetery and possible Scandinavian settlement at Cherrywood & Loughlinstown (Ó Néill 1999, 2006; Ó Néill and Coughlan 2010) and a large multi-ditched enclosure complex, at Rosepark, Balrothery, north county Dublin (Carroll 2008).

It is evident that counties Meath and Louth have seen a high proportion of early medieval excavations, undoubtedly because of their proximity to Dublin City with its multiple development pressures. Recent residential and development pressures in towns and villages in Meath have uncovered a range of settlements including a souterrain complex at Athlumney, Navan (O'Sullivan 1997; Jones 1999); an enclosure and cemetery at Bettystown, Co. Meath (Kelly 1977/79; Eogan, 1998; Clarke, 2001; Halpin, 2002; Kieran, 2004; Lehane, 2004; Murphy 2004, 2005) and settlement/cemeteries at Ninch, Laytown (McConway 2002a, 2002b, 2010) and Ratoath (Wallace

2010). Similar excavations at Haggardstown (Campbell 1994; McConway 1995; McLoughlin 1999; Moore 2001b; O'Carroll 1999; Walsh 2002) and Marshes Upper (Campbell, 2002; Gosling 1980/84a & 1980/84b; Mossop 2002a, 2002b, 2002c; Gowen 1992; McCormick & Crone 2000) have revealed intensely settled early medieval landscape of souterrains, enclosures, field systems and agricultural/industrial features in county Louth.

Similarly the development of Cork City may account for a number of important excavations of early medieval enclosures in its general hinterland at Carrigaline Middle (Sherlock 2001, 2002, 2003), Carrigrohane, Ballincollig (Moloney 2003), Killanully (Mount 1995) and Raheens I and II (Lennon 1993, 1994). It would be tempting to assume that the majority of excavations in counties Antrim and Down were associated with the expansion of Belfast, Lisburn and other major towns since the 1980s. However a substantial portion of these were undertaken as research excavations in earlier years, either by Queen's University, Belfast, or as part of the Archaeological Survey of Northern Ireland. There have, however, been a series of significant excavations around the ecclesiastical cores of Armagh City, Co. Armagh (Gaskell-Brown and Harper 1984; Crothers 1999; Hurl 2003; Lynn 1977; Lynn 1988e) and Downpatrick, Co. Down (Brannon 1986, 1987, 1988a, 1988b, 1997; Delaney 1975; Halpin 1998; Ó Baoill 1992; Proudfoot 1954, 1956).

Since the 1990s, significant Viking deposits have been revealed in all of the major towns. The excavations within the Scandinavian core of Dublin from the 1970s to late 1990s have been synthesised recently by Linzi Simpson (2000). Since then other notable excavations include those by Simpson (2003, 2004), Gowen (2001), Walsh (2001), Hayden (2002), McMahon (2002), Meenan (2002, 2004), Ó Néill (2004a), Cryerhall (2006) and O'Donovan (2008). Excavations of Scandinavian deposits have equally continued apace in Waterford city with notable excavations by Moran (1999), O'Donnell (1999), Hurley (2001a), Scully (1998, 1999) and Wren (1998, 2000, 2001, 2002). Similar urban settlement evidence has been uncovered in the estuarine marshy islands and mudflats of Cork city, with major excavations from the 1970s to the early 2000s described in key publications (e.g. Cleary *et al* 1997; Hurley 1998; Cleary and Hurley 2003). Other important Scandinavian excavations within the city have been recently included in the excavation bulletin reports (e.g. Kelleher 2002, 2004; Ní Loingsigh 2003, 2005). Evidence for Scandinavian urban settlement has also been discovered in the area of King's Island, the historic core of Limerick city, around St. John's Castle and St. Mary's Cathedral (e.g. Wiggins 1990, 1991, 1993, 1994, 1995, 1996, 1997, 1998, 2000; Hodkinson 1990, 1992; Hanley 1997) while more recent possible areas with Hiberno-Scandinavian archaeology from Wexford town include Barrack Street and May's Street (Wren 1994, 1995) and North Main Street (Sheehan 2002).

In contrast, the number of government-funded early medieval excavations has remained generally static even through the 'boom' years in recent times. In Northern Ireland, the newly formed Environment and Heritage Service in Belfast adopted a more supervisory role though continued to be involved in excavations at various sites such as Aghavea church, Co. Fermanagh (Ó Baoill 2000a, 2000b) and a settlement enclosure at Drumadoon, Co. Antrim (McSparron and Williams 2004, 2009, 2010). In 1991, the Discovery Programme was established as a non-statutory, research body at the behest of the then Taoiseach, Charles J. Haughey. Its research on 'Western Stone forts', 'Medieval Rural Settlement' and 'Lake Settlement' has resulted in investigations of early medieval stone and earthen enclosed settlements and crannogs at Dún Eoghanachta, Inishmore, Aran Islands, Co. Galway (See Cotter 1993, 1994, 1995a, 1995b, 1995c, 1996), Tulsk, Co. Roscommon (Brady and Gibson 2005), and Lough Kinale, Co. Westmeath (Fredengren, Kilfeather & Stuijts 2010). Excavations in the Ballyhoura Hills at Chancellorsland, along the Tipperary/Limerick/Cork border (Doody 2008), revealed a prehistoric/early medieval settlement complex. Other heritage-council supported excavations have been undertaken, including those recently at the site of an early medieval cashel at Caherconnell, Co. Clare, in conjunction with staff from TVAS Ireland (Hull and Comber 2008).

The end result of these legislative changes, and the subsequent expansion in archaeological investigations (enumerated above), has obviously seen a substantial increase in the number of sites excavated since the mid-1990s. The large-scale excavations on certain projects – especially road schemes and gas pipelines – have also investigated wider aspects of contemporary landscape archaeology than would normally not have been encountered during site-specific research

excavations. Significantly, these archaeological excavations were now also being carried out on sites other than the traditional monuments (ringforts, churches) that had been the focus for generations, and new forms of evidence (e.g. isolated ironworking hearths, charcoal pits, unenclosed settlements, cemeteries and settlement/cemeteries) began to be recognised. Out of this new excavated evidence is an emerging awareness of the diversity of early medieval Irish settlement enclosures which have been traditionally lumped together as 'ringforts' by archaeologists, particularly in the south. Though there has been some debate about the possible discovery of new settlement types such as 'plectrum-shaped enclosures' (Coyne and Collins 2003; Collins and Coyne 2007), more recent publications have sought to break away from attempting to classify these sites to instead emphasising their diversity and unique cultural biographical trajectories through time (Kinsella, 2010; Fitzpatrick 2009; O'Sullivan and Nicholl 2010).

Conclusions: changing excavation strategies and the development of the early medieval archaeological resource, 1930-2010

It seems clear that a number of key developments and events were crucial in the evolution of archaeological excavation strategies since the 1930s – and that these transformed our understanding of early medieval settlement in Ireland. The advent of the Harrvard Archaeological Expedition brought new archaeological methods and techniques, a confidence in large-scale excavation and the resources to investigate, analyse and publish key early medieval site types. In the following decades, some well-known Irish archaeologists pioneered archaeological excavations of classic site types and developed models of early Irish society that have barely been criticised until recently. With the emergence of EU-derived legislation and cultural heritage and environmental policies, new standards of archaeological excavation were imposed. A key development in this period was the reform of the EU Structural Funds in the later 1980s leading to increased capital expenditure on regional development, infrastructure and human resources. The large-scale excavations of blocks of Viking Dublin, Waterford and Cork also introduced the concepts of 'urban archaeology' and 'zones of archaeological potential' within Ireland's historic towns, ultimately leading to the formation of the urban archaeological survey of Ireland (Bradley 1984c). The adoption of the Valetta convention lead to the legislative incorporation of archaeology into the planning and pre-planning process introducing new forms of protection for archaeological 'Sites and Monuments' across the island. In real terms this has meant that new forms of 'testing' and 'monitoring' excavations, under the supervision of licensed archaeologists, have been undertaken *near* and within the delineated boundaries of known protected monuments (e.g. enclosed settlements, souterrains and ecclesiastical sites), in advance of any form of development initiative (from a once-off house to large-scale residential estates).

Ultimately, with significantly stronger planning and management strategies, the adoption of codes of practice with state agencies, a highly trained, skilled and above all young archaeological profession engaged in innovative, large-scale archaeological excavation projects that were seen throughout the island in the 1990s and 2000s (See O'Sullivan, McCormick, Kerr & Harney 2008; O'Sullivan, McCormick, Kerr & Harney 2009). Given the scale and detail (in amounts and spatial extent) of archaeological excavations and the widespread application of geophysical techniques, particularly along these infrastructural road and commercial projects, an array of previously unknown archaeological evidence from unenclosed habitations, settlement/cemeteries to field systems, watermills, cereal-drying kilns and metalworking-related features, have been discovered well beyond the bounds of the cartographic circles used to denote sites such as ringforts/raths and ecclesiastical sites, traditionally recorded in the Sites and Monuments Record of both jurisdictions (RMP and SMRNI) and scheduled monuments. The methodologies of these commercial sector archaeological excavations using a range of archaeological techniques – trial trenching, monitoring, large-scale open-area excavations and geophysical survey-work – have brought to light a whole new array of evidence which has yet to be properly integrated into recent archaeological narratives of early medieval Irish settlement. The accepted hierarchies of secular settlement have been challenged by the discovery of hitherto unrecognised site-types; the perceived uniformity of farming life and economic practices have unravelled; and perceived church-control over burial practices has been weakened by the identification of settlement/cemeteries and much more variable burial practices. The

full implications of the data collected from these excavations have not yet been fully realised or synthesised, and it is our hope that this volume will assist in that process.

Chapter Two: Early Medieval Houses and Buildings in Ireland

Introduction

Early medieval houses and dwellings were important places of human life where the household slept, ate food, gathered for social occasions and extended hospitality to their wider kin and neighbours. There in the fullness of day or darkness of night, families and friends gathered to prepare food, work bone and wood, embroider textiles, play board-games or listen to songs and stories about the past around the glowing flames of the burning fireplace. Through observing the ways of the household, young boys and girls were socialised to behave in particular ways, understand their own particular places in the world and appreciate how their society worked. In this sense then, early medieval houses and dwellings were – as they are today – key venues for the enactment or performance of social identities of ethnicity, social status, gender, kinship and community (Frazer and Tyrrell 2000; O'Sullivan 2008, 225; O'Sullivan and Nicholl 2010).

Early Irish laws, narrative literature, and hagiography provide a range of anecdotal detail about the character of houses and the activities within them (Murray 1979; Ó Corráin 2004, 551-53). The early medieval narrative literature, particularly the *echtrae* (adventure tales) and *immrama* (voyage tales), vividly describe some fantastic otherworldly houses with multiple doorways, massive fires, cauldrons of food, fine textiles, and silver and gold brooches hanging on the walls (O'Sullivan 2008, 227). In the saga literature, these mysterious houses were frequently venues for great royal banquets and where heroes meet with sexually predatory women. For instance, in the ninth-century tale *Tochmarc Becfola* a man and woman first eat a magical meal and then lie chastely together until morning in a mysterious house on an island with beds and cubicles (Bhreathnach 1984). Since there is little or no archaeological evidence for these fantastic otherworldly structures, we may assume that they are imaginary or metaphorical houses, clearly owing more to the demands of moralising and story-telling than to any real-life dwellings (O'Sullivan 2008, 227-28). Nonetheless, they do provide intriguing insights into contemporary social norms and early medieval *mentalités* relating to houses with their vivid descriptions of internal furniture and decorative features (O'Sullivan 2008, 228; O'Sullivan and Nicholls 2011).

The seventh and eighth century early Irish law tracts provides a more trustworthy account of houses in the early medieval period, as they are concerned with what property people should own and what fines are due for damaging, for example, a house's *imdae* ('bed'). The most famous of these law tracts – the early eighth-century text *Críth gablach* - provides some intriguing details about the size of houses, their construction details and the types of tools and domestic equipment used within them (MacNeill 1923, 281-311; Binchy 1941). It also strongly emphasises social status, gender and the organisation of social space within these buildings and it is clear that people were meant to know where to sit, move, and work, using such fixtures and features as doorways, hearths, and seating arrangements, to orientate their movements around these dwelling spaces (O'Sullivan 2008, 228; O'Sullivan and Nicholl 2010).

However, in addition to these historical sources, there now exists a considerable corpus of archaeological evidence – much now published - which permits a more comprehensive understanding of the shape, size, building materials and use of internal features in early medieval dwellings. Excavations have uncovered these dwellings in a wide range of rural settlement sites, primarily within raths, cashels and other enclosures but also in crannógs, promontory forts, monasteries and isolated or unenclosed settlement contexts. These dwelling places are crucial cultural artefacts which can also provide considerable information about domestic life, crafts and industry, as well as evidence for the social and ideological organisation of space (Lynn 1978a; Wallace 1992a; O'Sullivan 2008; O'Sullivan and Nicholls 2011).

History of Research and Excavation

There is excellent evidence for dwelling spaces and structures in both the rural and urban landscape in this period, particularly between the seventh and the eleventh century AD (in contrast with both the Iron Age and the later medieval period). Since the 1920s, there has been a strong tradition of excavating early medieval rural settlement sites, partially because of the very visible evidence of early medieval sites, particularly raths and cashels, in the Irish landscape. In the Irish Free State (and latterly Irish Republic) in particular, this tradition was also driven by a considerable popular and scholarly interest in existence of a pre-Norman early medieval Irish Golden Age (See O'Sullivan 1998, 178-81); and it was this ethos which shaped much of the early archaeological and historical research of this period till at least the 1970s. Traditionally, these excavations of domestic dwellings have been concentrated in the north-east and south-west of Ireland (Lynn 1994, 81) due to the active involvement of academic and government institutions in these areas; however, this pattern has changed in recent times with much new information from the midlands, though evidence from other areas, noticeably South Leinster and west Ulster and Connacht is still largely lacking.

Given the flimsy nature of these buildings, it is unsurprising that many excavated early medieval sites have produced little clear evidence for these post-and-wattle or stone-built structures. Many of the earliest excavated sites such Garranes, Co. Cork (Ó Ríordáin 1942, 86-87) and Ballycatteen, Co Cork (Ó Ríordáin and Hartnett 1943, 12) only uncovered scatters of post-holes and stake-holes that did not produce coherent house plans. The poor quality of early archaeological excavations of early medieval crannogs (e.g. Craigywarren, Lagore, Ballinderry crannogs Nos 1 & 2) also tended to obscure the numbers of houses known from such sites; however, more recent excavations at Moynagh Lough, Co. Meath (e.g. Bradley 1991) and Sroove, Co. Sligo (Fredengren 2002) have shown that houses can also be located in these places. By the 1970s, excavations in both rural and urban early medieval contexts had produced a large corpus of excavated domestic buildings and outhouses which permitted some initial interpretations to be made about their form, dating, chronology, origins and associations.

Chris Lynn (1978a) undertook the first initial survey of these buildings and had identified over 160 excavated early medieval rural domestic houses and ancillary structures by the end of the 1970s. Relatively few of these sites had produced complete ground plans of early medieval structures and frequently these could only be inferred from the existence either of annular gullies, circles of close-set stake-holes, or a scatter of posts and stake-holes with perhaps an associated hearth and occupation area (Lynn 1978a, 29). By 1994, Lynn recorded over 250 ground plans, usually fragmentary, of small early medieval rural buildings, either of round or rectangular plan and constructed in a variety of ways using wickerwork, timber, drystone, walling and even clay or turves (Lynn 1994, 81). Since the early 1990s, the number of known early medieval rural domestic buildings has exploded during the years of the 'Celtic Tiger' economic boom. Initial EMAP research – based mostly on excavation bulletins reports - would now indicate that over 600 early medieval houses have now been excavated on rural settlement and ecclesiastical sites (O'Sullivan *et al* 2008, 109; O'Sullivan and Nicholl 2011).

While early medieval rural 'Irish' circular and roundhouses have been excavated across the country since the early twentieth century, our knowledge of Scandinavian buildings in Irish contexts has only emerged during urban redevelopment projects over the last forty years. Since then a large number have been excavated, nearly all from within the major Norse or Hiberno-Scandinavian towns of Dublin and Waterford in particular, followed by Cork and to lesser extents Wexford and Limerick. Initial EMAP research indicates that *c.*550-600 Scandinavian buildings were excavated in Ireland up to 2004 (O'Sullivan *et al* 2008, 112). Scandinavian Dublin has witnessed the most extensive and longest history of urban excavations in Ireland. Here, Wallace (1992a, 7) identified over 200 Scandinavian buildings excavated between 1961-82 at the sites of Winetavern Street, St. John's Lane, Fishamble Street, Christchurch Place, High Street and Dublin Castle. In more recent years, extensive excavations at Temple Bar West, Exchange Street/Parliament Street and Werburgh Street have uncovered many others and there are probably over 450 Scandinavian buildings now known from the Scandinavian core of this city (See Simpson 2000; O'Sullivan *et al* 2008, 112-17; Kerr *et al* 2009, 210-26).

Ground plans of over another 120 Scandinavian buildings have been excavated in the historic core of Waterford; and the vast majority of these were investigated during the large-scale redevelopments in the heart of the city around Arundel Square and Peter Street in the late 1980s and early 1990s (Scully

1997a, 34; Kerr *et al.* 2009, 611-35). Over 30 others are known from Cork city and have been uncovered mainly on the South Island along South Main Street, Tuckey Street, Washington Street and Hanover Street since the mid 1990's (Cleary, Hurley and Shee Twohig 1997; Cleary and Hurley 2003; Kerr *et al.* 2009, 116-33). A smaller number of Scandinavian buildings have been investigated at Wexford, particularly along Bride Street (Bourke 1988–1989; 1995; Kerr *et al.* 2009, 659) and from the Scandinavian site at St. John's castle in Limerick city (Wiggins 1990).

Domestic Houses in Early Medieval Rural Settlement Enclosures

Houses in early medieval rural settlement enclosures, c. A.D. 400-800

There is a good understanding of the architectural development of early medieval houses in terms of their shape, size, building materials and the organization of internal features (Lynn 1978a; 1994; O'Sullivan 2008; O'Sullivan and Nicholls 2011). The earliest houses (i.e. AD 400-800) were usually round-houses reflecting a long tradition which probably stretched back into late prehistory, until rectilinear buildings emerged in importance in the ninth and tenth centuries (Lynn 1978a, 37; 1994, 83). Early medieval round houses in Ireland were typically constructed of stone or post-and-wattle walls, with wooden poles for joists and roofs of thatch of reed, turf or straw. Most were fairly small (typically 4-6m in diameter) although some were larger (6-10m in diameter). The enclosed house space was typically about 45m^2, comprising a single small room (Lynn 1991; 1994, 91; O'Sullivan 2008, 231). Some of the walls of these domestic structures were constructed with two closely concentrically placed wattle walls with the space between packed with soft organic materials – straw, moss, and heather (O'Sullivan 2008, 251).

There have been a considerable number of excavated early medieval round post-and-wattle 'rural' buildings and many of the most widely known published sites have been summarised by Lynn (1994), O'Sullivan (2008) and O'Sullivan and Nicholls (2011). However, recent excavations have uncovered more. The first early medieval phase at an enclosure complex at Ninch, Laytown, Co. Meath, for example, revealed circular wattle-and-daub houses varying from 4.6m - 10m in diameter (McConway 2002b). A circular house (I) defined by an arc of packed postholes, 6m north-south by 5m east-west, was excavated at the enclosed settlement of Killickaweeny, Co. Kildare (Walsh 2008, 34-35). The foundations of a round house defined by a slot-trench, 7.8m in diameter, was excavated at the ecclesiastical site of Dunshaughlin, Co. Meath and preceded a dumped industrial deposit dated to between AD 615-705 (Simpson 2005, 230-33); and a post-and-wattle roundhouse (6.25m diameter), was uncovered at another ecclesiastical site at Doras, Co. Tyrone (McDowell 1987, 138-44).

Despite the claims of the early Irish narrative literature for great banqueting halls, palatial buildings and otherworldly structure with multiple doorways, there is no archaeological evidence for the massive contemporary longhouses found in southern Scandinavia, northern Germany and the Netherlands (Hamerow 2002, 12-26). Initially, these northern European buildings, often oriented east-west contained a living quarters at the west end, a central entrance 'hall' with opposing doorways and an animal byre at the east with two rows of internal posts supporting the roof and dividing the interior into three aisles. In the courses of the seventh-tenth centuries, these aisled structures were generally replaced by fully framed, often bow sided, 'single-span' farmhouses with no internal uprights or attached byres ('Warendorf house'). One fifth-century long house at Flögeln-Eekhöltjen in Lower-Saxony measured 63.5m in length and a seventh-tenth century hall at Lejre (on the island of Zealand) was up to 4 m in height and was comparable in floor space (550m²) to the Carolingian palaces at Paderborn and Frankfurt (Hamerow 2002, 12-19). Although Anglo-Saxon buildings in England were smaller and less complex than the continental longhouses, they were still quite different to contemporary Irish round houses. Anglo-Saxon buildings were typically sub-rectangular in plan, *c.* 10-12m in length. They also lacked cattle byres and supported the weight of the roof on the walls instead of on internal rows of posts. (Hamerow 2002, 46-51). The first large halls with floor spaces of over 150m² appeared *c.* 600; and one of the most famous of these was excavated at Yeavering in Northumberland (Hope-Taylor 1977).

In contrast then, large round houses in early medieval Ireland are generally rare although one of the largest known examples, 11.2m in external diameter, was uncovered at an important crannóg at

Moynagh Lough, Co. Meath, which was occupied between the sixth and ninth century (Bradley 1991; 1993; 1994–1995; 1997; 1999; see also O'Sullivan 2008, 244-49). At a rath at Lissue, Co. Antrim, the excavator Bersu (1947, 42-47) interpreted a large number of post-holes in the interior as forming concentric circles. Based on previous excavations in the Isle of Man, he suggested that these represented a circular structure, *c.*40m in diameter, which would have covered the entire interior of the enclosure (*ibid*). However, no other such structure has been identified in an Irish context, and the practice of using a ring of internal roof-supports to support a wide roof span (as was common on Iron-Age British sites) never appears to have been employed in Ireland (Lynn 1994, 88). The Lissue structure remains therefore, to be properly explained.

Generally, there appears to have been no effort made to erect significantly large round houses in early medieval Ireland. Instead, early medieval builders, from the sixth-tenth century, often choose to construct a second, circular wicker or post-and-wattle structure and attach it to the larger house, to create a conjoined figure-of-eight shaped structure. This backhouse or *cuile* may have been used as a kitchen, sleeping area or private or exclusive space (O'Sullivan 2008, 231); the term *aircha* has also been used to describe a 'backhouse' or kitchen (Richey *et al.* 1879, 305) though MacNeill (1923, 288) has translated it instead as 'outhouse'. Numerous examples of early medieval conjoined post-and-wattle buildings have been identified at various enclosures and raths, including Lisleagh I and II, Co. Cork (Monk 1988, 59; 1995, 111), Deer Park Farms, Co. Antrim (Lynn and McDowell 1988a), Dressogagh, Co. Armagh (Collins 1966), Newtown, Co. Limerick (Coyne and Collins 2003, 18) and Corrstown, Co. Derry (Conway *et. al* 2007) and at the ecclesiastical sites of Illaunloughan, Co. Kerry (Marshall and Walsh 2005, 12-15), Caherlehillan, Co. Kerry (Sheehan 1998) and Ballybrolly, Co. Armagh (Lynn 1983a). The cultural origins of these seventh-eighth century conjoined figure-of-eight buildings are unknown but there are some possible parallels with earlier, Iron Age ritual structures in Ireland, as well perhaps, a number of drystone 'cellular' structures with similar plans and date range at sites in north-west Scotland, including Buckquoy in Orkney, Yarrows, Caithness and the Udal, North Uist (Ritchie and Ritchie 1981, 176-81; Lynn 1994, 88).

Houses in early medieval rural settlement enclosures, c. A.D. 800-1100

It is generally thought that there was a significant change from the use of round houses to rectilinear houses after about A.D. 800 (Lynn 1978a, 37; 1994, 83-86; O'Sullivan 2005a, 224-26). These rectilinear houses were typically built in stone, earth or turf, with an average measurement of 6-8m in length. They were simply constructed using low drystone walls or kerbs of boulders on edge, perhaps retaining low walls of clay or turf, with internal wooden poles to support roof of reed, turf or straw. These houses are frequently paved, or had parts of their floors lined with stone slabs and were often associated with souterrains (Lynn 1994, 92; O'Sullivan 2008, 231-32; O'Sullivan and Nicholls 2011). By the end of the early medieval period (tenth-twelfth centuries), rectangular houses built in stone or turf were normal and round houses much rarer.

Roundhouses tend to be associated more frequently with early medieval raths which are generally viewed as being primarily occupied from A.D. 600-900 (Stout 1997). However, rectilinear buildings also occur in these enclosed settlement contexts, but where they do, it is often possible to demonstrate that they were preceded by an earlier phase of round buildings, indicating that they were probably built towards the final phase of occupation (Lynn 1994, 92). In enclosed settlement sites, it is also often recognised that the primary (and often largest) domestic round house tend to be located towards the centre of enclosures, while rectilinear houses are frequently found closer to entrances or towards the sides of these enclosed spaces (Lynn 1994, 92; O'Sullivan 2008, 232; O'Sullivan and Nicholls 2011).

The reasons for the transition in architectural styles in the ninth/tenth century from rounded houses to rectangular houses remain unclear. External influences from contemporary Anglo-Saxon England, where rectangular houses dominate the record, has been advanced as an explanation (Lynn 1978a, 38), but this is perhaps unlikely as these forms of domestic buildings were in widespread use in England and northwest Europe well before the ninth century (see Hamerow 2002, 12-51; O'Sullivan and Nicholls 2011). Influences from the Irish Scandinavian towns, where rectangular houses were almost exclusively built, have also been suggested and it is evident that if exotic foreign prototypes

did precipitate this change in house form, it is likely that they may have manifested themselves first in these cosmopolitan towns. However, it is clear that these wicker and plank-built aisled structures contrast markedly with rural rectangular houses, predominantly made with stone and earth walls or footings (Lynn 1994, 85), weakening any direct comparisons between both these house types.

Christian concepts of rectilinearity have also been mooted as an idea. Churches from the beginning of the early Christian period were rectangular in plan, which may have inspired domestic dwellers to gradually imitate this building form (Lynn 1978a, 38; 1994, 86-88). It is perhaps more likely that this architectural shift related instead to other significant social and ideological changes in eighth and ninth century Ireland which involved an increasing centralisation of power in larger dynasties, an increased focus on smaller familial groups, and more restrictive or individualistic land ownership and social practices. Rectilinear buildings were more easily subdivided into 'rooms' or compartments than round houses and may have been built in order to express these changing social ideas about personal status, wealth and concepts of private space in this period (O'Sullivan 2008, 232; O'Sullivan and Nicholls 2011).

The progression in sequence from round to rectilinear houses is evident, for example, at various raths and cashels such as Dunsilly, Co. Antrim (McNeill 1991–1992, 110-11), Rathmullan, Co. Down (Lynn 1981–1982, 65) and Ballynacarriga, Co. Cork (Noonan *et al.* 2004) and Leacnabuaile, Co. Kerry (Ó Ríordáin and Foy 1941, 91-92); at ecclesiastical sites, including Church Island, Co. Kerry (O'Kelly 1958, 114) and Clonmacnoise (King 2009, 345); and the later unenclosed phase of occupation at Knowth, Co. Meath (Eogan 1977). At Rathmullan, the first two phases of occupation were associated with round houses while rectangular buildings, constructed on stone footings, were built in the later phases. The walling consisted of large flat boulders, whose uneven external surface was held in position by an earthen revetment (Lynn 1981–1982). The excavations in the 'New Graveyard', Clonmacnoise revealed three main early medieval phases of settlement, industry and economy, dating from the seventh to twelfth century in which circular post-and-wattle houses were replaced by larger circular houses and (later) rectangular houses, built on stone revetted platforms over the flood plain (King 2009, 345).

Early medieval rural wooden houses were most frequently built using post-and-wattle or with stone/earth walling. However, there is some slight evidence for possible sill-beam structures. Two longitudinal trench slots which may have been used to hold the sill of a wooden structure were uncovered in a rath at Shane's Castle Park, Co. Antrim and were identified as being contemporary with the primary occupation of the ringfort (Warhurst 1971, 61). Based on the absence of post-holes or slot-trenches, Manning (1984, 245) has suggested that two circular houses (2 & 3) at the ecclesiastical site of Killederdadrum, Co. Tipperary were constructed on sleeper beams. It is unclear if sill-beam structures were common in the early medieval rural landscape as preservation in these contexts is rarely as good as that in the Scandinavian towns of Dublin and Waterford, where these structures have been recorded. However, carpenters in early medieval Ireland were building substantial water-powered mill-houses using sill-beam plates and other sophisticated woodworking techniques from at least the seventh century (Rynne 1998, 91-92) and had the technical capability to build domestic houses in this form if they ever desired.

Storage buildings, workshops and outhouses in early medieval enclosed 'rural' contexts

Where (apparently contemporary) buildings of different plans occur together on a site, it has often been the practice of excavators to automatically interpret the rectangular structures (frequently towards the sides of enclosed spaces) as used for some non-domestic purposes such as a barn, byre and workshops (Lynn 1994, 83). The documentary sources provides evidence for cow houses, barns and outhouses and the term *aircha* has sometimes been translated as an 'outhouse' (MacNeill 1923, 288). It is occasionally possible to distinguish between domestic dwellings and these outbuildings; but one must be able to identify and differentiate the evidence of domestic houses (e.g. internal sleeping quarters, eating areas, hearths, craft and entertainment) from the indicators of agricultural, industrial or utilitarian structures (e.g. crafts, stores, stacks, pens, etc.).

There are a number of structures at the raths of Ballymacash, Co. Antrim (Jope and Ivens 1998, 110-14), Ballywee, Co. Antrim (Lynn 1988b), Deer Park Farms, Co. Antrim (Lynn and McDowell 1988a, 8-9 & 11-16), Seacash, Co. Antrim (Lynn 1978b, 60-61) and Ballyfounder, Co. Down (Waterman 1958, 42-44) that can be identified as outbuildings on account of their size, shape, location and use. Potential evidence for outhouses was identified at the raised rath of Deer Park Farms where excavations produced evidence for roughly thirty houses occupied from A.D. 600-1000, of which up to four or five of these houses were in use at any one time (Lynn 1988a, 45-46; O'Sullivan 2008, 249-53). In the mid-seventh century, at about 648, there were five round houses within the rath and these consisted of a centrally-located conjoined building (Structure X & Zeta); a further conjoined structure (Eta & Theta) at the northern downslope side of the rath and a smaller house (structure Epsilon), 4 m in diameter, at the south side of the rath. This latter structure lacked any hearth and may have been used for storage, or as a cattle byre or pig sty.

At the enclosed settlement of Killickaweeny, Co. Kildare, a sub-rectangular structure (II), 9m by 7m, appears to have initially been associated with metalworking activity. A series of gullies were identified outside the building and these may represent the foundations of ancillary structures or shelters. Immediately to its north was a square-shaped building (IV), 2m by 2.7m, defined by four evenly spaced stone-packed postholes. This structure was interpreted as the remains of a flimsy workshop/hut used in conjunction with the production of iron objects. A further structure (III) survived as a shallow penannular-shaped gully to the immediate west of Structure (II) and was interpreted as an animal pen or storage hut (Walsh 2008, 35-39).

The rath at Ballymacash, Co. Antrim has some of the best-preserved outhouses. Incorporating the inner face of the bank as their rear wall, they were enclosed by a post and wattle wall running in parallel along the northern side of the enclosure, later replaced with a series of low walls, indicating no lapse in use of the structures. To the east, a series of sleeper trenches and a spread of posts were interpreted as the remains of a lean-to structure, the roof of which would have rested directly on the walls. The floors within the lean-to structures showed little evidence for the presence of livestock. However, they produced substantial evidence for the processing and storage of cereal grains in the form of a grain-drying kiln, an oven with associated hearth and a storage pit (Jope and Ivens 1998, 110-113). The site presents a clear image of the structured use of the enclosure space with clearly defined zones of action and practice; the structures associated with agricultural and subsistence practices were located in the northern half of the enclosure, while domestic dwelling houses were located only in the south (O'Sullivan and Nicholls 2011).

Sod-Walled Huts and Drystone-Built Clochán in Western Ireland

The exposed conditions of the western coastline may have been partly responsible for the need to construct structures primarily of sods and stone or a combination of both in this area. Some of these drystone-built structures contain inward battered walls, which frequently corbel towards the apex of the roof and are commonly known as *clochán*. Not all *clochán* were raised in corbelled courses to the apex in the 'beehive' tradition; with many instead containing low battered corbelled walls with the final upper roof section finished by turf or thatch supported by internal posts. Drystone *clochán* are common across the western coast but appear to have been particularly prevalent at both secular and ecclesiastical sites in the west Kerry region (O'Sullivan and Sheehan 1996, 135). It would be unwise to view these as 'evolving from an indigenous building tradition that extends into prehistory' as several excavations (below) indicate drystone corbelled clochán-type buildings replaced earlier structures built primarily of sod in the early medieval period (Ó Carragáin 2005a, 24 & 43). Instead drystone *clochán* appear to have been first emerged around the eighth century and continued to be built through the early medieval period and perhaps beyond.

This sequence of drystone-built huts replacing organic-built structures has been identified at a number of comprehensively excavated ecclesiastical sites at Church Island, Reask and Illaunloughan, Co. Kerry and perhaps Ballyvourney, Co. Cork and Loher cashel, Co. Kerry (Ó Carragáin 2005a, 43). At Church Island, Co. Kerry (O'Kelly 1958, 59-61), a wooden roundhouse was replaced by a stone *clochán*. This structure appeared to have originally been insulated by a layer of sods on its exterior wall which was held in place by a surrounding stonework '*annulus*' or arc of stones (O'Kelly 1958, 70-

71). The excavations at St. Gobnet's house, Ballyvourney, Co. Cork also established that a wooden structure, defined by several large post-holes, was replaced by a round drystone built house (O'Kelly 1952, 24 & 36). Two drystone-built *clocháns* (F & G) belonged to the first phase of activity at Reask, Co. Kerry (Fanning 1981, 96-98). The basal course of an annulus (i.e. an arc of stones) surrounded the small single-celled circular *clochán* (F) on its west side at a distance of 0.60m from the outer face of the *clochán* and was used to contain blocks of sod for the insulation of the walls.

At Illaunloughan, the phase 1 mid-seventh to mid-eighth century round huts were constructed primarily of sods in the same manner as the early church on the site (Marshall and Walsh 2005, 11-18). The most flimsiest, exposed and perhaps earliest hut (C) appears to have been converted fairly quickly to storage and industrial purposes, as indicated by the metalworking debris over the building and this late use of this structure may have been contemporary with the conjoined domestic huts (A and B) on the western side of the island (Marshall and Walsh 2005, 18-22). The narrow sod walls of Hut (A) were contained within two concentric trenches, revetted by orthostats and dry-stone masonry but the adjacent Hut (B) was constructed slightly differently. Its sod walls were contained within two shallow trenches cut into bedrock but postholes around the inner trench indicate that the inner sod fill was revetted by post-and-wattle instead of stone. These sod huts (A and B) were replaced by a single drystone-built corbel-vaulted *clochán* (D), *c.*4.4m in diameter in the eighth to ninth century (Marshall and Walsh 2005, 37-42).

The tradition of digging parallel trenches for vertical stone uprights which supported sod walls appear to have been common in the Kerry region and the excavations at the unenclosed early medieval settlement complex at Bray Head (Mitchell, Hayden and Walsh 1998) have revealed considerable new evidence for the sod construction of these huts (Marshall and Walsh 2005, 27). The earliest hut (1) at the houses cluster at Bray Head was oval in form and was originally constructed by two lines of vertically-set stones set in trenches which retained a mass of sod and stone. Hut (2) and (3) were drystone-built circular structures. An annulus (0.8m-0.9m in width) appears to have originally encircled hut (2) and consisted of redeposited boulder clay revetted by a stone facing set in a shallow trench. Hut (4) was circular in form and its walls were built using a variety of methods involving conventional horizontal dry-stone masonry as well as the use of vertical-set slabs in narrow trenches which anchored cores of insulating sod, small stones and redeposited sub-soil. A circular house (IV) (3.5m in internal diameter) was excavated to the west of the cluster of houses (1-11) and like Houses 1 and 4, its walls were constructed by two lines of vertically-set stones set in trenches which originally retained a mass of sod and stone. Charcoal from the base of the internal stone-lined hearth yielded a two sigma radiocarbon date of A.D. 676-984.

The excavations at Bray Head demonstrated a shift from round/oval to rectangular buildings at the house cluster (1-9) and also evidence for a progression through time from the use of vertically set masonry to the use of horizontally laid masonry at the base of the houses' walls (see Mitchell, Hayden and Walsh 1998). In the house cluster, huts (5-9) were rectangular in form and their walls were either built using a variety of methods or were exclusively of drystone horizontally-laid masonry. One of the earliest rectangular buildings (8) produced a two sigma radiocarbon date of 888-1014. Two further houses (10 & 11) were also excavated within the cluster but there was no information about their architectural form (Hayden 1999a). The remains of another large, early medieval, stone circular house with a souterrain were examined 100m west of the early medieval house complex and were found to have been later replaced by a sub-rectangular, bow-sided building of possible Scandinavian origin (Hayden 2000a).

A number of excavated ecclesiastical sites and cashels provide important information about the character of drystone-built *clocháns* and their transition from round to rectangular house form. An unusual feature of the eighth-ninth century corbel-vaulted *clochán* (D) at Illaunloughan was its partly sunken floor which probably represented an attempt to maximise protection from the wind by using the surrounding ground as natural insulation (Marshall and Walsh 2005, 38). Similar partly sunken floored structures were excavated at an unenclosed house cluster at Inishkea North, Co. Mayo (Sheehan, Hansen and Ó Corráin 2001, 99) and were situated on a sand dune known as the *Bailey Mór* close to an early church site dedicated to St. Columcille. One of these structures consisted of a conjoined drystone-built corbelled *clochán* (B and C). A rectangular hut (A) was situated nearby and

its walls were lined with upright slabs and slightly corbelled layers of flags laid horizontally (Henry 1945, 134-40). Excavations on a flat sandy platform to the northeast of the *Bailey Mór* uncovered other stone buildings (undated) forming a compact group of rooms with walls of stone and earth which overlay an early medieval structure formed of timber and partly of erect slab (see below). It was interpreted as a dye workshop and may have been contemporary with the stone huts from the *Bailey Mór* (Henry 1951a, 75-6; 1952, 163-64, 177-8). A number of other drystone-built corbelled *clocháns* have been investigated on Skellig Michael, Co. Kerry and probably date to the eighth or ninth century (Bourke 2005, 130-34). The earliest, smallest cell (D) in the inner enclosure had a circular internal ground plan but pre-dated later cells with square internal plans (Bourke 2005, 126).

At a cashel at Kildreenagh, Loher, Co. Kerry, a round post-and-wattle building was found to have again preceded a round stone-built *clochán* (*c.* 6.6m internal diameter), with associated souterrain. The circular *clochán* pre-dated a rectangular stone-built structure, 7.75m by 6.3m in extent, which was itself built over an earlier, separate round wooden house, again of driven stakes. There was also the possibility of another early post-built structure in this area (O'Flaherty 1985; O'Sullivan and Sheehan, 1996, 191). A round stone-built *clochán* (A), 4.5m internal diameter, was erected against the western side of the enclosing wall at Leacanabuaile, Co. Kerry and was associated with the remains of two other stone circular buildings discovered beneath the walls of a rectangular stone house (B) in the centre of the cashel (Ó Ríordáin and Foy 1941, 92). This rectangular structure (7.1m by 6.15m) contained rounded external corners and abutted house (A) forming a large conjoined structure. Houses (A and B) contained corbelled walls though the discovery of four internal postholes in both structures suggested to the excavator that their roofs were completed by means of some form of a timber or thatched construction. Two other sub-rectangular structures abutted the walls of the cashel and were evidently the latest structures on the site.

Two conjoined figure-of-eight shaped stone huts were also excavated inside a cashel at 'Cathair Fionnúrach', Ballynavenooragh, Co. Kerry (Gibbons 1994; 1997). To the east of the cashel, immediately south of the entrance, were the remains of three *clocháns* roughly in a row; two of which were conjoined in a figure-of-eight. Another cashel site at Lissachiggel, Co. Louth (Davies 1937/40) along the east coast has produced stone-built figure-of-eight shaped buildings, though these cannot be closely dated. A small unenclosed early medieval *clochán* was excavated in Coarhabeg on Valentia Island, Co. Kerry (Hayden 1994a; 1994b). The structure consisted of three conjoined drystone cells which were probably corbelled to the apex of the roof. The central cell (Cell 1) (internal dimensions of 3.4m by 2.8m) survived to a maximum 2m wide and 1m high and contained a stone-lined hearth and paved surface of flagstones at the entrance passage and the area immediately outside the entrance. A burnt internal deposit yielded a 2Σ calibrated date of A.D. 562 to A.D. 758. Cell 2 (1.5m by 1.4m) adjoined Cell 1 at its northwest end and contained a roughly paved surface. Its walls survived to a maximum height of 0.80m, and would appear to have been built at the same time as the north wall of Cell 1. The fragmentary remains of a third sub-rectangular structure (Cell 3) adjoined the corner of Cell 1 and measured *c.*3.4m x 2.7m internally. Finds from the interior of cell 1 and 2 included stone spindle-whorls; struck flint fragments; a flint blade; a blue glass bead and a fragment of blue glass.

Drystone *clocháns* appear to have been built from at least the eighth century but continued to be constructed throughout the early medieval period. A sample from immediately under the wall of a *clochán* (D) at Illaunloughan produced a (2Σ) date of A.D. 775-961 (Marshall and Walsh 2005, 42). Other dating for site occupation implies that the house is unlikely to be later than the early-ninth century (*ibid.*). Mortar was used to set the paving slabs on the floor of two corbelled *clocháns* (A and B) and the paving within the church on High Island, Co. Galway (Marshall and Rourke 2000, 130-36). It is likely, therefore, that the church and the stone cells are of roughly the same date. The construction of the church appears to have been bracketed by burials in the ninth and eleventh (Marshall and Rourke 2000, 121), suggesting that the cells were built around the same time. A partially destroyed stone roundhouse was excavated at Trahanareear on Inishmurray, Co. Sligo (O'Sullivan and Ó Carragáin 2008, 216-39 & 320-21), but no archaeological deposits were found in its interior. A *leacht* (*c.* 9th-11th centuries) was built over an area of paving associated with the cell.

Evidence for the late use of *clochán* is evident at Dunbeg promontory fort, Co. Kerry and at an unenclosed settlement complex at Beginish Island, Co. Kerry. A large drystone-built *clochán,* circular shaped externally and rectangular internally, was excavated at Dunbeg (Barry 1981, 311-17) and contained two internal tenth and eleventh century occupation phases. The structure measured 7.5m internally and is unlikely to have supported a corbelled roof. At Beginish, the earliest five circular houses (2, 3, 4, 5 and 8) – perhaps associated with the nearby early ecclesiastical site at Church Island – were marked only by the remnants of their foundation courses and it was not possible to establish their original form. The best preserved structure comprised a sunken-floored dry-stone built circular house (1), 11m externally, with a smaller rectangular adjunct (4.5m by 3m internally) which was associated with an eleventh/early-twelfth century Hiberno-Scandinavian settlement (See Below). Its corbelled walls averaged 1.9m in basal thickness and stood to a maximum height of 3.5m above the original floor level though the final section of the roof appears to have been completed by a timber-framed roof. In contrast to the partly sunken *clochán*s at Illaunloughan and Inishkea North (See above), this building represented a clear fusion of native Irish *clochán* architecture with the Scandinavian or Anglo-Saxon *grubenhauser* tradition, emerging in the Irish Viking towns from the ninth century (O'Kelly 1956, 160-68; Sheehan, Hansen and Ó Corráin 2001, 96-101).

Houses at Early Medieval Unenclosed Settlements

There is also some evidence for unenclosed domestic houses – dwelling structures found outside the classic settlement enclosures of raths and cashels - during the main floruit of early medieval settlement enclosures from the early sixth-late ninth century. Unenclosed sites are generally not discussed in settlement models from c.600-900 which tend to be dominated by analyses of the different forms of raths in the landscape (Stout 1997). However, there has long been a view, inspired by the legal texts that early medieval enclosed homesteads were an expression of free status while the servile or semi-servile classes may have lived in unenclosed or nucleated settlements.

In the rural landscape, there is however comparatively little evidence for isolated unenclosed buildings. An unenclosed early medieval post-built house, c.7m in diameter, at Drumadonnell, Co. Down was inferred from the remains of hearth surrounded by a subcircular setting of post-holes around it (McSparron 2001a, 51-52). A second hearth was found nearby, but it was not associated with any post-holes. Finds included souterrain ware and the hearths produced a date range from the late seventh to late tenth century. Another unenclosed structure at Terryhoogan, Co. Armagh - close to an early ecclesiastical site - was also identified by the presence of a circular gully, c. 8m in diameter, which may have acted as a drip-trench for a roundhouse (McSparron 2007, 121-22). The gully contained iron slag, iron objects and souterrain ware, suggesting a *terminus post quem* occupation date from the eighth century. Two other curving gullies were also uncovered and may have been a drain around an annex to the main round house. No structural remains for the house were discovered due to truncation. A possible eighth/ninth century unenclosed hut site was uncovered at Killoran (66) in Derryville Bog, Co. Tipperary (Gowen, Ó Néill and Phillips 2005, 255-56). The hut site had been heavily disturbed by peat milling and was identified as a sub-rectangular setting of substantial uprights- including roundwood, brushwood and half-split posts- measuring 5.6m by 4m. An internal setting of three stakes bisected the hut. A sample produced a 2Σ radiocarbon date of A.D. 774-887 for the possible structure.

An irregular-shaped structure associated with a few sherds of souterrain ware, a quantity of iron slag (170 kg), and three *tuyères* were recovered at Ballyvollen, Co. Antrim (Williams 1985a, 100-01). The excavations failed to uncover an enclosing element and the site was interpreted as a specialist iron-working area. A hearth, pits, furnace bottom and unstratified rotary quern fragment was discovered near an unenclosed double-ringed post built roundhouse at Cloghlucas South, Co. Cork (Gowen 1988a, 125-28) but this structure could not be closely dated. Two successive unenclosed circular structures which pre-dated an inland promontory fort were excavated at Platin, Co. Meath (Lynch 2000; 2001; Conway 2001). The two structures measured an unusually large 15m in diameter and were defined by curvilinear gullies. Finds from the gullies of the earliest structure (B) included a piece of iron slag, a flint flake; ceramic bead fragment and crucible sherd. After the latest structure (B) was dismantled, the area appears to have been used for industrial activity evidenced by finds of a

whetstone, crucibles and *tuyère* fragments and linear gullies filled with iron slag, charcoal and burnt clay.

However, archaeological surveys in upland or coastal locations have identified a growing number of early medieval house clusters with surrounding field systems. Some were probably occupied throughout the year though others may have been seasonally occupied for booleying and other agricultural practices and thus their economic evidence and material culture might be expected to be 'poorer'. It has been suggested that the *clachan*, the nucleated settlement of farming communities which survived in parts of western Ireland into the twentieth century, may have first originated and evolved in the early medieval period (Evans 1973, 58-65) but this view is no longer accepted (Leister 1976). Although there is evidence for early medieval house clusters with associated field systems, particularly in the uplands and in western coastal 'marginal' locations, these should be considered distinct to the modern *clachan* which was a product of a unique set of economic, agricultural and political factors in eighteenth and early nineteenth century Ireland.

One of the best known excavated sites is at Ballyutoag, in the Belfast Hills, Co. Antrim (275m OD) and it consisted of a collection of early medieval houses within conjoined earthen banked field enclosures, which were interpreted as a possible upland transhumance village (Williams 1984). Two houses (A) and (B) within, Enclosure 1, were investigated and shown to have been occupied contemporaneously between the sixth and tenth century. The circular House (A) contained four phases of construction and rebuilding. These structures appear to have been built from the local basalt – the Phase 3 house had basalt door pillars; and the Phase 4 house had wall footings of basalt. Finds from the occupation phases were few but included souterrain ware and flakes of worked flint. Another hut-site (C) in enclosure 2 was also investigated but revealed no occupation evidence (*ibid*, 40-46). It has been estimated that the site could have housed upwards of 100 people. Similar early medieval upland sites in Co. Antrim have also been discovered at Browndod, Killylane and Tildarg (Williams 1983, 239-45), but have not been excavated.

A recent archaeological survey and program of excavation at an upland hill valley at Barrees in the Beara peninsula, Co. Cork produced evidence for two poorly preserved early medieval stone huts associated with field walls of late prehistoric and early medieval date. The first hut (E) was circular in form with stone foundations and was excavated inside a large field wall enclosure in the upper part of the Barrees Valley (Hickey and O'Brien 2009, 257-66). A sample of charcoal from under a large slab on the southwest side of the structure (E) produced a date from the late sixth to late eighth century (1380±40 BP), consistent with the find of a glass bead from the hut. Nearby, a D-shaped stone walled hut (F) was built against the inner face of an Iron Age field wall (Comber 2009, 266-71). There were no interior features, apart from a charcoal spread over the floor surface dating to the eleventh-twelfth century (895±20 BP) and perhaps contemporary with the use of the hut shelter. The absence of roofing evidence might suggest that the structure had a thatched roof supported by internal cruck-trusses. These structures may have been used as herdsmen's shelters in this upland hill valley.

At 'The Spectacles' in Co. Limerick (Ó Ríordáin 1949a, 59), two early medieval roundhouses - one relatively substantial and built of stone walls with a paved doorway and porch feature - and a rectangular house, were located within four small rectangular fields that may have been used as gardens. A series of larger fields and a semi-circular enclosure was located further up the hillside and may have been the location where the livestock was grazed (*ibid*.). Another pattern of huts and fields was discovered at Carrigoran, Co. Clare (Reilly 1999; Reilly 2000). The first early medieval phase consisted of a series of pits, posts and stake holes. Some of this evidence was interpreted as the remains of a hipped-roof building cut into the ground; an oval structure supported by a central post and another structure defined by a curvilinear gully. The pits contained charred remains and may have been used as storage pits or waste pits for cereal grain. A fragment of a rotary quern was also discovered, and three other pits have been interpreted as potential hearths. The site appears to have been abandoned before being re-occupied later in the early medieval period - a 'Class E' bone comb, dating to the ninth/tenth century A.D., was found in this phase (3). Several small curvilinear stone-walled and ditched fields were built in this later early medieval phase (3) and some of these may have been associated with cereal cultivation. Although there is less evidence for occupation than in

the earlier phase, the presence of metal slag and hearths/furnaces provides evidence for smelting and smithing during the latter centuries of the first millennium.

Two significant early medieval coastal settlement complexes associated with field systems were excavated in the Iveragh Peninsula, Co. Kerry. They appear to have been occupied from *c.*600-900 before both sites were potentially re-used by small Hiberno-Scandinavian communities during the tenth-twelfth centuries. Excavations at Beginish at the mouth of Valentia harbour on the northern side of the Iveragh Peninsula revealed an early medieval settlement consisting of eight houses, fifteen cairns, eight animal shelters and two poorly constructed structures lying within a network of low stone field walls at the eastern end of the island (O'Kelly 1956; Sheehan, Hansen and Ó Corráin 2001). The site may have originally been an unenclosed settlement complex, possibly associated with the monastery at Church Island, which was then re-used as a maritime way-station by a Hiberno-Scandinavian community from the tenth century onwards (See below).

A complex of unenclosed early medieval houses and kilns was uncovered at Bray Head at the most westerly projection of Valentia Island. The early medieval complex comprised over 32 huts and structures, mainly in two house clusters. Excavations investigated a group of eleven early medieval houses (1-11) and a corn-drying kiln which were situated within a large polygonal enclosure measuring 100m by 100m. The houses were built in a number of clear phases with a noticeable shift from round/oval to rectangular buildings at the settlement (See above; Mitchell, Hayden and Walsh 1998; Hayden 1999a; Hayden 2000a). Another cluster of unenclosed early medieval coastal houses was uncovered beneath a number of raised platforms ('baileys') at Inishkea North, Co. Mayo (See Above) (Henry 1945 1951a, 1951b, 1952). Finally moving away from the west, an intensely settled seventh-twelfth century settlement landscape was uncovered in the townland of Marshes Upper, Co. Louth, in the form of ten enclosed and unenclosed souterrains associated with extensive field systems and a structure (Gosling 1980-84a; 1980-84b; Gowen 1992; McCormick and Crone 2000; Campbell 2002; Mossop 2002a; 2002b; 2002c; O'Hara 2002).

Dwellings structures at Coastal Occupations and Shell Midden Sites

There is growing evidence for early medieval unenclosed dwellings associated with shell-midden sites along the western seashore. Many early medieval shell-midden sites have been recorded around the Irish coastline but most such as Oughtymore, Co. Derry (Mallory and Woodman 1984) have produced scant evidence for associated early medieval structures. However, the eroding machair soils can sometimes expose evidence for domestic (surfaces, hearths, structures) or industrial activity associated with these middens. Some appear to have had a primarily industrial or marine resource exploitation role though others were mainly domestic in nature. Many structures cannot be closely dated though those which can appear to have been mostly occupied from the eighth or ninth century onwards. It is possible that rising population during the period in which crannogs and raths were occupied from the seventh century encouraged communities of the poor and landless to establish dwellings places in these coastal locations (O'Sullivan and Breen 2007, 118).

These are some examples of potential early medieval domestic coastal structures. At a sand hills site at Ballymacrea Lower, Co. Antrim, the wall-footings of a stone structure built of basalt boulders were uncovered (Flanagan 1966, 115-16). Charcoal, bone, iron slag, and a number of sherds of souterrain ware were also recovered. A coastal habitation site at Rabbit Valley, Ballybunion, Co. Kerry produced extensive shell middens (McCarthy 1986), and a stone pavement, hearth and line of stake holes was discovered nearby. The excavator suggested that the former might have been associated with the nearby early medieval monastery, while the latter could potentially date to the Iron Age/early medieval period. A coastal structure was excavated at Murrooghtoohy South in the Fanore Sandhills, Co. Clare (Rynne 1968) and consisted of a roughly rectangular building measuring 8.6m X 4m, surviving to a height of 1-1.25m. A paved passageway leading to the entrance was found to be sunken slightly below the level of the house floor. A thin drystone wall was uncovered inside the building and may have served to partition the room. A shallow partly stone-lined trench in the centre of the house was filled with burnt material and was interpreted as a roasting oven or hearth (*ibid*, 9-11). The building was not closely dated though a bone pin and bone needle with flat round pointed head were recovered and these might suggest a potential early medieval date.

Coastal structures and shell middens at Doonloughan and Roundstone, Co. Galway, Inishkea North, Co. Mayo and Dooey, Co. Donegal have produced evidence for dog whelk shells which were used to produce early medieval dyes. It is interesting that a structure formed of timber and partly of erect slabs (House A- Site 3) at the unenclosed complex at Inishkea North (See above) was interpreted as a dye production workshop (Henry 1951a, 1952). It measured c. 7.3m x 6m with an entrance at the eastern end and was probably made of wattle walls set on stone footings. The site produced evidence for the manufacture of chlorite spindle-whorls and it appears that the dog whelk was primarily used for the dyeing of yarn (Edwards 1990, 83). A shell-midden (3) at Doonloughan, Co. Galway was dated to A.D. 723-889 (2Σ) and was marked by an eroding horizon of interwoven charred wood and straw, suggestive of a nearby wickerwork structure (McCormick *et al.* 1996, 81-82). Two pits, an iron object and a copper penannular brooch were also recorded. A second nearby site (2) took the form of an incomplete, circular stone hut, from which a broken blue glass bead, two worked bone pins, a broken blue bead, and a fish bone were recovered. Broken *Nucella* (*Purpura*) *lapillus* dog whelk shells were also found, and were interpreted as evidence for the production of purple dye at the site (McCormick and Murray 1997). The remains of a hearth and the stone foundations of a possible hut were recorded by antiquarians at the site of an excavated shell midden at Dog's Bay, Roundstone, Co. Galway (O'Rourke 1945). The antiquarians had reported the presence of shells of the dog whelk, periwinkle, limpet, oyster and mussel and had recovered two early medieval ringed pins from inside the midden (*ibid*, 117). Many shell midden sites along the Connemara coastline, Co. Galway appear to be the remains of bait middens in which limpet and periwinkle predominate and have been primarily radiocarbon dated to the Viking Age (eighth to eleventh centuries predominantly). This bait fish was used for line-fishing that could have caught both inshore and deep water species which when dried, cured or slated were sold as commodities in the Viking towns of Limerick and Dublin (Kelly 2010, 185).

An early medieval sandhills occupation and burial site at Dooey, Co. Donegal was occupied for at least three phases, marked by habitation evidence and fireplaces, before it was re-used as a cemetery in the fourth and final phase (Ó Ríordáin and Rynne 1961; Edwards 1990, 46-47; O'Sullivan and Breen 2007, 119; although this alternatively may have been a settlement/cemetery 'type' site). The earliest phase at Dooey was represented by number of shallow fire pits and habitation evidence over a large area and may date to around the fifth or sixth century A.D. In phase 2, the centre of the site was defined by a shallow, arcing ditch but by phase 3, this had started to infill with windblown sand and refuse. Also associated with this phase were postholes and a possible stone-built structure. Along with purple-dye extraction, iron objects, cast bronze brooches, pins and worked bone and antler were recovered, suggesting that metal working and a range of other activities were taking place on site during this time. Radiocarbon dates indicates a *terminus ante quem* of the eighth century, at the latest, for the phase 3 occupation (Ó Floinn 1999, 74). It is possible that the site functioned as a beach-market situated on the North Atlantic seaways between northwest Ireland and Scotland (O'Sullivan and Breen 2007, 119).

A stone circular structure, built partially of dry stone masonry, and specifically associated with ironworking evidence was investigated at Glanafeen, Co. Cork overlooking a shallow arm of Lough Ine (Ó Cuileanáin 1955). The building dated no earlier than the Iron Age and was not closely datable, but produced evidence for furnace bottoms, *tuyère* fragments and furnace linings as well as an elaborately built flue and hearth. Along with Dooey, Co. Donegal, this coastal site may have been inhabited by a high status smith situated along the western Atlantic route-ways.

Caves as Early Medieval 'Houses'?

An intriguing aspect of the early medieval archaeological record is the evidence for the apparent use and occupation of caves. Scatters of early medieval artefacts have been frequently recorded in caves at various sites, including Kilgreany, Co. Waterford (Dowd 2002); Park North, Co. Cork (Coleman 1942), Portbraddan, Co. Antrim (May 1943) and Dunmore Cave, Co. Kilkenny (Drew and Huddart 1980; Dowd, Lynch and McCarthy 2007) and indicate that some of these places may have been viewed as houses or short-term shelters by early medieval individuals or social groups. At some sites, there is evidence for the deposition of early medieval loot or precious objects. Excavations at

Dunmore Cave, Co. Kilkenny produced nine silver Viking coins, *c.* A.D. 928 (Drew and Huddart 1980, 17) and a possible late-tenth-century hoard including fourteen Anglo-Saxon silver pennies, a silver penannular arm-ring, hack silver, strap tags and sixteen conical-shaped objects woven from silver wire (Wallace and Ó Floinn 2002, 223). Further excavations uncovered a shale/lignite bracelet fragment, two bronze ringed pins, a blue glass bead and human skeletal remains and it was suggested that the Dunmore Caves may be equated with *Derc Ferna*, the site of a slaughter of the locals by the Dublin Vikings that was recorded in the *Annals of the Four Masters* for A.D. 928 (Dowd 2004).

Many caves also appear to have been used for burials or funerary rituals or were seasonally occupied by communities in early medieval Ireland. An excavated cave site at Carrigmurrish, Co. Waterford was located beneath a limestone knoll crowned by what was termed a "Bronze age (?) fort" (a possible ringfort?). Finds from the cave included combs, spindle whorls, whetstones, jet and iron fragments, all of which may possibly be ascribed to the early medieval period (Coleman 1947, 70). An early medieval habitation deposit was also excavated at Park North, Co. Cork (Coleman 1942). The outer chamber of a cave from Park North revealed a black habitation deposit containing a large quantity of animal bone and early medieval finds. It was dated to the eighth/ninth century, primarily on the discovery of a possible decorated bronze mounting of a shrine of similar date (*Ibid*, 75-76).

At Kilgreany, there was evidence for early medieval habitation and prehistoric burial and funerary activity (Stelfox 1930–1931; Movius 1935; Dowd 2002; Dowd and Corlett 2002). The cave was inhabited sometime between the fifth and tenth centuries A.D. The early Medieval period was represented by hearths associated with whetstones, spindle whorls, a tanged iron knife, bone points, worked bone, rotary quern and a bone needle as well as quantities of animal bone and marine molluscs, indicating that people were living in the cave and engaged in a range of activities involving sharpening of tools, weapons or ornaments, textile manufacture, the working of skeletal material and the preparation and consumption of food. Personal items were also found including a bronze baluster-headed ringed pin, a bone pin with a decorated bead, a ringed pin, a lignite bracelet, an eleventh/twelfth century gaming piece and a double-edged bone comb (Dowd 2002, 87-88 & 90-91).

A cave at Glencurran, Co. Clare produced early medieval domestic evidence primarily from outside the cave entrance where some modification of the natural bedrock had taken place to create a D-shaped platform (Dowd 2007; 2009). Here, a hearth and a collection of early medieval domestic artefacts were recovered including a socketed iron sickle, a tanged iron knife, a stone spindle-whorl and a perforated iron strap, possibly from a wooden bucket. A large quantity of animal bone was recovered from the entrance chamber and platform and may indicate butchery and consumption at the site. An early medieval ringed-pin was recovered inside the cave entrance where it seems to have been deliberately and carefully placed under a flat stone and a Viking necklace of glass beads was recovered deeper in the cave, approximately 50m from the entrance. Finally, an excavated cave attached to a D-shaped enclosure at Cloghermore, Co. Kerry (Connolly and Coyne 2005) revealed unusual early medieval funerary and burial activity associated with an eighth/ninth-century pagan Irish community and a late-ninth/tenth-century Scandinavian family. Also discovered were large quantities of animal bone, amber beads, ring-pins, spindle whorls, bone gaming pieces, iron fragments, worked bone, whetstones, pieces of bone combs but most of these items may have been funerary goods associated with the burials. A Viking silver hoard (c. A.D. 910-940), consisting of two ingots and four pieces of hack silver was discovered in a cleft inside of one of the chambers.

Souterrains as Places of Underground Habitation, Refuge or Storage, c. 700-1100?

Souterrains were artificial underground or semi-subterranean passages and chambers built of stone and/or wood – and it possible that some of these were used as, at least, temporary habitations. Clinton's (2001) book provides the most comprehensive overview of these monuments. Dry-stone built souterrains constitute the most commonly found type (over 95% of the total), though the remainder are made of earth-cut souterrains (mostly from the Cork region); rock-cut souterrains (recorded in the Cork area and north Antrim) and wooden-lined souterrains (Clinton 2001, 10-12 & 36). The distribution of souterrains across the island is very uneven, with concentrations in northeast

Ulster, north Leinster, east Connaught and south Munster (Clinton 2001, 34). Souterrains could be composed of a number of different structural aspects comprising entrance features; passages and constrictions; chambers; trapdoor features; stepped features; air-vents; cupboards and recesses; and drains. The floor surface of souterrains was rarely paved or cobbled but there is occasionally vestigial evidence for wooden doors and roof supports and possible murder-holes. The majority of souterrains were simple entrance feature/chamber structures but there is also evidence for more intricate combinations with entrance features, several passages, chambers, and more occasionally air vents, trapdoors, cupboards or recesses and drains (Warner 1979; Clinton 2001, 97-174).

Clinton (2001, 65-96) has investigated the material finds and scientific dating evidence from souterrains in depth and has suggested that the main floruit of these monuments occured from c.750-1250. He has noted that ogham inscribed-stones were also incorporated into the walls of many souterrains and none of these could have been built until after the fifth century or even much later. A substantial collection of early medieval personal and domestic objects, including ringed pins; stick-pins; beads; lignite and jet bracelets; combs; weaponry; souterrain ware; quernstones; millstones; ploughshares; whet- and hone-stones; bone needles; and other objects such as Anglo-Saxon and Hiberno-Norse coins have been recovered from souterrains or from their post-use backfilling. However, very few, if any, of these objects pre-date the seventh century and most relate to the latter half of the first millennium A.D. The scientifically derived data provided by dendrochronology and radiocarbon dating also confirms that the main use of souterrains occured in the last quarter of the first millennium and the first quarter of the second millennium A.D.

A significant number of other souterrains have been recorded within raths, cashels or church sites. Where they occur at proven multiphase enclosed settlements, they are almost invariably secondary additions which were frequently not contemporary with the enclosing element (Clinton 2001, 46-47). At numerous sites including Togherstown, Co. Meath (Macalister and Praeger 1931, 75), Kiltale, Co. Meath (Rynne 1974, 267), Rosepark, Co. Dublin (Carroll 2008, 72), Millockstown, Co. Louth (Manning 1986, 165), Raystown, Co. Meath (Seaver 2006, 80) and Ninch, Co. Meath (McConway 2010, 168-70), the souterrains traversed or cut the enclosing ditches. In the cases of raths that developed into raised mounds, such as Rathmullan, Co. Down (Lynn 1981–1982) and Deer Park Farms, Co. Antrim (Lynn 1989, 197), the souterrains were absent from the univallate phase, but present in the later horizons. Many souterrains inside enclosures may ultimately have been associated with a subsequent, open settlement and such a case has been argued for the royal site at Knowth, Co. Meath (Eogan 1977) where all nine souterrains - dating to the ninth-eleventh centuries A.D. – post-dated the enclosed phase of the early medieval settlement (Clinton 2001, 203-04).

The various theories about the functions of souterrains have been reviewed by Clinton (2001, 15-17 & 59-64). The discovery of pottery and charcoal in souterrains in the north led to the belief that souterrains were the homes of ‘a race of cave-dwellers’ in which air vents were interpreted as chimneys; charcoal deposits as fireplaces and the pottery as the remains of domestic debris (Lawlor 1915-1916, 45-46; 1916-1918, 85; 1918–1920, 214). In fact, the discovery of the sherds of this crude form of pottery in the subterranean passages of these monuments led to it becoming known as ‘souterrain ware’ (Ryan 1973, 619). Although the habitation aspect of souterrains did persist (Ó Ríordáin 1953, 32; de Valera 1979, 70), most interpretations have either focused on the role of souterrains as places of refuge (Warner 1979) or storage (Evans 1966, 29) or a combination of both (Edwards 1990, 30). It is evident that different souterrains may have had different functions and that the simple undifferentiated passage/chamber type may have been used or storage but the more complex examples built for refuge (Rynne 1958, 102).

The documentary evidence would indicate that souterrains were used as refuges and were perceived by the Vikings as worthy plundering sites (Lucas 1971–1973, 181-84); and the hidden nature of souterrains and the archaeological evidence for internal creeps, hidden chambers and sally ports could be used to support this theory. Edwards (1990, 32) has suggested that the coming of the Vikings ‘could have increased the need for souterrains and places of safe storage for valuables’ and the dating of these monuments to the ninth-twelfth century would be consistent with this development. The discovery of a bell carefully wrapped in moss in a concealed pit under the flagged floor of a souterrain chamber at Oldcourt rath, Co. Cork might indicate evidence for the safe-keeping

of valuables (Murphy and O'Cuileanain 1961, 83) and similar important finds has also been discovered in cave contexts (See Above). The close proximity and often direct access of souterrains into domestic dwellings might indicate that they were also used for general storage and Lucas (1971–1973) has suggested that the cool, fire-proof and uncontaminated settings of souterrains would have been suitable for the safe-keeping of dairy-products, or fresh or cooked meat (Edwards 1990, 30).

Souterrains and Associated Houses, c. 700-1100

The chance discovery of an isolated souterrain is often one of the only evidence for a possible early medieval unenclosed settlement (Edwards 1990, 46) and excavations near souterrains have uncovered both circular and rectangular houses (Edwards 1990, 31 & 46; Clinton 2001, 53-58). The significant change from the use of round houses to rectilinear houses after about A.D. 800 (Lynn 1978a, 37; 1994, 83-86; O'Sullivan 2005a, 224-26) can be used to provide relative dates for many of these souterrains. Clinton (2001, 55-58) has noted that many souterrains in the north and east were almost exclusively found with rectangular structures though the evidence from Munster and Connacht is more complex. This led him to suggest that those souterrains in the south and east associated with roundhouses might have slightly pre-dated those from elsewhere. At the cashels of Leacanabuaile (Ó Ríordáin and Foy 1941, 85) and Ballynavenooragh, Co. Kerry (Gibbons 1994; 1997), the souterrain extended from the backroom of conjoined figure-of-eight stone-built houses. A souterrain was also incorporated into a circular stone-built house at Loher cashel, Co. Kerry which pre-dated a rectangular stone house (O'Flaherty 1985). A partially earth-cut souterrain was dig into the hillside and accessed from the north side of a roughly circular house (4) at the unenclosed settlement complex at Bray Head, Co. Kerry (Hayden 1999a). A further stone circular house with a souterrain was uncovered 100m west of the early medieval complex at Bray Head and preceded a sub-rectangular, bow-sided building of possible Scandinavian origin (Hayden 2000a). The foundation courses of a curving stone wall were identified at Underhill, Co. Cork just below grass-level and 0.20m above a roof slab of a souterrain chamber (III). It has been largely destroyed and could not be interpreted with any certainty, though could possibly represent part of a wall of a house which formerly stood above the souterrain in the early medieval period (O'Kelly and Shee Twohig 1968, 42).

A cashel at Ballyjennings, Co. Mayo contained circular, square and rectangular houses but it was only the circular structure which was associated with the souterrain (Lavelle *et al.* 1994, 41). An unenclosed circular house at Killoran South, Co. Sligo contained an opening to a souterrain in its southeastern side. The houses perimeter was defined by an earthen bank, 3-3.4m wide, revetted on the northern and western (internal) sides by rocks (O'Connor 1993). Souterrains associated with circular houses are much less common in the north and east though a suspected timber-built souterrain was recorded in close proximity to the remains of a round timber house at Downpatrick (Brannon 1988, 6). An unenclosed souterrain Tullaghgarley, Co. Antrim was found close to a sub-circular depression, delimited by curving stone-lined cuts and arcs of stake-holes, containing quantities of souterrain ware (McQuillan and Long 1999). Corrstown, Co. Derry produced evidence for a contemporary rath and souterrain dating to around A.D. 600-700 which were later replaced by an unenclosed rectangular building dating from around A.D. 850-900 (Conway 2010, 11). Along the east coast, excavations at Smithstown, Co. Meath revealed four potentially unenclosed souterrains as well as gullies and ditches to the north which may have been roughly contemporary with these monuments (Gowen 1988b). An E ware sherd was found in the fill of an annular gully, c.7-8m in diameter and a potential keyhole-shaped cereal-drying kiln abutted the inner edge of the gully. The gully potentially defined an early medieval structure, abandoned centuries before the construction of the kiln. A second curvilinear gully traced for 11m lay to the south-west of this gully.

However, many other souterrains have tended to be associated with rectangular structures (Edwards 1990, 31 & 46) and this is generally consistent with the dating established for both these houses and souterrains. This trend has been recorded by Clinton (2001, 53-55) at the enclosed settlements of Drumaroad, Co. Down (Waterman 1956b, 74-75); Rathmullan, Co. Down (Lynn 1981–1982, 65) and Shane's Castle, Co. Antrim (Warhurst 1971, 58). From the later open settlement phase at Knowth, the nine souterrains were also all associated with rectangular houses and there was extensive evidence for farming, ironworking, metalworking, enamelling and other crafts (Eogan 1977, 72-73; 1991, 120).

Generally, souterrains in open or partially open settlement contexts were associated with rectangular houses (Edwards 1990, 46), particularly in the north of Ireland and this might support the suggestion of a transition towards unenclosed settlement in this later period. A souterrain and adjacent postholes, delimiting a trapezoidal or rectangular-shaped timber-framed wattle-and-daub structure, were excavated at Craig Hill, Co. Antrim (Waterman 1956a; Edwards 1990, 46). The souterrain and house were contemporary structures as the souterrain entrance was integrated into the basal courses of the back wall of the house. A stone-lined gutter was located to the south of this structure; and an area of paving was located to the east. Finds included souterrain ware and a bronze ring-pin.

At a marshy spot beside a tributary of the river Larne at Antiville, Co. Antrim (Waterman 1971), a rectangular house and souterrain were enclosed by a shallow ditch with a slight bank on the inner side, interpreted not as an enclosed rath but rather as a means of draining excess water from the site. Three phases of occupation were identified; the first appears to have ended with the burning of a structure, evidenced by a mass of burnt clay and was followed by a rectangular drystone-built dwelling with rounded corners. It was partially paved and a hearth was located west-of-centre while the souterrain was entered through the south-west corner of this Phase II house. In Phase III the Phase II house floor was deliberately covered in peat, a hearth was set into the floor and a new entrance was opened (*ibid*, 66-70).

Two adjacent unenclosed structures – a circular building (8m in diameter); and a rectangular building (8m by 5m) – were uncovered in the general area of a souterrain at Magheramenagh, Co. Derry (Reilly 1999). Radiocarbon dating indicates that the roundhouse was of Bronze Age date, and the rectangular house dated from the mid-seventh to tenth century A.D (Kerr *et. al* 2009, 391). Another second rectangular house (8-10m by 6m) was built on the remains of the Bronze Age roundhouse. The chronology of this house was not established, and it might potentially be contemporary with the early medieval rectangular house. No certain trace of a surface structure was found directly associated with the souterrain but the presence of a rock-cut step at its western end hints that there may have been one in that area. A series of pits and post-holes were also found surrounding the western end of the souterrain and may have formed an entrance structure to conceal or protect it. Souterrain ware was found in the souterrain, as well as fragments of a bone comb, and iron slag. Another unenclosed souterrain was also excavated in close proximity to this site (Gilmore 2000).

Other ambiguous structures have been found associated with souterrains though it's often difficult to establish their exact form. An unenclosed souterrain at Randalstown, Co. Meath *c.*180m north of the medieval church of St. Anne's produced evidence for a set of postholes at its entrance indicating the former presence of a doorway and postholes and pits beside the entrance may mark a dwelling site. Five pits were also found near a second souterrain, c.840m east of the above (Campbell 1985; 1986). At Markstown, Co. Antrim, the remnants of an early medieval house platform were found close to the remains of two souterrains (McSparron 2001b). Also uncovered on-site were souterrain ware and a sherd of E-ware.

Early medieval rural settlement and social and ideological change: the evidence for houses and dwellings in the tenth-twelfth century

Various archaeologists and historians have suggested that there was a shift during the ninth and tenth century from a social organization based around clientship, to a system of labour services to a lord indicative of proto-feudalism (Graham 1993, 44; O'Keeffe 2000, 26). Many raths may have been abandoned due to actual population relocation within new territorial frameworks under lordship control (O'Keeffe 2000, 26) and this reorganisation may have necessitated the emergence of the central lordly 'fortress' (Graham 1993, 44). O'Keefe (2000, 26-29) argues for the emergence of nucleated settlements around these 'fortress' sites which, in the historical sources for this period, are interchangeably referred to as *caislean, longphort or dun*. It should be stated that the archaeologival evidence for such settlements has not appeared, despite extensive archaeological excavations. This shift of social organization coincides with potential changes in the farming economy towards a more mixed arable-pastoral system (Kerr 2007, 111-13; McCormick and Murray 2007, 111-15).

Kerr (2007, 113) has suggested that the shift towards a mixed economy could be reflected in the development of a new settlement type, the platform rath. These site types were occupied late in the early medieval period and frequently bear motte-like elevated profiles at various sites such as Rathmullan, Co. Down or Big Glebe, Co. Derry. O'Keeffe (2000, 27-29) has suggested that the deliberate raising of the interior may have been undertaken to symbolically differentiate these lordly residences from the standard raths of pre-feudal age. The archaeological evidence for these pre-Norman 'fortresses' is very tenuous but various sites such as *Dúndáleathglais* or English 'Mount' at Downpatrick, *Dún Echdach* or Duneight, Co. Down, *Caistél Dúin Leódha* at Ballinasloe, Co. Galway and the possible eleventh/twelfth century pre-castle enclosing defences at St. John's Castle in Limerick City and Dunamase, Co. Laois have been identified as possible examples (McNeill 1997, 10-16; O'Keeffe 2000, 27-29).

William Marshall the Elder is credited with founding castles at both Dunamase and Kilkenny City in the early thirteenth century and it is interesting that a sod-built structure was also associated with a pre-castle twelfth-century horizon at this latter site (Murtagh 1993, 1108). Three walls survived, creating a roughly square structure (4.2m by 4.6m internally), with rounded corners with an internal central hearth and the remains of a small 'furnace' to the west. A series of postholes were found within the interior and associated with the sod wall. Evidence for iron- and bronze-working together with sherds of local cooking ware were found in and around the building. It is possible that this structure may represent evidence for a twelfth century pre-castle 'fortress' though the excavator did qualify that it could not be clearly established if this structure represented local Irish twelfth century activity or the first phase of Anglo-Norman occupation on the site (Murtagh 1993, 1108). At Maynooth, Co. Kildare, four structures – a rectangular building; a roundhouse; a corn-drying kiln; and a later roundhouse with attached palisade – were excavated beneath the keep of the castle (Hayden 1999b; 2000b). The rectangular structure could be prehistoric in date. The two small post-and-wattle round houses, each c. 5m in diameter and with central hearths, were constructed over this structure and are probably of early medieval date. The latest of the round houses had a curving wooden stockade added to one side of it and would appear to be contemporary with a series of regularly spaced shallow furrows indicative of cereal cultivation. However, it could be argued that there is no evidence for direct eleventh/twelfth century pre-castle activity at this site, as the form and size of these structures would be more consistent within a *c.*600-900 A.D. context.

The souterrain emerged as a structural-type in the last quarter of the first millennium and continued to be used into the start of the second millennium A.D. Stratigraphy and radiocarbon confirm that souterrains often date to the final phases of raths and enclosure sites (Clinton 2001, 204) and surveys suggest that isolated souterrain sites constitute c.60% of the total number of excavated sites (Buckley 1988–1989, 64). It is likely that souterrains should be understood as an independent form of monument whose role was re-defined following the decline of enclosed settlements during the tenth century. The fact observed by Clinton (2001, 204) that many souterrains in open or partially open settlement sites are associated with rectangular houses, particularly in eastern and northern counties is significant as this building form dates from after the ninth century. It might also indicate that souterrains in open settlement sites were linked to the growth of a tillage economy in this later period (Clinton 2001, 203-06); however much more detailed research is required to make this link and the archaeological remains of pre-Norman feudalism (or proto-feudalism) remains difficult to identify.

Norse Houses and Buildings in Urban and Rural contexts, *c.*AD 800-1170

Introduction

The excavations in the Scandinavian towns of Dublin, Waterford, Cork, Wexford and Limerick have recovered evidence for several different house types dating from the mid-ninth to late-twelfth century. To date, there is no evidence for ninth-, tenth or early eleventh century occupation evidence in any city except for Dublin. This situation might reflect the considerable extent of excavations in Dublin though as the corpus of urban excavations increases, the contrast between the early urban development of Dublin and the later developments in the other cities has become more pronounced (Hurley 2010, 154). The earliest and most comprehensive excavations were undertaken in Dublin city since the early 1960s; and it was from this evidence that the initial attempts at a classification of

Scandinavian buildings first emerged (Murray 1983). However, it was Pat Wallace's (1992a) systematic review of this evidence which produced the major statement on these buildings in their Irish and international contexts. He (1992, 9-23) analysed a large sample of buildings excavated from 1961-82 in Dublin city centre and suggested these buildings should be classified into five principal types based on their house form or plan. To these may be added two other types (6 & 7) which have been predominantly found in Waterford and Cork during the 1980s and 1990s (Wallace 2001, 48-49).

House types in Norse town

Type 1 buildings were the most common Scandinavian building and have been identified in every Scandinavian town, except Limerick. They were typically long sub-rectangular street-fronting building - *c.* 7.5m by 5.5m - with rounded corners and a doorway at each end walls. Internally, the floor space (c. 40m²) was divided into three aisles which comprised a central nave with a stone-lined hearth flanked on both sides by built-up bedding which ran parallel to the side walls. Type 1 houses had low post-and-wattle walls, typically of ash, hazel and willow, and a roof that was supported by two pairs of large posts that were set in from the side- and end-walls (Wallace 1992a, 9-14). This type was already established by the end of the ninth century and continued unchanged thereafter. The similarities of form, scale and layout of type 1 buildings at Dublin, Waterford, Cork and Wexford (Scully 1997a, 37), indicate that it was the building type *par excellence* in Irish Scandinavian towns across the Viking age period (Wallace 2001, 46).

In Dublin, the earliest type 1 buildings appear in the later ninth century at Exchange Street Upper/Parliament Street and Temple Bar West. The excavations at the former site revealed four structures in its earliest phases; at least one of which was a type 1 building, dating to the mid-ninth and tenth centuries (Gowen and Scally 1996, 11-15). Those at Temple Bar West replaced a number of *c.* ninth century sunken-floored structures (Simpson 1999, 17-30). In Dublin, this building type occured in numerous tenth and eleventh century levels at Dublin Castle (Ó hEochaidhe 1962, fig. 3), High Street and Christchurch Place (Murray 1983, 5-9), Fishamble Street (Wallace 2001, 44-45), Exchange Street Upper/Parliament Street (Gowen and Scally 1996, 16) and Werburgh Street (Hayden 2002, 67). Elsewhere type 1 houses have been identified at Bride Street in Wexford, dating from the mid-eleventh century (Bourke 1988–1989; 1995).

Type 1 buildings also appeared in Waterford in the mid-eleventh century and were the most common house form for at least a century. Excavations along Peter Street revealed fourteen contiguous plots, each containing the superimposed strata of at least twelve levels of houses (Scully and McCutcheon 1997). With the exception of the sunken floored buildings in Level 4, Levels 1-8 were dominated exclusively by post-and-wattle structures, with Type 1 houses fronting the street, and Type 2 generally to the rear. Other evidence for type 1 houses in Waterford was excavated at Bakehouse Lane (McCutcheon 1997a, 165) and the *Insula* South (McCutcheon 1997a, 172-75). In Cork, excavations on the South Island at the junction of South Main Street (40-48) and Old Post Office Lane (Ní Loingsigh 2003; 2005) and at the junction of Hanover Street and South Main Street (Cleary 2003; Hurley 2003a, 158) uncovered a series of early-twelfth century type 1 post-and-wattle houses. A series of type 1 houses were also excavated along Washington Street (Hurley 2003a, 157-58; Kelleher 2002) and on the east side of South Main Street (Kelleher 2004).

Type 2 structures were sub-rectangular in plan with pronounced rounded corners, and were smaller than Type 1 structures with an average area of 15m² (Wallace 1992a, 14-16). They were rarely divided into side-aisles and seldom contained a formal hearth. The door was usually in the sidewall generally formed with a double line of post-and-wattle and the floor was frequently covered in woven mats. Despite the absence of hearth, these little houses convey the impression of greater comfort than type 1 buildings (Wallace 1992a, 14). Type 2 buildings were much more common in Scandinavian Waterford than Dublin and mostly occurred as subsidiary buildings to the rear of the street-fronting type 1 houses in long narrow plots (Scully 1997a, 37; Hurley 2003a, 153). A similar pattern of type 1 and 2 houses fronting the main medieval street has been revealed at Hanover Street/South Main Street, Cork (Cleary 2003; Hurley 2003a, 158) and could indicate the presence of a burgage plot. These could mirror the late medieval property boundaries in Cork which may have consisted of rows of buildings with different specific functions- residential/trade street-fronting house,

sleeping chamber middle house and a hall for dining and residential use at the rear (Hurley 2003a, 153).

The origins of the type 1 and 2 houses are still a matter of debate. Wallace (1992a, 65-93) has argued that these houses in Dublin were of indigenous origin as it is difficult to find parallels for these houses at Scandinavian settlements outside Ireland. This is arguably the case though they may have also been influenced or perhaps represent insular versions of the rectangular farmsteads found in Scandinavian settlements in the Earldom of Orkney (O'Sullivan 2008, 232-33).

Type 2 buildings have been recorded in ninth century levels at Temple Bar West (Simpson 1999, 25) and in tenth and eleventh century levels at High Street, (Murray 1983, 11-13; Wallace 1992a, 21) and Fishamble Street (Wallace 1992a, 15). Tenth and eleventh-century post-and-wattle rectangular houses were also uncovered at Dublin Castle but the full results of the excavation are not yet published (Lynch and Manning 1990, 67; Lynch and Manning 2001, 178). Elsewhere, type 2 early-twelfth century houses have been recorded in Cork on the South Island at the junction of South Main Street (40-48) and Old Post Office Lane (Ní Loingsigh 2003 and 2005) and at the junction of Hanover Street and South Main Street (Cleary 2003; Hurley 2003a, 158). In Waterford, they have a similar date range to type 1 houses and have been uncovered along Peter Street (Scully and McCutcheon 1997), High Street (McCutcheon 1997b) and Bakehouse Lane (McCutcheon 1997a, 165).

Type 3 describes slimmer and shorter versions of type 1 structures. These were typically built in narrow and smaller plots and had an average floor space of over 15m². Internally, there was frequently no evidence for a threefold division of space though they often contained a doorway at either end like the type 1 building (Wallace 1992a, 16). This type was specifically invented by Wallace to deal with a narrow and difficult series of plots on a bend off the west side of Fishamble Street (Wallace 2001, 45). These buildings are much less common elsewhere and are arguably the most difficult type to accept in their own right (Wallace 2001, 46).

Type 4 describe sunken-floored buildings (SFS) which have been recorded in ninth, tenth and early eleventh century levels in Scandinavian Dublin and in late eleventh century and twelfth century contexts in Waterford and Limerick. Five *c.* ninth century sunken structures were excavated at Temple Bar West in Dublin (Simpson 1999, 13-16). Dug into the natural bedrock, the chambers of these buildings were small and rectangular with average dimensions of 2.25m by 3m. They had wattle walls with the roof supported by an arrangement of internal vertical posts usually located at either end of the structure. Elsewhere in Dublin, tenth century sunken-floored structures (SFS) were identified at Winetavern Street and Christchurch Place (Murray 1983, 15-16), Werburgh Street (Hayden 2002, 67) and possibly Fishamble Street (Wallace 1992a, 17).

Larger, more sophisticated sunken-floored buildings emerge in Waterford and Dublin during the eleventh century (Simpson 2000, 31). In Waterford, four late eleventh century sunken-floored buildings at Peter Street, Olaf Street and High Street and stone-lined passages of a further two structures in the *Insula* South have been recorded. They all had similar method of construction, set in pits c.1.5m below the contemporary ground level and their walls formed of vertically set staves of radially split ash placed directly in a narrow trench around the sides of the pits (chambers). An upper storey at ground level was supported by opposing load-bearing oak uprights set along the lines of the stave wall. The buildings also generally contained stone faced, steeped entrances leading into the chambers (Walsh 1997a, 48). A row of three sunken-floored structures were excavated at King John's Castle in Limerick and are thought to have been used for storage (Wiggins 1990).

Sunken-floored houses ('pit-houses' or *Grubehuse* in Danish) have a wide distribution in Southern Scandinavia, the North Sea Zone and Anglo-Saxon England. They first emerged on the continent in the Late Roman Iron Age and continued to be built through the Carolingian and Viking periods (Hamerow 2002, 31-35). It is unclear whether the sunken-floored houses in Irish Scandinavian towns represent direct influences from the North Sea Zone or the Anglo-Saxon *Grübenhauser* tradition of England. However, it has been tentatively suggested that the more sophisticated eleventh century examples from Dublin and Waterford may represent influences from Anglo-Saxon England (Walsh

1997a, 52-53) but that those early examples from the ninth and tenth century levels might be more directly related to the continental *grubehus* tradition (Sheehan, Hansen and Ó Corráin 2001, 101).

Type 5 describes small post-and-wattle huts often sub-rectangular in plan with no internal roof supports. They were found in all levels of occupation in Dublin and probably functioned as animal pens or were utilised for other outdoor activities (Wallace 1992a, 17-18). Six of these were recorded along Fishamble Street, Dublin where they tend to occur to the west or riverward side of the main buildings (Wallace 2001, 47). A range of non-dwelling structures and pens were also uncovered at Christchurch Place and High Street (Murray 1983, 57) and Essex Street west and Exchange Street Upper in Temple Bar West (Simpson 1999, 25-26) and may have functioned as animal corrals or were associated with crafts.

Type 6 describes sill-beam structures with load-bearing walls in Scandinavian Waterford and Cork which were constructed from the early-twelfth century onwards. These houses were built using substantial upright load-bearing earth-fast timber posts in the perimeter walls connected by horizontal ground beams called sill-beams or base-plates. The interior of the earliest of these buildings were similar to post-and-wattle type 1 houses and consisted of a central clay-covered aisle, a central hearth and side-aisles. Later examples contained areas of internal stone paving often near the hearths and internal house drains (Scully 1997a, 38). The excavations in Waterford and Cork indicate that post-and-wattle structures were largely replaced by sill-beam buildings with earth-fast roof supports by the mid-to late twelfth century. However, there was some evidence for continuity in Cork with some structures in the Christchurch area continuing to be built in the post-and-wattle tradition from the late-twelfth to fourteenth century (Hurley 1997a, 103).

In Cork, excavations at the junction of Hanover Street and South Main Street revealed a mid-twelfth century sill-beam structure overlying two post-and-wattle structures (Cleary 2003, 158; Hurley 2003a). Only the foundation sill-beams and the bases of the structural uprights survived. This structure consisted of a four roomed building (maximum length of 11.50m-12.50m x 5m-6m in width partitioned with post and stakes. Four mid-twelfth century timber-framed sill-beam houses were also excavated at the angle of South Main Street (40-48) and Old Post Office Lane and also superseded a series of type 1 and 2 buildings (Ní Loingsigh 2003 and 2005).

Over 21 sill-beam structures were excavated in Waterford from 1986-92; the earliest were investigated in the *Insula* North (early-twelfth century) with the latest at Arundel Square dating to the early-thirteenth century (Scully 1997a, 38). The first structures in the *Insula* North- the area between Peter Street (south), High Street Arundel Square and Cooke Lane- were situated away from the street-frontage and might indicate a population increase in the early-twelfth century. In contrast, the mid/late-twelfth-century sill beam houses were all located along street frontage indicating the increasing importance of this type of building (*ibid*).

The closest relatives of the type 6 buildings in Dublin are the 'timber-framed cellars' which are thought to date between the end of the twelfth and early fourteenth century (Murray 1983, 17 & 30-31; Wallace 2001, 48). In the Viking age period, a, later eleventh century stave-built structure set in sill beams was excavated at Christchurch Place. It measured - 4.85m by 8m and contained three aisles, four small corner rooms screened off by plank walls and two doors; one to the south and another on the east wall (Murray 1983, 27-29 & 95-99). At Bride Street in Wexford, an unusual plank-built structure with sharpened boards was driven into the earth. There was no evidence for sill-beams and it has few direct parallels (Bourke 1988–1989, 58). Attached to it was a plank-built lean-to structure which appears to have contained an internal wicker dividing wall. A bone pendant, dated c. A.D. 1050, was found in the back yard of a structure which directly replaced these structures.

Type 7 refers to Scandinavian houses built using stone-footings and walling. Hybrid versions of buildings constructed with stone footings and sill-beams appear in Waterford in the later twelfth century and at least one of these pre-dated the coming of the Anglo-Normans (Scully 1997a, 39). This substantial stone and timber house with a possible timber upper storey was excavated at the *Insula* North. The timber uprights supported the load-bearing element while the stone wall functioned as a perimeter wall. By the early thirteenth century, fully framed sill-beam timber superstructures

were being raised upon on stone-footings and shortly afterwards, these stone-footed structures were replaced by completely stone-built houses and undercrofts in the mid-thirteenth century (*ibid*).

The seven types of buildings broadly describe the houses within the Viking Age Scandinavian towns. However an unusual rectangular building (7m long x 4.5m wide) was discovered at Copper Alley during the Temple Bar West excavations in Scandinavian Dublin. The structure consisted of a double row of large post-holes with a hearth and side entrance (Simpson 1999, 9). The structure did not adhere to any of the Wallace's 'Type' building plans and was compared to Anglo-Saxon houses in England dating to the late fifth/early sixth centuries A.D. Radiocarbon dates indicate a 68% probability of it belonging to between A.D. 780-890. If it does date to around A.D. 800, then it could represent evidence for potential Anglo-Saxon contacts that are occasionally apparent in burial practice, art and trade (e.g. O'Brien 1993; 2003). It is unique to any other building in Ireland and its function and origin are still a matter of debate.

Possible Norse or Hiberno-Scandinavian houses and buildings in rural contexts

A growing number of Scandinavian or Scandinavian-influenced structures have been identified in the 'rural' landscape and particularly along the western coastline. Wallace (1992a) has suggested that the Scandinavian houses from Dublin may have been influenced by rural Irish domestic architecture to some extent, as there are rectangular houses, roughly similar to the Dublin houses, from rural sites such as Knowth, Co. Meath (Eogan 1977, 85), White Fort, Drumaroad, Co. Down (Waterman 1956b, 76-79) and Antiville, Co. Antrim (Waterman 1971, 66-70) though Lynn (1994, 85) was more sceptical of this comparison. The houses at the Neolithic passage tomb at Knowth, Co. Meath measured 6-12m in length and 3.5-6.25m in width and belonged to a large unenclosed tenth-twelfth century settlement of c. 15 rectilinear houses. The houses were delimited by kerbs of stones, contained central hearths on stone paved floors and were often attached to souterrains (Eogan 1977).

There has been some discussion about Scandinavian rural settlement in the Viking controlled territory of *Dylfinaskiri* around Dublin (Bradley 1995) though only one convincing site has been recorded at Cherrywood (Ó Néill 2006; Ó Néill and Coughlan 2010). The earliest structure (4) was sunken and was represented by an oval area, 2.75m by 1.9m surrounded by a U-shaped setting of stake and postholes open to the east. A bone needle was recovered from the central area and animal bone associated with the building was dated to A.D. 680-890. It may have been possibly associated with an earlier early medieval enclosed cemetery at the site. Post-dating this building was Structure (1), trapezoidal in plan, and c. 17.5m in length and 5.75-6.8m wide. It appeared to have load-bearing posts along the outer walls and a small number of internal stake and postholes indicated three transverse internal divisions. Structures (2) and (3) were potentially contemporary and they were constructed after Structures (4) and (1). Structure (2) was slightly sunken, divided into three and measured 8.15m by 5.4m. Animal bone from a deposit overlying its cobbled doorway was dated to A.D. 1020-1230. Structure (3) measured 9.4m by 5.3m and was divided into two rooms with the doorway visible in the southern gable wall. The cemetery at Cherrywood, Co. Dublin was probably in use between the sixth and seventh centuries and it had been abandoned for a time before it was chosen for settlement by a probable Scandinavian group (Ó Néill 2006). A number of houses, some of them sunken, were identified within the enclosure and excavation and radiocarbon dates revealed that some structures post-dated others. A cereal-drying kiln and a rectangular refuse pit were also identified and the latter produced animal bone, a ringed pin, a pronged and socketed object, a domed bronze stud, a decorated whale-bone plaque, iron objects, iron slag, bronze fragments, and a sherd of coarse pottery. The whalebone plaque has been dated to the second half of the ninth century. This is an important and possibly unique settlement because Scandinavian rural farmsteads have rarely been identified in Ireland while their choice of an abandoned cemetery (probably an ancestral cemetery or *ferta*) raises a number of interesting questions as to why the Scandinavian settlers chose this location. This was undoubtedly a deliberate decision and perhaps they were claiming ownership of this territory by supplanting previous indigenous control.

A rectangular-shaped cut, 3m long and 0.6m deep outside the large enclosure of the settlement/cemetery site at Corbally, Co. Kildare was interpreted as the remains of a possible sunken house or structure with some similarities to the sunken-floored buildings excavated in Fishamble

Street, Dublin (Coyne 2010, 83-84). If this similarity existed, it is likely that the Corbally structure utilised a truss option with the roof partly resting on the external ground surface. Buildings of this type have been recorded in Anglo-Saxon England (Coyne 2010, 84).

There is growing evidence to suggest that a sizeable number of Vikings may have settled along the western coastline of Ireland (Kelly 2010, 186). Much of this evidence has taken the form of sunken-floored rectangular buildings with some similarities to type 4 equivalents in the Scandinavian towns. A stone-built sunken house with a gable entrance accessed by a ramp was excavated at Truska Connemara (Gibbons and Kelly 2003; Kelly 2010, 178-180). The building measured *c.*4m by 2.5m internally and was similar in form to late ninth and early tenth century Dublin examples from Fishamble Street and Essex Street (Simpson 2000, 22-23). Radiocarbon dates from a grave dug into the entrance ramp of the house indicates that this sunken structure could not have been built after the late ninth century (Kelly 2010, 179). Further inland, recent excavations at a 'palisaded enclosure' at Lowpark, Co. Mayo uncovered three sunken rectangular structures associated with internal iron-smithing evidence dating from the sixth to tenth century A.D. (Gillespie 2006; Wallace and Anguilano 2010, 74-75).

At Beginish, Co. Kerry, excavations uncovered evidence for an unenclosed settlement of five circular building, possibly associated with the nearby monastery at Church Island, which was re-used as a maritime way-station by a Hiberno-Scandinavian community (O'Kelly 1956; Sheehan, Hansen and Ó Corráin 2001). The earliest Hiberno-Scandinavian settlement was represented by two rectangular structures (6 & 7), dated to around the tenth century and associated finds included a probable tenth-century soapstone bowl, a type of tenth-century ringed pin produced in Hiberno-Scandinavian Dublin, a hollow bone cylinder commonly found in Hiberno-Scandinavian urban contexts, and a type of rotary whetstone found in the North Atlantic Scandinavian region. The second Hiberno-Scandinavian settlement (House 1) comprised a sunken-floored dry-stone structure built in the *grubenhauser* tradition (See Above). A lintel from the stone-lined eastern entrance bore a runic inscription (c. A.D. 1050) and finds included a polished bone or ivory cruciform-headed pin of Scandinavian character, an eleventh/thirteenth- century bone comb and an eleventh/twelfth-century bronze disc-headed pin of Scandinavian type.

Excavations at the nearby monastery of Church Island uncovered a rectangular stone house outside the enclosure wall, built on top of the rubbish midden discarded from an earlier stone round house. The house, which measured 5.5m x 3.5m internally and interestingly, had externally-rounded corners and two opposing doors in the gables ends, similar to the houses in the Scandinavian towns (O'Kelly 1958, 74-75). The unenclosed settlement complex at Bray Head, Co. Kerry also revealed the remains of a large, early medieval, stone circular house with a souterrain, 100m west of the main house complex. The circular structure was replaced by a sub-rectangular, bow-sided house, built of regularly spaced large posts. It was suggested that the shape and construction of this house indicated a possible Scandinavian origin. The building was in turn overlain by the truncated remains of a medieval, rectangular, stone-walled house (Hayden 2000a).

It has been suggested that a possible 'byre-house' at Rinnaraw cashel can be compared with similar buildings excavated at Scandinavian sites in the Scottish Western Isles. At Rinnaraw, a stone-lined drain ran out of the stone-built house (7m by 5m internally) under the wall beside the entrance (Comber 2006, 107). This appears to lead from an internal paved area, and led the excavator to describe the structure as a 'byre-house', with the paved area acting as an animal pen. These drains, however, are also, common feature of 'byre-house' in recent vernacular buildings, (Aalen, Whelan and Stout 1997, 148), and Fanning (Fanning 1981, 88) interpreted the late insertion of a similar drain into the conjoined houses at Reask, Co. Kerry as being evidence for their re-use as byres. At the stone round house at Church Island, Co. Kerry, a similar drain, partially rock-cut, ran from the interior of the building out the door (O'Kelly 1958, 66 & 69). It is possible that the drain was for human use, thus ensuring that the dwellers did not have to go out outside to relieve themselves, particularly during winter. The exposed location of these house may have necessitated such an innovation and it is perhaps no coincidence that early British example are also confined to exposed coastal locations (Holman 2007, 51).

Hearths, Doorways, Occupation Floors, Beds and Other Furnishings

Introduction

The excavations in early medieval sites have produced evidence for a range of internal features. The richest evidence has undoubtedly been discovered in the Scandinavian towns where waterlogged conditions have preserved intact floors, benches, beds, doorways, porches and other internal features. This material evidence for house shape and size, for construction materials, floors, hearths, storage and domestic occupation can be used to enable a reconstruction of cultural norms and daily life and practice within these early medieval houses.

Hearths and fireplaces: Symbols of the household

Hearths were of great symbolic and social importance to the early medieval household, being literally the centre of the dwelling and the focus of most domestic and social activity within it. They were permanent features within the house which provided warmth for human survival during cold winters, for food preparation, and even light for craft activities. Recent experimental archaeological studies has revealed that people using a fire within an early medieval round house would have had sufficient light to carry out intricate craft activities, including the threading of a needle and embroidery and textile working (Nicholls 2005, 29). Hearths were also the central focus of social interaction took place and it would have been around the flickering flames of these fireplaces that families and friends would have entertained themselves with games, story-telling and songs.

Hearths are one of the most common features identified in early medieval houses and where other evidence is lacking, they have often been used to suggest the location of potential structures. Many hearths were undefined and consisted of rough circular areas of ash, burnt clay and charcoal, often located in the centre of the house. However, even these simple hearths, often had multiple layers of ash and clay, indicating long-term use and build-up. There is often evidence for stake-holes either side of the hearth in houses which presumably indicate the presence of pot-hangers used during cooking. Such evidence was uncovered inside one of the rooms (B) of a conjoined stone-built structure at Reask, Co. Kerry (Fanning 1981, 87-92) and in the larger rectangular house (B) of the conjoined building at Leacanabuaile, Co. Kerry (Ó Ríordáin and Foy 1941, 89). Occasionally, undefined hearths were placed across a single-level stone as occured at phase 2 in Sroove crannog where the central hearth was located on a single fire-reddened stone. This same place was re-used as a hearth in phase 3 (Fredengren 2002, 226-32).

In other houses, hearths were more formally defined, rectangular boxes edged and lined with stones. These hearths were frequently re-built on top of each other, perhaps over significantly long periods of time. At Moynagh Lough crannog, in the two round houses in Phase Y, the hearths were built of stones set on edge to create a rectangle or square. The same hearths were clearly re-used, but shifted slightly in location within the house across time. In Moynagh Lough's eighth-century large round house, the first fireplace was an open hearth into which a second rectangular, stone-lined pit was placed. Subsequently, a third fireplace was added to the east. There was also evidence for periodic rake-outs from this main hearth with at least twenty discrete spreads of ash taken out from the fire and spread across the house floor (Bradley 1991, 13-26; O'Sullivan 2008, 243).

Hearths were permanent fixtures in early medieval houses. Animal bone deposits are frequently recovered around the central hearths of early medieval houses – for example inside the buildings at Moynagh Lough, Co. Meath and Ballinderry I, Co. Westmeath (Hencken 1936, 117). O'Sullivan (2008, 248) has suggested that these animal bone deposits may have been deliberately left around the central hearths to remind people of past events, meals and great banquets. As permanent features, hearths hearkened back to the past, while their re-building signalled an intention that they be used again in the future. Some hearths may have become became historical settings, acting as symbols of the household's genealogical past and links to previous and future generations (O'Sullivan 2008, 243).

Doorways

The early medieval narrative literature describes doorways of houses as often symbolically significant. In the ninth-century *Immram curaig Máele Dúin* (The voyage of Mael Duin's boat) the hero finds a house by the seashore, with one door facing the sea and one facing the land (Oskamp 1970). In *Togail Bruidne Da Derga*, a house is described as having seven doors, with a shutter to block the wind from whichever direction it blows (Knott 1975, para. 29). The remains of doorways can be identified on many houses and are variously defined by kerb-stones, vertical wooden jambs and other features. The preferred orientation of early medieval doorways was to the east, south or southeast and was probably determined by weather factors (shelter from the prevailing wet south westerly winds) and inherited cultural norms with the doorway facing the rising sun to the east in the morning (O'Sullivan 2008, 238). Within enclosed settlements, the doorways frequently faced the enclosure entrance. The early medieval round house at Ballyvourney, Co. Cork had substantial upright stones on either side of the south-facing door ope, with a horizontal stone as a threshold and vertical posts on either sides to hold the swinging door (O'Kelly 1952, 36). Most of the doorways are often surprisingly small (presumably to reduce heat loss) and were probably closed with timber, wattle or rush-work doors. For instance, the oak timber jambs (dendrochronologically dated to A.D. 648) of an internal door connecting a round house with its backhouse (*cuile*) at Deer Park Farms were only 1.1m in height (Lynn and McDowell 1988a, 9), indicating that one must have been forced to crouch down to move into this backroom (O'Sullivan and Nicholls 2011).

Internal furnishings

Early medieval houses have produced relatively good evidence for defined separate wooden cubicles or compartments around the edges of the walls which are usually interpreted as the beds or benches termed *imdae* or *immdai* in the early documentary sources (Murray 1979, 87-88). These occur in both rural and urban settlement contexts and were an integral element in the furniture of an early medieval house. Internal movable furniture was also undoubtedly of great importance; however these are rarely found in early medieval houses though a number of stools have been recorded in Scandinavian Dublin (O'Sullivan 2008, 241).

Inside the stone round house at Church Island, a slightly curved rectangular arrangement of post-holes, 2m x 1m, was located against the wall opposite the door which was interpreted as forming the supports for a bed (O'Kelly 1958, 69). The central round house (Structure X) from the mid-seventh century occupation levels at the rath at Deer Park Farms contained raised bedding areas to the north and south, defined by timber and post uprights and with a filling of brushwood, meadow grass and grassland sods (Lynn 1989, 196). Various insects inhabited these deposits as well as the people who lay on them; including in one sample from the southern bedding, sixty-three human lice *(pediculus humanus)*, thirty-three human fleas *(pulex irritans)*, some cattle lice and a very few eggs of human intestinal parasites (e.g. *trichuris trichiura*) as might be accidentally deposited if a child had diarrhoea in the bed (Allison, Hall and Kenward 1999, 62).

Some texts indicate that these side beds could be made more private by using textile curtains hung on wooden rods, with various other bronze furnishings and decorative features (Murray 1979, 88). The early Irish law texts suggest that the socially significant beds were probably those on the north side. These were probably used by the man of the house, his wife, and favoured guests or family. The southern beds or benches may have been used by strangers, slaves, or lesser members of the household (O'Sullivan 2008, 253). It may be significant then that only the bedding areas on the northern side of Structure (X) at Deer Park Farms were defined at its ends by post-and-wattle screens (Lynn and McDowell 1988a, 2 & 8). In the bedding of the main roundhouse, a small bronze brooch pin was found. In the roundhouse (structure Eta) beside it, eleven glass beads and an iron ringed pin were found in the bedding (Lynn and McDowell 1988a, 9), either because they were accidentally lost or hung beside the bed (O'Sullivan 2008, 241-42; O'Sullivan and Nicholls 2010). This is interesting in light of a description of a fantastic house on an island in *Immram curaig Maíle Dúin* (The Voyage of Máel Dúin's Boat), containing 'a row of brooches of gold and of silver, with their pins in the wall,' as well as a row of neck-torques of gold and of silver and a third row of swords, with hilts of gold and of silver (Oskamp 1970, para xi).

Benches and beds are also a distinctive feature of the Scandinavian houses in Dublin, Wexford and Waterford, where there is evidence for rectangular post-and-wattle compartments, filled with deposited sods, loose brush-wood, topped with straw and rushes. At Essex Street West, an early-tenth to mid-eleventh Dublin type 1 house (structure BN) had side-aisle beds that were of straw over a clay and sod floor. The bedding also produced sixteen human fleas *(pulex irritans)* indicating the occasional discomforts of life in damp, organic-rich town house (Simpson 1999, 11; Reilly 2003, 51-52). A feature of the interior of the Waterford type 1 buildings, unique to anywhere else in Ireland, was the fireside raised benches, occasionally delimited by planks or post-holes, which occurred between the central hearth and the side aisles (Scully 1997a, 36).

Occupation floors

Floor surfaces are present in some early medieval houses, but particularly survive in the waterlogged conditions of crannogs and the Scandinavian towns. Floors were produced by the deliberate introduction of layers of various raw materials, such as brushwood, wattle panels, layers of earth, clays and gravels and occasionally stone paving and were built up over time in sequences, both as part of the natural detritus of daily living and the deliberate renewal of house spaces. The house floors at the waterlogged rath at Deer Park Farms were apparently covered in insect thriving organic conditions 'not unlike well-decayed leaf mould, with litter consisting of heather, bracken, brushwood and even fallen leaves' (Allison, Hall and Kenward 1999, 62). The floor surface of the stone roundhouse at Church Island, Co. Kerry was sealed by charred straw which the excavator interpreted as representing collapsed burnt thatch (O'Kelly 1958, 68). The floor was essentially a trampled midden comprised for the most part of shells, animal and fish bones, interspersed with burnt grain. A house in the southeast area of the ninth century occupation at Ballinderry II, Co. Offaly contained a foundation deposit of oak and ash posts laid in a criss-cross fashion with blocks of cut peat and brushwood between these timbers. The actual living floor was a layer of ash, clay and charcoal 7m across, 45cm deep with animal bone profusely distributed throughout (Hencken 1942, 32). At Sroove, Co. Sligo, the house floor of the phase 2 occupation was composed of a thick (20cm) layer of brushwood intermixed with clay. However, the house floor of the next occupation phase (3) was different, comprising a flagstone floor laid over a base of smaller stones, 2-3 layers thick (Fredengren 2002, 226-32).

Internally, the floor space of Scandinavian houses was divided into three, with the central, broadest strip, sometimes paved or gravelled. The floors were also often covered with laid clay or post-and-wattle. Palaeoenvironmental analysis indicates that house floors in Dublin (between c. 980-1030) and Wexford consisted of deliberately introduced (to maintain warmth) layers of wood-chips, ash, moss and leaf litter over the clay aisles (Coope 1981; Bourke 1995, 35; Reilly 2003, 46). Seeds from weeds and plants came in from people's feet, while beetles, fly puparia, mites and earthworm cases may signify the living carpet of the house and the introduction of soils from outside (Bourke 1995, 35; Geraghty 1996). Palaeoenvironmental studies indicate that the central aisles of these houses in Dublin were regularly swept out leaving little evidence for human waste or dung (Reilly 2003, 46) and wood chips were probably laid down on the floor much as in a modern butcher's shop. In contrast, the benches and side-aisle spaces at the wall edges produced plenty of rotting vegetation, household debris, personal objects and industrial waste, indicating that these remains had fallen down into the gaps in the bedding at either side of the house (O'Sullivan 2008, 241).

Domestic Life: Artefactual and Paleoenvironmental Evidence from Houses

The sources indicate that craft and domestic practices carried out within an early medieval settlement would have varied according to the social status of its inhabitants. Domestic life was also organised on the basis of gender relations, with men and women working together on some tasks, while some crafts were gender or age specific (Bitel 1996, 111-37; See Kelly 1997; Johnston 2001; Ó Corráin 2002, 68-79). The early Irish law text *Cáin Lánamna* indicates that many daily domestic or agricultural activities were done by both men and women, including ploughing; reaping; the care and herding of cattle, pigs, sheep and goats within enclosures and general work in the fields (Kelly 1997, 448-49). The sources indicate that men were responsible for heavy agricultural labour, for ploughing, the slaughter of livestock, metalworking, stone-working and carpentry as well 'public' tasks such as

attending assemblies and military hostings. It is interesting that plough irons are often carefully secured and stored within dwellings. These were the items that a freeman was expected to contribute to co-operative ploughing (Kelly 1997, 49).

The early sources indicate that women were responsible for a range of other domestic tasks, and for child-rearing. They were expected to prepare food within the household, and owned such equipment as a sieve (for sieving flour) and a kneading trough for making dough. Early medieval houses also frequently produce the quernstones that were used for grinding cereal grain. Some law texts describe a woman's other equipment as including 'a griddle, beetle, scale, bucket, kneading trough, sieve, dishes, cups, hides, pillows and cookpots'. These sources make it clear that the preparation of dairy products (milk, buttermilk, butter, cheese, whey, curds) was work done by women (whether wife, daughter, or slave). In early medieval raths and crannogs, we occasionally find the wooden buckets and churns probably used in milking, and in cheese and butter making. Textile production was another task of the women who were expected to spin yarn and weave and dye cloth. In fact, women were also expected to bring to a marriage the equipment for such tasks, such as spindles, distaffs, carding combs – and these as well as weaving tablets, needles and possible loom weights have been recovered from houses and settlements (Kelly 1997, 449-51; O'Sullivan 2008, 244). Similarly, children were probably involved in a whole range of tasks around the house (Kelly 1997, 451-52).

Object scatters around a house floor can potentially be used to reveal the different use of space within early medieval dwellings. Finds from two successive house floors (phases 2 & 3) within a structure at Sroove, Co. Sligo sheds light on the organisation of activities and internal features within the building (Fredengren 2002, 223-46). Few animal bones were identified on the phase 2 floor, though the presence of grain, blackberries and raspberries suggest food preparation and consumption within the house, probably during the Summer and Autumn. Finds from the floor of the phase 3 occupation included a lignite bracelet, comb fragment (near the fireplace) and bone beads as well as iron nails, a small bone handle and a knife towards the back of the house. The excavator suggested that the presence of such objects might indicate that the house was still 'alive' and not cleaned out before its abandonment (*ibid*). However, it is also possible that these personal objects indicate the location of the bedding against the back of the house walls and might hence usefully exhibit evidence for the organisation of daily and nightly activities within the structure (O'Sullivan 2008, 240).

The excavations at Moynagh Lough, Co. Meath recorded in precise detail the location of objects recovered from the floor of a large mid-eighth century round, 11.2m in diameter, and also classified their distribution according to type (Bradley 1984a). The distribution of domestic finds (e.g. pottery, whetstones, knives) and 'personal objects' (e.g. bronze pins, bone pins, glass beads, combs) suggests that day-to-day food preparation and basic domestic 1 crafts typically occurred in the southern half of the house. Intriguingly, in the studies of the Iron-Age British household, described above, similar patterns have been used to argue that the sunward (i.e. southern), 'bright' or 'warm' side of the round house was conceptually the space for daily life and the domestic world. At Moynagh Lough, the iron-working debris is, in contrast, largely located to the northern, 'dark' or 'moonlit' half, suggesting a symbolic and conceptual association with darkness, the 'night', the 'other'. The smith's being particularly an otherworldly personage of darkness and danger might tally with this. The northern half of the house may also have been the location for such 'night-time' activities as feasting, sleeping, &c.

The function of the backhouse of conjoined figure-of-eight shaped buildings has also sparked debate. The backhouse (Structure Zeta) of the large, central conjoined mid-seventh century building at Deer Park Farms contained a small hearth, wooden trough and lacked any evidence for beds (Lynn and McDowell 1988a, 2 & 8), which might indicate it was used for cooking purposes. This might suggest that it should be seen as a private or intensely female space, as opposed to a more public, 'male', space in the main round house (Structure X). This building contained a central rectangular stone-kerbed hearth with raised bedding areas to the north and south and may have been the main area for meeting people or holding public events (O'Sullivan 2008, 251-53). It should be admitted these are all classic structuralist gender interpretations, inspired by British Iron Age archaeology, which are now questioned by many scholars. Ironically, those same studies were themselves originally inspired by 'Celtic' mythology (mostly early Irish literature), and early medieval Irish concepts of 'sunwise' movement. So either the above is a circular argument, or it properly makes use of early medieval

Irish beliefs within an early medieval Irish round house. In any case, it hints that the spatial organisation of early medieval round houses was understood in both social and ideological terms (O'Sullivan 2008, 251-53).

Palaeoenvironmental studies of deposits of food, dung and other organic remains have revealed much about food sources, craftwork and diet in the Scandinavian towns. In Scandinavian Wexford, there was evidence for antler comb production within the houses and the rearing of cats for their skins: a practice illustrated by skinning-knife marks on the bones and the age pattern at death. Also identified were seeds of cultivated flax indicating the production of either linen or linseed oil as well as hemp seeds – probably accidentally imported with rope fibre – and teasel plant seeds - used in the woollen industry to raise the surface of cloth (Bourke 1995, 36). Tiny chips of amber and globules of slag and glass on the floor of houses in Scandinavian Dublin houses were occasionally identified, indicating some specific craftwork within houses, although these could have been brought in on people's clothes or leather shoes (Geraghty 1996; Reilly 2003, 47-52).

House Biographies and 'Special Deposits'

Introduction

Houses were at the centre of family life in early medieval Ireland and it was in these places that the main events of a person's life – birth, transition from childhood to adulthood, marriage and ultimately death – could all potentially occur within. It is likely that most well-built early medieval houses, if properly maintained and protected from wind and rain, could presumably have been occupied as long as 50 years or about the lifetime of an aged individual in early medieval society (O'Sullivan 2008, 236). In this sense then, early medieval houses may have had cultural biographies that were related to the life-cycles of the household that inhabited them: in other words the birth and death of the house may have closely mirrored the main events of its household or its principal resident and the rebuilding of a new house in its place may have symbolically marked a new beginning for the next generation or household (O'Sullivan 2008, 234-35; O'Sullivan and Kenny 2008; O'Sullivan and Nicholls 2011). There is growing evidence that these key moments in the life-cycle of a house may have been marked by symbolic actions such as the special deposition of particular objects or human or animal remains in particular contexts. This should not be seen as unusual as the early documentary sources indicate that the non-literate people (for the most part) of this period shared very odd beliefs and customs about life and death. Archaeology can occasionally allow us to investigate the biography of a house across their life-span and the evidence for 'special deposits' in these places, in terms of how they were first constructed, occupied, refurbished, internally organised and finally abandoned or destroyed.

Foundation deposits

Archaeologists have often suggested that 'special deposits' were placed in people's homes as votive offerings or totemic objects or to mark particular key moments in the lifecycle of the house such as its foundation or abandonment or death. It has long been recognised that the burial of parts of animals, humans and 'special' objects might represent 'foundation deposits' of buildings of the later Germanic Iron-Age and Migration Period (4-7th centuries A.D.) in the North Sea region (Van Griffen 1963). A recent study of 'special deposits in English settlements have noted that 'foundation deposits' in Anglo-Saxon houses were rare and that those which do occur relate more to high status buildings (e.g. 'Great Halls'), like Yeavering (Hamerow 2006, 26 & 30). There have been few studies of foundation deposits within early medieval Irish houses. O'Sullivan and Kenny (2008, 10-11) have observed that quernstone fragments were frequently re-used in the construction of early medieval corn-drying kilns and suggest that this votive deposition was carried out to ensure the safe drying of the harvest. Connolly (1992, 22-25) has noted that a tanged iron sickle was deliberately inserted between two side stones of a side-wall of an unenclosed souterrain at Beaufort, Co. Kerry during its period of use and not at a later date. It could be argued that it may have been deposited for storage. However, Clinton (2001, 203-06) has noted that unenclosed souterrains may have been associated with open tillage production and in this light it is conceivable that it may represent a foundation

deposit related to the safe-keeping of the harvest. To date, there have been no studies of foundation deposits for early medieval houses though one potential example has been recently excavated at an enclosure at Newtown, Co. Limerick. Here, the slot-trench of an internal figure-of-eight shaped house produced, amongst other things, a flint scraper, some horse teeth and the top of an adult human skull (aged about thirty) which were interpreted as possible 'Pagan' foundations deposits during the construction of the building (Coyne 2006, 66-68).

Changing places

Houses shifted in their practical cultural or social meanings during their biographical lifecycle. Excavations at Essex Street West in Scandinavian Dublin demonstrated that some houses (e.g. structure BI, a tenth- to early-eleventh century type 1 house) began life as a human dwelling before being re-used in later life as open-air animal pens or shelters (Simpson 1999, 20-26). More unusually in anthropological terms, other houses on this site were originally used as animal pens (floor analyses uncovered particular beetles which prefer animal dung in a deep litter of plant material) but were then re-occupied by people as there was consequent evidence for human fleas from this phase (Reilly 2003, 47-48). This evidence gives a sense of a particular household experiencing social or economic change across generations, with either a growth in family size or a sharp change in economic wealth, involving some localised movement around the property plot (O'Sullivan 2008, 235).

The sequence of building activity at three houses inside small fields at 'the Spectacles', Lough Gur, Co Limerick (Ó Ríordáin 1949a, 57-62) may also reflect some form of kinship change in the social group, potentially involving expansion and addition of a new family as neighbours (O'Sullivan 2008, 254-55). The earliest house was a circular building (A) containing a double-stone kerb and rubble-fill wall with two internal hearths, indicative of at least two phases of occupation. Towards the later period of use of house (A), the field wall immediately to the south was enlarged and thickened and the entrance gap between these two fields was deliberately blocked up. At the same time, a second oval or circular house (B) was built, backing on to the other side of this wall. What may be happening here is a phenomenon familiar in anthropology and in the modern Irish landscape. The land was being subdivided, and the second house was being built for younger family members, presumably a son, who had moved out. Interestingly, at the same time, there was a concern to preserve the privacy of both households, by the blocking of the entrance.

In some early medieval houses, there is also evidence for the periodic re-laying of floors with the introduction of clays, gravels and brushwood, indicating either a long-term reuse or a periodic return to a previously abandoned site. Fire sites and hearths in some houses have been shown to have been rebuilt, changed or moved, again indicating rhythms of household continuity and change. Other houses were deliberately rebuilt or located on precisely the same spot as earlier buildings over a number of successive generations; and examples of houses placed precisely on top of the ruins of earlier structures occurs at the raths of Deer Park Farms, Co. Antrim (Lynn 1989, 196-97) and Dressogagh, Co. Armagh (Collins 1966); the cashel at Lecanabuaile, Co. Kerry (Ó Ríordáin and Foy 1941, 89-90) and the crannog at Moynagh Lough, Co. Meath (O'Sullivan 2008, 235-36).

Protective or totemic items of the house

Though superficially a Christian people, early medieval communities had – to us - very odd beliefs and customs about life, death and the existence of otherworldly creatures. These people were undoubtedly intrigued by the discovery of ancient stone axes, scrapers and arrowheads – many of which were probably casually discovered and brought into their homes as curiosities or totemic items designed to link the house with the past and protect it and its occupants from any harm or danger. These objects have been frequently recorded on early medieval sites but it is often difficult to establish whether they indicate earlier residual prehistoric activity or were brought into these sites by early medieval people as special objects. In medieval Europe, Neolithic stone axes were perceived as thunderbolts or fairy darts with talismanic or protective powers (Carelli 1997) and there is no reason why they were not understood in such sense in early medieval Ireland. In Irish folklore, Neolithic stone axes were placed in milk buckets to prevent the liquid from souring, indicating a link between ritual and concerns about food security (O'Sullivan and Kenny 2008, 9). In other Irish folklore, flint

arrowheads were viewed as 'witches-stones' with magical properties that could protect cattle, milk and butter. Evans (1957, 303-04) heard of a tradition that cattle who were not thriving were reckoned to have been 'elf-shot' and that cow-doctors called to a stable would frequently carry a few flint arrow-heads to whip out of the animal's body at the right moment so as to cure them.

Polished stone axes have been recorded at numerous early medieval sites, including Cahercommaun cashel, co. Clare (Hencken 1938) and the ecclesiastical site at 'Killederdadrum', Co. Tipperary (Manning 1984, 256). A polished stone axe was recorded on the internal paving of the larger house of a conjoined structure at 'Cathair Fionnúrach', Ballynavenooragh, Co. Kerry (Gibbons 1994). Two polished stone axes, flint flakes and scrapers were recovered in the early medieval occupation phases at the crannog at Rathtinaun, Co. Sligo (Raftery Undated). A flint thumb scraper and chert arrowhead were found near the hearth of the house at Sroove, Co. Sligo (Fredengren 2002). Fragments of more than 12 Neolithic polished stone axes were recovered from early medieval deposits inside the raised rath at Deer Park Farms (Lynn and McDowell 1988a, 9) and 14 were recorded at Carraig Aille I and II (Ó Ríordáin 1949a, 86, 100 & 106) though this area of Lough Gur has produced considerable prehistoric evidence. At Ballynagallagh, Co. Limerick, a north-south linear trench interpreted as a fence foundation slightly post-dated a sixth-seventh century post-and-wattle house. The trench produced chert, flint, a whetstone, a stone axe fragment and a large quantity of animal bone, mostly from cattle (Cleary 2006, 23 & 36).

Lawlor (1925, 135) described a polished stone axe associated with a burial at Nendrum though how far this account can be taken at face value remains unclear (Bourke 2007, 406). At a crannog at Craigywarren, Co. Antrim, a range of lithics including 50 flint flakes, 3 scrapers, a concave scraper, a lozenge-shaped arrowhead and a stone axe fragment were recorded (Coffey 1906, 113-14). None appear to have been strike-a-lights (presumably because they were un-bruised) and there were no cores to indicate on-site flint working indicating that the flints were introduced on to the site. In the large round house at Moynagh Lough, it was observed that flint objects clustered around the hearth (Bradley 1984a). Some may have been strike-a-lights, but it is also possible that others were apotropaic objects designed to protect the household magically from fire or to establish the 'antiqueness' of the house floor by use of mythical objects (O'Sullivan 2008, 246).

There is growing evidence for the 'special deposition' of the bones of particular animals such as horses and dogs in pits, ditches, buildings and graves in Anglo-Saxon settlements (Hamerow 2006, 4-7). In Ireland, there is similar evidence but much remains unsynthesised. Recently, O'Sullivan and Nicholls (2011) have observed that horse stallion skulls were recorded at Lagore, Co. Meath and intriguingly beside the 'house' at Craigywarren, Co. Antrim (Coffey 1906, 117-18 & pl. X; Hencken 1950) – the same site in which a range of different flint lithics and a stone axe fragment appears to have been introduced onto the site. The lower levels or seventh century occupation phase of the crannog at Lagore, Co. Meath produced evidence for a number of human skulls with cut occipita and the remains of other human bodies scattered around the edge of the site (Hencken 1950-203). At Randalstown Co. Meath, five pits were located near the chamber of an unenclosed souterrain (Campbell 1986). One contained the articulated bones of ten horse feet, one complete horse skull, the jawbones of two others and a bone pin. At Fishamble Street in Dublin city, the grave of a small child dating to between the late eighth and late tenth century and an adjacent pit were excavated close to the site of a sunken structure. The pit contained the full skull of a cow including the jaw, indicating that 'the flesh of the cow's head was still attached when it was placed in the pit' (Simpson 1999, 16-17). Another pit at site C in Copper Alley was also possibly associated with a sunken structure in this location and again intriguingly contained a series of seven cow skulls (five with horns), placed along its eastern edge, with their jaws again attached. Two human skulls were then deliberately neatly placed on top of the cow skulls (*ibid*, 17) and may suggest some form of ritual deposit, perhaps relating to the biography of the nearby sunken house.

Marking the death of the house or structure

The death of an early medieval house or structure may have also been marked by a range of symbolic and ritual actions (Hamerow 2006; O'Sullivan 2008, 236-38; O'Sullivan and Kenny 2008, 9; O'Sullivan and Nicholls 2011). At the great fort of Cahercommaun, Co. Clare, a practically complete

human skull was discovered near the inner terminal of a souterrain (B) (Hencken 1938, 23; Clinton 2001, 67-68). The skull had been placed in a carefully arranged setting of stones which lay on the exposed bedrock of the souterrain floor. Immediately beneath the skull was a large iron hook and two knives lay beneath a small basal slab in which the skull lay upon. The finds were embedded within a layer of ashes mixed with animal bone which covered the floor of the souterrain. It was suggested by Movius, in his analysis of the human remains, that the skull represented a foundation burial (Hencken 1938, 77). Hencken (1938, 23) suggested that the presence of the hook might indicate that the skull was originally displayed and Rynne (1992, 205) interpreted the skull and hook as evidence for a ritual burial suggestive of some form of pagan Celtic head cult. However, a silver brooch of ninth century date was also found in the same stratum of mixed ash and animal bone above the bedrock of the same souterrain. Clinton (2001, 67-68) noted that it was unlikely that this deposit of ash and animal bone, c. 0.25m in depth would have been tolerated by the ninth century users of this souterrain, which had an height was just *c.*1m. Instead, he suggested that these finds must relate to the eventual abandonment of the souterrain in the ninth century and represent evidence for the late survival of an ancient cult practice.

The death or abandonment of early medieval houses also appears to have been marked by symbolic or cultic practices. At Deer Park Farms, a wooden oak trough (with a shoe last placed within it) was deliberately left behind on the floor of a small seventh-century round house (structure Zeta), whose post-and-wattle walls were deliberately pushed over to cover the trough before a new house was built on top of it over a layer of clay and stones. The wooden trough – presumably owned by the mother of the household for kneading dough or presenting food – was apparently 150 years older than the house and must have been one of its cherished antiquities (Lynn and McDowell 1988a; O'Sullivan 2008, 236; O'Sullivan and Nicholls 2011).

There are various examples at cashels at Leacanabuaile, Co. Kerry and Rinaraw, Co. Donegal; the raths at Dressogagh, Co. Armagh and Drumaroad, Co. Down; the unenclosed dwelling at 'The Spectacles', Lough Gur, Co. Limerick and the ecclesiastical site of Ballyvourney, Co. Cork (O'Kelly 1952, 32), where broken quernstones appear to have marked the death of particular houses in different ways (O'Sullivan 2008, 236-37; O'Sullivan and Kenny 2008, 9). At Leacanabuaile, broken rotary quern stones were placed in the walls of a phase I roundhouse which was subsequently replaced by a phase II rectangular building (Ó Ríordáin and Foy 1941, 95). Similarly at Dressogagh, the broken portions of a rotary quernstone were placed within the wall slots of a figure-eight shaped roundhouse immediately before it was replaced by another figure-of-eight building directly on top. At Rinnaraw (Comber 2006), Drumaroad (Waterman 1956b, 86) and 'the Spectacles' (Ó Ríordáin 1949a, 106), broken quernstones appear to have been deliberately deposited near the doorway thresholds of early medieval houses. This was most evident at 'the Spectacles', where a quernstone was placed directly in front of the door of a roundhouse, on top of the paving and would surely have impeded access to the house if it was still occupied.

At the early ecclesiastical site of Ballyvourney, Co. Cork, a broken quern stone fragment was discovered in a pit within the floor of a round house used by a metalworker, while other broken quern stones and an iron arrowhead were left at the base of a drain outside its doorway (O'Kelly 1952, 31-32). At several other excavated sites such as Lisnagun rath, Co. Cork (O'Sullivan, Hannon and Tierney 1998, 52), the cashels of Carraig Aille I and II (Ó Ríordáin 1949a, 83-86, 94 & 100), Co. Limerick and Lagore crannog, Co. Meath (Hencken 1950), there is evidence for a number of rotary quern stone fragments, many of which appear to have been deliberately broken (O'Sullivan and Kenny 2008, 10). Several of those (apparently deliberately) broken fragments of querns from Lisnagun were apparently unused, suggesting that these quernstones were purely symbolic and had no practical function. At the royal site at Lagore, 43 rotary quernstone fragments were found; and most of these were very small, often triangular or 'apple tart slice' in appearance, indicating that they had been deliberately smashed on rocks and not just accidentally dropped on the soft waterlogged ground of the crannog (O'Sullivan and Kenny 2008, 10).

Undoubtedly, many quernstones were probably accidentally broken with little thought either as to their deposition. However, there is emerging evidence that several quernstone fragments were left in a reduced or smashed state beyond what might occur through accidental breakage and were

deliberately deposited or abandoned in specific contexts within early medieval houses. It is worth noting that these were crucial domestic lives, used for preparing cereals, which might indicate some kind of deliberate or 'ritual' deposition related to domestic life and food preparation or security (O'Sullivan 2008, 238; O'Sullivan and Kenny 2008, 11).

It has been recently observed that articulated animals, humans and artefacts, particularly those associated with textile production such as spindle-whorls and loom-weights, have been found at the base of numerous Anglo-Saxon backfilled sunken-floored buildings (Gibson and Murray 2003, 210-11; Hamerow 2006, 17-19) and may have been part of a termination ritual associated with the abandonment or destruction of these houses. These objects were intimately connected with female identity in Anglo-Saxon society and might suggest that they were some form of female 'special' deposit (Hamerow 2006, 19). It has also been noted that some sunken-floored structures may have been used for grain storage, perhaps indicating concerns about the future fertility and protection of the harvest (Hamerow 2006, 28). It was noted by the excavator at a settlement/cemetery at Corbally, Co. Kildare that textile production artefacts such as fragments of two bone pins or needle were found in the fill of a possible sunken-floored structure (Coyne 2010, 83-84).

In anthropological terms, such deliberate deposits in Ireland may mark key events such as the abandonment of the house or the death of a key household figure within it. In Ireland, the breaking of querns and their deposition in doorways, wall slots or pits may have symbolised that food production had ceased and that an entire site or specific house had been abandoned. In other cases, these deliberate deposits may have marked the death of an important household figure. The early documentary sources indicate that it was the task of women to prepare food, so it is possible that on the death of such a figure, it was traditional practice to abandon or destroy the house or 'deliberately 'kill' the household's quern and leave it behind in ruins' (O'Sullivan 2008, 238; O'Sullivan and Kenny 2008, 11; O'Sullivan and Nicholls 2011).

Identifying Houses of Different Social Grades in Early Medieval Ireland

Aristocratic Houses: Status and Kingship and early medieval houses

The archaeological and historical evidence indicates that early Irish society was strongly hierarchical with various social grades of kings, lords, commoners, hereditary serfs and slaves. In early medieval Ireland, power and social status was performed and expressed through architecture, dress, and costume. Some 'royal' raths and crannogs display the physical signs of prestige in their prominent siting, massive construction, internal size, and the scale and number of their enclosing embankments or timber palisades. In this way, they served as symbolic expressions of status and power, and imply the ability of their owners to marshal a large labour-force to construct them. In early medieval Europe, royalty could also be expressed through prominent, well-appointed 'palaces' such as those discovered in the contemporary Carolingians world at Aachen, Paderborn and Frankfurt (McKitterick 2008, 157-71). In Ireland, the picture is rather more complex, as the early law tracts imply that a royal residence may not have been entirely different from the house of a prosperous lord (O'Sullivan 2008, 244). However, they indicate that house size was closely related to social rank of its occupants, so that both custom and law restricted an individual from building larger than a certain size.

Archaeological excavations have uncovered evidence for a variety of different types of houses which compare closely with those described in the eighth century law tracts. Crannógs were important places in early medieval society and there are numerous references to their use as royal residences. For example, the famous crannóg at Lagore, Co. Meath (Hencken 1950) has been identified with the site where the famous king *Diarmait Mac Cerrbeóil* gathered his vassals kings together for a feast inside its royal house (Meyer 1894, 74). In the same county, another excavated crannóg at Moynagh Lough was occupied between sixth and ninth centuries and produced evidence for defined entrances, palisades, round houses, midden/dung heaps, exotic imports, areas of metalworking, crafts and agricultural production. One of the largest round houses known in early medieval Ireland was uncovered in the mid-eighth century occupation levels and was constructed with double post-and-wattle walls, a laid floor of gravel and internal partitions for beds or storage. Several phases of large,

stone-lined hearths and deposits of animal bone strewn through the thick occupation layers were also identified within the house (O'Sullivan 2008, 245).

Intriguingly, the dimensions of this eighth century large round house, 11.2m in diameter, precisely fits the same measurements (thirty-seven feet) which the eighth century law tract, *Críth Gablach*, prescribes for the appropriate residence of a king or *rígthech*. Seventeen bed-cubicles are also prescribed for such a royal residence and might describe the extensive evidence for internal partitions within the building (MacNeill 1923, 305-06; O'Sullivan 2008, 245). In light of its size, internal complexity and close comparison to this law tract, this large round buildings should perhaps be identified as *rígthech* used for domestic occupation as well as feasting, hospitality and public assemblies; and historical research by Edel Bhreathnach (1998b) identifying Moynagh Lough with *Loch Dé Mundech* and its crannóg with that of the recorded 'royal' site of Mugdorna would add further support to this.

An interesting description of the organisation of space within a royal household is preserved within the Old-Irish text, *Lánellach tigi rich 7 ruirech* or 'the full complement of the house of a king and overking' (O'Daly 1962). The text vividly describes *Conchubar*, the king, at the chief seat; judges either side and attendants in position on the pillars of the dais; the smith's seat below the knees of the king; the hospitallers by the bounteous forearms of the king; the jesters, horn-blowers, charioteers and flute-players in the front part of the house; the leather-bottle makers and the brewers on the great threshing floor; the spearman beside the house posts; and many other more, including the hunters, fishers, trappers and fence-makers in a cubicle apart, among the vessels and in the company of the attendants and the cooks.

Archaeologists and historians can attempt to map out the details in these descriptions of royal residences and match them to archaeological sites, but it is worth remembering that many of these maybe imaginative works promoting the status of a king or lineage and not descriptions of houses that existed in reality. In fact, Edel Bhreathnach (1998a) has suggested that such literary descriptions of royal sites are based not on Irish houses, but on rumours and traveller's tales of houses seen in Anglo-Saxon England or Carolingian Europe. However, at the very least, they signify that the organisation of house space in early medieval Ireland was something understood very much in terms of social identity.

In the later Viking-Age (900-1100), there is arguably no archaeological evidence for potential 'royal' houses. None of the putative 'fortress' sites interchangeably referred to as *caislean, longphort or dun* have revealed domestic structures but in general, there is a lack of archaeological evidence for domestic buildings of this period in comparison to the early Christian period. There is no evidence for potential 'royal' houses in the Scandinavian towns and it appears that the kings of these cities may have lived in similar street-fronting type 1 dwellings as did many of its wealthy inhabitants. We do not find evidence in any of the towns for the great banqueting hall described in the Viking Sagas such as the epic 'song of Beowulf'. When Henry II entertained a number of Irish leaders outside the walls of Dublin city in the Christmas of A.D. 1171, it was within in a palace of wattle constructed after the manner of the country (Martin 1993, 90) and this might indicate that the dwellings of Irish kings, even in this later period, were again not entirely dissimilar to that of the 'lordly' classes.

Dwellings of the 'middle class'

It has been observed (Lynn and McDowell 1988a; Lynn 1989; Lynn and McDowell 1989) that there is a remarkable correspondence between the archaeological evidence from the seventh- to eighth-century rath at Deer Park Farms and the descriptions of the sizes of the house, the property and the internal accoutrements and artefacts of the *ócaire* and *mruigfer* grade farmers in the early eighth-century law text, *Crith gablach* (See MacNeill 1923, 291). Indeed, rather than being a fanciful document, one gains a sense from this comparison that the law text was written by an early medieval jurist, sitting in a real place like Deer Parks Farms and describing the house and objects around him. The law tract state, for examples, that the *bóaire* grade must have a house of 27 *traig* or feet (*c.* 8m), with a back-house of 15 *traig* (*c.* 4.5m) (Richey *et al.* 1879, 310-11) and these dimensions can be compared with the size of some of the largest figure-of-eight houses from Deer Park Farms.

Dwellings of the poor and unfree

The literary sources seem to indicate that the houses of many small farmers, cottiers, and lesser tenantry were unenclosed and stood unprotected in the fields (Ó Corráin 2004, 553) and in recent years there has been a tendency to interpret unenclosed dwellings, occupation sites, caves, small crannógs and coastal midden sites as the dwellings places of the poor and unfree (Fredengren 2002; Boyle 2004; Kinsella 2005). The three unenclosed house situated inside small vegetable gardens at 'the Spectacles', Lough Gur, Co Limerick (Ó Ríordáin 1949a, 57-62) have been interpreted as dwelling places of the poor or unfree (O'Sullivan 2008, 253-55). The range of finds from 'the Spectacles' included two bronze pins, an iron pin, two bone pins, bone points and comb, seven iron knife fragments, two glass beads, four jet bracelet fragments, whetstones, several stone-spindle whorls and some worked flint (ibid, 103-06). Although not destitute or poor, this was no wealthy social group but possibly some form of cattle herders or labourers of a local prosperous lord. The finds from the huts at the upland complex at Ballyutoag, Co. Antrim (Williams 1984, 40-46) and Barrees Valley (Comber 2009, 270; Hickey and O'Brien 2009, 263-66) were even more meagre, indicating that both sites were probably only occupied seasonally.

The door of the circular structure at 'the Spectacles' was not orientated to the east, south or southeast but faced in an untypical southwest direction. It has been suggested (O'Sullivan 2008, 238-39 & 255; O'Sullivan and Nicholls 2011) that doorways of houses similarly orientated in an untypical westerly direction may signify either seasonal use, or buildings of low social status. The small crannóg at Sroove, Co. Sligo contained a structure with another generally untypical southwest-facing door; and this small site has been interpreted as a 'poor' person's crannog (Fredengren 2001; 2002; O'Sullivan 2008, 239). At an early medieval upland enclosure at Ballyutoag, Co. Antrim (Williams 1984, 40-45), perhaps associated with summer cattle herding, the doors of a series of seventh-eighth century houses also have an untypical southwest-facing direction and might indicate again that these were not 'normal' dwellings, but temporary, seasonal habitations (O'Sullivan 2008, 239). A similar occurrence can be noted at another upland stone hut (E) at Barrees, Co. Cork whose entrance appears to have faced in an untypical northern direction (Hickey and O'Brien 2009, 257-66). A small hut marked by a single course of stones with a north-west facing entrance was built sometime after the middle of the seventh century on the summit of Dunnyneil Island, Co. Down. The structure preceded an enclosed fort, interpreted as the site of an early medieval emporium overlooking the Quoile estuary in Strangford Lough (McCormick and MacDonald 2010, 52).

Domestic Space and Concepts of Privacy

Perceptions of privacy in early medieval Ireland were quite different to what our modern mindsets would understand with entire families and related groups living in very close proximity to each other. However, it is possible to subtly identify concepts of privacy being articulated in slightly different ways through architecture and the layout of different forms of early medieval buildings. In rural Ireland, concepts of privacy were not easily articulated through single-plan round houses. However, the attachment of a backhouse to create a conjoined figure-of-eight shaped house effectively created a two-roomed home that provided greater scope for privacy and for functional and social diversity, than a single large round structure of the same floor area (Lynn 1994, 88; O'Sullivan 2008, 251). The architectural shift towards rectilinear buildings from the end of the ninth century might also indicate changing perceptions of individual social space and personal status, as these buildings were more easily subdivided into 'rooms' or compartments (O'Sullivan 2008, 232).

In the Scandinavian towns (unlike the rural setting of other Norse houses in the north Atlantic), families were immediately next to each other in adjoining house plots. It must be presumed then that a degree of 'social blindness' – an ability to discretely ignore the noises of the neighbour's family rows through the wattle walls – would be necessary to enable households to live in such close proximity in the densely packed streets of the town (O'Sullivan 2008, 234). The larger type 1 houses frequently fronted onto the street with the smaller, more compact type 2 ancillary buildings to the rear. Many of these type 2 houses in Dublin at Fishamble Street (Wallace 1992a, 15), Essex Street west and Exchange Street Upper (Simpson 1999, 25) and in Waterford (Scully 1997a, 37-38) lacked formal

hearths but frequently contained bedding material and double-lined post-and-wattle insulated walls. Despite the absence of hearths, these buildings 'convey an impression of greater comfort' than type 1 houses and may have been conceived as private bed-chambers for the principal residents or as additional sleeping accommodation for extended families, children and slaves (Wallace 1992a, 15; Hurley 2001b, 18; 2010, 159).

It is important to recognise that these Scandinavian houses were occupied by people who believed in different gods and mythologies; people who lived in a society structured differently to 'native' Irish society. Viking houses in Scandinavia, Iceland and Greenland all appear to have been organized into 'rooms' which reflect social, cultural or symbolic spaces - e.g. living areas, sleeping rooms, working areas, rooms for animals (O'Sullivan 2008, 234). The front porches, often floored differently from the rest of the house (with clay or wattle) and perhaps screened off from the rest of the house by post- and wattle, perhaps enabled some control of how neighbours would encounter the inner, private household. The back porches leading out into the plots behind the houses may have been used to separate the living space from the backyard, perhaps used as a space to store food, tools or raw materials or to defecate comfortably inside the house (amongst the mosses, textile rags and food debris recovered from Dublin's cess pits have been old, turned wooden-bowls which were presumably used as 'chamber pots' before they were finally discarded!).

Conclusions

Domestic dwellings are one of the most important cultural artefacts for understanding the way of life of a community, period or region. Early medieval dwellings and settlements were the places where people spent most of their time, where they were born, lived out their lives and frequently died. It was in these dwelling spaces that children learnt to behave within their world and where men and women enacted and negotiated multiple social identities of household, kinship, gender, social status and social role. Although very useful, the narrative literatures provides us with fanciful descriptions of great banqueting halls and royal dwellings and are perhaps the product of the wandering and vivid minds of the great early medieval polemicists. The early law tracts, although highly prescribed, arguably provide us with a more accurate description of these houses, their internal furnishings and layout and the expected social behaviour in these dwelling spaces. Archaeology has now supplied important corroborating information about the physical organisation and architectural development of rural and urban 'Irish' and 'Scandinavian' dwellings and the social, ideological and cultural perceptions of dwelling places and domestic practices in people's lives in early medieval Ireland. In exploring daily life and practice within early medieval settlements, we get an appreciation of how social relationships and identities were materialised in this period.

Using the law tracts, archaeology allows us to identify and reconstruct the houses of the different social grades, described by the early medieval jurists. These historical sources remind us that these places from royal sites to the dwelling spaces of the unfree were populated by households of several different social grades (from nobility, to retinue, servants, labourers and slaves) and our archaeological record was created by all of them. Archaeology also has a story to tell about the biographical history of houses and the inter-relatedness between these buildings and the generations of inhabitants who occupied its spaces. It shows us that few sites were actually occupied in the same way and that the households inhabiting these places all experienced the normal challenges and obstacles of life; waxing and waning economic fortunes, the growth and decline of households; death, disease and disaster. Much is already known about these places though there is no reason why future multidisciplinary perspectives, involving an integration of archaeological, palaeo-environmental, historical, and anthropological approaches cannot contribute even more to our understanding of dwelling spaces in early medieval Ireland.

Chapter 2: The organisation and layout of early medieval settlement spaces

Introduction

A large variety of early medieval settlements are now evident in the archaeological record (for example Comber 2008; Edwards 1990, 2004; Mallory and McNeill 1991; Mytum 1992; O'Sullivan 1998, 2000; O'Sullivan *et al* 2009; Proudfoot 1961). Traditional discourse has focused on ringforts or raths, crannogs and church sites, although the focus on the latter tended to be on ecclesiastical buildings and architecture instead of their potential settlement evidence. Promontory forts were inhabited during the early middle-ages while there has been a growing number of recently identified settlement/cemetery sites (Kinsella 2010; Stout and Stout 2008). Added to the variety of enclosed settlements are Scandinavian towns, such as those at Dublin (for example Halpin 2005; Simpson 2000, 2005a; Wallace 1992a, 1992b, 2001, 2004), Waterford (Bradley and Halpin 1992; Hurley 1992, 1998; Hurley *et al* 1997) and Cork (Bradley and Halpin 1993; Cleary *et al* 1997; Cleary and Hurley 2003) for example, while there are also a small number of potential rural Scandinavian enclosed farmsteads, such as Cherrywood, Co. Dublin (Ó Néill 2006), and potential *longphuirt* sites (Harrison *et al* 2007; Simpson 2005a). This chapter will assess the archaeological evidence for rural enclosed farmsteads, ecclesiastical settlement enclosures and enclosed Scandinavian settlements. Various aspects of the enclosure types will be investigated including their size; enclosing forms; the evidence for entranceways, gates, passageways, paths and roads; and how internal spaces were organised, such as work spaces, boundaries and plots related to domestic activity. Finally, we examine the chronology and settlement biographies of early medieval enclosed settlements to demonstrate that there is clearly now a huge diversity of settlement forms with individual and complex cultural biographies.

Early Medieval Settlement Enclosures

Raths, ringforts and cashels

Settlement enclosures, including univallate, multivallate and raised types, were the homes and farms of early medieval families and their retainers. It has been suggested that earthen settlement enclosures most commonly have diameters of 30m (Edwards 1990, 14), while Stout (1997, 18) has noted that the internal diameters of multivallate enclosures (one bank and ditch) tend to be similar in size to univallate types (multiple banks and ditches). When stone-built settlement enclosure sizes were compared to their earthen counterparts, it was found that they were smaller (Edwards 1990, 15). The majority of both earthen and stone-built settlement enclosures are univallate. Bivallate enclosures are rarer while there have only been two excavations at trivallate sites – at Garranes (Ó Ríordáin 1942) and Ballycatteen (Ó Ríordáin and Hartnett 1943), both in Co. Cork.

Initial research has shown that settlement enclosures, which are not circular in shape, have larger diameters than average-sized (30m) enclosed settlements (Kinsella 2010). There have been many references in recent archaeological literature to non-circular-shaped enclosures (variously described as D-, heart, and plectrum-shaped enclosures) which has resulted in the suggestion that these may represent a different or new type of settlement other than the ringfort (Collins and Coyne 2007; Coyne 2006, forthcoming; Coyne and Collins 2003). This argument focused on the shape of the enclosure suggesting that it deviated from the standard circular shape of ringforts. This argument has since been challenged (Kinsella 2010), and there are abundant early medieval settlement enclosures featured in the Appendix (from both old and recent excavations) with differing shapes and sizes.

Indeed, what is common to all these settlement enclosures is their diversity in terms of morphology and appearance and a multitude of factors (social, economic, ideological etc.) effected their construction. The term ringfort is thus misleading because it focuses both on the defensive and

circularity of the monument whereas the vast majority did not have defensive functions while a great many are similarly not circular in shape. *Rath* is a term favoured in Northern Ireland and, although this was a contemporary term used in the early middle-ages, it was used to describe the enclosing ditch and bank. Early medieval people also used the term *lios* or *les* to describe the enclosed space within the *rath*. These terms are also problematic because they do not refer to the complete farmstead incorporating both the enclosure and the enclosed house and buildings within. It is for this reason that there is increasing movement to re-classify ringforts or *raths* as early medieval settlement enclosures (Fitzpatrick 2009; Kinsella 2010).

Raised and platform settlement enclosures

Another variety of early medieval enclosed settlement constitutes raised and platform examples. Platform settlements were constructed on raised natural ground while raised types grew in height as a result of continued occupation across many centuries whereby each new settlement was constructed above the rubble of the previous dwellings (Lynn 1981/82). Usually, raised settlement enclosures, such as Rathmullan, Co. Down (Lynn 1981/82), and Deer Park Farms, Co. Antrim (Lynn 1987, 1988a, 1989; Lynn and McDowell 1988a, 1989, forthcoming), were initially constructed on flat ground and grew thereafter. Big Glebe, Co. Derry (Lynn 1988c) is an example of a platform settlement enclosure in which its builders utilised a natural platform while another, at Gransha, Co. Down, was constructed on a 4.5m raised platform before the settlement grew in height again due to the accumulation of occupational debris (Lynn 1985, 1988d). Most raised and platform settlement enclosures tend to support a smaller living space compared with enclosed settlements, which were constructed at ground level, and have average diameters between 20m and 30m.

Raised and platform settlement enclosure sizes

Name	Diameter/Size
Deer Park Farms, Co. Antrim	25m
Dromore, Co. Antrim	N/A
Drumadoon, Co. Antrim	14m by 5m
Dunsilly, Co. Antrim	N/A
Killealy, Co. Antrim	N/A
Meadowbank, Jordanstown, Co. Antrim	40m
Big Glebe, Co. Derry	20m
Ballyfounder, Co. Down	23m
Gransha, Co. Down	22m
Rathmullan, Co. Down	11m by 8m (top); 26m by 28m (base)
Grange, Co. Limerick	32m
Knockea, Co. Limerick	Approx. 20m
Knowth (on passage tomb), Co. Meath	85m
Nevinstown, Co. Meath	N/A

Crannogs

Crannogs were, for the most part, enclosed artificially-created island settlements or lake dwellings that were situated mostly in shallow lakes. They are usually circular or oval in plan and were constructed on, and with, a mixture of stone, timber and soil and were enclosed by a wooden palisade (O'Sullivan 1998, 2000; O'Sullivan *et al* 2007; Fredengren 2001, 2002). However, crannogs were also built on stone cairns without palisades and their builders utilised enhanced natural islands, as well as cairns, mounds and rock platforms situated along lakeshore edges, some of which were not surrounded by water (Fredengren, 2002, 10–2). Therefore, like their neighbouring early medieval settlement enclosures and settlement/cemeteries in the surrounding fields, crannogs were built in diverse ways and had varied cultural biographies and physical remains.

Archaeological surveys indicate that crannog sizes vary between relatively large sites (18m - 25m in diameter), to smaller mounds (8m - 10m in diameter) (O'Sullivan *et al* 2009, 43) and this diversity is also apparent when the sizes of excavated crannogs are compared.

Crannog size

Name	Diameter/Size

Deer Park Farms, Co. Antrim	25m
Dromore, Co. Antrim	N/A
Drumadoon, Co. Antrim	14m by 5m
Dunsilly, Co. Antrim	N/A
Killealy, Co. Antrim	N/A
Meadowbank, Jordanstown, Co. Antrim	40m
Big Glebe, Co. Derry	20m
Ballyfounder, Co. Down	23m
Gransha, Co. Down	22m
Rathmullan, Co. Down	11m by 8m (top); 26m by 28m (base)
Grange, Co. Limerick	32m
Knockea, Co. Limerick	Approx. 20m
Knowth (on passage tomb), Co. Meath	85m
Nevinstown, Co. Meath	N/A

Promontory forts

Promontory forts are enclosures that are mainly located at headlands, promontories or cliff-edges, either in coastal, riverine or inland locations. Raftery (1994, 48) has suggested that there are approximately 250 promontory forts around the coastline of Ireland with the largest concentration in the west and east. Very few have been excavated, but the majority of those that have revealed activity and occupation dating to the early middle-ages. The builders of promontory forts utilised the surrounding landscape to provide a natural defence, be it on the coast or inland, and a rampart or bank was only required along the exposed or open part of the promontory. It appears, therefore, that promontory forts were strategically located defensive sites. However, there is also early medieval settlement evidence on the small number of excavated forts while there has also been a suggestion that Dalkey Island, Co. Dublin, functioned as a trading gateway which supplied exotic items to high-status settlements on the mainland (Doyle 1998).

Settlement/Cemeteries

A number of settlement and burial grounds have been excavated in recent years. In many cases it appears that burial represented the primary activity and that people were interred during the late Iron Age/early medieval transitional period. Following this, people then built their homes and farm buildings in proximity to, and which respected, the burial place of their ancestors. Some of these sites then expanded into extensive settlement, burial and agricultural and/or industrial landscapes such as Raystown (Seaver 2006, 2010), Johnstown (Clarke and Carlin 2008) and Laytown (McConway 2001, 2002a, 2002b, 2010), all in Co. Meath, for example. Initial research suggested that these enclosures tend to be non-circular in shape and are larger than the 30m suggested for average-sized settlement enclosures (Kinsella 2010). This is confirmed when the enclosures sizes are examined below in the table as the majority are at least 40m in diameter with many much larger than this. There is also substantial evidence for multiple enclosures largely as a result of site expansion across a number of centuries. At other settlement/cemeteries, such as Parknahown, Co. Laois (O'Neill 2007, 2008) and Millockstown, Co. Louth (Manning 1986), archaeological evidence for industry or agriculture is less apparent but it does appear that the majority of settlement/cemetery sites were important and significant places in early medieval Ireland that were utilised by their respective communities over many centuries (Kinsella 2010). However, studies into these relatively recently identified sites are at an early stage and it would be unwise to present an oversimplified approach to their development at this point. Like early medieval settlement enclosures, there is great variation in the archaeology, chronology, organisation and material culture of settlement/cemeteries.

Settlement/Cemetery size

Name	**Diameter/Size**
Dooey, Co. Donegal	Phase 1 unenclosed area 56m by 64m; Phase 2 enclosure 38m by 40m; Site later used as cemetery
Butterfield, Rathfarnham, Co. Dublin	N/A
Mount Offaly, Cabinteely, Co. Dublin	N/A but site witnessed expansion over a number of phases with the construction of 3 succeeding enclosure ditches (inner ditches were back-filled each time)
Carrowkeel, Co. Galway	65m by 47m

Clogher, Co. Kerry	Inner enclosure 21m by 10m; Outer enclosure 52.5m by 52m
Corbally, Co. Kildare	45m by 40m
Loughboy, Co. Kilkenny	Inner enclosure 41m by 35m; Outer enclosure 52m by 39m
Parknahown, Co. Laois	Inner enclosure 54m; Outer enclosure 60m
Balriggan, Co. Louth	Inner enclosure 48m; Outer enclosure 19m west of inner enclosure ditch
Faughart Lower, Co. Louth	Inner enclosure 29m; Outer enclosure 40m; Final phase enclosure 55m (both inner and outer enclosure ditches were in-filled during construction of final enclosure)
Millockstown, Co. Louth	Phase 1 enclosure 65m by 56m; Phase 2 enclosure 37m; Phase 3 enclosure 40m by 100m
Castlefarm, Co. Meath	Inner enclosure 90m by 70m; Outer enclosure 110m by 90m
Johnstown 1, Co. Meath	Inner enclosure 59m; Second enclosure 53m by 54m; Third enclosure 47.5m by 61m
Knowth, Site M, Co. Meath	Inner enclosure 40m by 48m; middle enclosure 74m by 62.5m; Outer enclosure 110m
Ninch, Laytown, Co. Meath	Phase 1 enclosure 38m by 25m; Phase 2 enclosure 34m by 39m; Phase 3 enclosure 50m by 43m; Phase 4 was unenclosed settlement; Phase 5 and 6 related to possible livestock enclosures and series of gullies, ditches and large structure; Phase 7 enclosure 80m by 80m
Ratoath, Co. Meath	40m; Possible outer enclosure 14m west of enclosure
Raystown, Co. Meath	Inner penannular burial enclosure 22m by 18m; outer enclosure 50m; Sub-rectangular enclosure 60m squared
Knoxspark, Co. Sligo	Main enclosure 75m by 64m; Inner enclosure 23m by 19m
Dunmisk, Co. Tyrone	40m

Defining Early Medieval Settlement Enclosures: Walls, Banks, Ditches, and Palisades

Enclosing Walls

The majority of early medieval settlements in Ireland were enclosed by ditches and banks, walls, and palisades which were dependent, to a large degree, on their location. For example, settlement builders in the west and rocky areas utilised the surrounding and readily available stone to construct their cashels while dwellings and farmyards, surrounded by earthen ditches and banks, were constructed in many areas throughout the rest of the country. In the majority of cases, cashel walls were built with a rubble core faced on either side by stone slabs although their size and scale varied. The wall surrounding the settlement at Ballyegan, Co. Kerry, was 2.4m wide (Byrne 1991), whereas larger walls were found for example surrounding the cashels at Carraig Aille I and Carraig Aille II, Co. Limerick, which measured between 3.3m and 4.2m in width (Ó Ríordáin 1949a), Leacanabuile, Co. Kerry, which was 3.05m wide (Ó Ríordáin and Foy 1941), and at Loher, Co Kerry, where the wall was 4m thick and 3.3m high (O'Flaherty 1985; O'Sullivan and Sheehan 1996). The stone-built cashel or cliff-fort at Cahercommaun had an imposing inner wall surrounding the main dwelling area which was an impressive 8.5m in width (Hencken 1938). The height of the surrounding walls at cashel sites also varies due to degradation and the likelihood that the majority of stones were taken to build more recent field enclosures. At Cahercommaun, the inner wall survived to 4.5m in height (Hencken 1938), whereas the walls are much smaller at cashels such as Carrigillihy, Co. Cork (O'Kelly 1951), at 1.2m, and Lissachiggel, Co. Louth (Davies 1937/40), where it survived to a height of 1.8m.

Enclosing Banks

Early medieval settlements, surrounded by earthen banks and ditches, are numerous throughout the Irish countryside and survive as grass-grown monuments or have been revealed in large numbers beneath the ground prior to infrastructural and commercial developments. Settlement enclosure banks have been largely destroyed in many parts of the country due to centuries of farming activities but, where they have, there is evidence for a variety of sizes from those that were not very imposing to those clearly constructed as indicators of status and defence. Sometimes their former presence is indicated only by an absence of archaeological features along the inner edge of a settlement's enclosing ditch. The bank was constructed with the upcast from the enclosure ditch and in a large number of excavations, there is evidence that the bank was revetted by stone or timber. This was done, in many instances, to hold the bank in place and avoid soil slippage into its neighbouring ditch or into the *les*. At Drumadoon, Co. Antrim, for example, the bank had a stone-faced external façade. After the interior of the site was levelled, the external bank was strengthened with the addition of an internal stone revetment (McSparron and Williams 2009). The bank of the primary enclosure at Béal Ború, Co. Clare, had an internal stone-wall revetment and a wooden palisade performed the same function on its outer face (O'Kelly 1962). Excavation of the ditch around the settlement enclosure at Shane's Castle, Co. Antrim, uncovered two stout oaken stakes set in postholes against the outer edge of the bank. These were interpreted as having formed part of a revetment to prevent slippage of the bank into the ditch (Warhurst 1971). Another example of timber supports for the bank was identified at Leggetsrath, Co. Kilkenny, where slot trenches were found on either side of the entrance in the inner ditch. These held upright timbers which were probably used to retain the earthen bank (Lennon 2006).

In a certain number of excavations, there is evidence that the bank, or cashel wall, was topped by a fence or palisade by the presence of post- or stake-holes or a trench. At Lissachiggel, Co. Louth, evidence for a palisade was suggested by dark patches on the wall, 3.6m apart, which contrasted with the rubble-fill. Posts, 0.15m in diameter, may have been positioned along the wall top to form the palisade (Davies 1937/40). Tentative traces of palisade trenches, measuring 0.5m deep and 1m wide, were identified on the north-facing crest of two of the banks at the promontory fort at Dunbeg, Co. Kerry (Barry 1981), while another palisade trench was identified along the top of the inner bank at the settlement enclosure at Narraghmore, Co. Kildare (Fanning 1972). Sometimes the water-logged nature of some enclosure ditches preserves parts of the fence that fell into the ditch in antiquity. The remnants of a split-rail and wattle fence, which originally surmounted the inner bank, were uncovered at Killyliss, Co. Tyrone (Ivens 1984a) and, at Meadowbank, Co. Antrim, several hazel wands recovered from the silted-up ditch of this early phase of occupation have been tentatively interpreted as the collapsed remains of a bank-top palisade (Crothers 1995).

In most cases, the enclosure banks and ditches were not defensive in nature so they did not have to be formidable structures. The enclosure bank survived to a maximum height of 0.75m and width of 2.25m at Dromthacker, Co. Kerry (Cleary 2008), for example, while at Ballymacash, Co. Antrim, the bank was approximately 1.5m high (Jope and Ivens 1998). However, there are examples of settlement enclosures with imposing enclosing banks and clearly these sites were not simply enclosed farmsteads but may have had a more military or strategic function, or they may have been the homes of high-status families and their retainers in which a defensive boundary was more prevalent. The eleventh-century settlement enclosure at Béal Ború, Co. Clare, was encircled by a massive bank which was up to 17m wide at its base (O'Kelly 1962), and this was potentially a defensive fort used intermittently in times of danger or attack. The bank at Garryduff I, Co. Cork, survived to a maximum width of 6.5m and was 1.37m high (O'Kelly 1963), while the inner and middle banks at Ballycatteen, Co. Cork, were 4m and 3.35m in heighth respectively (Ó Ríordáin and Hartnett 1943). These sites were clearly important settlements which revealed evidence for non-ferrous metalworking and imported pottery and it appears that their imposing banks and ditches were directly related to the obvious wealth of the settlements.

Most raised and platform settlement enclosures were enclosed by a bank and ditch and multivallate examples are also recorded in a smaller number of cases such as Killealy, Co. Antrim (Harper 1970; Lynn 1981/82, 168), and Nevisntown, Co. Meath (Cahill 1977/79). There is also variety in the size of their enclosing banks. At Meadowbank, Co. Antrim, the bank around the settlement was up to 5m

wide, although this was related to its first, ground-level, phase (Crothers 1995). Excavation at Big Glebe, Co. Derry, revealed that the lower 5m or 6m of the mound had been constructed in one event and evidence for this was found in the form of large curving ramp, revetted with stone, which was up to 3m in height (Lynn 1988c). However, in certain instances, such as Knockea, Co. Limerick, it appears that the ditch upcast was spread across the interior rather than having been used to form a bank (O'Kelly 1967).

Unsurprisingly, given the potential defensive and strategic location of promontory forts, their banks and ramparts are usually impressively large structures compared with the majority of enclosed farmsteads. A single rampart, built on a low clay bank formed from the ditch, was up to 5.18m wide and 2.6m high at Larrybane, Co. Antrim (Childe 1936; Proudfoot and Wilson 1962). The promontory fort on Dalkey Island is located on the northern side of the island and consists of a small headland cut-off by a low bank with external ditch. The bank, which overlay an occupation layer, was approximately 1.5m high (Liversage 1968). Anther excavation at Dunbeg Fort, Co. Kerry, revealed a clochán that was defended by an inner stone rampart and an outer line of five ditches and four banks (Barry 1981). The four lines of banks survived to a maximum height of 1m above the old ground level and were up to 3m wide. The inner stone rampart, which completely cut-off the promontory, was an imposing building which had a maximum thickness of 6.35m and was 3.08m wide.

Many settlement/cemeteries were multi-phase sites with multiple banks and ditches and evidence for site expansion across several centuries. Like their neighbouring settlement enclosures, hundreds of years of intensive agricultural activity, notably in the north-east of Ireland where many have been discovered, have destroyed any above ground evidence including their banks. However, a small number of exceptions to this have been identified. At Carrowkeel, Co. Galway for example, the only part of the bank that survived was preserved by a much later drystone field wall that was evident in the southern part of the site (Wilkins and Lalonde 2008, 62). The partial remains of the banks associated with the Phase II and III enclosures at Millockstown, Co. Louth, were revealed during excavation (Manning 1986), as were the truncated remains of the banks related to the inner and middle enclosures at Knowth, Site M, Co. Meath (Stout and Stout 2008). The inner bank was 1.8m wide while the middle bank was much larger with a width of 4m. The outer enclosure at Knowth, Site M, also revealed the considerable remains of two banks either side of the ditch. These were imposing structures that measured 5.1m and 5.2m in width respectively. It is noteworthy that the size of the banks at Knowth increased with each successive phase. This is a pattern also noted with successive ditch sizes at some settlement/cemetery sizes suggesting that they grew in wealth, status and importance across many centuries before they were finally abandoned.

Enclosing Ditches

Settlement enclosure ditches surrounded the dwellings and structures within the *Ies* and were always found outside the line of the bank. A wide variety of sized and shaped ditches have been excavated from U- and V-shaped types to flat-bottomed examples. In many instances, the ditches average approximately 3m in width and are 2m deep (Edwards 1990, 20). At Curaheen, Co. Cork for example, the ditch of the main settlement enclosure was 1.65m wide across the top and was 0.8m deep. The ditch of a small appended possible animal enclosure was V-shaped with an average width of 1m and depth of 0.85m (Danaher 2002, forthcoming; Danaher and Cagney 2004). The cut of the enclosing ditch at Killulla, Co. Clare, had a profile varying from a U- to an almost V-shape and was between 1.3m-2.8m wide with an average depth of 1.25m (Murphy and Danaher 2001). At another settlement enclosure at Cahircalla More, Co. Clare, possibly an ironsmith's forge, the enclosure ditch was between 0.75m and 1.53m wide and between 0.2m and 0.8m deep (Taylor 2006).

There are, however, many examples of settlement enclosures that were surrounded by much wider and deeper ditches. At Béal Ború, Co. Clare, the ditch had an approximate width of 10m and depth between 1m and 2m and, aligned with its massive bank, defence must surely have been a key concern at this site (O'Kelly 1962). The external rock-cut ditch of Garryduff I was 5.3m wide and between 0.45m and 1.8m deep. It appears to have operated more as a quarry ditch to provide material for the core of the bank than a specific addition to the enclosures defences (O'Kelly 1963). A display of status may have also been a factor here as the family could call on suitable labour to dig

such a large ditch through very hard and difficult ground around what was undoubtedly a wealthy settlement. However, it would be wrong to suggest that all enclosures with larger than average ditches were defensive or high-status settlements. For example, the V-shaped ditch around the settlement enclosure at Rathbeg, Co. Antrim, was approximately 5.7m wide and 2.7m deep (Warhurst 1969), while the second phase of occupation at Mackney, Co. Galway, was marked by the construction of the enclosure ditch, which had maximum dimensions of 6m wide and 3.1m deep (Delaney 2009, forthcoming). These sites did not produce a large and varied number of artefacts (such as dress items, imported pottery or finds indicative of non-ferrous metallurgy) to suggest they were wealthy settlements. The broad diversity of differently sized enclosure ditches indicates that a whole range of individual and social factors may have influenced the extent of the enclosure width and depth from personal preferences, access to labour, defence and indicators of status etc.

In certain instances, raised and platform settlement enclosures were not enclosed by a ditch. At Drumadoon, Co. Antrim for example, the bank was located on the summit of the mound and there was no evidence of an enclosure ditch (McSparron and Williams 2009). At Deer Park Farms, an enclosure ditch was dug but was then probably sealed beneath the later raised settlement (Lynn and McDowell forthcoming). Where ditches are evident, sometimes more than one enclose the settlement, such as Killealy, Co. Antrim (Harper 1970; Lynn 1981/82, 168) and Nevinstown, Co. Meath (Cahill 1977), while, similalrly to settlements on flat ground, there is also diversity in terms of their size. At Meadowbank, Co. Antrim, the enclosure ditch around the first phase settlement was up to an imposing 7.5m wide and 2.5m deep (Crothers 1995), while another impressively wide ditch surrounded the settlement at Rathmullan, Co. Down, which was approximately 6m wide and 1.8m deep (Lynn 1981/82). However, the ditch was much smaller and shallower at Gransha, Co. Down. The earliest activity on the site was indicated by a small ditch (1.8m wide and 0.8m deep) which ran around the mound while a similalrly shallow ditch was excavated during the settlement's second phase (Lynn 1985, 1988d).

Given their strategic role as defensive sites, possible high-status settlements, or as important trading gateways, promontory forts were protected by both the natural topography and their imposing banks and ditches. At Dalkey Island, Co. Dublin, the potential trading gateway's ditch was 5m wide and between 2m and 2.4m deep (Liversage 1968). Dunbeg Fort, Co. Kerry, was protected by a stone rampart, four banks and five related ditches. Ditch 1 was deeper and more steeply sloping than the other defensive ditches. The four remaining ditches were situated north of Ditch 1 all had a similar U-shaped profile which measured between 0.98m and 1.55m deep. The defensive nature of the ditches is more than apparent as they were between 5.6m to 12m wide (Barry 1981).

Many settlement/cemeteries were multiphase sites with evidence for enclosure expansions and multivallation. Similalrly to contemporary enclosed settlements, their ditches varied between U-, V-shaped and flat-bottomed. There is evidence that the enclosure ditches at many of these sites grew bigger over time, possibly in relation to the growing importance of the sites. At Clogher, Co. Kerry, the earliest activity consisted of a small circular ditch that was 1.4m wide and 0.65m deep. The site was subsequently remodelled and an outer ditch, between 3m and 4m wide and 1m deep, was constructed which enclosed a larger area (Coyne 2004; Collins and Coyne 2007). The earliest enclosure at Parknahown, Co. Laois, measured 54m in diameter, and was defined by a ditch 2.25m wide and 1.2m deep. The next phase witnessed an expansion of the settlement and enclosure ditches. The larger ditch, for example, was 4m wide and 2.2m deep (O'Neill 2007, 2008). This pattern is also apparent at Millockstown, Co. Louth (Manning 1986), and Johnstown (Clarke and Carlin 2008), Knowth, Site M (Stout and Stout 2008), Ninch, Laytown (McConway 2001, 2002a, 2002b, 2010) and Ratoath (Wallace 2010), all in Co. Meath. It appears that the initial enclosure ditches at many settlement/cemetery sites were similar in size to those at settlement enclosures but became wider and deeper as the sites expanded and developed over the centuries.

Enclosing wooden palisades, fences and revetments

Excavations are slowly beginning to reveal a number of early medieval dryland settlements that were enclosed by palisades. Sometimes they were constructed prior to, or after, a bank and ditch was established, in other cases they were built alongside ditches, while there is also evidence for palisades

which constituted the only enclosing element throughout the settlement's lifecycle. At Coolcran, Co. Fermanagh, some stake-holes were identified below the bank and may have formed a perimeter fence prior to the construction of the settlement enclosure (Williams 1985b, 71). A similar suggestion was put forward after excavation of the bivallate settlement enclosure at Lisdoo, Co. Fermanagh, revealed a series of stake-holes below the bank which may have been suggestive of an earlier palisade enclosure (Brannon 1981/82). At Aghadegnan, Co. Longford, a palisaded enclosure, which cut through an earlier roundhouse, was replaced by a settlement enclosed by a bank and ditch (Carroll 1993). Patches of packing stones and re-deposited clays were associated with the trench and were interpreted as representing the postholes for a wooden palisade. At Lisleagh II, Co. Cork, an enclosure, defined by a bank and ditch, was succeed by a shallow ditch and external palisade. A narrow trench, containing traces of contiguous upright timbers, was found immediately outside, and encircling, the ditch. The palisade trench had cut through the remains of the original bank and suggests that the fence changed over time from a log-built palisade to a flimsy stake-fence (Monk 1995).

Early medieval settlements, enclosed exclusively by a palisade or palisades, have been excavated at Doonmore, Co. Antrim, Ballintemple, Co. Offaly, Lowpark, Co. Mayo, and Ballynagallagh, Co. Limerick. At the former, excavation on the rocky summit revealed areas of paving, a rectangular structure and two hearths. Possible post sockets were also discovered around the edges of the summit, indicating the likely presence of a light palisade (Childe 1938). A sub-circular enclosure at Ballintemple was defined by an outer palisade of (predominantly) single posts. Brushwood rods appear to have been interwoven around these posts which created a wattle fence (Stanley and Moore 2004). Two phases of palisade enclosures were identified at Lowpark. The first phase consisted of two palisade enclosures side-by-side that have been interpreted as settlement and livestock enclosures respectively. The third palisade was larger and enclosed the settlement palisade enclosure. Both the settlement and livestock palisade trenches contained *in-situ* packing stones which probably supported a plank palisade fence (Gillespie 2007, 19-22). At Ballynagallagh, in Lough Gur, a massive late-eighth or ninth century double palisaded enclosure, with an extrapolated perimeter of 380m, post-dated some unenclosed early medieval roundhouses. The double palisade, which appears to have been contemporary, was identified as two parallel north-south slot trenches (1.4m apart) with a number of large postholes cut into their base (Cleary 2006).

A great many crannogs were also enclosed by wooden palisades of various size and shape that utilised differing materials. Some were regularly spaced while others were not so evenly constructed. Some were protected only by light timber fences while others had much more formidable enclosures. A smaller number of crannogs were surrounded by walls while others were not enclosed at all or were only partly enclosed. At Craigywarren, Co. Antrim, the crannog was defined at its edge by a lightly-built wooden palisade, of cleft oak planks and roundwood ash posts, driven into the peat in a regular manner (Coffey 1906). The edges of the crannog at Bofeenaun, Co. Mayo, were defined by an enclosing wooden palisade of 82 vertical roundwood oak, birch, hazel and willow posts. This palisade, however, contained gaps and was irregularly spaced (Keane 1995; Lawless 1992). At Lagore, several consecutive palisades, consisting of posts, piles and planks, were evident surrounding the settlement that was occupied over many centuries (Hencken 1950), and this was a also identified on the multi-phase crannog at Moynagh Lough (Bradley 1991). At other crannogs, palisades only became a feature of later settlement phases such at Sroove, Co. Sligo, where the primary and final phases of the crannog's use were unenclosed. The second settlement phase was marked by the construction of a circular palisade, measuring 17m in diameter, of double and single rows of ash-wood posts driven to a depth of 0.4m into the clay (Fredengren 2001, 2002). Palisades also varied in size from smaller lightly-built types, such as Craigywarren, to much larger structures including the massive pile palisade from a later mid-eleventh-century phase at Ballinderry I, Co. Westmeath (Hencken 1936; Johnson 1999; Lynn 1985/86; Newman 1986). An outer palisade is also apparent at some crannogs which may have functioned as a breakwater to protect the island from erosion or was, perhaps, a defensive feature (O'Sullivan 2000, 33). In a smaller number of cases, stone walls were constructed fully or partially around crannogs such as Lough Faughan and Clea Lakes, both in Co. Down. At the former, the final occupation phase was enclosed within a stone revetment or wall, of three courses of stone with a straight outer face. It is unclear if this represents an early or late medieval phase because finds dating to both periods were discovered within the occupation material it enclosed (Collins 1955). At

Clea Lakes, the occupation surface was enclosed within a wall, 0.8m high, built in the manner of an early medieval stone cashel, although this may also have been a stone revetment. There were some prehistoric finds but the remainder were early medieval in date which indicates that the stone enclosure dated to this period (Collins and Proudfoot 1959).

Entrances and Gateways

Early medieval settlement enclosures contained a variety of entrances in terms of size, style and function (O'Sullivan and Nicholls 2011). Many were entered over undug causeways while there are some examples where temporary structures or bridges were required for people to gain access or depart the settlement. Some were protected by imposing and substantial gatehouses and defences while a great many were closed-off by a simple gate. Diversity in terms of the size of enclosure entrances is also evident ranging from those which allowed entry only to people and small animals, compared to enclosures with wide entrances that may have facilitated the movement in and out of larger livestock such as cattle. Many enclosed farmsteads certainly housed both people and animals while others may have been exclusively constructed for livestock such as the *bódún* ('cow-fortress') mentioned in the law texts, which was a large enclosure used to protect cows against cattle raiders (Kelly 1997, 366). There is also considerable archaeological evidence now for the mending, modification and replacement of gates and gatehouses.

At Killanully, Co. Cork, the eastern entrance to the enclosed settlement was a simple 3.5m wide uncut causeway between the two ditch terminals. It had no indication of any postholes which may have supported a gate (Mount 1995). Similalrly, at Grange, Co. Limerick, there was no evidence for a gate at the entrance. However, a considerable spread of charcoal and the remains of brushwood were uncovered at, and immediately outside, the entrance. It was tentatively interpreted as the remains of a simple, makeshift entrance barrier such as placing bushes in the opening (Ó Ríordáin 1949b). It seems then, that defence or security was not a prerequisite for people in all early medieval settlement enclosures.

However, the presence of stake-holes and postholes in the vicinity of settlement entrances indicates that gates were used as a means of protecting privacy and denying entry and exit to people or animals at many farmsteads. The types and position of gates varied from settlement to settlement. At Seacash, Co. Antrim, two large postholes, 2m apart and 0.35m deep, were found 2m inside the causeway so the gate may have been related to a levelled bank (Lynn 1978b). At Carrigaline Middle, Co. Cork, no evidence for a bank survived but the ditch was excavated and the entrance was similarly marked by a pair of substantial postholes which once held a gate (Sherlock 2003). Similar arrangements of postholes have been noted at other settlements such as Carrigillihy, Co. Cork (O'Kelly 1951), and Loughbown II, Co. Galway (Bower 2009), while the occurrence of one posthole marking the entrance, at sites such as Lisleagh II, Co. Cork (Monk 1995), and Carraig Aille I, Co. Limerick (Ó Ríordáin 1949a), is another common feature on settlement excavations and is suggestive of the former presence of a simple wooden gate supported by an upstanding post.

Some entrances showed evidence for multiple phases of use or were slightly more complex. At Lisnagun, Co. Cork for example, the entrance was located along the south-eastern sector of the enclosure and had been remodelled at least once. Its terminals were retained by a low dry-stone wall which formed a narrow 2m opening. An earlier entrance was revealed as a 1.2m wide and 0.9m deep trench, with adjacent large postholes, that was filled with large packing stones (O'Sullivan *et al* 1998). At Letterkeen, Co. Mayo, a fence surrounded the settlement and framed both sides of the entrance causeway. It respected the entrance and a series of postholes there suggested the gate was replaced on a number of occasions (Ó Ríordáin and MacDermott 1952). A series of large postholes, found at the entrance of the settlement enclosure at Mackney, Co. Galway, have been interpreted as either representing a gateway into the enclosure or possibly as the remains of a more substantial gatehouse structure (Delaney 2009, forthcoming). Similalrly, at Newtown, Co. Limerick, a series of postholes and a slot-trench were excavated immediately inside the entrance and were interpreted as the remains of some form of gatehouse (Coyne 2006).

At a number of settlements, the enclosing ditch was dug around the complete length of the ditch and access was only possible across a temporary bridge or ramp. At Cush 1, Co. Limerick, the ditch surrounding the counterscarp enclosure was continuous and access to the settlement was probably over a wooden walkway (Ó Ríordáin 1940). The entrance to the enclosure at Roestown, Co. Meath, occurred at the northeast and initial entry required a bridge or other form of access as the primary ditch was uninterrupted around the site. The second phase witnessed the construction of a causeway at the entrance (O'Hara 2007, 2009a, 2009b). A bridge-type structure was also required at another Meath settlement at Baronstown that traversed both the inner and outer enclosure ditches (Linnane and Kinsella 2009a, 2009b).

Undoubtedly defence and prestige was a factor at the entrances of other mainly high-status settlements. Here we see complex and substantial entranceways and gateways. At the trivallate settlement enclosure at Ballycatteen, Co. Cork, the southern entrance to the site showed evidence for multiple gates and palisades (Ó Ríordáin and Hartnett 1943). The outer enclosure entrance was destroyed by modern disturbance and only one definite rock-cut posthole was uncovered in this area whereas two rock-cut potholes appear to have supported a gate 3.5m wide at the entrance of the middle enclosure. The innermost enclosure entrance was the most elaborate and consisted of two gates and an inner palisade. The outermost gate was 2.3m wide and was supported by two postholes each. A palisade trench was revealed 1.8m inside the crest of the inner bank and encircled the site. The trench fill indicated that it held wooden posts. The inner gate was defined by two postholes formed by deepening the palisade trench from its usual depth. It closed the 3.05m gap in the palisade wall and formed the final defence of the site. A palisade of uprights along the eastern side of the entrance was interpreted as the wall of a shelter which served as a guardhouse. The eastern entrance of another trivallate enclosure, and possible royal settlement, at Garranes, Co. Cork, was also well-defended (Ó Ríordáin 1942). The settlement was defended by three irregularly spaced wooden gates between the ends of the outer and inner banks. Two trenches, which may have supported a palisade of uprights, extended between the ends of the inner bank and the fourth, and innermost gate, and served to narrow the entrance towards the interior. The entrance into the enclosure of another potential royal settlement at Clogher, Co. Tyrone, was defined by a possible wooden tower that was supported by six posts (Warner 2000). Another high-status settlement in Cork, at Garryduff, was marked by a series of postholes and trenches which were interpreted as forming the remains of a wooden palisade and a possible gatetower (O'Kelly 1963). A more recent excavation at a possible defensive settlement enclosure at Baronstown, Co. Meath, revealed linear cuts in the subsoil which extended across the two enclosure ditches. It appears that large timbers were placed in the cuttings which formed the base of a bridge. Successive layers of metalling were found in the area to the south of the outer ditch which reinforces the theory that a bridge was utilised here. A scatter of pits and postholes in the vicinity of the bridge crossing may indicate the location of a timber gatehouse but the surviving features were too flimsy to attempt any form of accurate reconstruction (Linnane and Kinsella 2009a, 2009b). Clearly, the entrances to these high-status settlements or defensive forts were designed with defence in mind. It is also plausible that the complexity and scale of the gateways and towers was a means of demonstrating prestige and power to their respective communities.

Entrances to crannogs were either arrived to by boat or, sometimes, along stone or timber causeways. The latter were, in certain instances, built just below the water level and turned and weaved unexpectedly, presumably to make it difficult for people unaccustomed to the passageway to access the crannog. The entrances themselves were secured by gates. At Ballinderry II, Co. Offaly, the palisade was only partly surviving in the northern section but a gated entrance, defined by two posts driven to a depth of 1.5m, was probably located at the northeast (Hencken 1942). At Moynagh Lough, Co. Meath, an entrance to the crannog was also identified on the northeast side during Phase X (Bradley 1991, 18). Multiple phases of entrances were recorded at Ballinderry I, Co. Westmeath (Hencken 1936). Like Moynagh Lough and Ballinderry II, a northern entrance was initially represented by a gap in the palisade. When the crannog was enlarged and enclosed by a substantial pile palisade, an elaborate entrance to the southeast was built. It consisted of a passageway of posts lining the entrance area on either side and there was also a gatepost with a bar-hole to the southwest, indicating the use of a gate. At a later phase, while the crannog was still in use, the entrance was unusually blocked off.

The entrances to promontory forts, like high-status and defended settlements, were complex and well-protected structures. At Dunbeg, Co. Kerry, two corbelled chambers were incorporated into the walls on either side of its stone-lintelled entrance which measured 2m wide and 2.3m high. Increased defence was apparently a concern during the site's second phase because the entrance was modified with the addition of further supports. At this time, the first ditch was deepened and a dry-stone wall was built against the outer face of the rampart. A retaining wall along the internal side of the rampart was also constructed during Phase 2 (Barry 1981).

Settlement/Cemetery sites were likewise entered and departed by a variety of ways through gates and across bridges. There is also archaeological evidence, similarly to the range of settlements discussed above, for the modification of entranceways. At Knockea, Co. Limerick, the enclosure was accessed through an uncut causeway at its southern end. A posthole was uncovered here and it, like so many other settlements, probably supported a gate (O'Kelly 1967). The settlement/cemetery enclosure at Balriggan, Co. Louth, was approached by a parallel ditched entrance at its south-western side. The avenue respected the ditch, but no causeway was present so the enclosure must have been entered by a bridge or temporary structure (Delaney 2010). At a number of settlement/cemeteries, there is evidence for entrance modifications or more than one entry. An entrance was present to the north of the first enclosure at Faughart Lower, Co. Louth and, during the site's second phase, it was modified and narrowed. The morphology of the site was altered substantially during the third phase when the inner and outer ditches were back-filled and were replaced by a large single enclosure. Two entrances, to the northwest and southwest, were related to this phase (Bowen 2008). This was also noted at the multi-phase settlement/cemeteries at Johnstown (Clarke and Carlin 2008), and Ninch, Laytown (McConway 2001, 2002a, 2002b, 2010), both in Co. Meath, where the enclosures' initial entrance was replaced with double-entrances during later phases.

Controlling Movement: Passageways and Pathways

Many entrances into early medieval settlement enclosures were laid with cobbles or paved surfaces. This was possibly due to the heavy flow of human and animal traffic in this area or as a means of stabilising the ground if the settlement was situated in wet or marsh-type surroundings. There is also evidence for multiple phases and repairs to the pavements at many settlements. In some cases the cobbled or paved entrances continued as pathways into the interior whereas in other enclosed settlements there is no evidence for metalled surfaces, either at their entrance or within the enclosure. Personal choice and preferences or functionality were factors for early medieval familles in how they constructed their settlement entrances.

At Shane's Castle, Co. Antrim, excavation revealed that a cobbled causeway, approximately 3m wide, had been left across the ditch (Warhurst 1971) and cobbled or paved entrances have been recorded at a large number of sites such as Carrigillihy (O'Kelly 1951) and Lisnagun (O'Sullivan *et al* 1998), both in Co. Cork, and Feerwore, Co. Galway (Raftery 1944) to name but a small few. The occurrence of paved areas at settlement entrances is historically recorded in early Irish literary and legal sources, and they were known as the *airdrochat* and were meant to be kept clean. They, therefore, served a public role and were meant to be regularly maintained (O'Sullivan and Nicholls 2011). Perhaps archaeological evidence for this was detected at Newtown, Co. Limerick, where the cobbled area in the entranceway had been repaired or resurfaced on at least one occasion (Coyne 2006, forthcoming). Cobbled surfaces have also been revealed at the entrances of possible livestock enclosures. At Loughbown II, Co. Galway, a metalled pavement was associated with a large causewayed entrance and two large postholes which probably supported a gate. The enclosure was largely devoid of features or artefacts indicative of settlement and was interpreted as a livestock enclosure (Bower 2009).

As has been mentioned, some paved or cobbled areas at settlement entrances continued into the enclosure and these pathways often steered movement in deliberate directions (O'Sullivan and Nicholls 2011). Sometimes they led to other paved areas (probable work areas) while, in many cases, the pathway led directly to a house. An example of the former was identified at Raheennamadra, Co. Limerick, where a 2m-wide metalled surface was excavated in the centre of the entrance passage and

formed part of a large early paved courtyard (75m2) in the northern part of the enclosure. A house was located immediately east of the paved area (Stenberger 1966). Another more pronounced example was a well worn and multi-phased area of paving at Croft Road, Co. Down, which indicates this area was repeatedly utilised over a long period (Proudfoot 1959, 103–5). At Garryduff I, Co. Cork, a gravelled passage stretched from the entrance to the eastern side of House II during the settlement's primary phase and provided a dry surface into the centre of the enclosure (O'Kelly 1963). At the raised settlement enclosure at Deer Park Farms, Co. Antrim, we see another complex entrance that controlled movement into the enclosure and towards the main house's entrance (Lynn and McDowell forthcoming). A final example concerns the cashel at Loher, Co. Kerry. Here, a lintel-covered paved entrance passage led into the interior of the cashel, and the pathway continued towards the entrance of House II (O'Flaherty 1985; O'Sullivan and Sheehan 1996).

Pathways, usually of wood, can sometimes be identified on crannogs. At Moynagh Lough, Co. Meath for example, timbers laid transversely on two parallel runners were recorded at the entrance until the runners were abandoned a further way into the settlement and the timbers were laid directly on the ground. It was suggested that the wet conditions at the crannog's entrance necessitated the use of a more substantial foundation but were not required on the dryer part of the settlement (Bradley 1991, 18). The wooden pathway then directed a person past a metalworking area and into the central space of the site that was overlooked by a house to the right (O'Sullivan and Nicholls 2011).

Paved or cobbled pathways are also present in some promontory forts. The lintelled doorway of a large dry-stone building at Dunbeg, Co. Kerry, was linked with the rampart entrance of the promontory fort by a flagged pathway (Barry 1981). Like a variety of other enclosed settlements, the person entering this impressive fort was deliberately directed to the entrance of the building by a pathway.

Cobbled or paved pathways are not commonly found at settlement/cemetery sites. Rather, areas of cobbling or work surfaces have been recorded at a small number. At Johnstown, Co. Meath, settlement evidence survived as refuse pits, hearths, gullies, spreads and cobbled surfaces that were distributed throughout the enclosures' interior. One of the cobbled surfaces overlay a portion of the Phase II ditch and finds related to it included animal bone, iron slag and an iron fish hook (Clarke and Carlin 2008, 71). Similar work surfaces were identified at Mount Offaly, Co. Dublin, where cobbled areas overlay an earlier enclosure (Conway 1999), and at Raystown, Co. Meath, where evidence from the site's final early medieval phase included a hearth, gullies, metalling, and slot-trenches of a possible rectangular building (Seaver 2010). Heavy truncation of archaeological features is a factor at numerous settlement/cemeteries while many of these sites were also used across a long period. These reasons may explain why pathways – especially from earlier phases – have not survived.

The Layout and Organisation of Enclosed Settlement Spaces: Boundaries and Plots

Within early medieval settlement enclosures, certain areas were demarcated for a host of activities related to domestic work, agriculture, craft and industry (see O'Sullivan and Nicholls 2011). The archaeological evidence has revealed farm outbuildings and pens that kept small animals. Sometimes excavations have revealed enclosures that were devoid of archaeological features or areas within settlement enclosures where nothing was found. It is reasonable to interpret the former as livestock enclosures and the latter as defined spaces within settlement enclosures where livestock were housed at night. In a number of settlements, cereal-drying kilns have been identified a distance from any buildings and it was here where crops were dried (for a detailed discussion about agriculture within the confines of settlement, see Chapter 3). Open-air hearths have been discovered at many enclosed settlements which were presumably used for cooking and industrial work (smithing and smelting hearths related to the latter will be discussed in Chapter 4).

In some cases, it may be that a hearth is the only archaeological feature surviving from a house but clearly many others were created by the settlement's inhabitants in the *les* outside their house. At Doonmore, Co. Antrim for example, excavation revealed areas of paving, a rectangular structure and two external stone-lined hearths (Childe 1938). Hearths were not always as carefully constructed as

those from Doonmore and can appear as areas of intensively burnt soil. This was the case at Lisduggan I, Co. Cork, where three hearths were located to the southwest of three houses (Twohig 1990). None of the hearths were delimited by stones but were identified as intensely scorched soil mixed with charcoal and animal bone. We should not assume that all outdoor hearths were contemporary because not all were reused in the same place across generations. Stratigraphical and radiocarbon dating of hearths at settlements such as Killealy, Co. Antrim (Harper 1970; Lynn 1981/82, 168) and Baronstown, Co. Meath (Linanne and Kinsella 2009a, 2009b) for example, demonstrate that external hearths were placed in different areas of the settlements across centuries. Refuse such as animal bone and carbonised seeds are sometimes found mixed in with hearth debris which suggests these external hearths were used for cooking. We have seen evidence for the former at Lisduggan I while a number of hearths' debris at Skahanagh North, also in Cork, produced animal bone and cereal remains. The external hearths were located to the southwest of a C-shaped structure in an area that was used for cooking and food preparation (Murphy 2006).

Pits have been found in increasing numbers on early medieval enclosed settlements, especially during the Celtic Tiger years, but their exact function is difficult to determine in many instances and their relationship to surrounding features requires much needed research. Some were clearly industrial in nature and charcoal production pits, and pits which contained smelting furnaces and smithing hearths will be discussed in Chapter 4. However, detailed environmental analysis from the contents of a number of pits has shown that they contained the refuse from the settlement's inhabitants. Excavation of an enclosure at Betaghstown, Co. Meath for example, revealed three large oval-shaped pits that were probably the remains of refuse pits. Charred plant remains, identified as hulled barley and oats; charred fruits, such as apple, cherry/plum; and finally wood, including willow, ash and hazel, were recovered from the pits. One of the pits was dated to A.D. 430-620 (Murphy 2005). At Cahircalla More, Co. Clare, two irregular-shaped early medieval pits within the enclosure produced iron fragments, iron slag, burnt animal bone and cereal grains. They contained both industrial and domestic waste and it appears this may have been the settlement of an ironsmith. A further bowl-shaped pit excavated outside the south-western side of the enclosure appears to have been dug to contain a broken saddle quern and its fill contained a small quantity of cereal grains (Taylor 2006). In some cases, structures were reused as rubbish pits. At Ballycatteen, Co. Cork for example, one of the chambers in Souterrain C contained a large dump of limpet shells. An iron axe-head, three small fragments of a bronze plate and a large quantity of animal bone were also recovered within this structure (Ó Ríordáin and Hartnett 1943). On a more recent excavation at Ballynagallagh, Co. Limerick, it has been suggested that two stone-lined storage pits were later reused as refuse pits. They contained quantities of animal bone and charcoal fragments and animal bone from one was dated to A.D. 682-905 (Cleary 2006).

Rubbish spreads or middens have been identified on early medieval enclosed settlements and O'Sullivan and Nicholls (2011) have highlighted how food refuse was deliberately left outside houses and at house or enclosure boundaries to convey social messages of wealth to outsiders for example. At Béal Ború, Co. Clare, habitation refuse stretched from the central hearth of the house, through the entrance, and connected with an extensive rubbish dump directly outside the door which was suggestive of a long period of occupation (O'Kelly 1962). This was an impressive and perhaps defensive settlement and its considerable rubbish dump may have been a means of displaying power and prestige to guests. A layer of habitation refuse, flecked with charcoal, was recovered across the whole floor of the secondary house at Carrigillihy, Co. Cork, and a fragment of a shale bracelet was recovered immediately to the southwest of the house in a refuse deposit associated with the building (O'Kelly 1951). This was a possible low-status dwelling but it has also been suggested that refuse and bones were similarly also available to view outside the house doors of poorer settlements (O'Sullivan and Nicholls 2011).

Cesspits are a rarer occurrence on enclosed early medieval settlements. One probable example includes a wattle-lined pit to the south of a house at Killyliss, Co. Tyrone (Ivens 1984a). Examination of its remains indicated the presence of human whipworm eggs which suggests it was a cesspit. A shallow gully surrounding this latrine indicates a screen was utilised for privacy.

Wells are also rarely found on early medieval settlement enclosures but occur more commonly on ecclesiastical settlements and settlement/cemeteries, where they appear to have been used for industrial rather than domestic use (see below). A well, which naturally filled with water, was uncovered at Killickaweeny, Co. Kildare, close to an ironworking area (Walsh 2008, forthcoming). Its upper fill contained metallurgical waste which demonstrates that it had gone out of use while the occupants continued to forge and mend iron objects. It appears this had an industrial rather than domestic function but water could possibly have been collected for both purposes during the settlement's earlier phase. Other finds from the well included a grindstone and a wooden rod. A more likely source of water consisted of a funnelled pit that was identified in the south-western area of the enclosure close to a round house. This may have collected and stored water for the occupants' domestic use. A 'well' feature was recorded at the mouth of a souterrain within an enclosure at Ballykilmurry, Co. Waterford (Mongey 1933). It contained a number of ash/charcoal deposits but little further information was available.

In some crannogs, rubbish was left beside the palisade or thrown out into the water. Designated areas of the settlement were utilised for craftworking and metalworking while we also know that ironworking was the only activity carried out at one crannog, Bofeenaun, Co. Mayo (Keane 1995; Lawless 1992), because settlement evidence in the form of houses or domestic artefacts was entirely absent. Undoubtedly, many other unexcavated crannogs were also constructed for purely industrial means. Outdoor hearths, like those found on enclosed settlement and ecclesiastical sites, were used by crannog inhabitants for domestic and industrial purposes. Some hearths may indicate the former presence of houses which have not survived while others were constructed in the yard surrounding the dwelling. A number of hearths identified at Lough Faughan, Co. Down for example, may represent external types or may have belonged to unidentified houses. Some were clearly industrial because iron and bronze slag, crucibles and a clay mould for casting bronze pins were the only objects found in them (Collins 1955). However, others were probably used for domestic purposes and not all were contemporary. An 'outer hearth', which produced gaming pieces, bone dice, glass beads and a bronze drinking horn terminal was associated a sixth-century secondary phase at Ballinderry II, Co. Offaly (Hencken 1942). Interestingly, this phase has been interpreted as an open-air site used for cooking, bathing and the processing of antler and deer bone, potentially associated with aristocratic red deer hunting (Newman 1986), and again shows the diversity of use for crannogs throughout the early middle-ages.

O'Sullivan and Nicholls (2011) have shown that, on some crannogs, rubbish built up against the wooden palisade, or it was thrown over into the lake. Evidence for the latter was identified at Moynagh Lough, Co. Meath (Bradley 1991), and Ballinderry II, Co. Offaly (Hencken 1942), where bones were gathered up after feasts and discarded into the lake. At Ballinderry I, Co. Westmeath (Hencken 1936), the largest accumulation of bone lay against the palisade on the north side of the crannog which was the furthest place from the house and a midden was also recorded by the palisade at Craigywarren, Co. Antrim, at the northeast (Coffey 1906). There was also a 'midden' of animal bone beside the house at the latter crannog which produced most of the site's finds including pottery, a concave scraper, a silvered, plain pennanular brooch, a bronze pin and a finger ring and a bracelet (ibid.). Food refuse was similarly recorded in front of the door of the house and to the left towards the lake at Sroove, Co. Sligo (Fredengren 2001, 2002). This comprised large amounts of animal bone and represented a major proportion of the site's bone assemblage. Therefore, crannog dwellers disposed of their rubbish in a variety of ways. In some instances, animal bone and food refuse built-up along the inner edges of the palisade or was left outside houses. It would have been relatively easy for people to dispose of this rubbish in pits so again we can think in terms of middens as status symbols related to the occupants access to plentiful food supplies. O'Sullivan and Nicholls (2011) have also highlighted the significance of boundaries to early medieval people; therefore food refuse was deliberately disposed along crannog edges.

There is evidence that pits were used to dispose of refuse while analysis has also shown that they were used as outdoor toilets. A cesspit at Moynagh Lough, Co. Meath, was a sub-rectangular pit which was filled with lenses of dung and alternating layers of straw and leaves which were presumably the wiping material used after the toilet (Bradley 1993, 76). This cesspit was located just inside the entrance to the crannog, off to the right of the end of a timber pathway that led into the

site, and in full view between a roundhouse and the palisade. It was also dug into the west edge of metalworking area 1, which indicates the outdoor toilet was constructed after metalworking in this area had ceased (O'Sullivan and Nicholls 2011). Similar external cesspits have been noted on other crannogs including Ballinderry I, Co. Westmeath, and Ballinderry II, Co. Offaly (O'Sullivan and Nicholls 2011). These were also in view of houses or entrances to the crannog and it appears that ideas of privacy for early medieval individuals differed to what is accepted today although these may have been enclosed by structures which have since not survived.

Excavations within promontory forts, at forts such as Larrybane, Co. Antrim (Proudfoot and Wilson 1962), Dalkey Island, Co. Dublin (Liversage 1968), and Dunbeg, Co. Kerry (Barry 1981) for example, have revealed various evidence for settlement including dwellings, hearths, pits, functional and dress items and animal bone assemblages although these have differed at each site. At Larrybane, possible rectangular structures within its interior were identified as roughly cobbled floors (Proudfoot and Wilson 1962). Interestingly, a rectangular house at Dalkey Island was built both upon the bank and on one of the highest places in the northern part of the island so it appears that visibility was a key factor for the occupants' choice of location (Liversage 1968). As we have seen, a pathway led from the fort entrance to the central and only house (it had two phases of use) at Dunbeg although a souterrain was also present which was connected to the rampart (Barry 1981). Dalkey Island has perhaps produced the widest settlement evidence including a house, external hearths, some within ditches, a possible cereal-drying kiln, and various pits whose function is unclear. Some of the latter were probably refuse pits while others produced industrial debris including slag and a possible tuyère fragment indicative that ironworking occurred on site (Liversgae 1968). Doyle (1998) has assessed the very large assemblage of imported pottery at Dalkey and its location to suggest the promontory fort was utilised as a trading gateway and it is possible that its inhabitants were involved in distributing exotic items to wealthy and powerful people on the mainland. Animal bone, souterrain ware and iron finds including a ring, nail, sickle and slag suggests people resided and practised ironworking at Larrybane, while exotic material, including a fragment of bronze, a glass bangle, and an amber bead, are indicative of external trade or contacts with high-status individuals (Childe 1936; Proudfoot and Wilson 1962). Other forts, like Dunbeg (Barry 1981), revealed relatively few internal features as well as small artefactual and animal bone assemblages so perhaps this was a defensive fort and settled only intermittently in times of danger.

Settlement/cemetery sites show variation in their layouts from univalate enclosed settlements and burial grounds, such as Carrowkeel, Co. Galway (Wilkins and Lalonde 2008), Butterfield, Co. Dublin (Carroll 1997) and Dunmisk, Co. Tyrone (Ivens 1989; although the latter two may have been undocumented ecclesiastical settlements), to larger and more common multivallate multiphase enclosures with related agricultural and industrial activity including Raysown (Seaver 2006, 2010), Johnstown (Clarke and Carlin 2008), and Ninch, Laytown (McConway 2001, 2002a, 2002b, 2010), all in Co. Meath, and Balriggan, Co. Louth (Delaney 2010), for example. It is not known why some small burial grounds became the focus of intensive later settlement and agriculture across many centuries while other cemeteries were abandoned within a few generations. In terms of the burials grounds themselves, not all were defined by boundaries while there is also variation regarding their location within the enclosures. It appears that the majority of cemeteries were not bounded by any internal enclosures. Exceptions to this are Parknahown, Co. Laois (O'Neill 2007, 2008), Raystown, Co. Meath (Seaver 2006, 2010), and Knoxspark, Co. Sligo (Mount 2002). The location of the cemeteries within the enclosures differed. Some were initially centrally placed such as Carrowkeel, Co. Galway (Wilkins and Lalonde 2008), Johnstown (Clarke and Carlin 2008) and Knowth, Site M (Stout and Stout 2008), both in Co. Meath, and Dunmisk Co. Tyrone (Ivens 1989). Others were situated in the northern part of the enclosures, for example Parknahown, Co. Laois (O'Neill 2007, 2008), and Faughart Lower, Co. Louth (Bowen 2008), while the southern part of the enclosure was favoured at Clogher, Co. Kerry (Coyne 2004; Collins and Coyne 2007), Loughboy, Co. Kilkenny (Cotter 1998, 1999), Balriggan, Co. Louth (Delaney 2010), and Castlefarm, (O'Connell 2006, 2009a; O'Connell and Clark 2009), and Ratoath (Wallace 2010), both in Co. Meath. At Millockstown, Co. Louth (Manning 1986), the cemetery was slightly to the east within the 'ringfort' enclosure. In many instances, the graveyards at settlement/cemetery sites expanded to incorporate further burials over time. For example, at Johnstown, Co. Meath (Clarke and Carlin 2008), burials were placed to the south and east of the

initial central mound cemetery, while a succession of enclosure ditches were identified at Mount Offaly, Co. Dublin, to demarcate multiple phases of the cemetery's expansion (Conway 1999).

The cemetery was obviously a key aspect of settlement/cemetery sites and in many, but not all, cases it formed the primary component of the site. Families and communities buried their dead in a place that probably held a special resonance (possibly related to ancestral ties to the land), and then established their homes and settlements. It may seem unusual to us that people chose to live so intimately beside the resting place of their loved ones but for communities in the past, ties to the land and its agricultural yields enforced their connection to daily work and practices (O'Sullivan *et al* 2009, 118). The living buried their dead in the lands they laboured on and which sustained them and all were intimately connected to a sense of place. Therefore, many settlement/cemeteries were busy and bustling places and on entering one, people would have been aware of other buildings within the enclosure, such as houses and outbuildings, external hearths, metalworking areas, pits, wells and many other features related to domestic and agricultural life. Souterrains are also commonly found. In Chapter 3, we will discuss agricultural activity in more detail as well as the many related neighbouring fields, mills and cereal-drying kilns.

External hearths are found at settlement/cemeteries as they are, as we have seen, on many forms of enclosed early medieval settlements. A number of hearths were identified at Raystown, Co. Meath, across a succession of phases (Seaver 2006, 2010). During Phase II (between AD 500-700), a number of hearths and pits were enclosed by two substantial boundaries. One may have functioned as a mill-race while the other was fed by a series of gullies and ditches which drained from a terminal at the junction of the outer burial enclosure. During Phase IV (AD 700-900), a new substantial mill in the southern part of the site was constructed which was related to an open settlement consisting of a series of hearths, gullies and a refuse pit. A second water mill replaced an earlier mill in the northern part of the site during Phase V (AD 900-1150) and settlement evidence during this phase again included a series of hearths, related to a possible rectangular building, as well as a baking-slab, gullies and metalling. External hearths have also been recorded at Johnstown, Co. Meath (Clarke and Carlin 2008), and Millockstown, Co. Louth (Manning 1986), for example, and would have served both domestic and industrial purposes.

Pits were dug on settlement/cemeteries to contain rubbish from domestic day-to-day activities as well as waste from industrial work such as metalworking. At Raystown, Co. Meath for example, a refuse pit from Phase V in the southern habitation area contained hearth rake-out, a ringed pin, animal bone, and charred oat and wheat (Seaver 2010). Many of the pits at Johnstown, Co. Meath, contained iron slag, iron knives, burnt and unburnt animal bone, indicating that food and ironworking refuse were discarded into them, while other examples contained charred cereals (Clarke and Carlin 2008, 70). Like Raystown, the pits' contents show that early medieval occupants at Johnstown had a mixed diet which included meat and crops. Refuse spreads are also recorded at settlement/cemetery sites. At a later phase at Dooey, Co. Donegal, an enclosing ditch was dug around the central part of an earlier unenclosed occupation area. The ditch appears to have filled-in relatively quickly with sand but habitation continued as refuse was found both inside and outside the in-filled ditch (Ó Ríordáin and Rynne 1961).

Wells have been uncovered at a number of settlement/cemeteries including for example Faughart Lower, Co. Louth (Bowen 2008), Castlefarm (O'Connell 2006, 2009a; O'Connell and Clark 2009) and Ninch, Laytown (McConway 2001, 2002a, 2002b, 2010), the latter two from Co. Meath. It is likely that the wells were utilised for domestic drinking water and/or industrial or craft purposes. The latter was most likely at Castlefarm where eight large unlined wells – ranging in depth between 1.6–2.5m – were discovered. These may have related to textile production on site because numerous sewing needles, spindle whorls, loom beater pins, a weaver's rubbing stone and a loom weight were recovered from some of the enclosing ditch fills (O'Connell 2009a). Wells have also been uncovered at ecclesiastical settlements but are much rarer on settlement enclosures. They were probably required at larger settlement/cemetery and ecclesiastical sites to supply drinking water to larger numbers of people. Also, there tends to be a broader range of craft and industrial activities (including both iron and non-ferrous metalworking) at many settlement/cemetery and ecclesiastical settlements so readily available water would have been required, especially for metalworking.

Chronology, Change and Cultural Biographies

Earlier suggestions by Caulfield (1981) and Limbert (1996) that earthen enclosed early medieval settlements have Iron Age origins have been conclusively challenged, firstly by Lynn (1975a, 29; 1975b, 45; 1983b, 48–50), and more recently by Stout (1997) to demonstrate that they are early medieval enclosed farmsteads. Lynn (1981/82, 150) initially suggested a construction/primary occupation phase between AD 600-1000 for enclosed settlements and Stout (1997, 24–9) narrowed this to between AD 600 and 900. O'Sullivan *et al* (2009, 34–5) have identified a number of problems with Stout's analysis of the radiocarbon dates because no account was taken of the dates' stratigraphical context and his conclusions were based on one standard deviation. Kerr (2007, 98–9) has since re-appraised the radiocarbon dates more precisely and concluded that the dating of typical univallate and multivallate sites can be refined to c. A.D. 600-850.

Kerr's settlement study of north-west Ulster also involved a chronological investigation of raised and platform enclosures. He found these tend to have slightly later construction/primary occupation phases between the mid-eighth and mid-tenth centuries compared with univallate and multivallate enclosed settlements (Kerr 2007, 99). However, some of these sites originated as univallate enclosures, such as Deer Park Farms, Co. Antrim (Lynn 1987, 1988a, 1989; Lynn and McDowell forthcoming), which were heightened across their lifetime, while others were later re-used as mottes in the later middle-ages. A settlement that revealed all such phases was excavated at Rathmullan, Co. Down, in which it was constructed as a univallate enclosure in the sixth or seventh century, was then converted into a raised enclosure in the eighth/ninth century, and was further modified as an Anglo-Norman motte in the twelfth century (Lynn 1981/82, 148–50).

Much fewer stone enclosed settlements have been excavated and therefore their chronologies have received less attention. Excavation and radiocarbon dates from stone enclosed settlements at Rinnaraw, Co. Donegal (Comber 2006), Caherconnell, Co. Clare (Hull and Comber 2008), and Drumaroad, Co. Down (Waterman 1956b; Kerr 2007, 91) indicate construction/main occupation phases from the ninth century at the former and tenth century at the latter two. Although the presence of pre-cashel occupation at Carraig Aille, Co. Limerick, complicates the dating of the site, Ó Ríordáin (1949a, 108) suggested that the site was occupied between the eighth and eleventh century and most of the finds are certainly from the latter part of the early medieval period. At Cahercommaun, Co. Clare, Hencken (1938, 2) suggested an early ninth-century date for the site on the basis of a silver pennanular brooch but Ó Floinn's (1999, 73–9), analysis of the artefacts has revealed objects dating between the fifth/sixth, eighth and ninth/tenth centuries. Cotter (1999), however, could find very little potential in-situ material from the earlier phases and suggested that the cashel wall, internal buildings and souterrain date to the ninth/tenth century. Therefore, the limited dating evidence so far from stone enclosed settlements suggests they have similar construction/primary occupation phases to raised and platform settlement enclosures and are slightly later than earthen types (O'Sullivan *et al* 2009, 54). Stone-built enclosures, like various univallate and multivallate settlement enclosures, were also reused and occupied in the later medieval period (Fitzpatrick 2009).

Early medieval palisaded enclosures are rare in the archaeological record and only two have been radiocarbon dated thus far at Ballynagallagh, Co. Limerick (Cleary 2006), and Ballintemple, Co. Offaly (Stanley and Moore 2004). Both palisades at the former appear to have been contemporary and the innermost was constructed between the mid eighth and late ninth century. A radiocarbon date from a hearth within the palisade at Ballintemple was dated between the mid sixth and mid seventh century. Radiocarbon dates are awaited from the multiphase palisade enclosures at Lowpark, Co. Mayo, but the main settlement palisade enclosed a souterrain and artefacts from the site included quernstones, honestones, iron knives, copper-alloy ringed pins, a bone pin, glass beads, lignite bracelet fragments, an iron belt buckle and a gold filigree panel indicative of early medieval occupation (Gillespie 2007, 19). It would appear, therefore, that palisade enclosures were constructed and occupied at different times during the early medieval period and that their form and chronologies also varied.

Crannogs were built in the late Bronze Age, early Iron Age, and the early and late medieval periods (Fredengren 2002, 94, 103; O'Sullivan 1998), while small unpalisaded Mesolithic and Neolithic crannogs, situated at the edges of midlands lakes, have also been discovered at Moynagh Lough, Co. Meath (Bradley 1991), and Lough Kinale, Co. Longford (Fredengren 2002; O'Sullivan 1998). However, it is clear, from stratigraphic, artefactual, radiocarbon and dendrochronological evidence that the most intensive occupation and abandonment phases occurred between the sixth and eleventh centuries AD (Baillie 1979, 79; O'Sullivan 1998), while dendrochronological dating indicates an increase in crannog construction in the seventh century, cotemporary with the primary occupation of univallate and multivallate dryland enclosed settlements (O'Sullivan *et al* 2009, 54).

Very few promontory forts have been excavated but the majority have revealed early medieval activity. There have been suggestions that they originated in the Iron Age (Edwards 1990, 41; Raftery 1994), but stratigraphic evidence, radiocarbon dates and artefactual analysis now suggests that some, at least, were constructed in the seventh or eighth centuries AD with a probability favouring the latter. Pre-early medieval evidence has been found on some promontory forts. At Dunbeg, Co. Kerry for example, a shallow ditch that partially underlay the early medieval stone rampart was radiocarbon dated to the late Bronze Age (Barry 1981, 307), while Neolithic and Bronze Age temporary encampments were revealed on the promontory fort at Dalkey Island, Co. Dublin (Liversage 1968). However, the evidence from both sites does not confidently relate to a building phase for the promontory forts.

Clearly there has been considerable early medieval archaeological evidence found on promontory forts suggesting that their most intensive use occurred during this period. The excavators of Larrybane, Co. Antrim, suggested the site was constructed about A.D. 800 and this date was supported by the presence of souterrain ware in the primary habitation layers (Proudfoot and Wilson 1962, 93, 107). Around 1500 sherds of this pottery were recorded on the fort as well as animal bone and artefacts related to domestic and industrial use. Radiocarbon dates from Ditch I, and both phases of the clochan at Dunbeg, Co. Kerry, indicate the fort was constructed in the eighth century and was occupied until the eleventh century (Barry 1981, 311). Animal bone from the ditch fills and cairn, and human bone from a burial at Knockspark, Co. Sligo, was also radiocarbon dated revealing that the site was mainly in use between the late seventh and tenth centuries (Mount 2002). Excavations on Site II, beneath the bank at Dalkey Island, Co. Dublin, revealed an occupation spread that contained B- and E-ware pottery. This demonstrates that settlement activity, dating between the fifth and mid seventh centuries, occurred on the site *before* the promontory fort was constructed (Liversage 1968; Doyle 1998). A house at Site III, built on the bank, was also excavated at Dalkey Island and E ware sherds were distributed in two areas at either side of the entrance. This suggests that the structure may have been in use when they were deposited and possibly dates to the seventh century (ibid.). Therefore, it appears – based on radiocarbon dates and artefactual analysis from these findings – that promontory forts were constructed mainly in the eighth century and were variously occupied until the tenth/eleventh centuries. This is, of course, based on a very small sample and further research is required to elucidate their chronologies.

It has been suggested that many settlement/cemeteries have their origins in the late Iron Age/early medieval transitional period and that burial comprised the initial activity at the site (Kinsella 2010). This appears to have occurred at Johnstown (Clarke and Carlin 2008), Ratoath (Wallace 2010), and Raystown (Seaver 2010), all in Co. Meath, while the primary enclosure and earliest burials at Castlefarm, also Co. Meath, were dated between the fifth and sixth centuries (O'Connell 2009a; O'Connell and Clark 2009). However, at other settlement/cemetery sites, radiocarbon dates from the enclosure ditches and internal features suggest the enclosures were constructed first but it could be that some undated burials represent the primary activity at the site. Indeed, this is a problem in assessing the chronologies of settlement/cemeteries because not all burials are revealed or dated. At Loughboy, Co. Kilkenny, a charcoal spread from the interior was dated between the fourth and sixth centuries and a burial was dated after to the seventh/eighth century (Cotter 1998, 1999). Radiocarbon dates from the primary fills of the initial enclosure, and later double-ditched enclosure, at Parknahown, Co. Laois, returned fifth to seventh century dates (O'Neill 2007, 2008). The cemetery was undated but it is possible some of the earliest burials date to this period. A pit within the enclosure at Balriggan, Co. Louth, was dated between the fifth and seventh centuries but the

enclosure ditch or burials were not dated so, again, we are unsure of the chronological development of the site.

At other settlement/cemetery sites, it appears more conclusively that burial represented later activity. At Dooey, Co. Donegal, the cemetery was utilised after the site's initial role as an unenclosed settlement (Ó Ríordáin and Rynne 1961). Radiocarbon dates from Carrowkeel, Co. Galway, indicate the enclosure and burial ground were used contemporaneously in the seventh century (Wilkins and Lalonde 2008), while it appears that the early medieval settlement and burial phase at Knoxspark, Co. Sligo occurred from the late seventh/eighth century and after (Mount 2002). The longevity of these sites also varied from those that were used into the later medieval period, such as Johnstown (Clarke and Carlin 2008) and Castlefarm (O'Connell 2009a) for example, both in Co. Meath, to those that were abandoned at various parts of the early middle-ages. Therefore, there is variation in the chronology and organisation of these sites as they originated and developed at different times.

Settlement enclosures of all types had cultural biographies. The 'cultural biography' is based on anthropological theories which explore how places and objects often have a 'life-cycle' or 'biography' from production, through use and abandonment that mirrors the patterns of birth, life and death of its inhabitants (see O'Sullivan 2008). Most importantly, places and objects also shift and change in social and cultural meaning across time and settlements were used and organised differently over years, decades and centuries (Gerritsen 2003; Van de Noort and O'Sullivan 2006). Enclosed settlements were therefore not static and the people that occupied them and their retainers and slaves dug and maintained enclosure ditches, constructed and retained banks, they built and extended their enclosures, houses and farm buildings were replaced and mended across generations, and pathways, entrances and internal industrial and craft areas were repaired or repositioned until finally, the settlements were abandoned.

Harold Mytum (1992, 123), based on the excavated evidence from Antrim, Down and Cush, Co. Limerick, stated that enclosure banks were 'generally unsubstantial and only constructed once', and this lead to the over simplified view that early medieval settlement enclosures were generally only occupied for a couple of centuries and were rarely modified. Although true for some settlements, it does not reflect the individual settlement biographies of many more enclosures which demonstrated complex use identified by archaeologists as ditch re-cuts, bank modifications and enclosure modifications. There are an ever increasing number of enclosed settlements that have produced multiphase settlement activity. Excavations at Lisleagh I, Co. Cork for example, showed that the univallate enclosure was enlarged and replaced with a more formidable bivallate enclosure after only a short period, whereas conversely, its neighbouring site, Lisleagh II, began as a large enclosure but was replaced by the construction of a shallow ditch and palisade. During the final phase, occupation occurred over the in-filled ditch (Monk 1995). We have seen how palisaded enclosures predated the banks at Coolcran (Williams 1985b, 71) and Lisdoo (Brannon 1981/82), both Co. Fermanagh, and Aghadegnan, Co. Longford (Carroll 1993), while it has also been demonstrated that many univallate settlement enclosures were heightened into raised enclosures while some were remodified again as mottes in the later middle-ages. Recent excavations in Meath, at Roestown (O'Hara 2007, 2009a. 2009b), Baronstown (Linnane and Kinsella 2009a, 2009b) and Dowdstown (Cagney and O'Hara 2009; Cagney *et al* 2009), all demonstrated that these were multiphase settlement enclosures that produced evidence for numerous ditch re-cuts and modifications as well as enclosure extensions and differences in lengths of occupation. Rathgurreen, Co. Galway, is unusual because unlike many enclosed settlements that extend outwards, a second series of vallation was constructed inside the original univallate enclosure (Comber 2002). Finally, in other examples, settlement enclosures were abandoned in favour of unenclosed settlements such as Knowth, Co. Meath (Eogan 2007, 1–5) and Rosepark, Co. Dublin (Carroll 2008).

We have seen how crannogs were constructed and inhabited from prehistoric to late medieval times but that they were most intensively occupied during the early middle-ages. Multiple occupation phases have been identified at Moynagh Lough (Bradley 1991, 1993) and Lagore (Hencken 1950; Lynn 1985/86), both in Co. Meath, Rathinaun (Raftery 1957, 1966, undated) and Sroove (Fredengren 2002), both in Co. Sligo, and Ballinderry I, Co. Westmeath (Hencken 1936; Johnson 1999; Lynn 1985/86; Newman 1986), for example. At these sites, platforms were variously cleaned and rebuilt;

palisades were constructed, repaired and extended; houses replaced earlier dwellings; entrances were modified; and external metalworking areas and hearths were abandoned or dismantled in favour of new working areas or features.

Multiple phases of use have been recorded at some excavated promontory forts. Several of the sections through the banks at Dunbeg, Co. Kerry, revealed that they had been constructed in two or three distinct phases which took place fairly close together as indicated by the lack of any intervening old sod horizons between them (Barry 1981). The rampart was constructed in two phases. The first related to the construction of the inner half of the wall while Phase II involved the addition of further supports to the entrance, the deepening of Ditch 1, and the construction of a dry-stone wall against the outer face of the Phase 1 rampart (*ibid.*). The phasing from Dunbeg appears close together and at Dalkey Island, Co. Dublin, three potential phases of activity dating to the early medieval period were also identified but we do not know if these phases spanned months or centuries (O'Sullivan *et al* 2009, 45).

Settlement/cemetery sites likewise have revealed complex site biographies and some of the larger sites especially, including Raystown (Seaver 2010), Ratoath (Wallace 2010), Johnstown (Clarke and Carlin 2008), and Ninch, Laytown (McConway 2001, 2002a, 2002b, 2010), all from Co. Meath for example, were intensively used settlement and burial grounds with multiple phases of settlement, agricultural and industrial activity. Many, but not all, display evidence for cemetery extensions, numerous ditch re-cuts, enclosure modifications, and the reuse and repositioning of specialised agricultural and industrial areas indicative of vibrant and bustling places that were used across many centuries (Kinsella 2010).

Therefore, this variety of settlement enclosures shows great diversity in terms of their biographies as some were occupied continuously while others were abandoned and re-settled. Some were built on green-field sites, were constructed over earlier palisaded or unenclosed settlements, or developed around small cemeteries while others were constructed on lake shores or further out in the water; some were abandoned shortly after initial use while others were occupied and prospered across many centuries as evident by ditch and bank modifications, enclosure extensions and multiple phases of house building and repair. Finally, some enclosed settlements were abandoned in favour of open settlement while others were reused and modified in the late medieval period until all were eventually abandoned. The availability of this wealth of archaeological evidence highlights more than ever the dangers of basing social settlement models on morphological grounds alone without consulting archaeological findings (i.e. Stout 1997). Excavation, for example, has shown that multivallation at many sites was not a contemporary action but represents several phases of settlement enclosure. This has obvious implications for research identifying bivallate and trivallate sites as high status settlements. Likewise, what are identified as upstanding mottes today in the landscape may hide earlier early medieval raised settlement occupation. It is clear that only excavation can decipher the biographies of settlements and that analysis of morphology alone overlooks the waxing and waning of each individual site.

The Early Medieval Church and Ecclesiastical Settlement Enclosures

Archaeological investigations of ecclesiastical sites have tended to focus on their buildings' art and architecture. Large-scale infrastructural developments have not significantly increased our knowledge about early medieval ecclesiastical settlement as in other areas because the location of known church sites was typically acknowledged during the planning process and rescue excavations have occurred, for the most part, in relation to graveyard extensions or small-scale building work in the vicinity of the known site. However, a recent notable exception to this was the discovery of a previously unknown ecclesiastical enclosure with extensive craft and industrial evidence at Clonfad, Co. Westmeath (Stevens 2006, 2007). There have also been a number of research excavations at ecclesiastical sites, for example Kilpatrick, Co. Westmeath (Swan 1973, 1975, 1976, 1980, 1994/95), Inishcealtra, Co. Clare (De Paor 1997; De Paor and Glen 1995) and Innaloughan, Co. Kerry (Marshall and Walsh 2005), while a number of recent rescue excavations, in the environs and vicinity of churches at Kilgobbin, Co. Dublin (Bolger 2004; Larsson 2004a, 2004b, 2004c), and Armagh Cathedral (for

example Crothers 1999; Gaskell-Brown and Harper 1984; Hurl 2003; Lynn 1988e), have contributed to our understanding of related settlement and agricultural activities at ecclesiastical sites.

Swan's (1983, 1985) survey and aerial photography of early medieval ecclesiastical sites has shown that they were larger than the majority of secular enclosed settlements. The majority had an enclosure diameter between 90m and 120m, while larger ecclesiastical sites were between 300m and 500m in diameter (Swan 1985, 97). His survey indicates that up to three enclosure ditches could be present although univallate and bivallate enclosures are more common.

Defining Early Medieval Ecclesiastical Enclosures – Walls, Banks and Ditches

Enclosing Walls

Ecclesiastical settlements were enclosed by either walls or ditches and banks (Swan 1983, 1985), although the majority of excavations have occurred on those surrounded by the latter. Excavation of enclosure walls have highlighted variations in terms of their size and scale but like secular cashel settlements, the majority were stone-faced on either side of a rubble core. At Church Island, Co. Kerry, the cashel wall survives to a maximum width of 2m and was up to 1m high (O'Kelly 1958). It runs for approximately two thirds of the way around the ecclesiastical settlement and may have enclosed almost the complete habitable part of the island. Excavation at another ecclesiastical settlement at Reask revealed that its wall was up to 3m thick (Fanning 1981). In certain instances, variations in wall designs were also apparent. At High Island, Co. Galway for example, the enclosure had originally been defined by a substantial stone wall which included two inter-mural chambers (Marhsall and Rourke 2000).

Enclosing Banks

Relatively few banks have survived around ecclesiastical settlements. At Kilpatrick, Co. Westmeath, traces of an internal bank with stone-lined façade were detected on occasion (Swan 1976). Killederdadrum, Co. Tipperary, was a possible ecclesiastical settlement enclosure and its enclosing bank, like Kilpatrick, was barely identifiable although it survived best along the northern perimeter where it had a maximum height of 0.7m and was approximately 3m wide (Manning 1984). Similalrly to their secular counterparts, the extent of ecclesiastical enclosure banks varied from place to place and according to the size and prominence of the site.

Enclosing Ditches

Early medieval ecclesiastical sites ranged from large and influential monastic settlements such as Armagh and Clonmacnoise to smaller enclosed ecclesiastical sites that met the needs of their local congregations. It appears, generally, that enclosure ditches were more substantial than many of those surrounding secular enclosed settlements but, like the latter, could be V-, U-shaped or flat-bottomed. Unsurprisingly some of the largest monastic settlements had similalrly large enclosing ditches. At Armagh, excavation on its inner enclosure revealed the ditch was 6.4m wide and up to 3m deep (Gaskell-Brown and Harper 1984), while two sections of the enclosure ditch at Clonmacnoise, Co. Offaly, were between 5m and 6.2m wide and 3.8m deep (Murphy 2003, 16). At other ecclesiastical sites, where a diverse range of craft and industrial activities have been identified such as Kilpatrick, Co. Westmeath (Swan 1994/95) and Tullylish, Co. Down (Ivens 1987), ditches 4m and 5m wide and up to 3m and 4m deep respectively surrounded the sites. More recent excavations at Clonfad, Co. Westmeath, uncovered two enclosure ditches and the outer ditch measured 3m in width and was 1.7m deep (Stevens 2006, 2007).

Entrances and Gateways

The entrances to ecclesiastical settlements vary in terms of their size and complexity. As with many secular enclosed settlements, the enclosure at Ardfert, Co. Kerry, was entered by a possible causeway defined by two postholes at its northern terminal (Moore 2007, 39–41). At Killederdadrum, Co. Tipperary, the entrance consisted of an un-dug causeway, between 3m and 3.5m wide, across the

ditch. Two pairs of large postholes were found inside the causeway, flanking the entrance, and may have held either successive gate-posts (2.5m apart) or formed part of a single entrance structure (Manning 1984). Rather than the defensive gatehouses or towers found at high-status secular settlements, possible guesthouses, indicative of the religious and pious role of these sites, have been identified outside the entrance of the ecclesiastical settlements at Church Island, Co. Kerry, and High Island, Co. Galway. The Church Island house is located immediately outside the monastic enclosure wall (O'Kelly 1958, 74–5). Its interpretation as a guesthouse is based on evidence from early documentary sources which indicates that the monastic guesthouse was sometimes located outside the monastic enclosure (Marshall and Rourke 2000, 50–1). It should be noted, however, that the enclosure wall post-dated the rectangular house. At High Island, a sub-rectangular structure was located at the entrance and against the external wall of the enclosure. Marshall and Rourke (2000) have also suggested that it served as a guesthouse.

Controlling Movement: Passageways, Pathways and Roads

Pathways, similalrly to secular settlement enclosures, were relatively common at ecclesiastical settlements and appear to be associated with the 'sacred' structures within the enclosures (O'Sullivan *et al* 2009, 94). At Downpatrick, Co. Down for example, a pebbled pathway of unknown date seemed to lead to a medieval cemetery within the enclosure (Brannon 1988, 3), while at Church Island, Co. Kerry, an extensive paved pathway, running along the inside of the cashel wall, joins the rectangular house (House 2) to the stone oratory (O'Kelly 1958, Plate XVII). Two paved paths were evident at Illaunloughan, Co. Kerry, including one that extended from the door of the church, and another that led to the shrine's entrance (Marshall and Walsh 2005, 223). In other instances, entire areas of paving are noted, such as High Island, Co. Galway, where the area between the church enclosure wall and the church was paved (Marshall and Rourke 2000, 103), while a pavement of large sandstone slabs completed a circuit around the enclosure at Relickoran, Co. Sligo (O'Sullivan and Ó Carragáin 2008, 224).

Roads and trackways formed another component of the early medieval settlement landscape. The law-tracts distinguish five categories of roads including, in descending order of importance, the highway, road, byroad, curved road and cow-track (Kelly 1997, 391). Clonmacnoise, Co. Offaly, produced archaeological evidence for the construction, maintenance and modification of its roads between the eighth and twelfth centuries (King 2009, 345). One of these measured 3m wide, was at least 18.5m long and could be ascribed an early medieval date because it was truncated by an eleventh-century pit (King 1995).

Another form of travel was the trackway or causeway (*tóchar*) which was built to pass over extensive areas of bog (Kelly 1997, 392). There are approximately thirty known wooden trackways dated to the early medieval period by radiocarbon or dendrochronology in Ireland (O'Sullivan *et al* 2009, 145). Many of these come from rural locations mainly in counties Offaly and Tipperary. Ecclesiastical examples include a trackway platform at Dromiskin, Co. Louth (Murphy and Conway 1999), Lemanaghan monastery, Co. Offaly (McDermott 1998b; O'Carroll 1999a, 1999b, 1999c), and a potential pilgrim's road towards Clonmacnoise in Bloomhill Bog, Co. Offaly (Breen 1988).

The Layout and Organisation of Ecclesiastical Enclosures: Internal Spaces, Boundaries and Plots

Enclosed ecclesiastical settlements varied in size and layout and contained a variety of buildings, both religious and domestic. Their inhabitants also constructed farm buildings and kilns (see Chapters 3) while outdoor fires were lit to cook food, and pits, for rubbish and industrial activities, were dug in various spaces throughout the enclosure. The layout and division of domestic space differed from small ecclesiastical settlements, usually enclosed by one bank and ditch, to much larger monasteries that could have two or sometimes three surrounding banks and ditches. Herity (1995, 15) has noted that religious buildings tended to be situated on the eastern side of early western ecclesiastical settlements while domestic structures were frequently located in the western part of the enclosure facing an open space called the *platea* (Herity 1995, 30, 59; Marshall and Walsh 2005, 128).

Doherty (1985, 57) has argued that larger monastic settlements were deliberately designed whereby the inner enclosure defined the sacred core and the outlying enclosures demarcated areas of decreasing holy importance. A reappraisal of the excavation at Nendrum, Co. Down, by McErlean and Crothers (2007), revealed that the inner enclosure was the ritual focus of the settlement which contained the church, round tower, cemetery, cross slabs and sundial. The middle enclosure contained the domestic buildings including a possible '*scriptorium*' and industrial activity included some evidence for non-ferrous metalworking. The evidence from the outer enclosure was less clear although ironworking was apparent. Excavations outside the ecclesiastical cores of Armagh and Clonmacnoise, Co. Offaly, also indicate divisions of space related to domestic, industrial and craft activity. At Armagh there is also considerable evidence for craftwork over 200 metres from the central core (Lynn and McDowell 1988b, 59–60; Lynn 1988e). We have seen (above) that roads were excavated at Clonmacnoise but there is also extensive evidence for the construction and continuity of house plots from the eighth to twelfth century (King 2009, 335-36, 345), and these plot divisions and evidence for roadways are matched only by the evidence from the urban Hiberno-Scandinavian towns.

Like secular settlement enclosures, outdoor hearths were a feature of ecclesiastical settlements and were used for outdoor cooking and domestic activities. At Clonmacnoise, Co. Offaly, a rectangular structure and a contemporary adjacent round house were surrounded by a metalled yard with a wooden gate, walls and what appears to be a large outdoor domestic formal hearth (King 2009, 335–6). Outdoor hearths were also identified at St Michael le Pole, Co. Dublin. The primary phase of activity at Ship Street was represented by a group of shallow gullies, hearths and postholes. Charcoal from a hearth dated to A.D. 659-870 and these features suggest occupational activity in the area between the mid seventh and late ninth century (Gowen 2001, 28–31). Possibly contemporary with this was a rectangular building and associated external hearth at Bride Street. The hearth contained animal and fish bone while potential hearth debris on the south of the site contained food refuse (McMahon 2002, 74–7).

Pits used for waste disposal have also been identified at ecclesiastical settlements and their contents can reveal information on the diets and food resources utilised by the inhabitants. The earliest archaeological activity at Bride Street, Co. Dublin, consisted of two rubbish pits and a refuse spread which contained charcoal, animal bone fragments and shellfish remains. One of the pits contained charred animal bone, apple pips, blackberry seeds, hazelnut shells, shellfish, fish bones and charred grain. Post and stakeholes were present around the pit's edge which may have held a post-and-wattle lining (McMahon 2002, 71–4). A number of refuse pits were also excavated in proximity and beside a cemetery at Golden Lane/Chancery Lane (O'Donovan 2008). One of the pits, dated to A.D. 868-1018, contained large quantities of animal bone and five perforated bone pins. The other pit produced a belt buckle fragment. Industrial activity was also present in the area and the combined archaeological evidence from excavations around St Michael le Pole indicates settlement, agriculture and industry there from potentially the late seventh century onwards.

Refuse spreads occur around houses and at banks, walls and ditches on ecclesiastical sites. At Church Island, Co. Kerry, an interesting development of phases was recorded related to the occupants' waste disposal (O'Kelly 1958). Initially, the inhabitants of an early wooden round house deposited their food waste and refuse outside their home. This layer contained charcoal, winkle, limpet shells, animal bone and a large quantity of iron slag indicative of ironworking in the vicinity of the settlement. Habitation refuse was also found within a later stone-built round house. This building also had an internal stone-flagged drain which progressed under its entrance passage and contained shells and fragments of bone in its upper fills. The inhabitants of this house appear to have thrown their food waste out the door. Over time, it formed into a large spread of rubbish leading from the house, downslope, and towards the enclosing cashel wall where it developed into a large midden of refuse, 1m high, against the wall. During this phase a rectangular stone house was built beside the circular house and over its rubbish midden. At Illaunloughan, also in Co. Kerry, another extensive refuse midden was associated with one of the huts (Hut D) (Marshall and Walsh 2005). It was considerably more substantial than those from the Phase 1 huts and indicates a long period of occupation. Perhaps people living on ecclesiastical settlements similalrly left their household rubbish in full view of neighbours and

newcomers as indicators of affluence. Household waste was not viewed in terms of dirt and disease but rather as a status sign demonstrating access to meat joints, cereals and vegetables.

Cesspits at ecclesiastical sites, like secular enclosed settlements, are rare. However, they have been recorded during excavations at St Michael le Pole, Co. Dublin. At Bride Street, a pit in proximity to the rectangular structure mentioned above contained animal bone, fish bone and human faeces which suggests it both functioned as a refuse and cess pit (McMahon 2002, 74–7). Walsh, during her excavations on Chancery Lane to the west of St Michael le Pole church, also identified cesspits alongside a small structure and refuse pits dating between the tenth and twelfth centuries (Walsh 2009, 21–4).

Wells are more common on ecclesiastical settlements compared with their contemporary secular enclosed settlements. They have been uncovered close to houses at Ballyvourney, Co. Cork (O'Kelly 1952), and Church Island, (O'Kelly 1958) and Illaunloughan (Marshall and Walsh 2005), both in Co. Kerry. The well at the latter consisted of seven dry-stone steps leading down to a pool of water while the others were of simpler construction. The dating of some of these wells is uncertain but, if contemporary, were likely to have supplied fresh water to the occupants of the ecclesiastical settlements. Some wells possibly had both domestic and industrial functions. Ironworking was prominent at Ballyvourney while Phase I at Clonfad, Co. Westmeath, produced evidence for subdivisions of the enclosures, and domestic evidence such as postholes, refuse pits, cobbled areas, and wells (Stevens 2006, 2007). Metalworking and craft working were prominent at Clonfad so the wells may have produced drinking water as well as water needed for these other activities. A well was also excavated at Golden Lane/Chancery Lane, Co. Dublin (O'Donovan 2008), but it had an industrial function. It was identified amongst a complex of features including a lime kiln and mortar pit related to lime production. A date of A.D. 1022-1164 from the well overlaps with the construction date for St Michael le Pole church in the early twelfth century and these features may relate to the construction of the church.

Early Medieval Ecclesiastical Enclosures: Their Chronology and Cultural Biographies

Many excavated early medieval ecclesiastical sites indicate evidence for prehistoric settlement but there is relatively little archaeological evidence for definitive continuity of settlement or the citing of church sites at prehistoric cult sites. The suggestion that Inishmurray, Co. Sligo, was originally a non-religious settlement has little evidence to support it (O'Sullivan and Ó Carragáin 2008, 33), and there is also no evidence to support Lawlor's claim that the enclosure walls at Nendrum, Co. Down, had a secular origin (McErlean 2007a, 332). In some cases, such as Armagh and High Island, Co. Galway, the evidence is more convincing. The primary fill of the enclosure ditch at the former was radiocarbon dated to the late Iron Age (Gaskell-Brown and Harper 1984, 158), while an Iron Age date was recovered from a spread below the church at the latter (Marshall and Rourke 2000, 87). These, however, seem to be the exception rather than the rule and the more convincing archaeological evidence for the identification of early church sites, between the fifth and seventh centuries, possibly relates to the distribution of ogham stones and cross-inscribed stones, which it has recently been argued have strong early ecclesiastical connections (Swift 1997).

It has been suggested that there are potentially over 2000 early Irish ecclesiastical sites and the majority are enclosed (Mitchell and Ryan 1998, 291). The late prehistoric date from the enclosure ditch at Armagh is at odds with the vast majority of radiocarbon-dated ecclesiastical settlement enclosure ditches. Although one sample from the inner ditch at Tullylish, Co. Down, produced a mid fourth to sixth century date, charcoal from another sample was dated to the mid fifth/mid sixth century, while the outer ditch was dated between the late seventh and mid tenth century (Ivens 1987, 112–3, 119). Various inner and outer enclosure ditches at Clonfad, Co. Westmeath (Stevens 2007), Clonmacnoise, Co. Offaly (Murphy 2003), Doras, Co. Tyrone (McDowell 1987), Dunshaughlin, Co. Meath (Simpson 2005b), Kill, Co. Waterford (O'Connell 2004), and Lusk (O'Connell 2009b) and Tallaght (Walsh 1997b; Meenan 1996), both in Dublin, have been radiocarbon dated and all have produced early medieval dates ranging between the sixth and twelfth centuries. The enclosing wall at

Caherlehillan, Co. Kerry, was a primary feature of the church site and it produced a date between the mid fifth and late seventh century (Sheehan 2009, 194–6, 204).

Ecclesiastical settlements can also be dated by their internal religious and secular buildings. It is generally accepted that early ecclesiastical settlements from the fifth to the ninth century would have been dominated by wooden or sod-walled churches (Hamlin 1985, 286). However, few early medieval wooden churches have been excavated although a notable exception is Caherlehillan, Co. Kerry, where a fifth/sixth century wooden church aligned with nearby burials was discovered (Sheehan 2009, 196–7, 204).

Stone-built churches are much more common and have been classified into five categories. Dry stone built Gallarus-style oratories are largely restricted to western Kerry and they appear to date between the eighth and eleventh centuries based on an architectural chronology proposed by Rourke and Marshall (2005, 112–21). Simple rectangular structures, with roofs made of wattle/shingles or supported by a stone roof or vaulting, are the most common form of early medieval stone churches and generally date from the tenth to twelfth centuries (Harbison 1982, 618–9; O'Keeffe 1998; Hamlin 2008, 54; Ó Carragáin 2005a, 28, 2005b, 138). Other rectangular churches, with an additional antae, are dated to the late eleventh or early twelfth centuries (Ó Carragáin 2009, 144-46), while rarer rectangular churches, with contemporary chancels, appear to date between the eleventh and thirteenth centuries (Ó Carragáin 2005b). Finally, small barrel vaulted oratories, surmounted by corbelled roofs, have been discussed as another early medieval church type which have been dated to the late eleventh and mid twelfth centuries (Harbison 1970, 46–7; O'Keeffe 2003, 87–91; Ó Carragáin 2005a, 24–7).

Tomb shrines were only found at important ecclesiastical settlements because they contained the translated corporeal remains of founding saints (Etchingham 1993, 154; O'Keeffe 1998, 116). These were constructed from the seventh century onwards but the practice appears to have been particularly common in the eighth and ninth centuries with evidence for a clear revival of the tradition in the late eleventh and twelfth centuries (Ó Carragáin 2003, 134).

Other religious buildings within ecclesiastical enclosed settlements include *leachta*, round towers and high crosses. Thomas (1971, 168–72) argues that the former derives from the words *lectus* in Latin and *lecht* in Old Irish, which can be translated to 'grave'. However, O'Sullivan and Ó Carragáin (2008, 319–23) suggest they most likely functioned as altars and that, based on the available stratigraphic and radiocarbon evidence, the *leachta* on Inishmurray, Co. Sligo, were built towards the end of the first millennium A.D. or the beginning of the next millennium. These monuments however remain difficult to date. Conversely, round towers are now widely accepted as an ecclesiastical monument which emerged in the tenth century and became most common in the eleventh and twelfth centuries (O'Keeffe 2004, 72), while the various types of high crosses are now generally regarded as dating mainly from the later eighth to tenth centuries with a further revival during the twelfth century (Edwards 1990, 164–8).

Many non-religious buildings were found within ecclesiastical settlements such as houses and farm buildings, alongside external hearths, refuse pits and industrial and agricultural features, and these have also assisted with the dating of ecclesiastical sites. Similalrly to dwellings identified on secular enclosed settlements (Lynn 1978a, 37; 1994, 83), round or curvilinear houses were the most common form of buildings from the sixth to ninth century before they were replaced by rectangular houses after this period. At Illaunloughan, Co. Kerry, three Phase I sod-built round houses were dated between the mid seventh and mid eighth centuries and were built in the same manner as the early church on the site (Marshall and Walsh 2005, 11–8). Conjoined wooden houses were also present at a fifth and early sixth century church site at Caherlehillan, also in county Kerry (Sheehan 2009). The dating of dry-stone circular houses is more problematic but a sample from immediately under the wall of a cell at Illaunloughan produced a radiocarbon date of A.D. 775-961 and other dating for occupation of the site implies that the house is unlikely to be later than the early ninth century (Marshall and Walsh 2005, 42). Rectangular domestic buildings tend to be later in date than their circular or curvilinear wooden/organic equivalents and this was highlighted from the excavations at Clonmacnoise, Co. Offaly, which revealed that house types evolved from post-and-wattle structures to

larger circular houses on stone revetted platforms to finally rectangular houses on similar footings between the seventh and eleventh centuries (King 2009, 345).

Excavations at Clonmacnoise, Co. Offaly, also revealed the presence and dating of roads and a bridge. Roads were constructed and maintained between the eighth and twelfth centuries (King 2009, 345), while the bridge was dated by dendrochronology to c. A.D. 804 (O'Sullivan and Boland 2000). Other features, related to industry and craft, have also been dated. Evidence for the latter at Armagh for example, dating between the sixth and eighth centuries, was identified over 200 metres from the central core (Lynn and McDowell 1988b, 59–60; Lynn 1988e), while an ironworking furnace at Clonfad, Co. Westmeath, was dated between the mid seventh and mid eighth centuries (Stevens 2006, 2007).

Multiphase habitation evidence has clearly been identified at ecclesiastical sites. Ditch re-cuts were identified at ecclesiastical settlements such as Armagh (Gaskell-Brown and Harper 1984), Tullylish Co. Down (Ivens 1987), and Dunshaughlin, Co. Meath (Simpson 2005b), for example, while multiple phases of settlement, craft and industrial activity were recorded at Clonfad, Co. Westmeath (Stevens 2006, 2007) and Clonmacnoise, Co. Offaly (King 2009). Larger monastic settlements were undoubtedly vibrant places occupied by religious and lay people engaged in a range of agricultural, craft and industrial activities across many centuries as houses, religious buildings work areas and roads and pathways were constructed and repaired or repositioned from generation to generation. Not all enclosures were contemporary at ecclesiastical settlements and this was most clearly demonstrated at Church Island, Co. Kerry, where the cashel wall was one of the last additions to the site's multiple early medieval phases (O'Kelly 1958, 77).

Viking and Hiberno-Norse Enclosed Settlements: longphorts and towns

The Viking Longphort in Ireland

The *longphort* is the first Viking type of settlement recorded in the annals from the middle-ninth century. *Longphuirt* were temporary fortified bases, used for raiding, which were often located at the confluence of a river and its tributary (Ó Floinn 1998, 161). Archaeologically, an increasing number can be positively identified. One contender is the D-shaped enclosure at Dunrally, Co. Laois, located on the banks of the River Barrow (Kelly and Mass 1995, 30–2). The site features a substantial ditch with evidence for an inner bank, which encloses a space measuring 360m by 150m. A second circular inner enclosure, measuring 52m by 41m, is also present (Kelly and Mass 1999, 138–41). Another possibility is the D-shaped enclosure at Athlunkard, Co. Clare. It measures 75m by 30m and is situated at the junction of a smaller tributary stream and the River Shannon. Finds from the locality indicate an early medieval date and included a plough coulter, a spearhead, an axehead and a small silver 'weight', although not all were found within the enclosure itself (Kelly and O'Donovan 1998, 13–6).

There have been extensive archaeological excavations at two Irish longphorts (or *longphuirt*). In Waterford, a D-shaped enclosure at Woodstown is almost certainly a *longphort* (Harrison *et al* 2007; O'Brien and Russel 2004, 2005). However, excavation revealed that Woodstown was occupied over a considerable period and that it had a complex economy. Rather than a temporary fortified encampment, this appears to have been a permanent Scandinavian or Hiberno-Scandinavian settlement. The possible *longphort* at Woodstown, Co. Waterford was enclosed by two concentric ditches roughly D-shaped in plan (Harrison *et al* 2007; O'Brien and Russell 2004, 2005). Excavation at the northern end of the site revealed that the two ditches had a complex stratigraphy with multiple fills and possible re-cuts. The earliest, shallower ditch was associated with an internal bank while the larger outer ditch was at least 2.2m wide and 0.6m deep. The inner ditch was subsequently backfilled and stake-holes were inserted into its fill to form a palisade for a larger ditch, which was situated immediately outside the line of the smaller, earlier one. The larger outer ditch was up to 4m wide and 1.3m deep and was re-cut several times.

In Dublin, Scandinavian warrior burials with grave goods were discovered at Ship Street Great and South Great George's Street (Simpson 2005a) and Golden Lane (O'Donovan 2008) outside the town walls which were dated to the early ninth century. Occupation evidence was also identified at South Great George's Street that both pre- and post-dated the burials. The initial settlement activity consisted of a series of posts, a later bank, drainage ditches, deposits of shell, animal bone and charcoal fragments and artefacts including iron nails, a drop-bearded axe and part of an iron shears. Occupation also occurred on the eastern part of the site and included refuse pits, open hearths, postholes, possible cultivation furrows, seeds and burnt animal bone (Simpson 2005a, 36–7). A later large rectangular house with two building phases was also revealed and was dated to the later ninth century. Like Woodstown, Co. Waterford, the ninth-century archaeological evidence in Dublin points to a settled community rather than some form of fortified base but it is conceivable that these sites initially had a defensive function before they prospered into more long-term settlements. It is also possible that the Dublin longphort was quite extensive, stretching along the banks of the River Liffey.

Most recently, a probable Viking longphort has been identified by Eamonn P. Kelly and Mark Clinton at Linns twd, near Annagassan, Co. Louth. This may be identified as the longphort at Linn Duachaill, on the coast of Ard Cíanachta (Co. Louth) which has extensive annalistic references from the mid-ninth century AD. A ditch and possible bank cuts off a headland enclosed on one side by a river and the other by the sea. Archaeological excavations in Summer 2010 uncovered Viking Age hack silver and other artefacts potentially of ninth century date (Eamonn P. Kelly, pers comm.). The sheer scale and size of the longphort at Linns has transformed our potential appreciation of these sites.

Little is known of certainty about the form and appearance of Viking *longphuirt*. Indeed, *longphort* studies are still at their infancy and little is still known about their character, use and form in the ninth and tenth centuries (Gibbons 2005, 23). The identification of D-shaped enclosures as Scandinavian settlements along river banks and tributaries is a relatively new one and continued research, and notably excavation, is required before they can be collectively assessed and understood.

The Norse or Hiberno-Scandinavian town in Ireland

By the early tenth century, Norse towns were established in Ireland – many of them going on to become major medieval and modern cities. There have been an enormous amount of archaeological excavations carried out in the main urban areas of Ireland since the 1970s and especially over the last two decades and these have added considerably to our knowledge about this country's first towns. Dublin, Waterford, Cork, Wexford and Limerick initially began as relatively small enclosed settlements and trading ports before they grew into important centres of international trade with substantial political influence. These towns supplied goods and slaves overseas and in turn were supplied by their hinterlands. The towns were all located along rivers and their tributaries and they were surrounded by a variety of defences. Excavations have identified a series of enclosures in Ireland's Scandinavian towns and it is evident that, as more and more land was required due to population increases and economic growth, these enclosures were modified, rebuilt and expanded across the centuries.

Defining Norse or Hiberno-Scandinavian urban settlements: Banks, Walls, Ditches and Revetments

Enclosing Banks and walls

The defences around the main Norse or Hiberno-Scandinavian towns in Ireland demonstrate variation in terms of their chronology and construction. Dublin, during the mid-ninth century, was initially enclosed by an earthen bank which was not defensive in nature. However, after the tenth century, its defences developed into much larger earthen structures until the town was surrounded by a substantial stone wall by the twelfth century. A similar sequence can be found at Waterford although the earliest enclosure is dated to the eleventh century. Unlike Dublin, there was also evidence here for a further earthen bank and ditch outside the wall dating directly before the Anglo-Norman period. At Limerick, a twelfth-century pre-Anglo-Norman bank was detected, while Cork differs to the other

towns in that it was surrounded mainly by a timber revetment. There is little evidence of a surrounding bank and Scandinavian activity, preceding the late eleventh century, has yet to be discovered in the city. The defences related to Wexford have yet to be identified.

In Dublin, the mid to late ninth century bank was not defensive in nature and probably functioned as a floodbank or barrier to the river. Excavations at Fishamble Street revealed a series of nine banks running along the south side of the River Liffey. The earliest banks were low and were approximately 1m high (Wallace 1992b, 44). Further excavations of the bank at Exchange Street Upper/Parliament Street (Gowen with Scally 1996, 11), Essex Street West (Simpson 1999, 14), on the south side of Ross Road (Walsh 2001, 96), and at Werburgh Street (Hayden 2002, 47, 66), indicate it was approximately 3.5m wide and nearly 1m high. There was evidence that the bank at Essex Street West had been strengthened with the addition of wattle screens.

During the tenth century, the bank was replaced and its construction varied throughout different parts of the town. Bank 1 at Ross road for example, dated to the early tenth century, was 2.5m wide and 0.45m high and may have had a pathway along its top. It was situated high above the Poddle and possibly functioned as a town boundary (Walsh 2001, 97–8). A potential early tenth century bank was identified directly east of Exchange Street Upper. It was 0.5m high and 1.8m wide and was described as non-defensive (Scally 2002, 16). Banks at Exchange Street Upper/Parliament Street and Ross Road have been dated between the middle and later parts of the century. The former was 0.7m in height and between 3.1-3.7m in width (Gowen with Scally 1996, 15; Scally 2002, 17–21), while evidence for the latter suggests it was burnt down and replaced by a third bank, which consisted of deposits of clay, silt, small stones and sods (Walsh 2001, 101–2).

Throughout the eleventh century in Dublin, the bank was strengthened and reinforced. For example, at Fishamble Street, the bank was constructed with gravel, stone and earth, was reinforced with post-and-wattle screens and was crowned with a palisade fence (Wallace 1992b, 45). The bank became much wider and stronger in other areas of the town as well. Unlike the previous two banks at Exchange Street Upper/Parliament Street, the third bank was a substantial and defensive enclosure. It had a maximum width of 6.4m and was 1.2m high on the settlement side but was at least 2.3m in height on the eastern riverfront side (Gowen with Scally 1996, 17; Scally 2002, 21–5). A similalrly substantial bank at Ross Road was approximately 6m wide and over 4m high. The bank was probably mounted by a palisade trench and its form remained the same until the early twelfth century (Walsh 2001, 106).

In the twelfth century, the earthen bank was replaced with a substantial stone wall. The wall, which was 1.5m wide and potentially up to 3.5m in height, was built along the earlier earthen embankment at Fishamble Street. It had a rubble fill with mortared stone facings and was not completely free standing (Wallace 1992b, 45). This wall is very similar to the late Hiberno-Scandinavian walls found at Essex Gate/Parliament Street (Scally 2002, 25–7), and Ross Road (Walsh 2001, 108–11).

There is very little archaeological evidence in Waterford for the tenth and early eleventh century Scandinavian settlement but this can probably be explained since the bulk of excavations in the 1980s and 1990s took place along Peter Street, High Street and Lady Lane to the west of the postulated tenth-century settlement which may have occurred in the area around Reginald's Tower and Cathedral Square (Bradley and Halpin 1992, 108; Hurley 1997b, 8–11). The earliest evidence for an enclosing bank is from a late eleventh century context. The defences ran parallel to Bakehouse Lane and were identified along the eastern side of Arundel Square (Hurley 1997c, 21–7). The bank was situated on the eastern (inner) side of a large ditch and was sourced mostly from its upcast. It survived to a maximum height of 1.8m but may have originally stood up to 3m high. It was evidently partly demolished and had been truncated on its western side by the subsequent stone revetment wall. The tail of the bank was defined by a flimsy wooden fence at Arundel Square. Though postholes were uncovered at the eastern lip of the ditch, it is probably likely that the front (west) face of the bank was un-revetted except for woven wattle which protected the clay from slipping back into the ditch. The bank was composed mostly of stony heavy yellow clay derived from the ditch.

Like Dublin, in the twelfth century, the settlement was defended by a town wall (Hurley 1997c, 27–31). The wall ran parallel to Bakehouse Lane (e.g. Gittings 1986, 1987, 1988; Hayden 1988; Murtagh and Hurley 1989; Scully 1990). The wall contained a coursed stone-faced exterior with a mortared rubble core projecting above a footing of one to two courses. The outer face was well built and battered while the inner face, built against the bank, was more irregularly faced. The wall was built as a revetment against the remaining eastern half of the earlier defensive bank. It survived to over eight courses above a stone footing along the northern section and may have originally stood at over 3m high.

Another possible pre-Anglo-Norman earthen bank and ditch was constructed outside the wall, potentially in the mid twelfth century, to accommodate a further expansion of the town. This defensive bank was uncovered in a series of excavations further west of the wall (Moran 1999; Wren 1998, 2000, 2001, 2002). The bank had a maximum width of 7.64m but was probably at least 1-2m wider and survived to a maximum estimated height of 1.4m above the occupation debris (Wren 1998).

A clay bank revetted by a limestone wall was excavated at King John's Castle, Co. Limerick. It survived to a height of 1.7m and contained a 1m-wide pathway on a berm at its base. Excavation revealed that the structure was utilised in the Anglo-Norman defences and is therefore a twelfth-century pre-Norman structure (Wallace 1992b, 47).

Similarly to Waterford and Limerick, there is no clearly established ninth- or tenth-century Scandinavian archaeological horizon at Cork and the earliest evidence from various sites in the South Island and Barrack Street on the South Bank dates from the late eleventh century. Though the pre-Norman archaeological evidence is concentrated on the South Island, it is quite possible that further excavations may confirm that the area of the South Gate Bridge – spanning the south channel of the River Lee – was the physical centre of the earliest Scandinavian settlement (Cleary and Hurley 2003a, 156). Cork has produced limited evidence for enclosing banks or walls. A rare low stone bank defined the southern perimeter of the island and was associated with a crude timber revetment. The latter was built to the south of the stone bank and was dated to the late twelfth century. Two subsequent parallel timber revetments were constructed further to the south (Sutton 2004).

Enclosing Ditches

Hiberno-Scandinavian Dublin's enclosing bank and succeeding wall were free standing and were not accompanied by an enclosure ditch. However, in Waterford, an excavation along Bailey's New Street revealed two large north-south aligned ditches that were backfilled in the late-twelfth/early-thirteenth century (O'Donnell 1999). The earliest ditch was 5.7m wide and 1.3m deep and finds included two stick pins and a ringed pin indicating a late tenth/eleventh century date. The other ditch was filled with material of the same date and extended parallel and to the east of the early ditch. It is possible that the two ditches may mark the western limits of the original tenth century Dún. By the late eleventh century, Waterford was defended on its west side by a deep ditch which accompanied the large clay bank (Hurley 1997c, 21–7). The ditch was revealed in a number of areas (e.g. Gittings 1986, 1987, 1988; Hayden 1987, 1988; Hurley 1990; Scully 1990), and it had a maximum width of 8.5m at the top and a depth which varied between 2m and 2.5m. At King John's Castle, Co. Limerick, a ditch also accompanied the bank but was less substantial at 2.8m deep. This was a twelfth-century and probable pre-Anglo-Norman bank and ditch (Wallace 1992b, 47). The defences related to Wexford have yet to be identified.

Enclosing Revetments

Cork has produced limited evidence for enclosing banks or walls whereas significant waterfront revetments and the introduction of estuarine clays have been revealed due to its low-lying marshy location. At Tuckey Street, for example, an early twelfth-century timber fence/revetment was erected prior to the reclamation of ground in that area (O'Donnell 2003, 13–4). Timber revetments have also been uncovered in a number of locations including South Main Street (Kelleher 2004; Ní Loingsigh

2005), the junction of Washington Street and South Main Street (Kelleher 2002, forthcoming; Hurley 2003a, 157–8), an adjacent site between Grand Parade and South Main Street on the southern limits of the South Island (Sutton 2004), and in an area adjacent to the South Gate Bridge (Ní Loingsigh 2003). The revetments generally consisted of posts that were driven into the clay which supported large timbers, mostly of oak.

The Lay-out and Organisation of Space within Norse or Hiberno-Scandinavian towns

Passageways, Pathways and Roads

A variety of pathways have been excavated in Hiberno-Scandinavian Dublin. Excavations demonstrate that paths were found leading from streets directly into property plots, houses and outbuildings and that they were continually upgraded and replaced while their builders utilised a variety of different materials from organic to sturdier stone types. By the middle of the eleventh century, for example, quality carpentry construction was noted on some of the Winetavern Street pathways (Wallace 1992b, 42). A complex timber surface was recorded at Exchange Street Upper/Parliament Street which consisted of a woven wattle path on the north and a series of layers of brushwood with large planks laid along the leading edge of Bank 2 on the south. The northern section gave access to the river while brushwood and planks provided a working surface (Gowen with Scally 1996, 16). Numerous pathways were revealed at Werburgh Street in the southern area of the town and many led to the entrances of the buildings discovered there or were positioned alongside them (Hayden 2002). The paths were continually mended and replaced. For example, a pathway leading to House E1 was initially floored by a layer of sod, was then covered with grass and straw before finally being laid with wattle screens. After a certain period, both the house and pathway were replaced and the latter was wider and delimited by a fence (Hayden 2002, 47–9). At Fishamble Street, in both the tenth and eleventh centuries, the pathways led from the street to the houses. The length of the paths indicated that the houses were set back several metres from the streets. The paths were approximately 1.5m wide and usually consisted of elongated woven mats laid on top of each other. In other cases they were formed with round or half round logs laid on longitudinal runners. In rare cases, they were constructed of gravel and paving stones (Wallace 1992b, 42). In the eleventh century, the route, running east-west and parallel to the Liffey, remained constant during the Hiberno-Scandinavian settlement of Dublin. Paths leading from the plots at Temple Bar West linked up with it and wattle types were replaced by substantial stone paths or roads during the late tenth and early eleventh century (Simpson 1999, 32).

Like Dublin, there is a considerable corpus of excavated pathways associated with plot boundaries and buildings in Waterford. Over half of the Waterford Type 1 houses contained pathways mainly outside their back doors. They were constructed from a variety of materials including gravel, wattle mats, limestone slabs and timber (Scully 1997a, 37). The paths at the front of the houses were not as long due to the close location of the roads out front (Scully 1997a, 37).

There is limited but growing evidence, similarly to Dublin and Waterford, for pathways leading from streets directly into property plots, houses and outbuildings in Cork. Pathways, for example, were discovered leading between several buildings at the junction of South Main Street and Old Post Office Lane (Ní Loingsigh 2003, 2005). A number of pathways were also associated with a series of Hiberno-Scandinavian-type houses at South Main Street (Kelleher 2004).

Roads were also constructed within Ireland's Scandinavian towns. The street lines and gradual expansion of Dublin occurred along the natural contours while many of Dublin's early roads probably lie beneath the present streetscape (Wallace 1992b, 39). One of the earliest known Scandinavian roads in Dublin – dating between the mid and late ninth century – was identified at Essex Street West (Simpson 1999, 25). The road – built as a permanent route – replaced a demolished house and led to the river. It divided the houses to the west at Fishamble Street and to the east at Exchange Street Upper. A substantial wattle path or road was built at the northern part of the site at Fishamble Street. It ran parallel to the River Liffey and continues as a route today indicating the antiquity of some of Dublin's early routeways (Simpson 1999, 30). Two potentially early tenth-century roads were

identified at Werburgh Street in the southern part of the town. The first road was metalled and ran south-eastwards around a mound. This road was replaced by a larger road which contained a heavier layer of metalling (Hayden 2002, 47).

The earliest road in Waterford dates between the mid and late-eleventh-century and consisted of a 16m length of a metalled surface that was laid directly on the old ground surface at Peter Street (Scully and McCutcheon 1997, 55). It was approximately 3.6m in width and appears to have been contemporary with the earliest mid-eleventh century houses. The three main east-west roads in the town were crossed by three or four north-south roads and lanes which continued down-slope to the banks of the River Suir. Some sunken buildings were excavated adjacent to the modern north-south running Olaf street and could tentatively indicate the presence of a late eleventh century laneway there (Hurley 1997b, 9–10).

There is sparse archaeological evidence for any roads from Hiberno-Scandinavian Cork. So far, excavations at Barrack Street, in proximity to South Gate Bridge, have uncovered a late eleventh century timber trackway (Lane and Sutton 2003, 5–9). It was constructed by laying layers of round wood branches on the estuarine clay before a superstructure of timber planks and large roughly hewn tree trunks was placed over them. Further excavations have revealed that the Scandinavian road on the South Island probably lies beneath the modern South Main Street because the excavated buildings in this area were aligned with, or fronted onto, the main medieval street (Hurley 2003a, 157–8; Hurley and Trehy 2003, 29–30; Kelleher 2002, forthcoming). Scandinavian Wexford and Limerick have yet to reveal evidence for roads or pathways (Wallace 2001, 42; 2004, 827).

Property plots and boundaries

Common to Scandinavian towns in Ireland was the presence of property plots. These enclosed a range of buildings and were usually defined by post and wattle fences. A noteworthy feature of many of the Dublin excavations is that property plots remained largely static across the centuries, which indicates an ordered and regulated town. Plots and fences are evident in the mid ninth century and this demonstrates planning and regulation during the settlement's earliest days. Although fences had to be repaired and rebuilt, this was done so along the lines of the preceding property boundary. Conversely, the houses, outbuildings and pathways within were not static but utilised different parts of the plots from generation to generation. The following are some examples from the Dublin excavations.

Structures within plots were evident from excavations at Exchange Street Upper/Parliament Street in the lower levels in the mid to late ninth century. The first plots were defined by sod deposits which were later replaced by light post and wattle fences. These plots remained constant for the most part until the construction of a clay platform in the twelfth century (Gowen with Scally 1996, 14). A number of mid ninth-century sunken structures were excavated at Temple Bar West but were not associated with property boundaries. However, shortly after and during the middle and latter decades of the century, a series of houses, structures and associated plots were constructed over the sunken structures (Simpson 1999, 20). A post and wattle fence separated structures' R and P at Essex Street West, for example, while a house at Exchange Street Upper was confined by property boundaries and had a trapezoidal yard at its western end. Property boundaries were also evident at Fishamble Street to the west of the site and these boundaries, similalrly to most plots at Temple Bar West, remained the same from the late ninth until the eleventh centuries and, in one case (Property 2), the early twelfth century (Simpson 1999, 25, 30).

Plots were present on Fishamble Street in the tenth century and they largely remained unchanged for over 200 years. Contrary to this, the position of houses, outbuildings and pathways regularly changed as successive building phases utilised different areas within the static plot boundaries (Wallace 1992b, 40). Plots varied in shape from rectangular to trapezoidal and from skinny to wide. In Fishamble Street, the most northerly plots had their widest end at the street side and their narrowest end at the waterfront but it was vice-versa at the southern end. The plots were divided by post-and-wattle fences which were regularly replaced.

Structures within plots were excavated at Werburgh Street to the south of the town (Hayden 2002). The plots were small and were filled mainly by houses. In some cases, for example level 3 which has been dated to the mid tenth century, the plot boundaries remained the same as structures were built and replaced. However, by the end of the century, the level 6 plots were laid out in different lines and the layout of the area had changed (Hayden 2002, 56). This is unusual when compared to many other examples where plot boundaries remained static. Both plots and pathways were defined by post and wattle fences.

Murray's (1983, 43–57) study of the relationship between Hiberno-Scandinavian buildings identified differences in the size and function of the plots at High Street, Christchurch Place and Winetavern Street. The plots on High Street were usually large with small buildings. However, there were larger structures within the plots at Christchurch Place and the buildings were set back further from the street and had individual pathways leading to their entrances. Winetavern Street was similar to High Street in that small buildings were placed on either side of a pathway in a congested layout.

Unlike Dublin, the location and evolution of plot boundaries at Scandinavian Waterford seems to have been more fluid but, similalrly to Dublin, there was evidence for post-and-wattle fences. On Peter Street, fourteen adjoining plot boundaries were identified and each plot contained the superimposed strata of at least twelve house levels dating between the mid-eleventh and early fourteenth centuries (Scully and McCutcheon 1997, 53–137). Excavations showed that the plots were not all occupied at the same time and that they were usually confined to the vicinity of the backyard houses, with rarely any evidence for boundary divisions between street-fronting houses (Scully and McCutcheon 1997, 54, 106). Type 2 houses in the backyards of earlier levels at Peter Street often transgressed the boundary of previous plots indicating that boundaries were not always preserved. However, excavation of an east-west boundary fence along the northern side of Arundel Square revealed that it was maintained from its earliest to latest levels until it was replaced by a stone wall in the early sixteenth century (McCutcheon 1997b, 149).

Another series of at least fourteen plots were uncovered adjacent to High Street and eight of these contained definite structural evidence (McCutcheon 1997b, 142). This area had been heavily truncated but a series of north-south boundary fences, associated with the plots, was identified to the east of Arundel Square (McCutcheon 1997b, 149; McCutcheon and Hurley 1997, 154).

There is growing evidence for the layout of property boundaries along the main street (South Main Street) of the twelfth-century Scandinavian settlement on the South Island in Cork. These property boundaries were aligned east-west to the main north-south medieval street and were built using a variety of methods using post-and stake-holes and stave-built fences set in base plates. Hurley (2003b, 153) has suggested that the late medieval property boundaries in Cork may have consisted of rows of buildings with specific functions including a residential/trade street-fronting house, a sleeping chamber middle house and a hall for dining and residential use at the rear. Evidence for a ranking of buildings was uncovered in the eleventh/twelfth-century levels at Waterford where Type 1 houses fronted the street while Type 2 structures were situated to the rear. A similar pattern of Type 1 and Type 2 houses fronting the main medieval street has been revealed at Hanover Street/South Main Street in Cork (Cleary 2003, 31–44; Hurley 2003a, 158).

Houses with plots have also been identified in Scandinavian Wexford at Bride Street and excavation has demonstrated the continuity of plot boundaries between the eleventh and fourteenth centuries (Bourke 1988/89, 1995; Wallace 2004, 827). Enclosed yards were revealed at the rear of the houses and appear to have been used for industrial or food-rearing purposes. One yard, for example, was probably used as a small pen (possibly for pigs), while there was also evidence for leather-working. There is no evidence, as yet, for plot boundaries in Scandinavian Limerick (Wallace 2004, 827).

Living conditions within Norse towns

Ireland's Norse towns were bustling places, crammed with people, animals, houses, workshops and a range of other structures including external hearths, refuse pits and rubbish dumps. These towns would have been occasionally loud, dirty and smelly places and the archaeological features that have been excavated attest to a wide range of domestic, craft and industrial activities (See Chapter 4 for an in-depth analysis of craft and industry in Ireland's Scandinavian towns).

External hearths have been revealed in Dublin related to both domestic and industrial use. Excavation of three ninth-century sunken structures at Fishamble Street, for example, also revealed a paved area and external hearth beside them (Simpson 1999, 13–6). There were no hearths within the structures and it is likely that cooking was undertaken outdoors. Hearths were also used for ironworking and an industrial area, which replaced an earlier settlement at Exchange Street Upper and Copper Alley, included many unenclosed hearths with neighbouring paved areas, a large hearth that contained vitrified clay and iron slag, burnt spreads, charcoal and ash deposits as well as a large number of postholes which did form a coherent plan (Simpson 1999, 30). The industrial area was active between the tenth and early to mid twelfth century.

Rubbish was discarded a number of ways in Ireland's Scandinavian towns in pits, ditches, outdoors on middens and dumps, and it was even recycled as building material for the towns' enclosing banks. Rubbish pits and refuse spreads, including deposits of shell, animal bone, charcoal fragments, and artefacts such as iron nails, a drop-bearded axe and part of an iron shears, testified to domestic activity at South Great George's Street, in Dublin. Excavation also revealed a series of posts, a later bank and drainage ditches which represented the earliest settlement evidence in this location. Occupation was also evident on the eastern part of the site and included further refuse pits and open hearths, postholes, possible cultivation furrows, seeds and burnt animal bone (Simpson 2005a, 36–7). At Insula North in Waterford, pits – including two wood-lined types – a cistern, and several drainage features were revealed beside a scatter of stake-holes and a roughly built small stone enclosure and these are likely to be related to domestic activity in the area (McCutcheon and Hurley 1997, 154). Analysis of pits and cesspits, as well as other features such as ditches and houses, in Waterford has produced a large collection of textiles, ropes, string, animal hair and vegetable remains which has revealed insights into the diets and types of clothes worn by the town's eleventh and twelfth century dwellers (Wincott Heckett 1997, 743). Tests on a number of textile samples also demonstrated that some of the clothes were dyed (Walton 1997, 760–1). Information on diet was also available after investigations of refuse deposits at Barrack Street, Washington Street and Hanover Street, in Cork, identified hazelnut shells which showed that they were gathered for consumption inside the town. A variety of fruits, including blackberry, bramble, elder, raspberry, crab-apple, were recorded in deposits at Hanover Street and Washington Street, while oat, wheat and barley grains were also revealed within a ditch fill at Washington Street (Cleary and Hurley 2003, 393).

Pits throughout the Scandinavian towns were used to dispose of industrial waste while some were packed with charcoal which strongly suggests they were charcoal-production kilns. Two of the latter were identified at Exchange Street Upper/Parliament Street in Dublin (Gowen with Scally 1996, 15), while four shallow pits, rich in slag, charcoal and indicative of ironworking, were cut into the floor of a house at the eastern end of Peter Street in Waterford (Scully and McCutcheon 1997, 100). Rubbish dumps and spreads from houses, ditches and plots also informs about the types of crafts undertaken by people in Ireland's first towns. In Dublin, for example, leather and bone working appears to have been concentrated in High Street as evident from the waste from its workshops. Antler workshops were also located on High Street and Christchurch Place – many motif pieces were found in this area – and antler combs were produced on a large scale (Murray 1983, 54; Wallace 1984, 123–4). In Waterford, large amounts of antler and bone waste, as well as horn cores, were recovered from the late eleventh to early twelfth century organic layers in the defensive ditches and from twelfth century extramural dumping (Hurley 1997d, 650). Bone and antler were used to make a wide variety of artefacts including combs, casket mounts, gaming-pieces, spindle-whorls, needles, pint-beaters, pins, handles, toggles, drinking horns, tuning pegs, a flute, a possible whistle and cut bone and antler hollow cylinders. The bone and antler artefacts were all recovered primarily from house floors, associated backyards and twelfth and thirteenth century pits. In Wexford, leather-working debris was found in one of the backyards of a house on Bride Street (Bourke 1988/89, 1995).

In Dublin, there is also evidence that rubbish and waste from the town was used in the construction of the town's enclosing bank. Two tenth/eleventh century banks were revealed below the Powder Tower in Dublin Castle along the south-eastern lines of the town. The first bank was composed of clay and had a stone facing. A later bank – revetted with timber – was formed with refuse layers which were dumped over the earlier bank (Lynch and Manning 2001, 180, 182). The third phase, late tenth and early eleventh century, bank at Exchange Street Upper/Parliament Street was a substantial structure and was constructed over Bank 2. It consisted of clays and much of the domestic waste, such as animal bone, from the preceding occupational layers (Gowen with Scally 1996, 17; Scally 2002, 21–5).

Norse or Hiberno-Scandinavian towns: Chronology and Change

As has been noted earlier, our knowledge about the archaeology and chronology of *longphuirt* is at a very early stage and we are mostly reliant on historical accounts for information on the first Scandinavian fortified bases in Ireland. The most likely excavated contender so far, at Woodstown, Co. Waterford, has been dated to the ninth and tenth centuries (Harrison *et al* 2007, 29–33), while recent excavations of Scandinavian warrior burials with grave goods in Dublin, at Ship Street Great and South Great George's Street (Simpson 2005a) and Golden Lane (O'Donovan 2008) outside the town walls, were dated to the mid ninth century. Occupation evidence was also identified at South Great George's Street that both pre- and post-dated the burials. The initial settlement activity consisted of a series of posts, a later bank, drainage ditches, deposits of shell, animal bone and charcoal fragments and artefacts including iron nails, a drop-bearded axe and part of an iron shears. Occupation also occurred on the eastern part of the site and included refuse pits, open hearths, postholes, possible cultivation furrows, seeds and burnt animal bone (Simpson 2005a, 36–7). A later large rectangular house with two building phases was also revealed and was dated to the later ninth century. Like Woodstown, Co. Waterford, the ninth-century archaeological evidence in Dublin points to a settled community rather than some form of fortified base. What both also have in common is that they were located in areas outside the later town walls but their identification as possible *longphuirt*

The dating evidence from Ireland's Scandinavian towns differs in that our earliest comes from Dublin where ninth century settlement evidence was identified. Excavations at Exchange Street Upper/Parliament Street (Gowen with Scally 1996; Scally 2002) and Temple Bar West (Simpson 1999) revealed banks, a road, pathways, structures and plots dating from the mid ninth century. The sites were located in the north-eastern section of the later tenth century town. In Waterford, very little archaeological evidence for the tenth and early eleventh century Scandinavian settlement has come to light probably because the majority of excavations in the 1980s and 1990s occurred along Peter Street, High Street and Lady Lane to the west of the potential earlier tenth-century settlement (Hurley 1997b, 8–11). Similalrly, there is no known ninth- or tenth-century Scandinavian archaeological evidence in Cork and the earliest evidence from various sites at South Island and Barrack Street on the South Bank dates from the late eleventh century. However, although the pre-Norman archaeological evidence is concentrated on the South Island, it is quite possible that further excavations may confirm the area of South Gate Bridge – spanning the south channel of the River Lee – as the earliest Scandinavian settlement (Cleary and Hurley 2003, 156). The excavated evidence from Wexford at Bride Street dates from approximately the eleventh century (Bourke 1988/89) while we have little information about Scandinavian Limerick. The historical evidence indicates a ninth century Scandinavian settlement at Cork and tenth century settlements at Waterford, Wexford and Limerick (Wallace 2004, 817–8), and future excavations may locate these earlier settlements. The Scandinavian towns prospered and developed throughout the later middle-ages and now comprise some of Ireland's largest cities.

These were nucleated settlements where houses, outbuildings, plots, roads and pathways were constructed in close proximity to each other and were replaced regularly. These towns were initially enclosed by moderate defences – possibly boundary markers or flood barriers – but they were soon rebuilt as formidable defences. Unlike many of the plot boundaries, these defences were not static but were repositioned by the town's people to accommodate expansion of the settlement and to increase defensibility. In Dublin, as at Wexford, house plots were mostly fixed and boundary fences

were mended and maintained in the same place whereas the buildings inside them changed with each building phase (Wallace 1992b, 40; Wallace 2004, 827). In Waterford, there was more fluidity in the positioning of plots and excavations showed that they were all not occupied at the same time as (Scully and McCutcheon 1997). We have seen that pathways and roads were constructed and repaired across centuries and advances in construction techniques were evident on Dublin paths by the middle of the eleventh century (Wallace 1992b, 42). Multiple phases of bank, plot, house, road and path construction have been recorded from excavations and the Scandinavian towns' settlement biographies are one of bustling places, teeming with people that were continuously occupied and reshaped.

Conclusions

Early medieval rural farmsteads, ecclesiastical settlements and towns were characterised by a broad range of buildings and structures related to domestic, craft, industrial and agricultural activities. The majority of settlements were defined by enclosures and entranceways which demarcated private spaces and were used to safeguard livestock and people within. Movement, and the use of space, was deliberately negotiated within settlement enclosures through the use of pathways, work areas, the placement of buildings and the demarcation of boundaries. There was clear distinctions between dwelling, work and agricultural areas while, at ecclesiastical settlements, the sacred core was separated from domestic and other activities.

However, archaeological excavation has also demonstrated that this broad range of early medieval enclosures had unique histories and each settlement was occupied and used differently by their inhabitants. The habitation of these settlements – sometimes across a generation or two and others over a number of centuries – meant that they appear differently in the archaeological record with evidence for circular and non-circular-shaped enclosures, enclosure annexes and extensions, ditch re-cuts and modifications and the construction and replacement of entranceways, pathways, internal spaces and buildings. Ideas of the period between AD 600 and AD 900 as a static one can now be challenged. Also, terms such as ringfort are unsuited to the range and diversity of settlement enclosures while the identification of all multivallate enclosures as high-status settlements, based on morphological grounds, does not factor the individual and changing nature of these sites and excavation is required to unmask the cultural biography of each early medieval settlement.

The centuries between AD 400 and AD 1100 witnessed the construction and habitation of a wide range of settlement enclosures. Our knowledge of settlement during the late Iron Age/early medieval transitional period and between the tenth and twelfth centuries however is still poorly understood although there are a growing number of settlement/cemetery sites which show evidence for habitation in the latter. Settlement/cemeteries have only been relatively recently identified in the archaeological record and these require further research into why some developed into larger settlement and agricultural centres while others were abandoned after a short period. Like the term ringfort, the term settlement/cemetery masks the unique history of each individual site and it appears that there is great diversity and complexity amongst these newly recognised settlements.

Clearly then, there is a requirement to archaeologically assess the individual character of each enclosed early medieval settlement. These were dwellings where families lived and worked and social relationships were formed. Excavations can decipher the unique history of each settlement and how social identities of household, kinship, gender, social status and social role were expressed through daily routine and practice. In exploring daily life and practice within early medieval settlements, we gain a sense of how social relationships and identities were materialised in the period.

Chapter 3: Agriculture, economy and early medieval settlements

Introduction

Most people in early medieval Ireland were involved in, or in some connected to, some aspect of agricultural economy and production. It is well-known that revolutions in dairying and livestock management, crop cultivation technologies, milling and cereal crop processing underpin most aspects of early Irish society and the early medieval archaeological record. Chapters 1 and 2 assessed the archaeological evidence for early medieval enclosures of all types and some of the archaeological features related to settlement and domestic activity. These included the enclosing element itself and their entrances and gateways, as well as certain internal structures such as houses, outbuildings, pathways, outdoor hearths for cooking, wells that supplied water, cesspits for disposal of human waste, and various rubbish dumps, middens and spreads. This chapter will assess the archaeological and historical evidence for related agricultural activity at - and within - early medieval settlements beginning with the farmyard buildings and structures identified within the early medieval enclosure or *les*. The chapter then moves on to assess the evidence for related field-systems, gardens, plots and structures, such as cereal-drying kilns and watermills, which have been discovered in the spaces outside the settlement enclosures. Indeed, the scale of excavation during the 'Celtic Tiger' years has increased considerably archaeological information about early medieval agricultural practices and most notably those related to cereal growing and cultivation. This chapter then assesses the evidence for agricultural labour and the types of foods produced and eaten by early medieval people. Finally, the evidence for agriculture related to Ireland's Scandinavian towns is briefly investigated.

Early Medieval Settlement Enclosures as Farmyards: Houses, Sheds, Livestock Pens, Dungheaps and Pits

The early medieval legal sources

The early medieval Irish documentary sources – mainly the seventh and eighth century law texts – describe the types of outhouses and farm buildings found within early medieval settlement enclosures that accompanied the main dwelling. Early medieval domestic houses and their associated outhouses varied in size according to the rank of the individual residing within the enclosure. The outhouse of a *mruigfer* for example (the most prosperous grade of commoner) had a diameter of 5.2m while the outhouse of the *ócaire* (the lowest grade of freeman) was smaller at 4m in diameter (Kelly 1997, 361–2). The types of farm buildings within a *les* included a cow-house (*bóthech*), calf-pen (*líos loég*), sheep-pen (*lías caíreach*), pig-sty (*muccfoil*), and hen-coop (*árus*). The written sources appear to indicate that the cow-house was a substantial roofed structure in comparison to unroofed calf- and sheep-pens which were constructed from wattle and secured by posts (Kelly 1997, 364–5; Lucas 1989, 27–8). Information on pig-sties is less readily available but it appears that they were circular structures like the majority of calf- and sheep-pens (Kelly 1997, 366). The hen-coop was a movable structure, probably made of wickerwork, and was either kept in the outhouse or possibly secured up in a tree to protect the hens from predators such as foxes (Kelly 1997, 103–4). Pits (*corróic*) are also recorded in contemporary historical documents and were also probably used for food storage (Kelly 1997, 367). The presence of animals within the enclosure is further supported by references to a dunghill (*otrach*) which was probably dung obtained from the animals' pens and used as fertiliser (Kelly 1997, 364). There are few written references to cultivation within the *les* but the law texts do describe the house (*tech nincis*) of a fosterperson, who undertakes the maintenance of an elderly landowner, which is surrounded by a yard where crops or vegetables were grown (Kelly 1997, 367).

Storage Buildings and Outhouses

Archaeological excavations have uncovered numerous examples of houses and buildings within enclosed settlements. Although it can be sometimes difficult to distinguish between houses and other non-domestic structures (i.e. storage buildings, stables or barns) within the *les*, the presence of a hearth within a building usually strongly supports its classification as a house. Therefore, when a number of buildings occur without hearths in proximity to a main house, they may reasonably be described as outhouses and farm buildings. There is also the issue of whether buildings are contemporaneous. In certain cases there are obvious stratigraphical relationships between structures while it is also possible to obtain radiocarbon dates from a number of buildings within an enclosure to ascertain if they were contemporary. However, in other instances it is often impossible to determine if buildings and houses were in use at the same time and interpretation is based on their spatial association, shape, size and artefactual evidence. Excavations have revealed a wide variety of potential outbuildings that have been variously interpreted as animal pens and shelters, and structures used for storage. A number of lean-to structures, that were built against the enclosure bank, have been identified at Seacash (Lynn 1978b), Rathbeg (Warhurst 1969), and Ballymacash (Jope and Ivens 1998), all in Co. Antrim, and Lisnagun, Co. Cork (O'Sullivan *et al* 1998), for example. In all cases, other buildings, including probable houses, were identified within the settlement enclosures and it is likely these functioned as associated farm buildings although their precise function is difficult to determine. At Lisduggan III, Co. Cork, a rectangular structure, which measured 7m by 6m, was situated in the centre of the enclosure. It was defined by lines of regularly-spaced postholes, which it was suggested would have been strong enough to carry a roof without supports and was interpreted as a livestock pen (Twohig 1990). This potentially relates to the cow-house identified in the written sources.

Excavations at Mackney, Co. Galway (Delaney 2009, forthcoming), and Raheens II, Co. Cork (Lennon 1994), were noteworthy for the large number of structures identified within the enclosures which represent a range of domestic and outbuildings. At the former, a roundhouse was centrally positioned and a curvilinear lean-to structure with central hearth, which measured 3.8m by 8.4m, was constructed against the bank. Although interpreted as an ancillary structure by the excavator (Delaney 2009, 41), this lean-to structure may be a later rectangular house based on its size and presence of an internal hearth. Another curvilinear structure, which was composed of six postholes and a central post, was open to the north and was interpreted as an animal shelter. A rectangular structure beside the souterrain may have been used for storage (Delaney 2009, 45). At Raheens II, Co. Cork, at least eleven structures and three souterrains were identified which represented a number of construction phases. All the structures were circular except for one sub-rectangular example. The sub-rectangular structure measured 4.6m by 6.5m while the six other circular structures had average diameters of between 4.5m and 5.6m. These may represent a succession of houses. Four other buildings were smaller in diameter, between 2.4m and 3.5m, and may have been used as outhouses or storage buildings (Lennon 1994).

It is difficult to archaeologically determine the exact function of many of these buildings but the likelihood is they were not dwellings due to their size, lack of hearth and absence of domestic finds. Many would have been suitable for the enclosure of small animals and may be the calf-pens, sheep-pens and pig-sties as described in the law texts. There are fewer examples of larger sturdier structures although the rectangular building at Lisduggan III, Co. Cork, may have been a cow-house. That animals were kept within settlement enclosures is further supported by environmental evidence such as insect analysis. The excellent preservation of ecofacts, due to the waterlogged conditions within the raised settlement at Deer Park Farms, Co. Antrim, revealed the presence of dung beetles which are specific to animals such as cattle, sheep, pig and horse (Kenward and Allison 1994, 95–6).

Pits – industry and waste disposal

There have been an increasing number of pits identified within enclosed early medieval settlements that were used for discarding food refuse (Chapter 2) and industrial debris (Chapter 4). The identification of pits that were used for food storage is problematic because it is difficult to determine if these were refuse or storage pits. At Carrigoran, Co. Clare for example, eight pits were discovered to the south of a number of structures (Reilly 1999, 2000). Charred seed remains, dominated by

hulled barley, oats and indeterminate cereals, were recovered from a number of these. Rotary quern fragments were also found in a disturbed context in proximity to the pits and it appears that this area was used for the storage and grinding of cereal. However, the burnt seeds may have been dumped into the pits after a failed drying episode in a kiln so these may be in fact refuse pits. Also, it appears that grain was stored in above-ground structures (see below), and it is unlikely that Ireland's wet and damp climate would have been suitable for the storage of grain below ground. The *corróc* is however described in historical sources and a variety of differently shaped and sized pits may have been used, alongside souterrains, to store a range of dairy products or salted meats.

The law texts state that the barn (*saball*), which stored grain after the crops had been threshed, dried and winnowed, was owned by wealthy farmers, such as the *bóaire*, and was found near their house. The *ócaire* however only had a share in a barn (Kelly 1997, 242–3), so it would have been used by a number of low-ranking farmers. That the sources suggest the barn lay near the house of a wealthy farmer indicates it was within the *les* although Kelly (1997, 369) suggests it was most likely located outside the enclosure in an area known as the *airlise* which translates to the area in front of the *les*. However, a number of excavations have identified potential grain storage barns that were located within the enclosure. Small square-shaped structures, represented by postholes, have been uncovered at Curaheen, Co. Cork (Danaher 2002, forthcoming; Danaher and Cagney 2004), Killickaweeny, Co. Kildare (Walsh 2008, forthcoming), and Balriggan, Co. Louth (Dealney 2010). These may represent the remains of elevated granaries whereby the grain store was supported on four wooden posts in a heightened position above the threat of rodents such as mice and rats. A more substantial, although only partially surviving, structure was excavated at Dowdstown, Co. Meath (Cagney *et al* 2009; Cagney and O'Hara 2009). It was possibly square, or rectangular, and survived to a maximum length of 10m. It was post-built and was surrounded by a partially extant drip gully that may have been 6m wide. The structure's interpretation as a barn related to the recovery of charred grain from a number of associated deposits. Field enclosures and a large number of cereal-drying kilns were also present at the site so cereal growing and processing was clearly an integral component of the economy at Dowdstown.

Internal Divisions Within Settlement Enclosures: the Spatial organisation of economic activities

There is also emerging archaeological evidence for the structured use of enclosure space with clearly divided areas related to domestic, agriculture and industrial activities (see Chapter 4 for a discussion on the latter). At Ballymacash, Co. Antrim for example, the structures associated with agricultural and subsistence practices were located in the northern half of the enclosure, while domestic dwellings were located only in the south (Jope and Ivens 1998, 110–14). A number of structures were identified on the enclosed farmstead at Killickaweeny, Co. Kildare, including a round house, a rectangular building that may have been used by the occupants for ironworking and repairing, an ironworking area, the potential granary discussed above, and a small penannular-shaped structure located beside the bank that may have been an animal pen (Walsh 2008, forthcoming). A linear gully, which possibly held a fence, traversed the enclosure and separated the domestic activity from an open space to the north. It is likely that this area was used for the containment of livestock (Walsh 2008, 42–3). At Roestown, Co. Meath, the interior of the enclosure was divided into distinct areas by a number of internal ditches (O'Hara 2007, 2009a, 2009b). A number of cereal-drying kilns and related shelters and structures were located in the partitioned southern part of the settlement and this area was probably utilised for all aspects of cereal processing including threshing, drying, winnowing and storage of the grains (O'Hara 2009a, 42). Excavation at Balgatheran, Co. Louth, identified an early medieval settlement enclosure with large internal ditch and an associated field. A number of structures and a kiln were also identified (Chapple 2000). The large L-shaped ditch, which was 3m wide and 1.5m deep, traversed the settlement and contained iron slag, flint fragments and burnt bone in its primary fill and a secondary phase of activity, concentrated at the western terminal, contained large quantities of iron slag as well as residual flints and a single piece of a shattered rotary quernstone. The chronological relationship between this and the enclosure ditch is unclear but it may have demarcated an internal division within the enclosure possibly to separate domestic, industrial and agricultural activities. A final example of subdivisions within an early medieval enclosed settlement concerns Uisneach, Co. Westmeath, where a number of phases were identified leading to

increased partitions of the internal space (Macalister and Praeger 1928). These probably demarcated areas related to settlement and agriculture.

External Gardens and Fields

Early medieval legal sources

Historical sources supply information about the types of gardens and fields located outside early medieval settlement enclosures. Although the law texts describe the yard of a fosterperson within the *les* (see above), the vegetable garden (*lubgort*) was mostly located outside the enclosed settlement (Kelly 1997, 368). The garden and cereal-drying kiln (*áith*) were probably situated within the *airlise*, the enclosed field outside the *les*, while a prosperous farmer may also own a watermill (*muilenn*) close to their house (Kelly 1997, 369). Other fields are mentioned such as the infield (*faithche*) and outfield (*sechtar faithche*). The former relates to the entire area that surrounded the settlement although it is difficult, based on the written sources, to determine the size of the infield. The outfield relates to the part of the farm situated outside this area. The *faithche* may contain, amongst others, tilled fields, hills, places of assembly and roads (Kelly 1997, 370), so must have been a substantial area. Based on descriptions of farming practices, it may be envisaged that lower-ranking farmers, such as those of *ócaire* rank, ploughed in cooperation and co-owned a large open field in which each farmer held separate strips. For wealthier farmers, including the *bóaire* and *mruigfer*, they probably owned and farmed one or two large fields (Kelly 1997, 371). Cultivated fields – probably fairly large and rectangular in shape – are typically described in the law texts as having two headlands and two sides. Their raised beds were approximately 2.4m wide and a drainage ditch was situated between each (Kelly 1997, 372).

Field boundaries

Although information about early medieval fields is not abundant, the written sources supply plenty of information on the types of field boundaries. Four types are listed in the main law-tract on farming, *Bretha Comaithchesa*: the stone wall (*corae*), the trench-and-bank (*clas*), the bare fence (*nochtaile*) and the oak fence (*dairimbe*) (Ó Corráin 1983; Kelly 1997, 372). Walls are described as being of three courses high or 0.9m thick and 1.2m high (Kelly 1997, 374). The bank of the trench-and-bank was expected to be 0.9m high and the ditch should have a similar depth. Sometimes, trees or bushes were planted in the bank although wild bushes and scrub would have taken hold there naturally (Kelly 1997, 374). The bare fence was a less permanent type of boundary and consisted of 1.2m stakes set evenly apart which were interwoven with pliable rods. Blackthorn was placed along the top of the fence as an added protection against livestock (Kelly 1997, 375). The oak fence was similarly constructed but with oak posts and would have been a more permanent structure (Kelly 1997, 376).

Prior to large-scale infrastructural projects and related archaeological excavation, aerial photography and archaeological survey were utilised, alongside the historical evidence, to identify potential early medieval field-systems. Initially, Norman and St Joseph (1969), and more recently Barrett (2002), have identified a range of small, squarish, petal and irregular-shaped fields through aerial photography that appear to relate to enclosures of probable early medieval date. Williams (1983) also surveyed some upland areas in Co. Antrim and identified a number of curvilinear field-systems that related to both enclosed and unenclosed settlements. However, the majority of landscapes and field-systems uncovered by aerial photography and archaeological survey could represent a palimpsest of human activity over hundreds, or even thousands, of years and only archaeological excavation can decipher their chronology and development.

Early medieval field enclosures, until recently, were not excavated on a large scale as traditionally, research and excavation focused on individual settlements including their enclosing element and interior. However, there is now, due to the huge increase in excavations until recently, a significant corpus of archaeological evidence related to the spaces outside early medieval settlement enclosures including a range of differently sized and shaped enclosure annexes, fields and potential livestock enclosures.

Some of the petal-shaped fields identified through aerial photography and archaeological survey have now been excavated. Two small ditches, which radiated from the settlement enclosure at Glebe/Laughanstown, Co. Dublin, formed a petal-shaped field enclosure which was radiocarbon dated to the late seventh and late ninth centuries (Seaver 2005, 2007, forthcoming). Hawthorn and blackthorn were identified in the wood charcoal from the site and these may have grown on the field banks that surrounded the field (Seaver 2005, 60). External features outside the stone enclosure at Ballyegan, Co. Kerry, included a cereal-drying kiln, a possible animal corral and field boundaries (Byrne 1991). The field boundaries, built of earth and stone, had a maximum width of 2m, were almost 1m high and appeared to form a curvilinear field which respected the settlement enclosure. Ditches radiating from a settlement enclosure have also been identified at Leggetsrath West, Co. Kilkenny (Lennon 2006; Lennon and O'Hara forthcoming). A segment of a curving ditch, which respected the settlement enclosure, was discovered further down slope from it. Several shallow linear ditches were related to this and may represent further sub-division of the space outside the enclosed settlement. A blue-glass bead recovered from one of the ditches suggests an early medieval period. Two cereal-drying kilns were also built over the field ditches, which further supports an early medieval date (Lennon 2006).

Excavations at multivallate enclosures have revealed evidence related to agriculture between the enclosing ditches while a wide range of settlement enclosure annexes and extensions have been identified which were either contemporary with the primary construction of the settlement or represented a later need for additional space. Some of these have been interpreted by archaeologists as livestock enclosures (see below), while others potentially represent vegetable plots and small fields. At Cahercommaun, Co. Clare for example, the area between the first and third enclosing walls yielded no significant archaeological deposits and it was suggested that this area was intended primarily for agricultural use (Hencken 1938). Small rectangular-shaped enclosures are present within the middle enclosure and may have been vegetable plots. Other areas were more substantial – both within the outer and middle enclosures – and these may have been used for cereal growing and the enclosure of animals. A number of enclosures were identified within the area between the inner and outer enclosing ditches at Balriggan, Co. Louth (Delaney 2010). These included a parallel-ditched entrance way, a D-shaped enclosure, a roughly square-shaped enclosure and some smaller enclosures. Artefacts from the ditches were limited to sherds of souterrain ware and a lignite bracelet. The curvilinear enclosure may have been an animal pen while the others were probable vegetable plots and/or small crop fields. Excavations at Baronstown, Co. Meath, revealed a circular settlement enclosure that was surrounded by a slightly later outer enclosure (Linanne and Kinsella 2009a, 2009b). A complex sequence of dividing ditches and gullies, which created small plots, was situated to the north and west of the circular enclosure and mostly within the outer enclosure. Their stratigraphic relationships were difficult to determine but they appear to represent a succession of small vegetable plots related to the later expansion of the site when the outer enclosure was constructed. Excavations at Colp West, Co. Meath, revealed a sixth/seventh century square-shaped enclosure, measuring 20m by 20m, that was appended onto a settlement enclosure, and a number of related animal enclosures (Murphy forthcoming). The square enclosure was devoid of internal features and it was probably a small corn field. The presence of a palisade trench at the base of the ditch suggests it was once surrounded by a timber fence. Within the same county, at Dowdstown, a circular enclosed settlement was modified, firstly with the addition of a rectangular enclosure, and following this, its amalgamation into a larger D-shaped enclosure with related annexes and fields (Cagney *et al* 2009, Cagney and O'Hara 2009).

The presence of square or rectangular fields, such as some of those mentioned above, is potentially indicative of cereal growing because cereals and vegetables are almost invariably grown in lines to facilitate soil preparation, planting and maintenance (O'Sullivan *et al* 2009, 139). Therefore, curvilinear enclosures would be unsuitable for crop cultivation and may have been constructed to enclose animals (see below). The rectangular enclosures at Dowdstown may represent such corn fields. One example included a multi-phase enclosure (Enclosure 4), which measured 40m northwest–southeast by 24m northeast–southwest, and was annexed onto the D-shaped settlement enclosure. It continued in use throughout the settlement's lifetime and charred seeds and animal bone was present

in the ditch fills as well as a small number of artefacts. Geophysical survey of the site also showed that these fields extended westwards beyond the excavation limit (Cagney and O'Hara 2009, 124).

Early excavations of field-systems occurred at Cush, Co. Limerick, where a line of rectangular fields were located along the west-facing slopes of the Slieve Reagh hillside and many of the field boundaries respected the enclosed settlement ditches (Ó Ríordáin 1940). The field enclosures were generally long and thin, and ran down the hillslope, whereas those at the northern end appeared square in plan. Some of the fields were as long as 200m while others were considerably smaller. The field boundaries were commonly U-shaped in section, 0.9m deep and low banks survived to a height of approximately 0.45m (Ó Ríordáin 1940, 139–45). Edwards (1990, 56) has noted that their size approximately corresponds with the trench-and-bank system described in the law-tracts for the enclosure of arable land. The use of some of the fields for crop husbandry was noted by Fowler (1966, 69–71) when he identified a block of ridge and furrow running east-west across part of the rectangular enclosure attached to the southern group of settlement enclosures which may have been early medieval in date.

Further excavations of early medieval rectangular-shaped fields have occurred at Marshes Upper, Co. Louth**,** Cahircalla More, Co. Clare, and Boyerstown 3 and Ratoath, both in Co. Meath, for example. Marshes Upper was an intensely settled early medieval landscape and excavations in the townland have so far discovered field-systems, ten souterrains – both enclosed and unenclosed – a cereal-drying kiln and a structure (Campbell 2002; Gosling 1980/84a, 1980/84b; Gowen 1992; McCormick and Crone 2000; Mossop 2002a, 2002b, 2002c; O'Hara 2002). Excavation of a number of ditches showed that they comprised a system of rectangular early medieval fields measuring approximately 50m by 80m. Another larger example measured 102m north-south by 64m east west and was defined by a 2m-wide ditch which had an average depth of 0.5m. The ditch was re-cut at least three times and the presence of bank-slump material indicated that an up-cast bank may have been partially stone-faced. Finds were evident in the final re-cut and included probable fragments of souterrain ware and small quantities of hazel charcoal and worked flint. The charcoal was radiocarbon dated between the late seventh and late ninth centuries AD (Mossop 2002b). At Cahircalla More, the settlement enclosure was an integral part of a large pattern of rectangular fields defined by five broadly linear ditches to the north and west. The field boundaries measured between 0.5m and 1.2m wide, and were between 0.25m and 0.65m deep and finds included animal bone, cereal grains, a copper-alloy ringed pin, whetstones, a small quantity of iron slag, a mini-anvil stone, oyster shell, and some prehistoric items. Cereal grains from two of the ditches produced radiocarbon dated ranging from the seventh to the twelfth century (Taylor 2006; Hull and Taylor 2007). Excavations at Boyerstown 3 revealed the remains of successive early medieval field-systems that related to a close-by enclosed settlement (Clarke 2009). The fields were rectangular and sub-rectangular with internal sub-divisions and annexes. Enclosure 1, for example, measured 23m by 60m and contained three subdivisions. Finds from the ditch fills were restricted to small quantities of animal bone, a small quantity of cremated bone, seeds and a small number of artefacts including two iron knives. It appears that Enclosure 1 and its subdivisions functioned as small gardens and fields related to vegetable and cereal-growing (Clarke 2009, 39). Enclosure 2, which measured 43m by 22m, cut the southern part of Enclosure 1 and was dated to the late seventh and early tenth century. Again finds were few from the ditch fills and it was probably a crop field (Clarke 2009, 40). Various annexes and ditches related to both enclosures returned radiocarbon dates between the sixth and eighth centuries. A circular enclosure, which was dated to the mid seventh and early ninth centuries, was also revealed and may have been an animal enclosure (Clarke 2009, 41). Boyerstown is a wonderful example of continual land use and organisation by successive generations over an approximate 200-year period during the early middle-ages in which fields related to both arable and livestock were identified. Cereal cultivation was also an important component of the agricultural economy at Ratoath and rectangular fields, dating between the fifth and eighth centuries, were situated to the east of the settlement/cemetery alongside a number of cereal-drying kilns which produced large quantities of cereal grains (Wallace 2010).

Miscellaneous Livestock Enclosures

Early medieval legal sources

McCormick (1995, 34) believes that many early medieval settlement enclosures were used, especially at night, to protect cattle from raids arguing that the primary function of enclosure banks and ditches was to defend livestock. We have seen above from archaeological evidence that specific areas were used within enclosed settlements for livestock while historical sources also describe the various farm buildings and dunghills within the *les* (see above). There is also archaeological evidence now for a range of enclosure annexes that were constructed for the containment of animals. The law texts also refer to a cow fortress (*bódún*) which was a fortified enclosure where cows were brought for protection against cattle-raiders (Kelly 1997, 366). These livestock enclosures therefore can be differentiated from enclosed farmsteads because they were specifically built to contain cattle.

Other enclosures

Enclosure annexes, built to enclose livestock within an area connected to the main settlement enclosure, may be distinguished from the garden plots and corn fields described above due to their curvilinear shape. At Curraheen, Co. Cork, an annex, which measured 16m in diameter, was appended onto the eastern side of a larger settlement enclosure, measuring 62m by 44m (Danaher forthcoming). The former was interpreted as a livestock enclosure because no internal features were present and its enclosing ditch, which was dated by charcoal between the seventh and ninth centuries, was devoid of artefacts except for a possible hone-stone. The related settlement enclosure contained an oval house, a possible elevated granary and pits. A number of sub-rectangular and curvilinear enclosures, representing successive phases of activity, were appended onto the initial enclosed settlement at Colp West, Co. Meath (Murphy forthcoming). The main enclosure enclosed a souterrain, hearth and pits indicative of occupation. The remaining enclosures were largely devoid of archaeological features and probably represented a series of livestock enclosures. Enclosure annexes have also been excavated at Killickaweeny, Co. Kildare (Walsh 2008, forthcoming), Johnstown, Co. Meath (Clarke and Carlin 2008), and Castlefarm, Co. Meath (O'Connell 2009; O'Connell and Clarke 2009), for example, which have been interpreted as related animal enclosures.

There are also a growing number of early medieval enclosures that have revealed limited or no occupational evidence in terms of internal structures or finds from their enclosure ditches. They have reasonably been interpreted as livestock enclosures and may be the *bódún* described in the law texts. Garryduff II, Co. Cork, was perhaps the first recognised of these as it revealed no settlement evidence or finds, except for a few charcoal spreads. It was interpreted as a cattle enclosure that was associated with a neighbouring high-status enclosed settlement at Garryduff I (O'Kelly 1963, 120–5). Three early medieval enclosures were excavated in proximity to each other at Lisduggan North, also in Cork (Twohig 1990). Lisduggan I and II were situated close together on a south-facing slope of Knocknanuss Hill. The former enclosed three buildings and produced finds indicative of settlement while the latter was interpreted as a livestock enclosure. It has a diameter of 50m and enclosed only a short length of a cobbled pathway. Except for one single flint of piece, no structural, artefactual or faunal evidence was uncovered in any of the trenches. Ross, Co. Meath, was a large early medieval enclosure that lacked any contemporary internal features (Wiggins *et al* 2009). There were few finds, small quantities of iron slag and a small piece of copper slag, while the quantity of animal bone – some of it butchered – was meagre for such a substantial enclosure. It suggests that Ross was either occupied only intermittently and/or for brief periods or was more plausibly a livestock enclosure (Kinsella 2008, 104).

It would appear, based on current archaeological, historical and environmental evidence, that the majority of curvilinear enclosures were built to contain livestock while square and rectangular-shaped fields were mostly utilised for growing cereals and vegetables. However, the excavation of a large rectangular enclosure at Dowdstown, Co. Meath, which was stratigraphically and chronologically related to its neighbouring settlement and agricultural enclosure complex, highlights the diversity of enclosure and field types in early medieval Ireland. The enclosure measured 60m by 47m and was situated below the escarpment, on which the settlement was located, and within the floodplain of the River Boyne. Geophysical survey also detected similarly sized and shaped fields to the east of this outside the excavation limit (Cagney and O'Hara 2009, 124). These fields potentially represent early medieval floodplain-enriched meadows whereby winter flooding of the area provided rich and nutrient

grasslands for lowland summer grazing (Cagney *et al* 2009, 42; Kinsella 2008, 105). Historical sources refer to the lowland pasture of cattle, during the summer months, on winter-flooded rich grasslands such as the callow (*caladh*) and turlough (*tuarloch*) (Feehan 2003, 56, 75), and this would have reduced the need to bring cattle to upland areas during the summer to avail of grazing.

Upland Transhumance Settlements

Booleying and transhumance in early medieval Ireland

Transhumance, or booleying, related to the removal of livestock for grazing into upland and mountain areas during the summer months. The common upland areas were divided at the beginning of May and transhumance continued until November 1 when the last animals and minders returned to their permanent settlements. The practice of booleying was associated with the lowest social grades in early medieval Ireland which included the majority of women and children (Patterson 1994, 91). Slaves were responsible for herding their lord's domestic animals and shepherds and cowherds were also low-status individuals (Kelly 1997, 438, 442). The law texts also stress prejudices against freemen who herded their own livestock while the cow grazer (*bógeltach*) did not have an honour price because he carried out the work expected of a woman or child (Kelly 1997, 450).

Booleying was therefore a seasonal activity carried out by the lowest social grades during the summer months. Archaeologically, a number of potential transhumance settlements have been identified. Ballyutoag is situated in the northwest margins of the Belfast Mountains, Co. Antrim. The landscape is comprised of enclosed pasture and peatland at a height ranging between 168m and 244m. Excavation and survey identified a range of curvilinear field systems, some of which enclosed groups of hut platforms (Williams 1984). The fields covered an area of approximately 24 acres and were formed by low earthen banks. A group of fields to the west of Enclosure's I and II (those enclosing the huts) contained cultivation ridges (Williams 1984, 38). Excavation of Huts A and B, within Enclosure 1, indicated they were occupied contemporaneously. Their excavation produced large amounts of flint fragments, souterrain ware, some cereals, while sheep/goat were the only animal bones discovered outside Hut A. Personal items were rare, featuring only the stem of a bronze ringed pin and the fragments of two D-section lignite bracelets. Another hut site (Hut C), in Enclosure II, was also investigated but revealed no occupation evidence. The finds and radiocarbon dates, ranging between the sixth and tenth century, demonstrate an early medieval date for the settlement and field systems (Williams 1984, 47). If the houses and field systems were contemporary, as suggested by the excavator, Ballyutoag represented an upland village of possibly 100 people (Williams 1984, 47). The artefactual evidence coveys a very low standard of living while its inhospitable upland location strongly suggests Ballyutoag was a seasonal upland transhumance settlement where cattle grazed for the summer months and small levels of crop husbandry were undertaken at subsistence levels by the animals' minders including cowherds, shepherds, slaves, women and children.

A more recent programme of archaeological survey and excavation was undertaken at an upland hill valley at Barrees in the Beara peninsula, Co. Cork (O'Brien 2009). Excavations revealed early medieval huts which were associated with field boundaries dating to the late prehistoric and early medieval periods. Hut E was located within a stone wall enclosure in the upper part of the Barrees Valley. Charcoal from under a large slab on the southwest side of the Hut was dated to the late sixth and late eighth century while the only find was a glass bead (Hickey and O'Brien 2009, 257–66). Nearby, a small D-shaped stone-walled hut (Hut F) was built against the inner face of a large field wall. Charcoal, which was dated the eleventh and twelfth century, was the only material present within the interior (Comber 2009, 266–71). Excavations also revealed a circular stone enclosure that measured 17m in diameter. It lacked any internal features and may have been a livestock enclosure. A small number of finds were recovered from the enclosure including early medieval dumbbell glass beads, stone discs and an iron point. Peat overlying the enclosure was radiocarbon dated and indicates that the enclosure was abandoned between the late twelfth and thirteenth centuries.

A final potential upland transhumance settlement was excavated in 1940 at Doolargy, otherwise known as Lissachiggel, Co. Louth (Davies 1937/40). Seventeen huts were identified within, and

abutting, a stone enclosure which was located on marshland at 244m OD. A number of unenclosed huts and field systems were also evident in the immediate surrounding landscape. Based on artefactual and construction evidence, the huts were built during the latter part of the early medieval period and the seventeenth or eighteenth centuries. The majority of the latter were constructed against the cashel wall. The early medieval huts were all small structures and many were conjoined. The hearth was generally located in the larger building and artefacts from the huts were rare including coarse pottery (probably souterrain ware), flint tools (possibly strike-a-lights), and pieces of iron. The only dress items were a glass bead and fragments of a lignite bracelet. Hazelnut shells, burnt bone and charcoal were also identified within and around the huts.

Common to Ballyutoag, Barrees and Lissachiggel are their marginal upland locations and limited artefactual collections. Their interpretation as transhumance seasonal settlements is a reasonable one given the archaeological evidence, landscape setting and information from historical sources. Animals, and especially cattle, were brought uphill to avail of summer grazing and were accompanied and protected by various low-status groups including slaves, cowherds and shepherds, and mothers and children. These groups left little trace archaeologically as they had few possessions. Once the summer ended, the seasonal dwellings were abandoned and both people and animals returned to their permanent lower-lying settlements.

Unenclosed Settlements as Farmyards

Both the archaeological and historical evidence depicts early medieval enclosed farmsteads which were organised into designated dwelling and agricultural spaces set within an extended farm of fields and open grasslands. However, outbuildings and structures related to agriculture, and field systems have also been identified at unenclosed settlements. The 'Spectacles', Co. Limerick, was an unenclosed early medieval settlement that consisted of one rectangular and two circular houses as well as an animal shelter and other structures within an arrangement of small and large early medieval field systems (Ó Ríordáin 1949a). The animal pen was situated to the west of one of the circular houses and was approximately 4.25m long and 0.9m wide and utilised the surrounding rock outcrops as part of the walls of this structure. The rectangular house was located in the next field south of that containing the circular house and animal pen. Several postholes and cobbled areas between the house and cliff edge were interpreted as possible outhouses. Each unenclosed house site was situated in a small rectangular field overlooking Lough Gur. The fields were only half an acre in size and the field boundaries comprised of double-stoned walls with rubble fills, ranging in width between 1m and 3m, except for one which was made from earth. Their close proximity to the houses and small size suggest they were probably used for tillage. Another field bank was situated up the hillside was probably part of a wider field system used for pasture (Ó Ríordáin 1949a, 57–63).

Excavations at Beginish, Co. Kerry, revealed an early medieval settlement consisting of eight houses, fifteen cairns, eight animal shelters and two poorly constructed structures at the eastern end of the island (O'Kelly 1956). The site may have originally been an unenclosed settlement, possibly associated with the monastery at Church Island, which was re-used as a maritime way-station by a Hiberno-Scandinavian community (Sheehan *et al* 2001). The animal shelters were constructed over two phases and an example from Phase II was a small structure that measured 2m by 1.2m. It contained roughly-built low walls and revealed no evidence for any trace of a hearth or associated domestic activity. The dwellings and farm buildings lay within a network of mostly rectangular fields. Stone walls demarcated the field boundaries and some of the fields were further subdivided into more irregular sized plots.

Cereal-Drying Kilns and Horizontal Watermills – Arable Agriculture as Part of the Wider Settlement Landscape

The Celtic Tiger excavations and the identification of farming landscapes

The role of tillage, as part of a mixed agricultural early medieval economy, has been dramatically revised since the boom in development-led archaeology during the 'Celtic Tiger' years. Historians such

as Kelly (1997) have identified a wide range of farm buildings and fields located outside settlement enclosures while Ó Corráin (2004, 552) rued the neglect of landscape archaeology in identifying this evidence. This chapter has already assessed the abundant archaeological evidence now for a wide range of fields and enclosures related to both pastoral and arable agriculture. Excavations in the spaces outside enclosed settlements have also revealed a large number of further features related to the latter including cereal-drying kilns and watermills. The wealth of this archaeological evidence ties in with the written and palynological evidence and demonstrates that tillage was a key component of the early medieval economy.

The role of livestock and dairying

Previously, archaeologists have recognised the importance of crop husbandry in early medieval Ireland but their hands were tied by a lack of evidence (Duignan 1944, 141; Proudfoot 1961, 104–8; Edwards 1990, 60; Mallory and MacNeill 1991, 189–90; Mytum 1992, 191–9). Conversely, early faunal collections, during the Harvard excavations of the 1930s, favoured the retrieval of large, mainly cattle, bone which resulted in an overestimation of the importance of cattle in the pastoral economy (McCormick and Murray 2007, 35–6). This dominance of cattle bone, at the expense of other livestock, and artefacts and features related to arable farming, resulted in past archaeological narratives that downplayed the importance of crop husbandry in the early medieval economy. Mitchell and Ryan (1998, 286), looking at these past narratives, reasoned that the products of arable farming were overlooked and that tillage was portrayed as less significant in comparison to the role of livestock husbandry.

Historians have long understood the importance of livestock, and particularly cattle, to early medieval families and communities. Ó Corráin (1972, 53) summed this up succinctly when he stated that,

> "Land was measured in terms of the number of cattle it could maintain, legal compensation was reckoned in terms of cattle; a man's standing in society was determined by his wealth in cattle... the cow was the most immediate form of mobile wealth for raiding, for granting fiefs to clients and for paying ones debts".

Cattle, therefore, were highly significant in terms of economic and social relationships and even mythological beliefs (Feehan 2003, 55–62; Kelly 1997, 27–9). However, historians have also widely accepted the role of crop husbandry within a mixed early medieval economy because, simply put, the evidence was there. There are many references to the agricultural equipment, outbuildings, cereal-drying kilns, watermills and field enclosures that were intimately associated with tillage (Kelly 1997; Ó Corráin 2004, 553–5; Ó Croínín 1995, 90). The law-texts also identify the people who were expected to own or share in the running of a mill or kiln, and those who worked the fields, harvested and processed the grain (Kelly 1988, 1997). Therefore, historians have long had access to sources which confirm the importance of crop husbandry in early Irish farming.

Crop cultivation, cereal-drying kilns and processing

Palynological studies have shown an increase in both arable and pastoral agriculture from approximately the fourth century AD although the rate of speed and preference initially for crops or livestock varied slightly throughout the sampled areas (Cole and Mitchell 2003; Hall 2000, 2005; Plunkett 2007). Undoubtedly, there was an upsurge in agriculture from the late Iron Age/early medieval transitional period and tillage formed an important component of this mixed agricultural economy. Apart from a variety of fields described above, some of which were created to grow cereals, archaeologists have further evidence now for crop husbandry in the form of numerous cereal-drying kilns and watermills.

A variety of cereal-drying kilns, classified by their shape in plan, have been identified in the archaeological record. Monk and Kelleher (2005) initially identified dumbbell, figure-of-eight, keyhole and L- or comma-shaped kilns, but oval types can be added to these. Essentially, all consist of a firespot, a flue and a drying chamber. In certain instances, such as Roestown, Co. Meath for example (O'Hara 2007, 2009a, 2009b), kilns contemporary with the settlement, were situated within the enclosure. We have seen however that the Roestown kilns were partitioned in a specialised cereal

processing area within the settlement. The majority of cereal-drying kilns are located in the spaces outside settlement enclosures and this is unsurprising given the risk of fire.

Cereal-drying kilns worked efficiently when hot air, from an open fire, reached the cereals within the drying chamber via a flue. The kiln's primary function was to dry cereals after they had been harvested and they were hugely important structures due to Ireland's damp and wet climate. However, this was only one aspect of a kiln's function (Monk 1994, 217). An equally important function of the cereal-drying kiln was to harden the grain to allow for effective milling. This was relevant both for small-scale and larger-scale production as grinding the grain, without prior drying, was more difficult and resulted in the clogging of the quern surface (*ibid.*). Kilns may have also functioned as small ovens used to parch the primary spikelets of hulled wheats prior to secondary winnowing and cleaning because parching made the robust glumes easier to remove (*ibid*, 218). Cereal-drying kilns were used for the production of malt and evidence for this has been detected at Corbally, Co. Kildare (Tobin 2003). They were also utilised to fumigate for insect pests (Monk 1994, 218). It has also been recognised, through analysis of the charred cereal remains within kiln deposits, that many kilns were multifunctional and/or that their function changed across time (van der Veen 1989, 313).

Monk and Kelleher (2005, 105–6) have devised a preliminary chronological framework for the development of cereal-drying kilns in Ireland. They suggest that dumbbell and figure-of-eight kilns date to the early medieval period followed by keyhole-shaped and L- and comma-shaped kilns which are predominantly associated with the late middle-ages. However, the excavation and radiocarbon dating of large numbers of kilns on road schemes, such as the M3 and M7/M8 for example (Kinsella 2008, 106; O'Sullivan and Kinsella forthcoming), now appears to show a gradual progression from small earth-cut keyhole and oval kilns, followed by figure-of-eight-shaped structures, until these were gradually replaced by larger keyhole- and L-/comma-shaped stone-built kilns. The development of the flue seems to have been an important factor in the evolution of the kiln. The earliest examples tend to date from the Iron Age, followed by figure-of-eight kilns, which were in use until approximately the tenth century, while stone-built keyhole and L-shaped kilns were used from the latter part of the early medieval period throughout the later middle-ages. It is worth noting that a clear chronology of cereal-drying kilns has yet to be established and the above is based on a small spread of dated examples investigated by the authors. There was also undoubtedly an overlap in the use of these different types of kilns. The excavation of a potential early-to-middle Bronze Age figure-of-eight-shaped cereal-drying kiln at Carrigatogher, Co. Tipperary (Hackett 2010, 33–5), identifies the need for research into the development and chronology of cereal-drying kilns in Ireland.

Horizontal watermills

Watermills were technologically sophisticated structures which facilitated the grinding of grain in large quantities. Their construction and operation would have required skilled individuals as watermills were one part of a wider network of features including a dam, a feeder stream, a mill race, a bypass channel and the mill building itself (Rynne *et al* 1996, 25). Indeed, the millwright in early Irish sources was given the status of the lowest grade of lord (Rynne 1998, 87). Like cereal-drying kilns, they were located in the areas outside settlement enclosures usually adjacent to streams which connected to larger rivers or, in a smaller number of cases, were driven by tidal power (O'Sullivan and Downey 2006, 36). Brady (2006, 46) identified a concentration of watermills in the south and south-east of the country with the remainder in the midlands and north-east although Rynne (2007, 34) considers this distribution to be artificial, due to systematic fieldwork in search of mills being undertaken in this area along with extensive drainage schemes over the last decades of the twentieth century.

Brady (2006) has recorded 97 watermills dating to both the early and late medieval periods although the former constitute the majority of these sites. Rynne (2007) believes this figure under-estimates the total because Brady did not include incidences of power-driven millstones found near streams in his research, while the most recent published list of dated mills can be found in McErlean and Crothers (2007, 11).

Horizontal watermills are the most common type although vertical examples are known in smaller numbers; nine from a total of 97 mills are vertical mills (Brady 2006, 46).The earliest securely dated horizontal watermill is Nendrum, Co, Down, dated by dendrochronolgy to AD 619, while a dendrochronological date of AD 630 was returned from a vertical mill at Little Island, Co. Cork (Brady 2006, 48). Radiocarbon dates from a vertical mill at Killoteran, Co. Waterford, place its use between the mid fifth and early seventh century (Murphy and Rathbone 2006, 26), indicating that both the horizontal and vertical watermills were introduced at approximately the same time. Brady (2006, 49) however noted that the most intense period of mill building occurred between the mid eighth and mid ninth centuries.

Transformations in early medieval agriculture

A number of recent publications have identified a shift in emphasis from pastoral to arable farming from approximately the ninth century onwards (McCormick 2008; McCormick and Murray 2007; Kerr 2007). Kerr (2007) argues that platform and raised settlement enclosures were unsuited for the enclosure of cattle and that they are found on land better suited to tillage. He has also identified that they were constructed slightly later than univallate and multivallate enclosures between the mid-eighth and mid-tenth centuries (Kerr 2007, 99). McCormick and Murray (2007, 106–8) identified a decrease in the number of cattle, from a variety of faunal assemblages, while an increase in sheep was also noted for the same period between the tenth and eleventh centuries. They argue for a movement in agricultural practices that was based on cattle, between the sixth and eighth centuries, to arable production and view the decline in the number of cattle alongside other evidence such as an increase in open and raised settlement, the decline of the univallate and multivallate settlement enclosure and an upsurge in watermill construction (McCormick and Murray 2007, 115). The latter also corresponds with Brady's (2006, 49) findings for an intense period of watermill construction between *c*. AD 750 and AD 850. Therefore, there is compelling evidence that an arable-based economy superseded a livestock, and notably dairy, economy from the ninth century onwards.

However, this is not to overlook the prominence of tillage at an earlier period. Huge numbers of cereal-drying kilns have been discovered in advance of large-scale infrastructural developments. For example, at least 90 kilns were excavated along the M3, Co. Meath (Kinsella 2008, 106), while at least 22 were identified on the M7/M8 road scheme (N. Kenny pers comm.). At certain sites, such as Corbally, Co. Kildare (Tobin 2003), Rosepark, Co. Dublin (Carroll 2008), and Dowdstown (Cagney *at al* 2009; Cagney and O'Hara 2009), Baronstown (Linnane and Kinsella 2009a, 2009b), and Colp West for example (Murphy forthcoming), all in Co. Meath, significant numbers of kilns were excavated. A total of 56 cereal-drying kilns were identified in the hinterland of Tara and radiocarbon dates from 42 of these indicate intensive cereal processing between the fifth and ninth centuries and a particular concentration between the fifth and sixth century (O'Sullivan and Kinsella forthcoming). A great many kilns are returning radiocarbon dates spanning the early medieval period and notably between the fifth and sixth century which indicates that large-scale cereal processing was occurring prior to the construction of watermills. Therefore, although it is apparent that the role of cattle in early Irish society declined in importance after the eighth century, crop husbandry was of undoubted importance to families and communities throughout the early medieval period.

Previous studies have identified links between arable farming and ecclesiastical settlement (Stout 1997, 1998, 2000), while many of the Irish terms related to cereal processing are derived from Latin indicating that the Church was closely connected with tillage (Kelly 1997, 222, 481). However, Hall (2005) has assessed the pollen evidence near monastic settlements and she found no evidence that there was a direct correlation between increased crop husbandry and ecclesiastical activity. Her findings suggest that monasteries were generally founded in places where arable farming was already established and it was also noted that 'a comparison of evidence from the monastic and secular sites does not indicate change unique to monastic landscapes' (Hall 2005). Watermills and cereal-drying kilns have been identified at ecclesiastical settlements but numerous kilns have equally occurred at a wide variety of settlements including settlement enclosures and settlement/cemeteries. Watermills have also been excavated at Raystown, Co. Meath (Seaver 2006, 2010), while another probable mill was identified at Balriggan, Co. Louth (Delaney 2010). Therefore, tillage was an important aspect of the economy prior to the arrival of Christianity in the fifth century and the archaeological evidence

points to the key role of arable agriculture in both secular and ecclesiastical contexts throughout the early middle-ages.

The Organisation of the Domestic Economy: Agricultural Labour, Food Production and Food Types

Farm labour

The range of agricultural and labour-intensive practices that occurred within the *les* and the fields surrounding early medieval settlements depended on both social rank and gender. Farm labour was undertaken by the unfree and low-status individuals but there does not appear to be too much of a distinction between the work of the unfree and servile classes and that of low-status commoners such as the *ócaire*. The male slave (*mug*) was associated with cutting and carrying wood while the female slave (*cumal*) undertook milking and churning. Young slaves, both boys and girls, were responsible for the herding of animals (Kelly 1997, 438–9), while it appears that children of free social rank undertook similar duties (Kelly 1997, 451). The care and protection of livestock from people and predatory animals was the responsibility of servants, such as the shepherd (*áugaire*) and cowherd (*búachaill*), and it appears from the early sources that they were paid for their servile work (Kelly 1997, 442–3). Low-ranking freemen such as the *ócaire* did regular farmwork themselves, such as joint-herding, while they were also clients and would have had to join the reaping party in their lord's cornfields (Kelly 1997, 445–6). The law texts also suggest that it was normal for a farmer's wife to work with their husband and possibly older children in the fields. Women of free common rank were involved in farmwork that included ploughing, reaping, looking after livestock and fattening pigs (Kelly 1997, 449). There was a strong association of women with milking and dairying (Kelly 1997, 450). Unlike the noble and royal social grades who did not partake in any manual labour, clerics of all rank and their monastic clients were also active in the fields. They believed that there were strong spiritual benefits related to agricultural labour and they also wanted to achieve self-sufficiency for their community (Kelly 1997, 453–4). Therefore, the written sources convey that everyone, apart from the highest-ranking members of society, was responsible for farm labour in early medieval Irish society but that these duties were divided according to gender and age.

Technologies and materiality of agricultural labour

Artefacts, associated with animal husbandry and tillage, have been discovered across a wide variety of early medieval settlements. Those related to the former are relatively rare although there is more evidence for the latter. Potential iron goads have been identified at Ballyknockan, Co. Wicklow (Macalister 1943), and Rathgureen, Co. Galway (Comber 2008, 40) for example, and these were used to prod livestock such as oxen or horses (Kelly 1997, 495). Iron knives are common finds across a range of early medieval settlements and, along with iron axes, would have been used to slaughter livestock. Iron axe heads have been found at a variety of secular and ecclesiastical settlements including Cahercommaun, Co. Clare (Hencken 1938), Ballycatteen (Ó Ríordáin and Hartnett 1943) and Curraheen, both in Co. Cork (Danaher forthcoming), Rosepark, Co. Dublin (Carroll 2008), Caraig Aille II, Co. Limerick (Ó Ríordáin 1949a), Clonmacnoise, Co. Offaly (King 2009), and Killederdadrum, Co. Tipperary (Manning 1984). They have also been uncovered on crannogs such as Ballinderry I (Hencken 1936) and Newtownlow (Bourke 1985, 1986), both in Co. Westmeath, Lagore, Co. Meath (Hencken 1950), and Lough Faughan, Co. Down (Collins 1955). Further evidence, indicative of livestock slaughter and meat preparation, includes both knife and chop marks on animal bones (McCormick 1984, 1986; Comber 2008, 41).

The law texts list a number of tools related to cultivation including a spade, shovel, fork, mattock and rake (Kelly 1997, 465–8), and some of these have been discovered during excavations. A spade or mattock was discovered on the ecclesiastical settlement at Church Island, Co. Kerry (O'Kelly 1958), while a spade and shovel were revealed on the crannogs at Ballinderry II, Co. Offaly (Hencken 1942), and Moynagh Lough, Co. Meath (Bradley 1991) respectively. A fork-like implement was found on another crannog at Rathinaun, Co. Sligo (Raftery undated). There are many references to the plough in early sources and it was a vital tool in preparing the land prior to the sowing of cereals. A plough consisted of a share; which cut the earth horizontally, a coulter; which was a vertical iron knife in

front of the share that cut the earth vertically, and a mouldboard; which was located behind the share and turned the sod (Comber 2008, 32). It has previously been argued that the adoption of new plough technology, resulting from contacts with Roman Britain, hastened the growth of agriculture throughout the opening centuries of the first millennium (Mitchell and Ryan 1998, 248). However, more recent research by Brady (1993, 37) and Kelly (1997, 469–71) has shown that the coulter plough was not introduced to Ireland until approximately the tenth century while there is no archaeological or historical evidence for the mouldboard in early medieval Ireland. Irish ploughing, therefore, remained much the same during the Roman occupation in Britain and farmers ploughed with the ard or scratch plough throughout the late Iron Age and for most of the early medieval period in Ireland. Agriculture, however, was clearly expanding and Ryan (2000, 32) has outlined a number of possibilities which influenced this including the development of cooperative farming, the use of plough teams of four oxen, improved varieties of crops and extensive manuring which were all a culmination of better management. Plough shares have been discovered at Deer Park Farms (Lynn and McDowell forthcoming) and Ballyfounder, both in Co. Antrim (Waterman 1958), Dundrum Castle, Co. Down (Waterman 1951), Leacanabuaile (Ó Ríordáin and Foy 1941) and Ballyegan, both in Co. Kerry (Byrne 1991), Faughart Lower, Co. Louth (Bowen 2008), Bollies Little (Sweetman 1983) and Lagore, (Hencken 1950) both Co. Meath, and Carraig Aille II, Co. Limerick (Ó Ríordáin 1949a). Iron coulters are known from Whitefort, Co. Down (Waterman 1956), Faughart Lower, Co. Louth (Bowen 2008), Lagore, Co. Meath (Hencken 1950) and Ballinderry I, Co. Westmeath (Hencken 1936).

Once the cereals were ready, they were harvested with tools such as sickles and billhooks. Sickles have been identified at a variety of settlements including Larrybane (Childe 1936; Proudfoot and Wilson 1962), Seacash (Lynn 1978b), both in Co. Antrim, Glencurran cave, Co. Clare (Dowd 2006), Garryduff, Co. Cork (O'Kelly 1963), Church Island (O'Kelly 1958) and Leacanabuile (Ó Ríordáin and Foy 1941), both in Co. Kerry, Cush, Co. Limerick (Ó Ríordáin 1940), Lagore, Co. Meath (Hencken 1950), Rathinaun, Co. Sligo (Raftery undated), and Togherstown, Co. Westmeath (Macalister and Praeger 1931). Billhooks were uncovered at Deer Park Farms (Lynn and McDowell forthcoming) and Seacash (Lynn 1978b) both Co. Antrim, Cahercommaun, Co. Clare (Hencken 1938), Garryduff, Co. Cork (O'Kelly 1963), Tullylish, Co. Down (Ivens 1987), Dowdstown (Cagney et al 2009; Cagney and O'Hara 2009) and Lagore (Hencken 1950) both in Co. Meath, Rathinaun, Co. Sligo (Raftery undated), and Ballinderry I, Co. Westmeath (Hencken 1936). The written sources indicate that reaping-parties contained large numbers of people and one of the base client's obligations was to provide labour for his lord's harvest (Kelly 1997, 238). After the grain had been harvested, the grains were removed from their cornstalks with a threshing stick or a flail. It appears the latter, which succeeded the threshing stick, was commonly used in Ireland by the eleventh or twelfth century (Kelly 1997, 481). No archaeological evidence for either is known.

Food preparation

Although the early sources describe that men and women were responsible for a variety of tasks, they clearly show that men were responsible for the labour-intensive stages of work and women for the final product. For example, men reared and sheared sheep while women combed, spun and weaved the material. Similarly, men cultivated, harvested, and processed cereals while grinding the grain was the responsibility of the woman (Kelly 1997, 449–50). Generally, therefore, a woman's work occurred within or near the home and she was primarily responsible for food-preparation (Kelly 1997, 322, 451). Similarly, female slaves, who probably resided in the homes of their owner, were responsible for the preparation of food (Kelly 1997, 439; Sexton 1998, 82). An array of baking utensils are described in the law-tract *Bretha im Fhuillema Gell* and include a griddle, a griddle slice or turner, measuring buckets, a kneading-slab, a kneading-trough and a sieve (Kelly 1997, 322; Sexton 1998, 81). Women prepared the dough mixture in the kneading-trough and it was cooked over the hearth on the griddle. The bread was then turned using the griddle slice (Sexton 1998, 81). Quernstones were used to grind cereals and they are commonly found on early medieval settlements (O'Sullivan and Kenny 2008). This work was also associated with women and especially female slaves (Kelly 1997, 439). The skills of food preparation and cooking were passed on from mother to daughter although the chores expected of boys and girls differed. Girls were taught how to use the quern and the kneading-trough and how to look after lambs and children. Boys learned more labour-intensive work such as drying grain, splitting firewood and taking care of young animals (Kelly 1997,

452). High-ranking women, according to the law texts, were not expected to partake in any manual labour but they were associated with needlework and embroidery (Kelly 1997, 451). Unsurprisingly, children of noble or royal rank were never trained in the work of the kitchen or the farm (Kelly 1997, 452).

The term *fulacht* in early sources refers to a cooking pit which was mostly used in open areas away from settlements but could sometimes be located close to a dwelling. The term applied to both water-filled pits for boiling meat and also outdoor cooking hearths where meat was roasted on a spit (Kelly 1997, 337). Examples of the latter may relate to the many external hearths identified both within and outside early medieval settlement enclosures. Burnt mounds or *fulachta fiadh* are one of the most frequently excavated archaeological monuments in Ireland. Their most common function was to bring water to the boil by a form of hot-stone technology (Brindley *et al* 1989/90, 25), while the most common interpretation, similalrly to the function proposed in the early texts, was that they acted as cooking places for boiling meat (O'Kelly 1954, 105). This is supported by the retrieval of animal bone, although usually in small quantities, from many burnt mound excavations whilst other finds are rare. Other interpretations suggest they may have been sweat baths or saunas (Lucas 1965; Barfield and Hodder 1987, 370–9), they were used for textile and leather processing (Coles 1979, 198; Hodder and Barfield 2003, 59–66), while recent experimental archaeology suggests that they could have been used to brew beer (Quinn and Moore 2007, 8–11). The vast majority of burnt mounds however date to the Bronze Age although there is there is limited evidence that they were used during the early medieval period (Brindley *et al* 1989/90, 26–8; Ó Néill 2004c).

Food and Diet

Both the archaeological evidence (including animal bone and environmental analysis) and the historical sources demonstrate that people in early medieval Ireland generally enjoyed a healthy and balanced diet that included meat (mainly beef), dairy produce, grain products, and vegetables and fruit. Indeed the written sources indicate that the staple diet consisted of bread and milk (Kelly 1997, 316), which were the foodstuffs derived from both crop and animal husbandry. Distinctions are made between winter food (*gaimbiad*) and summer food (*saimbiad*). The former consisted of a mix of cereals and meat while the latter refers mainly to dairy produce (Kelly 1997, 318). The law-tracts indicate that higher-status individuals generally enjoyed a greater variety of food than people of lower rank (Kelly 1997, 318), and excavations across a range of settlements have produced differing quantities of animal bone and cereal remains. It is clear that some settlements were the homes of important and high-ranking individuals whereas a great many did not produce the quantity or diversity of ecofacts and artefacts evident on high-status settlements.

The importance of cattle to early Irish society has been alluded to above in terms of social and economic relationships. Between the sixth and eighth centuries, beef comprised 80% of the meat consumed (McCormick and Murray 2007, 105), while evidence from the majority of archaeological settlements indicates that surplus cattle were slaughtered in their second autumn and that the majority of juvenile calves killed were male (Mitchell and Ryan 1998, 287). Calves were slaughtered at an early age for their meat and only a few were allowed to mature for stud or traction (Edwards 1990, 57). However, contemporary writings suggest that meat was of less importance than dairy products which were essential to the diet of early medieval people (McCormick 2008, 210). This is confirmed from both the range of dairy products listed in early written sources such as milk, cream, butter, buttermilk and a wide range of cheeses (Kelly 1997, 323–30), and through zooarchaeological analysis where animal bone assemblages, dating between the sixth and eighth centuries, have been dominated by cattle, followed by pig and then sheep (McCormick and Murray 2007, 105). Therefore, cattle during this period were highly valued for their dairy produce and were the basis for status and wealth.

The dominance of cattle in animal bone assemblages, between the sixth and eighth centuries, contrasts with the evidence from earlier periods (McCormick 2007), and from the latter part of the early medieval period where there is greater variety in the faunal assemblages as the number of cattle decrease and there is a greater quantity of sheep and pig bone (McCormick and Murray 2007, 106–7). Although beef and dairying continued to be of great importance to the early medieval diet,

cows no longer held the same social or economic value and it appears that wealth was measured through a variety of means including access to silver, the slave-trade and increases in grain production from the eighth century (McCormick 2008, 219–21; McCormick and Murray 2007, 111–15).

Pigs generally comprise the second most common species after cows in early medieval animal bone assemblages and were generally slaughtered between the ages of one and two when the animals gave their maximum meat yield. This is supported from the animal bone yields at a range of settlements such as the crannog at Ballinderry II, Co. Offaly (Hencken 1942), the ecclesiastical settlement at Armagh (Edwards 1990, 58), the settlement/cemetery at Johnstown, Co. Meath (Clarke and Carlin 2008; Fibiger, Carlin and Kinsella 2008) and the enclosed settlement at Killickaweeny, Co. Kildare (Walsh 2008; forthcoming; Fibiger, Carlin and Kinsella 2008) for example. The written sources indicate that pig meat was valued for its taste and especially by the lordly classes when it was salted (Kelly 1997, 84, 336).

Sheep generally occur in less numbers than cattle or pig on the majority of early medieval settlements (McCormick and Murray 2007, 105). Sheep were kept mainly for their wool although the amount of wool produced by a sheep compared to today's standards was low (Mytum 1992, 186). They were also utilised for their meat, milk and skin (Kelly 1997, 70–3).

Meat and dairy products were just two parts of a mixed early medieval diet and it is clear that grain products were equally important. Their importance can be gained from information in the law texts that assign a bushel of grain as a form of currency, while the annals refer to the natural or human destruction of cereals (Kelly 1997, 219). Regarding the latter, the annals only recorded significant events related to the death of kings, battles and so on, so the inclusion of bad harvests is indicative of the importance placed on cereals as a foodstuff. Cereals were also graded according to human rank and the eighth-century law-tract *Bretha Déin Chécht* lists seven cereal gains based on the order of their prestige. Bread-wheat and rye are the highest ranking cereals while six-row barley and oats are found at the bottom (Kelly 1997, 219). It is evident therefore that cereals were considered key dietary requirements by early jurist writers and a range of grain products are described in the early written sources.

Based on analysis of these sources, Sexton (1998) has identified cereal foodstuffs based around two groups – pot-based foods and bread. Porridge and gruel-type meals were varied. The most common porridge (*littiu*) was commonly associated with children and the sick and was seen as a nourishing and sustaining dish (Sexton 1998, 76, 84; Kelly 1997, 331). Three other gruel-type dishes were more closely associated with the strict and penitential diets of monks and these were usually taken on holy days as a break from the traditional diet of bread and water (Sexton 1998, 77, 84).

There was also a variety of breads made with different cereals. Standard loaves (*banfuine* and *ferfuine*) were prepared with wheat while flat breads, either of oats, wheat, barley or rye, are also recorded (Sexton 1998, 80). Other ingredients within the breads included variously salt, honey and pulses while they were served with a variety of condiments due to their insipid taste (Sexton 1998, 83). Bread was the staple monastic dish and it was generally coarse and prepared with barley, oats or pulses and baked on an ash fire (Sexton 1998, 82). The written texts also stress that monk and nun food rations should be small and bread could be served with a condiment of fish, butter, cheese or an egg (Kelly 1997, 343–4).

Environmental analysis of macro plant remains, at a number of early medieval settlements, has revealed that oats and barley were the most common cereals present (Monk 1986). Six settlements in Munster (four from Cork and two from Kerry) were assessed for cereal and plant remains and it was found that barley and oats were the dominant species while wheat grains and rye were rare (Monk *et al* 1998, 72). The archaeobotanical evidence was similalrly assessed at a number of sites, including cereal-drying kilns, in North Wicklow and oats dominated the early medieval assemblages, followed by a sizeable proportion of barley and a small quantity of wheat (Johnston forthcoming). The law-tracts list wheat and rye as prestige cereals yet these are almost absent from the archaeobotanical record at early medieval sites. This is probably best understood with the realisation that only the

highest-ranking individuals had access to prestige foodstuffs so wheat breads and other wheat or rye products were probably only eaten at high-status settlements. The early written sources also list barley and oats as the lowest ranking cereals and these were, therefore, equated with the common and low-status social classes. These social groups comprised the majority of Ireland's early medieval population so it should be unsurprising that they are the most common cereals from the period. Barley and oats were also relatively versatile crops and had broader uses when compared with wheat and rye. Oats are suited to Ireland's damp climate and can be grown in marginal areas with poorer soils (Lafferty *et al* 1999, 72). Barley and oats could also be used as animal fodder whereas wheat and rye were principally used for human food. The dominance of oats and barley therefore was related to their wider usage as well as their association with specific social ranks (Monk *et al* 1998, 73).

Barley was also used to brew beer and beer is commonly mentioned in early Irish sources. It was viewed as a drink to mark social occasions and it was associated with high and low ranking individuals. Common households were expected to have a tub of fermentation and a mug of beer should always be available, while larger royal or ecclesiastical households were expected to have their own brewer (Kelly 1997, 332–3). Beer also formed an important component of the early medieval diet and especially during winter months when milk and vegetables were scarce. Beer would have provided vitamins and other nutrients and it was treated as a substitute for vegetables and fruit in the law-tract *Bretha Crólige* which deals with the food of invalids (Kelly 1997, 333). Therefore, oats and barley were commonly used as ingredients for porridges, gruels and breads while barley was used to brew beer. Wheat and rye were uncommon cereals but would have featured in the foods of high-status individuals.

Vegetables and fruit are recorded in early Irish sources but there was little variation in the types available. The most frequently mentioned vegetable was *cainnenn* which was probably a type of onion while watercress, sorrel and wild garlic are also mentioned (Kelly 1997, 339). Nettles were collected to make broths or soups while hazelnuts, apples and a variety of wild fruits are also recorded in the written sources (Kelly 1997, 340).

The river, sea and coastal areas were also exploited by early medieval people (O'Sullivan and Breen 2007). The written sources refer to a range of marine and freshwater resources but most of the fishing evidence seems to refer to salmon and trout and marine species are rarely mentioned by name (Kelly 1997, 282–98). It appears, however, that the sea, rather than the rivers, was exploited more heavily and this may have been due to the limited range of fish within rivers prior to the Anglo-Norman period (McCormick and Murray 2007, 76). The artefactual evidence for fishing is limited with hooks and possible net sinkers being found only on a small number of sites (McCormick and Murray 2007, 76). Both seals and whales were hunted and the latter provided large quantities of meat as well as whalebone which was used in the construction of saddles and hoops when no wood was available. Whale teeth were also valued as items of decoration (Kelly 1997, 282–5). Shellfish was also exploited both as a food and for dye production (Murray 2007, 128–31). Further evidence for marine exploitation comes from surveyed evidence for fish-traps. One early law-tract on land values refers to 'the law of the estuary' (Kelly 1997, 553), which mentions '*ar inber esig nanta'.* Kelly was unsure of the meaning of the term '*nanta'*, suggesting that it meant 'stays' or 'remains', and thus may refer to permanent fish-traps. Recent intertidal archaeological surveys on the Shannon estuary (O'Sullivan 2001, 2003, 2005b) and Strangford Lough (McErlean *et al* 2002, 144–85) have revealed physical traces of such fish-traps.

The Evidence for Agricultural Economy in Relation to Norse towns

Ireland's Scandinavian towns were centres of trade and would have been reliant on their meat from the farms and estates outside their town walls. McCormick's (1983) analysis of cattle bone from Fishamble Street, Dublin, showed that there was a low incidence of calves in comparison to contemporary rural settlements. He concluded therefore that cattle were not raised in the town but were purchased from outside (McCormick 1983, 261; McCormick and Murray 2007, 57). Small animal pens have been recorded within Dublin, at Temple Bar West for example (Simpson 1999, 25–6), while Wallace's Type 5 structures are described as small huts without roof supports which probably

functioned as animal pens (Wallace 1992a, 17–8). These have been identified in the majority of Ireland's Scandinavian towns and indicate that small animals, such as pigs and goats, were kept within the town walls, but that most of the meat consumed, especially beef, would have been brought in from outside.

Archaeobotanical analysis identified that cereals, such as oats, hulled barley, bread-wheat, wheat, rye and possibly flax, and wild fruits and berries were consumed in Waterford (Tierney 1997, 888–93), while oats, wheat and barley were identified within the fill of the ditch at Washington Street, Cork (Cleary and Hurley 2003, 393). Hazelnuts and a variety of fruits, including blackberry, bramble, elder, raspberry, crab-apple, were also identified in Cork (Cleary and Hurley 2003, 393). Artefacts, indicative of cereal harvesting and processing have been identified. In Waterford, finds included a considerable quantity of quern-stones, iron shears and a sickle blade (McCutcheon 1997c, 424–9). An iron spade, a number of wooden rakes, pitchforks and shovels as well as five pruning hooks, dating to between the late-eleventh and late-twelfth centuries, were also found. The hooks were hafted to a shaft and used for pruning trees (Scully 1997b, 461–9; Hurley and McCutcheon 1997, 600).

Those residing within the town walls also consumed a lot of fish and shellfish (Hamilton-Dyer 2007, 112; Murray 2007). Fishing was clearly important as artefacts including lead line-weights, wooden net-floats and stone sinkers have been found during excavations (McCutcheon 1997c, 421; Ní Loingsigh 2003). Archaeozoological studies of deposits from Dublin, Waterford and Cork confirms this focus on marine species, with bones from hake, cod, ling, plaice and herring all known from these towns (Hamilton-Dyer 2007, 112; McCarthy 1997, 2003).

Conclusions

Until relatively recently, information on the types of farm buildings, gardens, fields and agricultural activities was reliant on historical sources. However, the scale of excavations during the 'Celtic Tiger' years has undoubtedly transformed our knowledge about the early medieval settlement and agricultural landscape. Excavation has revealed a variety of buildings beside dwellings within settlement enclosures including outbuildings, lean-to structures and four-post buildings and these would have been used as small livestock enclosures and storage sheds. There is also evidence for the deliberate demarcation and separation of spaces within enclosures for dwelling, agricultural, craft and industrial activities. These spaces were divided by male and female activities with the former responsible for heavy manual work while women worked mainly within the confines of the home. The farmyard or *les* was therefore a busy and noisy area where men, women and children lived and worked beside their animals and performed a variety of domestic and agricultural tasks to supplement their dietary, social and economic needs.

There is now a large volume of archaeological evidence identifying the types of fields and buildings found outside settlement enclosures such as cereal-drying kilns and watermills. There is evidence for a number of enclosure annexes which were probably used to enclose livestock. Certain enclosures were devoid of buildings or finds suggestive of habitation and these were probably cattle enclosures built specifically for their protection. Early medieval fields were variously curvilinear and rectangular-shaped and it appears that the former related to the enclosure of livestock while the latter were crop fields. However, this is a simplified model and there is undoubtedly need for future research into the types of fields and their uses during the early middle-ages.

The identification of large quantities of cereal-drying kilns and watermills, alongside field-systems, points to the prominence of crop husbandry in early medieval Ireland. Cereal cultivation was a key component of a mixed agricultural economy from a least the fifth century. It appears that the importance of tillage increased from the ninth century due to the decrease in economic and social value of the cow from this time.

Of course, farming was practised in order to provide food and subsistence and there is much information from the early written sources about the types of food in early medieval Ireland. Animal bone analysis and archaeobotanical studies offer further insights into the types of meats and cereals consumed and it is evident that cattle were valued primarily for dairy products and that beef was the

most common meat consumed. Oats and barley were the most common cereals used in the preparation of porridges and breads and, according to contemporary written sources, women were responsible for the preparation and cooking of most meals. Coastal and riverine resources were also exploited as were vegetables and wild fruits and berries.

Finally, zooarchaeological evidence indicates that Ireland's urban centres were reliant on their hinterlands for beef while their surrounding fields would have grown the cereals required for the towns' consumption. Buildings and artefacts within the town walls show that small animals were kept while fishing was practised in the surrounding rivers and seas. The archaeobotanical evidence also demonstrates that a variety of fruit, vegetables and shellfish were consumed alongside meat and cereals.

Whereas previously there was little archaeological evidence for the types of fields and agriculture practised outside rural farmsteads, ecclesiastical settlements and urban towns, there is now a huge wealth of evidence that points to a highly managed and intensively utilised agricultural landscape. The products of this agricultural labour fed households, were used as currency in client relationships and latterly supplied Ireland's towns.

Chapter 4: Early medieval crafts and industry on settlements

Introduction

Early medieval crafts and industry were also an important element of the early Irish economy, a key aspect of production linked to both secular and ecclesiastical wealthy, personal livelihoods and wider systems of exchange and trade. Crafts and industry in early medieval Ireland, like settlement, agriculture and other activities, would have been organised in social terms – especially in terms of gender, social rank and status - and manual labour had to be avoided if you were above a certain social rank. The early Irish sources attest to the relative status and importance of different crafts, for example, the early laws, such as the *Uraicecht Becc*, indicate that carpenters, copper-workers and smiths were all of high-status, occasionally having a similar honour-price to that of lower grade of nobility (Kelly 1988, 62). Other sources indicate that the blacksmith was held in high esteem by the community, occasionally figuring as a semi-mythological figure. In contrast, comb-makers were of quite low social status and were scoffed at by the author of the *Bretha Nemed Toísech* (Kelly 1988, 63).

The identification and extraction of raw materials; the various stages of craft production; the distribution of artefacts through trade and exchange; and finally the use, repair and abandonment of objects can all be traced in the archaeological record. Early medieval crafts and industry also influenced the organisation and layout of settlements. Ironworking and copper-alloy working were clearly important, if small-scale, activities, on many sites, while some sites appear to have been largely devoted to such activities. Recent excavations have provided a growing body of evidence for the production of iron, copper alloys, bone, antler, lignite, leather and textile products at a range of early medieval sites. Evidence for highly specialised activities including glass-working, enamelling and copper-alloying have also been discovered. Of all of these, metalwork has received the most attention with key monographs on ironworking being produced by Scott (1991) and on non-ferrous metalwork (Comber 2004). Most recently Comber's (2008) monograph on the economy of the ringfort has provided an overview of the evidence for the full range of craft working activities in early medieval Ireland and contains a very useful outline of the technical processes used in the various crafts (*ibid*. 231–50).

Early medieval Ironworking

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 ironworking has recently been advanced by the work of Comber (2008); Photos-Jones (2008a-d); Carlin (2008) and Wallace and Anguilano (2010).

Artefacts

Iron objects are frequently found on early medieval settlements and 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. (See Comber 2008, 112–3). 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).

Raw materials, processes, manufacturing

The principal source of iron in early medieval Ireland is believed to be bog iron ore (Wallace and Anguilano 2010, 70); a deposit not a rock 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) and the rath at Mullaghbane (Spence 1972, 43) and bog ore at Ballyvourney, Lough Faughan (Scott 1991, 151) and Clonfad (Stevens 2007, 42). 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 Reevy, Co. Down (Gaffikin and Davies 1938, 202). Iron ore has been collected from the bogs around Clonmacnoise and is believed to have been used for ironworking 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 and O'Cuileanain 1961, 90). Haematite was recognised at Ballyhenry (Scott 1991, 154), and ironstone nodules were found at Nendrum (Lawlor 1925, 140).

There is no 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). The extracted ore was then dressed, washed, winnowed and crushed with only the most iron-rich pieces retained for smelting (Wallace and Anguilano 2010, 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. It is likely that iron ore was found on other sites but was not recognised as such by the excavators (Scott 1991, 154).

The iron smelting process required charcoal production. 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, 101–5). 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. Possible early medieval charcoal production pits have been discovered at Kilmaniheen West, Co Kerry (Taylor 2004) and Barefield and Kilbreckan, Co. Clare (Hull and Taylor 2007, 25-26). Several rectangular charcoal pits, 2-3m in length, have been identified on a number of sites along the M4 roadscheme in Co. Meath, including Hardwood 3, dated to AD 720-960 2Σ (Carlin 2008, 88) and Ardnamullen, which produced a date of AD 1020-1250 2Σ (*ibid*.). 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). Analysis of the charcoal from the metallurgical features along the M4 indicate that oak was the dominant species for fuel though ash was employed within a furnace at Killickaweeny 1 (*ibid*, 101). Charcoal was also found at St Gobnet's house at Ballyvourney, but it was probably derived from the coppicing of hazel, willow and poplar (O'Kelly 1952, 35).

The charcoal was used for smelting the bog iron ore in a furnace. It is difficult to reconstruct the original form and superstructure of early medieval smelting furnaces because these rarely survived 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). The slag was not tapped but formed into furnace bottoms at the base of the pit while the metallic iron was left to form a bloom. These 'bowl furnaces' may have contained a low clay domed superstructure. However Carlin (2008, 92) and Mytum (1992, 231) have suggested that smelting in early medieval Ireland occurred within more efficient non-tapping shaft furnaces, known interchangeably as slag-pit furnaces or low-shaft furnaces. These comprised a low cylindrical clay shaft built over a basal pit which preserved the hollow hemispherical bowl in the ground (Carlin 2008, 92). The sides of the chimney may have contained clay blocks with tubular openings or *túyeres* to allow blasts of air into the furnace using a bellows to reach the high temperatures necessary for smelting. *Túyeres* were also used in smithing hearths and non-ferrous metal-working, thus sometimes complicating the interpretation of ironworking 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 and Anguilano 2010, 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).

There is growing evidence for early medieval Irish smelting furnaces (Comber 2008, 115–7) at various sites, including Altanagh, Co. Tyrone (Williams 1986, 51); Coolcran, Co. Fermanagh (Williams 1985b, 78); Garryduff I (O'Kelly 1963, 99-101) and Lisleagh I and II (Monk 1988, 60; 1995, 111), both in Cork; Rathgurreen, Co. Galway (Comber 2002, 181); Killickaweeny, Co. Kildare (Walsh 2008, 40–1), and Johnstown, Co. Meath (Clarke and Carlin 2008, 73). Garryduff I produced furnace evidence in its two occupation phases. In phase I, a furnace to the northwest of a house (II) consisted of a bowl-shaped hollow, with a low superstructure of clay and small stones (O'Kelly 1963, 99–101). The furnace was associated with a considerable quantity of iron slag and a small blob of glass nearby might suggest that it was utilised for other purposes, other than iron smelting. The superstructure survived to a height of 0.18m and measured 0.23-1m in thickness. The hollow measured 0.1m deep and 0.3m in diameter and had been lined with clay which was partially vitrified. In phase II, six circular hollows, 0.3m-0.46m in diameter and 0.23-0.3m deep were excavated and were found to contain burnt sides and fragments of furnace linings (*ibid*, 99–101). A furnace at Dressogagh, Co. Armagh, consisted of a saucer-shaped hallow, 1m in diameter which contained a charcoal spread and lumps of vesicular slag (Collins 1966, 119).

It has been recently argued that these low-shaft non-tapping furnaces were utilised in early medieval Ireland (Carlin 2008, 92). A large number of early medieval smelting furnaces were excavated at Killickaweeny 1, Johnstown 1, Hardwood 2 & 3, Towlaght 1 and Newcastle 2 along the route of the M4 in counties Meath and Kildare and consisted of bowl-shaped pits with evidence for slag and heat-reddened sides and bases (*ibid*, 94). Six shallow subcircular 'bowl' furnaces with deposits of slag and *in-situ* burning were found in a metalworking area inside the enclosure at Killickaweeny and were probably used for both iron smelting and smithing activities (Walsh 2008, 40-41) while Johnstown 1 also revealed twelve smelting pits (Clarke and Carlin 2008, 73). Most of these furnaces had a diameter of between 0.4-0.7m and depth of between 0.1-0.2m. 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 (Carlin 2008, 94). 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.

Carlin (2008, 93, 107) has noted 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). 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, to date there is no published unequivocal evidence for the use of the tapped shaft furnaces in early medieval Ireland.

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 Twomileborris (Wallace and Anguilano 2010, 80-82). The most common evidence for ironworking 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 ironworking process and whether smelting or smithing occured 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. They have been recorded at numerous sites, including Altanagh (Williams 1986, 69); Coolcran (Williams 1985a, 78); Garryduff I (O'Kelly 1963, 101); Rathgurreen (Comber 2002, 181); Dunsilly (McNeill 1991/92); Sluggary (Shee Twohig 2000, 12); Ballynagallagh (Cleary 2006, 27); Ballyvollen (Williams 1985a, 95–6); Marshes Upper (Gowen 1992, 98); Reask (Fanning 1981, 118); Clonmacnoise (King 2009); Kilpatrick (Swan 1994/95, 9) and at Upper English Street, Armagh City (Crothers 1999, 64, 69).

Bellows and *túyeres* were used in both iron smelting and smithing as well as in non-ferrous metalworking. The bellows rarely survive but clay *túyere* fragments are frequently identified. Examples of these – used in either ferrous or non ferrous metalworking – have been recorded at various sites, including Killanully (Mount 1995, 140); Dromthacker (Cleary 2008, 41); Garryduff I (O'Kelly 1963, 99–102); Twomileborris (Wallace and Anguilano 2010, 80); Lowpark (Gillespie 2006); Lagore (Hencken 1950, 126); Moynagh Lough (Bradley 1993, 79); Ballyvollen (Williams 1985a, 99); Cathedral Hill (Gaskell-Brown and Harper 1984, 149–50), Upper English Street, Armagh (Crothers 1999, 64 & 69); Tullylish (Ivens 1987, 106); Movilla Abbey (Ivens 1984b, 93); Illaunloughan (Marshall and Walsh 2005, 207); Clonmacnoise (King 2009, 342); Nendrum (McErlean and Crothers 2007b, 110); Dunmisk (Ivens 1989, 55); Ballyvourney (O'Kelly 1952, 34); Reask (Fanning 1981, 118); Kilpatrick (Swan 1994/95, 8) and Clonfad (Stevens 2010, 91).

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. 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).

Iron-smithing can be done in most places even at a domestic hearth and does not require a purpose-built structure (Wallace and Anguilano 2010, 71). Iron smithing hearths were smaller and produced less quantities of iron slag than smelting furnaces. 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. 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).

There is much less evidence for iron smithing than for iron smelting. 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- the refining of iron bloom into billet (Carlin 2008, 100). Other smithing hearts at Johnstown 1 and Killickaweeny 1 were used for producing artefacts (blacksmithing/forging) and these hearths can often only be identified by the presence of 'hammerscale' and the evidence for unfinished objects (*ibid*, 100). Four smithing workshops were excavated at Lowpark (Gillespie 2006; Wallace and Anguilano 2010, 75–80). The large quantities of vitrified clay fragments and pieces of *túyeres* found indicate substantial well-insulated smithing hearths with clay wall superstructures and blow holes (Wallace and Anguilano 2010, 75). Smithing hearth cakes are also known and examples have been found at various sites including Clonfad (Stevens 2010, 91) and Lowpark (Wallace and Anguilano 2010, 76-77).

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 ironworking furnace at Rathgurreen and was identified as having a similar function (Comber 2008, 118). Other possible stone anvils have been recorded at Cahircalla More (Hull and Taylor 2007, 26) and Caherconnell (Hull and Comber 2008, 31) and Sroove crannóg, Co. Sligo (Fredengren 2002) and possible iron equivalents have also been noted at Cloghermore cave (Connolly and 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). 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). Evidence for 'hammerscale' – an oxidised film of metal found on the surface around a smithing area produced from the hammering of iron – has been identified at a number of sites including Altanagh (Williams 1986, 69), Lowpark (Gillespie 2006), Killickaweeny (Walsh 2008, 40) and Twomileborris (Wallace and Anguilano 2010, 80). 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).

Tools such as hammers, tongs, files and punches were all used in the final stages of ironworking though could also be utilised for several other different crafts. However, there is a relative absence of these ironworking 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 at various sites, including Garranes (Ó Ríordáin 1942, 102); Dooey (Ó Ríordáin and Rynne 1961, 62); Randalstown (Wood-Martin 1886); Moynagh Lough (Craddock 1990, 211; Bradley 1984b) and Nendrum (Lawlor 1925, 143; Bourke 2007, 407).

Examples of iron hammer-heads are known from Garryduff I (O'Kelly 1963, 64–5); Dooey (Ó Ríordáin and Rynne 1961, 62); Lagore (Hencken 1950, 109); 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 ironworking functions and the former is known from various sites including Carraig Aille I and II (Ó Ríordáin 1949a, 87, 101); Cahercommaun (Hencken 1938, 58); Leacanabuaile (Ó Ríordáin and Foy 1941, 95); Gragan West (Cotter 1990); Lisnagun (O'Sullivan *et al* 1998, 50–2); Grange (Ó Ríordáin 1949b, 133); Bofeenaun (Lawless 1992, 19–21); Park North Cave (Coleman 1942, 71-73); Marshes Upper (Gowen 1992, 99–100); Ballyutoag (Williams 1984, 46); Church Island (O'Kelly 1958, 101); Reask (Fanning 1981, 130); Kiltiernan (Waddell and Clyne 1995, 182) and Upper English Street, Armagh City (Crothers 1999, 70). 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 Carraig Aille II (Ó Ríordáin 1949a, 79); Oldcourt (Murphy and O'Cuileanain 1961, 87); Cahircalla More (Hull and Taylor 2007, 26); Ballyfounder (Waterman 1958, 48); Garryduff I (O'Kelly 1963, 46); Craigywarren (Coffey 1906, 115); Moylarg (Buick 1893, 32); Lagore (Hencken 1950, 110); Bofeenaun (Lawless 1992, 21); Kilpatrick (Swan 1994/95, 13); Johnstown (Clarke and Carlin 2008, 73); Raystown (Seaver 2010, 276); Mount Offaly (Conway 1999); Dooey (Ó Ríordáin and Rynne 1961, 62) and Scandinavian Dublin (McGrail 1993, 167). Various sites have produced iron punches, including Carraig Aille I (Ó Ríordáin 1949a, 98); Lagore (Hencken 1950, 110); Illaunloughan (Marshall and Walsh 2005, 183); Clonmacnoise (King 2009, 342); Kells (Byrne 1988); Moyne (Manning 1987, 54); Kilpatrick (Swan 1994/95); Johnstown (Clarke and Carlin 2008, 73); Raystown (Seaver 2010, 276); Balriggan (Delaney 2010, 96); Mount Offaly (Conway 1999); Ballyvollen (Williams 1985a, 96) and Scandinavian Waterford (Scully 1997, 469) and Dublin (McGrail 1993, 167). Files, whetstones and grindstones were used for sharpening, shaping and smoothing iron and metal tools, blades, points and other objects. 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, Quinney and Russell 2005, 70).

The status and role of the blacksmith and the contexts of ironworking

Much of our understanding about the organisation of early medieval iron and metal-working is derived from the early literary sources. The law tract, *Uraicecht Brec*, indicates that the honour-price of the chief blacksmith or *gobae* was recorded as the most important craftsman after the wright or *sáer* (Kelly 1988, 62), equalling that of the physician, coppersmith and silversmith (Scott 1991, 187). The literary sources suggest that the Blacksmith was a specialist craftsman who worked only in iron and not in other metals. This distinction also appears to have been relevant to their smithy or forge in which the tract, *Blaí Ord Indeoin*, indicates was an open or partially open workshop manned by a range of workers such as the blacksmith who wielded the heavy hammers, the persons who operated the bellows and the apprentices (Scott 1991, 196; Comber 2008, 122).

Contexts of ironworking

Aside from mining and charcoal-production, the four separate processes involved in ironworking were ore processing (roasting), smelting, bloomsmithing and forging. Carlin (2008, 108) has suggested that most of the activities required to produce iron billet (charcoal-production and primary iron-smelting and occasionally bloomsmithing) may have been undertaken close to the ore and fuel sources (bogs and oak forests) in areas unsuitable for habitation. Considerable amounts of these resources would have been required for these initial stages which would have rendered it impractical to locate these tasks far away from where timber and ore was accessible (*ibid*, 108). The billet was then probably blacksmithed/forged within the confines of a nearby settlement. The excavations along the M4 support this hypothesis as the only evidence for iron-forging hearths was found at the settlements of Killickaweeny 1 and Johnstown 1 (*ibid*, 108). Similarly, Clonfad only produced evidence for primary and secondary iron-smithing and it was suggested that the smelting of the raw iron ore must have been carried out elsewhere, probably close to the source (Stevens 2010, 93).

Recent excavations have identified examples of these primary sites in the form of unenclosed or 'isolated' hearths, furnaces and charcoal-production pits. Some along the M4 were located close to areas of bog which probably afforded early medieval communities with an abundant supply of bog ore. Some examples of these 'isolated' ironworking sites which are not close to known early medieval settlements include Dollas Lower (Dowling and Taylor 2007, 273–4) and Kiltenan South, Co. Limerick (Dennehy 2007, 291), Hardwood 3, Co. Meath (Carlin 2008, 91) and Aghanaglough, Co. Waterford (Tierney and Elliot 2008). The sites at Hardwood provided evidence for charcoal production and the primary smelting and smithing of iron (Photos-Jones 2008c, 1, 22-3). A number of charcoal-production pits at Aghamore, Co. Westmeath were excavated on an early to late medieval ironworking site (Byrnes 2007) and other clusters of charcoal production pits at Kilcotton 1 and 2, Co. Laois were located close to woodland resources (Kenny 2010, 111-3). 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.

The crannog at Bofeenaun could be regarded as an 'isolated' specialised ironworking 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 ironworking activities may have been undertaken close to the ore and fuel resources. 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 by forged into artefacts (blacksmithing) on the site or may have been traded further afield where this activity could have taken place (Wallace and Anguilano 2010, 84). However, if the settlement was situated in very close proximity to the ore and fuel resources, it is quite likely that primary ironworking activities were also undertaken at these sites. There is growing evidence for smithing workshops at early medieval settlement sites. Some of this ironworking 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, ironworking tools (e.g. tongs, hammers, anvils, punches, and chisels), smelting and smithing slags, hammerscale, cemented smithing pans and shelter-like structures for the smith (*ibid*, 109).

Comber (2008, 121) has noted that the early stages of ironworking (e.g. smelting and bloomsmithing) were undertaken away from domestic structures to protect the occupants from the fumes and hazards of the work. Frequently these activities were undertaken on the periphery of the site away from the domestic structures. Thus there is evidence that ironworking was undertaken in the enclosing ditches of at Johnstown (Clarke and Carlin 2008, 57); Petitswood (Channing 1992); Rathgureen (Comber 2008, 181); Lowpark (Wallace and Anguilano 2010, 74-75); Clogher (Scott 1991, 160) and Woodstown (O'Brien and Russell 2005, 75). In some monasteries, there is also evidence that ironworking 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).

Some sites, such as Lowpark (Gillespie 2006; Wallace and Anguilano 2010, 75-80), Lisleagh (Monk 1988; 1995), and Johnstown (Clarke and Carlin 2008, 73; Photos-Jones 2008a, 232), specialised in ironworking. The palisaded enclosure at Lowpark produced four smithing workshops dating from the sixth to the tenth centuries A.D. Three of the ironworking 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 and Anguilano 2010, 75-80). An enclosed settlement at Twomileborris 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 2010, 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 *túyere* and a rare loaf-shaped piece of iron bloom were also found (*ibid*, 80-1).

In contrast to most of the larger settlements, the evidence at Johnstown 1 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 ironworking was undertaken within the enclosure, it was located in the western areas where there were fewer burials (*ibid*, 74). The rath at Lisleagh I produced 800kg of metallurgical waste (Monk 1988), and it has been identified as another upper tier iron smelting specialist site (Scott 1991, 101). At Killickaweeny, there were two areas of ironworking; 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 ironworking (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). The furnace, slag and charcoal at Dressogagh were found in the southeast area, but the main domestic hut was centrally located (Collins 1966).

At Nendrum, there was evidence for ferrous and non ferrous metalworking 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 and 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 and 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 ironworking. A layer of furnace waste, iron slag and *túyere* fragments were found to the west of the site (Manning 1989) and a vast quantity of dumped ironworking material containing slag, furnace bottoms, smithing cakes, *túyere* fragments was found to the northwest of this. All parts of the ironworking process were evident indicating that these activities (smelting and smithing) were probably undertaken close to the excavated area (King 2009, 341-3).

Recently, excavations at the monastery at Clonfad 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; 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 and brazing shroud fragments (vitrified clay pieces) used in the brazing process during the manufacture of wrought-iron hand-bells. Ironworking continued in the seventh and eighth century and the backfilled enclosing ditches produced evidence for metal scrap, ingots, ceramic crucible fragments, smithing hearth cakes, *túyeres*, 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).

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

101). However, ironworking appears to have taken place within actual structures at Lowpark (above), Reask (Fanning 1981, 106-8), Church Island (O'Kelly 1958, 69) and 'St. Gobnet's House', Ballyvourney (O'Kelly 1952, 32-5). It is possible that ironworking occurred after the houses became derelict, as was the case in Illaunloughan where the church was later used for ironworking (Marshall and Walsh 2005, 46). Tierney and Elliot (2008, 105), however, suggest that ironworking 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'.

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 ironworking has, however, been found within a building in Peter Street in twelfth century Waterford (Scully and McCutcheon 1997, 104). There is also evidence for ironworking at unenclosed sites. The sandhills site at Dooey (Ó Ríordain and Rynne 1961) is unusual in that there is evidence for ironworking along with fine bronzeworking, antler working and dye-making indicating a specialised broad-based industrial site. The scale of the ironworking 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).

Levels of ironworking

Although knowledge of the basics of ironworking 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 and Anguilano 2010, 73), perhaps indicative of specialised ironworking sites. However, it is often difficult to determine the duration of the ironworking activity at some sites (e.g. Johnstown) while the extent of the excavated area on different sites can vary considerably, skewing our perception of the character of ironworking at these places. There is evidence for ironworking at clearly high status secular sites, such as the trivallate rath of Garranes (Ó Ríordáin 1942, 105-8), as well as at numerous univallate raths. There is also evidence for ironworking at the most important ecclesiastical sites, such as Clonmacnoise, as well as smaller secluded monasteries such as Illaunloughan. Scott (1991, 101) described five levels of ironworking on Irish sites but Carlin (2008, 108-10) suggested three main contexts in which the activity may have been undertaken in early medieval Ireland.

Carlin's first level saw local farmers undertaking ironworking 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 to make and repair simple artefacts (Edwards 1990, 86; Mytum 1992, 235). The widespread finds of whetstones on settlements might also indicate that the general repairing and sharpening of iron tools was commonplace in early medieval Ireland (Comber 2008, 119). Most standard settlement enclosures such as Coolcran (Williams 1985b) have produced ironworking features such as furnaces and hearths as well as small amounts of iron slag and other industrial debris. It is likely that these early medieval farmers produced their own charcoal for small-scale ironworking activities (Kenny 2010, 113-4), 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).

Carlin's second and third levels comprised specialist production on a smaller number of ecclesiastical and secular high-status sites where iron metallurgy was undertaken by professional smiths producing a wide range of iron objects and artefacts. Carlin (2008, 111) has suggested that as the law tracts describe a blacksmith's honour price as equivalent to that of the coppersmith or silversmith, it would be apposite to locate the blacksmith with the other skilled metalworkers at high status sites under the patronage of the local chief or clergy. Many of these high status secular and ecclesiastical sites have produced evidence for specialist ironworking alongside other contemporary, yet physically separated, specialist activities, including non-ferrous metal-workers (copper-alloy and to a lesser extent silver and gold) and glass production (Carlin 2008, 109). A number of royal sites, such as Lagore (Hencken

1950), Garranes (Ó Ríordáin 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 ironworking. 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' ironworking 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 ironworking activities at smaller, ordinary farmsteads in early medieval Ireland.

It is then likely that a great many self sufficient farmers were capable of a basic level of ironworking but that more complex objects were produced by specialist blacksmiths working on high-status settlements under the patronage of the lordly and clerical classes. 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. It is also possible that some specialist ironworkers worked from their own residence or in apparently marginal landscapes under the general supervision of the chief of a local territory. The above mentioned Bofeenaun may represent one such example of a specialist ironworking site.

Comber (2008, 124) has suggested that certain settlement enclosures may have been occupied by specialist smelters and smiths and has identified one potential enclosed example at Cahircalla More, Co. Clare. This site contained one oval structure in the southwest part of the enclosure interpreted as an ironworking smithy, dating from the mid sixth to mid seventh century (Hull and Taylor 2005, 38; 2007, 26). Two internal pits inside the building contained large quantities of charcoal and iron slag, as did the remains of its curving gully. Other finds from the site included a small stone anvil, quern-stones, ring-pin, pin-sharpener, whet-stones and chisel (*ibid*.) Another possible example at Ballyvollen produced 170kg of iron slag, three *túyeres*, 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.

Another enclosure with an interesting historical connection to ironworking was partially investigated close (400m) to the site 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-unn' which can be translated as 'bree' or hill of the smith ('gobha') (*ibid*). The limited excavation 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. Evidence for occupation was not identified though such evidence may exist within the unexcavated area. 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.

Early Medieval Non-Ferrous Metalworking

Introduction

The evidence for non-ferrous metalworking 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 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-metalworking 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 AD 997. These silver pennies were based on the English *Æthelraed* series and found their way all over Europe between AD 997 and about AD 1040. After this period, the Dublin silver pennies declined in weight and legibility suggesting a more localised distribution (Wallace 2004, 837-9).

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 only 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 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 *tuyéres* 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.

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 metalworking 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 metalworking 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 but it is not stated if it was for smelting or melting, and he does not, for example, mention the presence of either clay mould or crucible fragments.

Tuyére fragments can be used to indicate the presence of metalworking furnaces and many examples have already been described. Metal ingots, crucibles, clay and stone moulds, heating trays, motif-pieces, scrap-metal, lumps of waste, slag and ore were also associated with non-ferrous metal-working. Most raw copper-alloy would appear to have arrived on settlements pre-processed, in the form of copper-alloy ingots such as those found at Movilla Abbey (Ivens 1984b, 96); Nendrum (Bourke 2007, 407); Downpatrick (Ryan 1988, 43); Clonmacnoise (Ó Floinn and King 1998, 123); Moynagh Lough (Bradley 1993, 75); Garranes (Ó Ríordáin 1942, 100) and Moylarg (Craddock 1990, 174). 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.

Crucibles are commonly found on early medieval settlements but were importantly specific to non-ferrous metal-working, not being used in the iron smelting bloomery process. 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). Clay crucibles are known from numerous sites (See Comber 2008, 80), including Lagore (Hencken 1950, 235-40); Moynagh Lough (Bradley 1993, 75-80; Craddock 1990, 180-4); Ballinderry II (Hencken 1942, 50); Dooey (Ó Ríordáin and Rynne 1961, 61); Woodstown (O'Brien and Russell 2005, 119, 122); Garranes (Ó Ríordáin 1942, 134-9); Carraig Aille II (Ó Ríordáin 1949a, 91-2); Roestown (O'Hara 2009b, 62); Raheennamdra (Stenberger 1966, 49); Rathgurreen (Comber 2002, 171); Ballycatteen (Ó Ríordáin and Hartnett 1943, 35); Garryduff I (O'Kelly 1963, 95-9); Lisduggan 1 (Twohig 1990, 19); Clogher (Craddock 1990, 187); Movilla Abbey (Ivens 1984b, 93); Reask (Fanning 1981, 117); Tullylish (Ivens 1987, 104-6); Ballyvourney (O'Kelly 1952, 27); Cathedral Hill (Gaskell-Brown and Harper 1984, 145-9), Upper English Street (Crothers 1999, 63) and Scotch Street (Lynn 1988e, 82), both in Armagh City, and Clonmacnoise (Ó Floinn and King 1998, 124; King 2009, 342-43). Some crucibles from Cathedral Hill, Armagh bear the marks of tongs which were used to handle them (Gaskell-Brown and Harper 1984, 146; Comber 2008, 140-3).

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.*). However, Hencken concluded that the traces of iron 'would have come into the crucibles as impurities in the crudely smelted copper' (Hencken 1950, 239). Scott (1991, 3), however, suggests that crucibles may have occasionally been used in ironworking at this time. Residues of metal were found in the interior of a bronze-working crucible from Lagore and crucibles with residues of gold have been found at Knowth (Eogan 1977, 74) and Clonmacnoise (King 2009, 338).

There has been some discussion of the possible uses of 'heating trays' or 'hot-plates' which are sometimes found associated with crucibles at various sites such as 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'.

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. One 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 and Harper 1984, 125); Clonfad (Stevens 2007, 43; 2010, 91) and Temple Bar West, Scandinavian Dublin (Simpson 1999, 33). 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 and Russell 2005, 119).

Clay moulds were used for producing finer objects such as ringed-pins and penannular brooches. 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 metalworking activity are known from a relatively large number of early medieval settlements (See O'Connor 2005) such as Cathedral Hill, Armagh (Gaskell-Brown and Harper 1984, 137-43); Tullylish (Ivens 1987, 106); Nendrum (Bourke 2007, 408-11); Kilpatrick (Swan 1995, 79); Clonmacnoise (Ó Floinn and King 1998, 124; King 2009, 342-43); Illaunloughan (Marshall and Walsh 2005, 204-7); Lough Faughan (Collins 1955, 59); Lagore (Hencken 1950, 126); Moynagh Lough (Bradley 1993, 75-80); Ballinderry II (Hencken 1942, 50-1); Gransha (Lynn 1985, 88); Clogher (Warner 1973); Garryduff I (O'Kelly 1963, 184) and Dooey (Ó Ríordáin and Rynne 1961, 61).

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 Cathedral Hill, Armagh (Gaskell-Brown and Harper 1984, 136); Nendrum (Bourke 2007, 408-09, 414); Movilla Abbey (Ivens 1984b, 94); Downpatrick (Brannon 1988, 63-64); Clonmacnoise (Murphy 2003, 2; King 2009, 340); Illaunloughan (Marshall and Walsh 2005, 188-9); Inishcealtra (de Paor 1997); Garryduff I (O'Kelly 1963, 78-85); Gransha (Lynn 1985, 88); Béal Boru (O'Kelly 1962, 8-10); Moynagh Lough (Bradley 1993, 76, 79); Lagore (Hencken 1950, 172-3); Glebe (Seaver 2005, 60-1); Roestown (O'Hara 2009, 64); Dooey (Craddock 1990, 174-5) and High Street/Christchurch Place in Scandinavian Dublin (Ó Ríordáin 1971, 75; Wallace 1984, 123) and Waterford (O'Meadhra 1997).

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 reason 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.

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 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 (Eogan 1977, 74) 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).

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. 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 and 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). An enclosure on the summit of Dunnyneil island, overlooking the Quoile estuary in Strangford Lough, was dated to the eighth-tenth century and produced artefacts associated with the assaying of silver (McCormick and MacDonald 2010, 53).

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 metalworking (Comber 2008, 144). An iron stake used in the beating of sheet metal was recovered from a metalworking area (1) at Moynagh Lough (Bradley 1993, 76) and three tiny needles of bronze were interpreted as possible compass points at Kilpatrick (Swan 1995).

Non-ferrous metalworking workshops

On early medieval settlements, locations of metalwork workshop usually consist of structural remains in association with finds of slag, crucibles and moulds and other metalworking material (Comber 2008, 138-9). Several secular and ecclesiastical sites have produced evidence for the various processes involved in copper and copper-alloy working, including 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 and 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 metalworking activity (*ibid*, 86).

The metalworking 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 metalworking 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 metalworking 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 metalworking (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* metalworking (O'Brien and Russell 2005, 119). One furnace fill was radiocarbon-dated to between the early fifth and early seventh-century. 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 and 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 and Walsh 2005, 16-21). An area of metalworking 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 metalworking 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 metalworking 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 metalworking in the area (McErlean 2007a, 378).

Contexts of non-ferrous metalworking

Evidence for fine metalworking 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 metalworking can be regarded as a consistent feature of the large monasteries (Ryan 1988). This evidence can be paralleled with material from high status settlement enclosures and crannogs such as Garranes (Ó Ríordáin 1942), Dooey (Ó Ríordáin and Rynne 1961, 61-62), Lagore (Hencken 1950, 234-41) and Moynagh crannog (Bradley 1993, 77-80).

Excavations within enclosed settlements indicate that metalworking 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 and 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 metalworking 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, Illaunloughan, Tullylish, Iniscealtra (De Paor 1974), Nendrum and Roestown. With the exception of Dooey, there is no evidence for isolated early medieval bronze-working sites as was the case with iron-working and in contrast to iron-working it appears to have been undertaken within Scandinavian Dublin.

Levels of metalworking

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. 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 (*ibid*, 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 have revealed large quantities of metalworking waste and finished items which may indicate the activities of a resident highly-trained *cerd* working in a permanent workshop. In contrast, other sites such as Lissue, Seacash, Rathmullan, Raheennamdra and Tullylish have produced levels of minimal or low-levels of metalworking 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.

Glass, Enamel and Milliefiori-Working

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. 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).

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 have been recorded at numerous settlements (Kerr *et al.* 2009) and a small sample of these include Deer Park Farms (Lynn and McDowell 1988a, 9); Cush (Ó Ríordáin 1940, 146-8); Bowling Green (Fanning 1970, 16); Oldcourt (Murphy and O'Cuileanain 1961, 87); Ballymacash (Jope and Ivens 1998, 119); Seacash (Lynn 1978b, 67); Garryduff I (O'Kelly 1963, 70-7); Garranes (Ó Ríordáin 1942, 116-8); Lisduggan 1 and 3 (Twohig 1990, 18-9, 26); Lisnagun (O'Sullivan *et al* 1998, 54); Dromthacker (Cleary 2008, 36-7); Carraig Aille I and II (Ó Ríordáin 1949a, 89-91, 95, 101); Ballinderry II (Hencken 1942, 51-2); Dooey (Ó Ríordáin and Rynne 1961, 62); an unenclosed upland hut at Barrees Valley (Hickey and O'Brien 2009, 263-5); Dunmore cave (Dowd *et al* 2007, 9-11; Bornholdt Collins 2010, 19); Ballyvourney (O'Kelly 1952, 25); Clonmacnoise, (King 2009, 344); Reask (Fanning 1981, 120-1); Illaunloughan (Marshall and Walsh 2005, 189); Nendrum (Bourke 1997, 415) and Scotch Street (Lynn 1988e, 82) and Upper English Street (Crothers 1999, 63), both in Armagh.

Glass studs are known at Deer Park Farms (Lynn 1988a, 47); Garryduff I (O'Kelly 1963, 72-4); Carraig Aille I (Ó Ríordáin 1949a, 102); Ballinderry II (Hencken 1942, 53) and Lagore (Hencken 1950, 129-32). Glass bangles are not a very common find on early medieval settlements though Carroll

(2001) has undertook an analysis of these. Although described as bangles, many were too small to be worn by anyone other than a small child and some of these at least were probably used as pendants (Edwards 1990, 94). Examples of bracelets/bangles have been recorded at Lagore (Hencken 1950, 145-50); Ballinderry I (Hencken 1936, 156), Moylarg (Buick 1893, 36); Cahercommaun (Hencken 1938, 41-2); Seacash (Lynn 1978b, 67); Garryduff I (O'Kelly 1963, 74); Carraig Aille II (Ó Ríordáin 1949a, 95); Knowth (Eogan 1977, 75); Quinn's Rath, Co. Wicklow (O'Connor 1944, 58) and Clonmacnoise (King 2009, 344).

Raw materials, processes, manufacturing

There is evidence for the working of glass, enamel and millefiori 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. 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).

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 metalled pathways appear to have lead 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 Craigywarren 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).

Scientific analysis of vitreous materials

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.

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.

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.

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).

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 occured 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).

Artefacts

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 majority of excavated early medieval domestic sites (See O'Connor 1991). These can vary greatly in size with some consisting of narrow pebbles or stones, barely worked but smoothed through use but others were more carefully-shaped, rectangular objects with a perforation at the top to hold a copper-alloy ring for suspension, perhaps at the waist (Edwards 1990, 96). Most sites have produced a few fragments of whetstones though considerable numbers are known from a small number of excavated sites such as Garranes (25), Carraig Aille (107), Garryduff I (125), Cahercommaun (524), Ballinderry II (192) and Scandinavian Waterford (over 234) (O'Connor 1991, 45-6; McCutcheon 1997c, 410).

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 broke 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 spindlewhorls, 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.

Excavations at Armoy 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. 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. 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 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 Kilteel. 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), Castleskreen II (Dickinson and Waterman 1959, 80) and Garryduff I (O'Kelly 1963, 89) 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 find 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). 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), Garryduff I (O'Kelly 1963, 88-89 & 91) and Borris-in-Ossory 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 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).

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 provides 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, Ballynasculloge 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.

Carpentry and Wood-Working

Introduction

Wood was clearly of importance in early medieval Ireland as most structures (e.g. houses, fences, fish weirs, palisades & mills) were built with this material, as were most everyday artefacts in a society which was largely aceramic for a large part of the period. However, wooden structures and artefacts are only preserved in waterlogged conditions and therefore the bulk of the evidence is primarily restricted to crannógs, occasionally the ditches of raths, boglands and the urban Scandinavian towns. Even on these sites the evidence may be under-represented as evidence for craft-working waste may not have been recorded.

The working of wood was probably widespread in a heavily forested landscape and the law tracts describe the ownership and protection of woodlands and the varying importance and properties of each type of species (Comber 2008, 77). The law tract, *Críth Gablach* and *Uraicecht Brec* describes a range of master carpenters such as wood carvers, ship wrights, millwrights and those capable of making an oratory (*durthech* or 'oak' house) but make a distinction between wood-workers and wood-turners, the latter of which held a lower position in society (Kelly 1988, 61; Comber 2008, 76). The honour-price of standard wrights was accorded the same status of an *Aire Déso*, the lowest grade of nobility (Rynne 1998, 87). The *Críth Gablach* also describes the prosperous *bóaire* farmer as owning a variety of domestic utensils including a washing-trough, a vat for boiling, a bath and various tubs, trays and mugs; all of which were almost certainly made of wood. Finds from the various crannógs indicate other wooden artefacts including mallets, pounders, scoops, ladles, spatulas, lids, boxes, hollowed handles for knives and other tools such as pins, pegs and wedges (Edwards 1990, 75-7). O'Sullivan (1994, 675) has noted that the early literary sources also describe orchards attached to monasteries with the fruit from these trees forming an integral part of the diet of the often vegetarian-based ecclesiastical communities.

Wood-working tools

There was a wide variety of implements and tools used in early medieval woodworking but most of these could be used in other craft activities. Comber (2008, 74-6) has discussed the evidence in some detail (See also other craft sections). The waterlogged conditions at Lagore (Hencken 1950) has preserved one of the largest early assemblages of woodworking tools which included iron axes, an adze, a wooden mallet, knives, gouges, awls, a punch, two small saws, a draw-knife and iron nails as well as whetstones for sharpening them.

The axe was the main tool used to fell trees and there are numerous examples of stone axes and to a lesser extent, iron axes and axe-heads, at early medieval sites. Iron examples have been found at various sites, including Killederdadrum (Manning 1984, 254); Nendrum (Bourke 1997, 417, 421); Carraig Aille II (Ó Ríordáin 1949a, 77); Cahercommaun (Hencken 1938, 51); Ballycatteen (Ó Ríordáin and Hartnett 1943, 28-9); Lagore (Hencken 1950, 107-9); Lough Faughan (Collins 1955, 61); Ballinderry I (Hencken 1936, 153, 160); Rosepark (Carroll 2008); Cloghermore Cave (Connolly and Coyne 2005, 205-6) and Woodstown (O'Brien *et al* 2005, 59). A shaft-hole carpenter's axe was found outside the palisade of a crannog at Newtownlow (Bourke 1985); and four iron woodworking axes, and three further examples inside dug-out boats close-by were recovered from the Clonmacnoise bridge site, dated to A.D. 804 (O'Sullivan and Boland 1998). Bill-hooks were used for cutting rods (as well as in cereal cultivation) and are known from sites including Lagore (Hencken 1950, 105-6); Deer Park Farms (Lynn 1988a, 47); Seacash (Lynn 1978b, 67); Cahercommaun (Hencken 1938, 51); Craigywarren (Coffey 1906, 115); Rathtinaun (Raftery Undated); Ballinderry I (Hencken 1936, 129) and Garryduff I (O'Kelly 1963, 58).

Many sites, such as Raystown (Seaver 2010, 276), have produced evidence for cut-marks of adzes used for squaring up logs or hollowing out rough-cut timber but the actual evidence of these tools is more limited with examples only noted at Lagore (Hencken 1950, 109) and Nendrum (Lawlor 1925, 141; McErlean 2007a, 374). Iron draw-knives were used to shape wood by removing shavings and consisted of a slightly curved blade with a handle at each end. A complete example and parts of two others were found at Cahercommaun (Hencken 1938, 48-9) while another was founbd at Lagore (Hencken 1950, 109). Examples of iron saws are known from various sites, including Garryduff I (O'Kelly 1963, 46-7); Carraig Aille I and II (Ó Ríordáin 1949a, 79, 98); Lagore (Hencken 1950, 109); Sluggary (Shee Twohig 2000, 12) and Scandinavian Dublin (McGrail 1993, 167). Gouges and flint hand tools were used for cutting or scooping-out wood and examples of the former are known at Lagore (Hencken 1950, 110); Feltrim Hill (Hartnett and Eogan 1964); Gragan West (Cotter 1990); Ballyegan (Byrne 1991, 19); Clea Lakes (Collins and Proudfoot 1959); Mount Offaly (Conway 1999) and Kilpatrick (Swan 1976).

Files were also used to finish wooden artefacts and punches, awls or possibly slotted-and-pointed iron artefacts for scoring holes (See other craft sections). Iron and metal awls consisting of simple rods tapering to a point at one or both ends have been noted at a large number of sites including Knowth (Eogan 1977, 74); Cahercommaun (Hencken 1938, 48); Carrigillihy (O'Kelly 1951, 81); Garryduff I (O'Kelly 1963, 44-6); Garranes (Ó Ríordáin 1942, 104); Carraig Aille I and II (Ó Ríordáin 1949a, 81, 98); Millockstown (Manning 1986, 157); Knockea II (O'Kelly 1967, 94); Sluggary (Shee Twohig 2000, 12); Lagore (Hencken 1950, 110); Ballinderry I (Hencken 1936, 159-60); Ballinderry II (Hencken 1942, 13); Raystown (Seaver 2010, 276); Cathedral Hill, Armagh (Gaskell-Brown and Harper 1984, 128, 132), Illaunloughan (Marshall and Walsh 2005, 183); Kells (Byrne 1988); Killederdadrum, (Manning 1984, 256); Moyne (Manning 1987, 54) and Scandinavian Waterford (Scully 1997b, 469). Pieces of wood were joined using iron nails or wooden pegs. Iron nails are one of the most common finds on early medieval sites; the evidence for the latter is much scarcer, though 42 examples were recovered at Lagore (Hencken 1950, 166).

Artefacts and wood-working techniques

There is much evidence for carpentry techniques such as stave-building, lathe-turning, carving, hollowing-out and joinery forms (grooves, mortise-and-tenon joints etc.) at early medieval sites. Wooden vessels, in whole or fragmentary form, are one of the most frequent finds and many of these were either stave-built, lathe-turned or simply hollowed out. Small stave-built cups and mugs were

used for the preparation and consumption of food while larger coopered vessels such as tubs, buckets and casks were used for storage or other domestic chores such as washing, butter-making, animal feeding and fetching and collecting water. Stave-built casks were used for the storage and transportation of commercial items while these casks could be re-used as water-butts and cisterns (Hurley 2003c, 351). Yew and oak were the most common woods used to make staves. These were seasoned and shaped – 15 unfinished examples have been recorded at Moynagh Lough (Bradley 1984b, 91) and then the vessel was assembled together. This was achieved by placing a circle of vertical-positioned moistened staves within a hoop, heating them over a fire and shaping the vessel by driving successively smaller hoops over the staves to make exact joins. The staves were trimmed at the top and the bottom and a groove cut around the interior to support a base and perhaps a lid. The hoops used in production were then replaced by more permanent equivalents. A variety of staves, hoops and bases from waterlogged sites demonstrates a wide array of stave-built vessels from large tubs, buckets and barrels to small drinking containers and tankards (Edwards 1990, 76).

Carpenters worked simple pole lathes operated by a treadle to produce small wide bowls, narrower beakers and shallow platters used in the preparation and consumption of food. A wide variety of woods, usually used green, including alder, yew, hazel, poplar, birch and willow might be employed in this process. These would have been turned on a lathe secured at both ends by spindles or mandrels leaving the hands free to work the cutting tools consisting primarily of gouges, chisels and hook-ended irons (Edwards 1990, 76). Earwood (1993, 94) has noted the similarity between some Irish wooden bowls and imported E-ware pottery and it is possible that the latter influenced the design of these bowls which were used as fine tablewares. Occasionally, lathes may have also been used to produce other wooden objects such as the wheel hub from Lough Faughan (Collins 1955, 67).

Much of this evidence for stave-built vessels and lathe-turned objects has been traditionally found in crannog sites. The ninth/tenth century crannóg at Ballinderry II produced evidence for wooden buckets and parts of 15 lathe-turned bowls and one platter (Hencken 1942, 58-61). Stave-built buckets, lathe-turned bowls, tubs and other domestic utensils were recorded at Lagore (Hencken 1950, 152-9), Ballinderry I (Hencken 1936, 217-22) and Killyvilla (D'Arcy 1897b, 392) and finds from outside the palisade at Newtownlow Crannog – probably occupied around the turn of the second millennium – included parts of stave-built wooden vessels (Bourke 1985; 1986). Objects from the structural layers from a crannog at Lough Faughan, occupied between the seventh and tenth centuries, included wooden cart fragments, a turned wheel hub, a yew-wood hoop from a large barrel, stave-bucket fragments and a turned wooden bowl (Collins 1955, 65-8). Finds from the various early medieval horizons at a crannog at Rathtinaun included a considerable collection of wooden stave-built (with bases and barrel hoops) and lathe-turned wooden vessels (dishes and platters) and carved tubs (Raftery Undated). The wooden artefacts recovered at the Nendrum tidal mills included 46 pegs, two possible handles, an oar, a tiny wooden nail, a pin beater or spindle, parts of two stave-built tubs or buckets, the remains of two turned alder wooden bowls and a fragment of basketry (Earwood 2007, 222). The stave-built containers were indicated by fragments of wooden hoops, broken wooden staves and part of the base of a container at the site of Mill 1 (*ibid*, 225-8).

The waterlogged enclosures of early medieval settlements have preserved the fragments of numerous stave-built and lathe-turned vessels. Staves and the lid/base of a yew vessel were recovered from the waterlogged enclosure ditch at Killickaweeny (Walsh 2008, 49). Due to the waterlogged nature of the circular enclosure ditch at Baronstown (Linnane and Kinsella 2009, 115), 308 wooden artefacts were recovered including bucket and barrel staves, a near intact turned wooden bowl and a wooden scoop. The nature of the wooden artefacts, often broken or degraded, indicated that the inner enclosure ditch was used as a dump for domestic waste. Fragments of stave-built buckets were recovered from the waterlogged bases of the outer enclosure ditch and a series of earth-cut wells at the enclosed settlement of Castlefarm (O'Connell 2009a, 51-2). At Collierstown, the western part of the Phase IV enclosure ditch obliterated much of the Phase III enclosure and contained various artefacts, including a wooden stave fragment and a fragment of Late Roman Amphorae (Bii ware) (O'Hara 2009c, 96). Three lathe-turned waste pieces were found at Lissue; one contained a flat disc with a rectangular central hole for the insertion of the lathe spindle, identified as the waste from a turned wooden bracelet (Earwood 1993, 199). A stave-built oak butter churn held in place by two wooden hoops fastened by iron clamps and nails was also found (Bersu 1947, 53-4, 1948, 132). The staves and

bases of several wooden vessels were preserved in a souterrain of an apparently unenclosed settlement at Antiville (Waterman 1971) and wooden staves were recorded in a similar context at Ballyaghagan rath (Evans 1950, 23). A lathe-turned spindle whorl was recorded from Raystown (Seaver 2010, 277) and a range of lathe-turned, stave-built and one-piece wooden vessels have been recorded at Deer Park Farms (Lynn and McDowell 1988a, 9).

In Scandinavian Cork, staves were recovered from Hanover Street (Hurley 2003c, 351-4) and lathe-turned bowls were found at South Main Street (Ní Loingsigh 2005), testifing to the presence of specialized coopers in the city in the twelfth century. Twenty vertical timber planks set in an oak base plate also formed the remains of an early twelfth century property boundary north of Tuckey Street (O'Donnell 2003, 13-6) and parallel rows of oak staves and posts were uncovered at Washington Street (McCutcheon 2003). Between the eleventh and thirteenth centuries, Winetavern Street in Dublin was occupied by wood-turners and coopers, as indicated by the many lathe-turned bowls platters and staves that were found (Ó Ríordáin 1971, 77); a wooden barrel stave was recovered from the ninth and tenth century horizons at Exchange Street Upper and Parliament Street (Gowen with Scally 1996, 11-5) and fragments of wooden stave-built vessels were found at Castle Street (Hayden 1997). Woodturning and coopering in Scandinavian Waterford is also indicated by the recovery of fragments of lathe-turned and stave-built vessels and the bases of wooden baskets (Hurley and McCutcheon 1997, 616, 618-23). The resident of one house at Peter Street appears to have been primarily engaged in woodworking as a concentration of wood-chips was found in association with the house (Hurley 1997e, 898). Stave-building technology was also used for defining property plots and houses in the Scandinavian towns (See Chapter 2).

Wooden vessels and objects could also be carved or hollowed out without the use of a lathe. Apart from items carved out of large blocks or trees (e.g. troughs or dug-out boats), carved wood has rarely survived, except in Scandinavian Dublin. A carved wooden figure of a nude man was recovered from Lagore (Hencken 1950, 168) and a gaming board was discovered at Ballinderry I (Hencken 1933, 1936, 135, 175-86). It was decorated with interlace, fret-pattern and Viking Borre-style ring-chain ornament, indicative of a tenth century date. A similar type of board now lost was discovered at Knockanboy, Derrykeighan, Co. Antrim (Simpson 1972). Another unusual wooden find consisted of a hollow yew horn from the River Erne which contained a copper-alloy mouth-piece bound with narrow copper-alloy sheets, one of which was decorated with an engraved fret pattern (Waterman 1969). A number of carved and decorated woodwork fragments were found in Scandinavian Dublin, ranging from a series of possible crooks; a yoke; part of a craved boss from a wooden ‘high cross’; the roof a house shrine; a stylus; a decorated box and a figurine (Laing 2006, 81-2).

Early medieval tubs, troughs and dug-out boats carved or hollowed out of large blocks of wood are relatively common discoveries but many of these cannot be closely dated without the use of dendrochronology. Carved wooden tubs have been recorded at a number of sites, including Rathtinaun (Raftery Undated) and Ballinderry I (Hencken 1936, 217-8). A tub from Ballinderry I, decorated with trellis and cordon ornament, was produced by hollowing out a piece of trunk and a groove cut to support a separate bottom plate (Laing 2006, 81) and a trough was discovered inside the backhouse (Zeta) of a large central conjoined mid-seventh century building at Deer Park Farms (O'Sullivan 2008, 251-3). Two wooden trough fragments and a dug-out boat were recorded from the ninth century occupation at Ballinderry II (Hencken 1942, 58, 60) and dug-out boats were also found in the second phase of occupation of Ballinderry I (Hencken 1936, 149, 152). One unfinished example of a dug-out boat was brought ashore at Oxford Island, Lough Neagh, and was dated to A.D. 524±9 (McGrail 1976, 22-3; Baillie 1982, 240-1) and eleven dug-out boats were recorded close to the site of the ninth century bridge at Clonmacnoise (O'Sullivan and Boland 2000). There is also evidence for plank-built ships involving more sophisticated carpentry techniques. Various parts of ships and boats- stem, mast, bulkhead, knee and floor timbers- were also recovered from within Scandinavian Waterford and probably indicate boat-building in the city (McGrail 1997, 636).

Contexts of wood-working

There is relatively little evidence for wood-working areas within early medieval settlements. Wood-working tools are often found invariably scattered across the sites and the discovery of wooden

remains in the fosses of enclosed settlements probably more accurately reflect dumping and slippage in this area, than actual craft activity within the ditches. It is likely that the cleaving and rough shaping of trees may have occured at, or close to, the place of felling. There is no evidence for stockpiles of timber for working on any early medieval excavated site though a number of cut sticks in the fosse at Lissue may have been intended for use in wattling (Bersu 1947, 53). McErlean (2007b, 250-1) has noted that many planks and beams in the seventh century dam of mill 1 at Nendrum has the appearance of being re-used or recycled from other buildings and has suggested that a stockpile of wood prepared for other monastic structures (e.g. churches and buildings) was ransacked by the builders of this mill to complete the structure as soon as possible.

A small number of sites have produced evidence for wood-chippings which might indicate the location of where wood was dressed and sharpened. Wood-chippings or shavings have been discovered in the ditch and in house 1 at Ballinderry II (Hencken 1936), inside the fosse at Lissue (Bersu 1947, 53) and outside the palisade at Ballinderry II (Hencken 1942, 31). The excavations at Killyvilla crannog produced 'an immense quantity of bark and wood-chips, chiefly of oak, in the northeast quadrant of the site (D'Arcy 1897a, 207, 211). Evidence for woodworking at the Nendrum tidal mills was present in the form of a collection of 200 off-cuts (Earwood 2007, 222). These were found in the immediate vicinity of the mill-structures and appear to have been discarded during the shaping of split timber to produce the beams and planks for these buildings (ibid, 236-39). Moynagh Lough produced 15 unfinished lathe-turned vessels outside the palisade (Bradley 1984a), and two roughed-out pieces of alder and a third unstratified example was discovered outside the palisade at Lagore (Hencken 1950, 72).

Woodworking assemblages rarely survive except in waterlogged sites such as Lagore, Moynagh Lough, Ballinderry I and II, Deer Park Farms, Lissue, Nendrum and within the Scandinavian towns. It is impossible to identify meaningful patterns regarding the levels of woodworking activity at different types of early medieval settlements based on this limited dataset. However, Comber (2008, 78) has suggested that the corpus of material from sites such as Moynagh Lough and Lagore may indicate that these produced a surplus of wooden items for 'external consumption', while this craft activity was perhaps undertaken on a lower subsistence level in most other places.

Bone, Antler and Horn-Working

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 Brec* mentions a craftsperson, identified as a 'wool-comber' by MacNeill (1923), and a 'comb-maker' by Kelly (1988, 63) with an honour price of just half a *sét*. 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.

Artefacts

The most common bone and antler objects comprise pins and bone combs. The simple pig-fibula pin was the most common type and contained a relatively straight shank with a slightly expanded head which was often perforated and occasionally decorated. One hundred and thirty one of these were retrieved from Lagore (Hencken 1950, 194) and 81 from Cahercommaun (Hencken 1938, 38). However, a wide diversity of polished and shaped pins, with decorated heads and occasionally decorated shanks, has also been noted. The Lagore assemblage (Hencken 1950, 190-4) provides an

indication of the wide variety, ranging from simple spherical-headed pins, nail-headed pins, segmented-headed pins and smaller disc-headed pins, to more complex pins with zoomorphic and anthropomorphic-headed examples (Edwards 1990, 86).

A wide variety of bone combs are known and a scheme for the different types has been outlined by 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). 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 Cathedral Hill, Armagh (Gaskell-Brown and Harper 1984, 128), 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).

There is growing evidence for cut-bone hollow cylinders, particularly in Scandinavian urban and rural contexts, which have sometimes been regarded as by-products of bone- and antler-working. However these were often highly polished and sometimes show evidence of friction with hairs, strings and fibres and it has been suggested they be regarded as artefacts in their own right (Sheehan *et al* 2001, 106). Examples have been found at Dalkey Island (Liversage 1968, 116, 225); Beginish Island (Sheehan *et al* 2001, 105); Illaunloughan (Marshall and Walsh 2005, 188); Kells (Byrne 1988); Nendrum (Bourke 2007, 414-5); Ballinderry II (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).

Raw materials, processes, manufacturing

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 pounds 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). 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).

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 and 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 Dooey 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 (O'Sullivan *et al* forthcoming) and these include Cahercommaun (Hencken 1938, 63); Dún Eoghanachta, Inis Mór (McCormick and Murray 2007, 237); Deer Park Farms (McCormick and Murray 2007, 221); Rathgureen (Comber 2002, 174-77); Knockea II (O'Kelly 1967, 100); Lough Faughan (Collins 1955, 63); Lagore (Hencken 1950, 198); Moylarg (Buick 1893, 34, 1894, 324); Killyvilla (D'Arcy 1897b, 393); Ballinderry I (Hencken 1936, 140, 156, 163-5, 170) and Ballinderry II (Hencken 1942, 56); souterrains at Ballyarra (Fahy 1953, 58) and Marshes Upper (Gowen 1992, 99); Mount Offaly (Conway 1999, 39); Derrynaflan (Ó Floinn 1986); Cashel (Cormac's Chapel) (Hodkinson 1994, 171); Kilpatrick (Swan 1994/95, 6); 'Killederdadrum' (Manning 1984, 265); Nendrum (Murphy 2007, 277) and in pits near the War Memorial Park, Co. Dublin (Healy 1989).

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). For instance, the excavations at Christchurch Place 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).

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 Moylarg (Buick 1894, 324). A bracelet made of three joined pieces of boar's tuck 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). Part of the vertebra of a whale was also recorded at Downpatrick and found a final use as a slab in an early medieval pavement (Brannon 1988, 63).

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 craftworking 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. 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 (spindlewhorls, 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'.

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 (See 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. The

most extensive evidence has been discovered at the stone forts at Cahercommaun, Carraig Aille and Dún Eoganachta; the crannog at Lough Faughan and the raised settlement enclosure at Deerpark Farms. 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).

Textile Production

Introduction

Textiles and plant fibres 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. However, early medieval textiles and dress rarely survived except in very extremely waterlogged conditions. We are therefore forced to primarily depend on evidence for weaving equipment used in the production of cloth; representations on sculpture and in manuscripts and hints in the early historic sources to understand the various stages in the manufacture of textiles and the type of clothes worn by men and women in early medieval Ireland (Edwards 1990, 81).

Tools, raw materials, processes, manufacturing

Textiles could be produced using either animal (wool, hair or fur) or plant (e.g. grass, cotton or flax) material. Wool was clipped from the backs of sheep using iron shears but 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 and there was evidence for uncarded (undressed) wool at Lagore (Start 1950, 207). Numerous settlements have produced iron shears, including Dowdstown 2 (Cagney and O'Hara 2009, 130); Deer Park Farms (Lynn 1988a, 47); Garryduff I (O'Kelly 1963, 44); Killanully (Mount 1995, 139); Garranes (Ó Ríordáin 1942, 102); Killickaweeny (Walsh 2008, 45); Nevinstown (Cahill 1977/79); Lough Faughan (Collins 1955, 61), Moylarg (Buick 1893, 36), Lagore (Hencken 1950, 112-3); Ballinderry II (Hencken 1942, 46); Cahercommaun (Hencken 1938, 48); Carraig Aille II (Ó Ríordáin 1949a, 77); Kilgobbin (Bolger 2004); Clonfad (Stevens 2006, 11); Illaunloughan (Marshall and Walsh 2005, 181); Moyne (Manning 1987, 54); 'Killederdadrum' (Manning 1984, 254); Armagh (Gaskell-Brown and Harper 1984, 128); Cloghermore cave (Connolly and Coyne 2005, 212-3); Corbally (Coyne 2010, 83); and Scandinavian Waterford (Scully 1997b, 458-9).

Silk was a textile made from the fibres of the cocoon of the Chinese silkworm which were spun into a smooth, shiny fabric famous for its sleek texture. It was not produced in Ireland and had to be imported into the country in the early medieval period. Textiles could also be made from plants such as flax which was used to make linen. The 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 were removed by the heads by being pulled 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 to make them ready 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), and flax seeds have been found at Deer Park Farms (Kenward and Allison 1994, 93), Carraig Aille II (Ó Ríordáin 1949a, 110) and Lisleagh (Monk 1995, 113). 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 they were worked into fibres for spinning.

The next step involved hand-spinning the wool, hair and flax fibres into threads using a long wooden spike (spindle) and small circular-shaped objects known as spindlewhorls containing a central perforation (See O'Brien 2010). Evidence for spindlewhorls are found on a great many early

settlements and were manufactured out of 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; O'Sullivan *et al* forthcoming). A number of lead pan weights with central perforations were recorded from Woodstown and may have functioned as whorls (O'Brien *et al* 2005, 71). The spindlewhorls were generally in the shape of a disc or hemisphere, but bone and antler spindlewhorls may have been turned on a lathe creating a characteristic bowl-shape. One possible lathe-turned decorated antler whorl and a disc-shaped stone example was found at Killickaweeny, dating from the eighth to tenth century (Walsh 2008, 48). Spindlewhorls are found on numerous sites but rarely in any great numbers apart from a few excavated sites such as Cahercommaun (Hencken 1938, 43-4) and Garryduff I (O'Kelly 1963, 89-90), which, along with Knowth (Eogan 1977, 74), have produced evidence for the manufacture of stone spindlewhorls usually in the form of unfinished examples and those broken during the drilling of the central perforated hole.

The spindles were usually produced out of wood and therefore rarely found though examples have been identified in waterlogged sites at Deer Park Farms (Earwood 1993, 135) and Winetavern Street, Dublin (Heckett 2003, 89). A wooden forked stick or distaff was probably also used and was designed to hold the unspun fibers, keeping them untangled and therefore easing the process of spinning. These are also very rare but potential examples of wooden distaffs have been recorded at Lough Faughan, Lagore, Ballinderry II (Patterson 1955, 81-2) and Raystown (Seaver 2010, 277).

The next step involved weaving the spun yarns or threads together to form a fabric or cloth. Stone hanging weights, with an hour-shaped hole in the centre, have been identified in the archaeological literature as 'loomweights' implying the use of vertical warp-weighted looms in early medieval Ireland (Edwards 1990, 81) and Hodkinson (1987, 49-50) has compiled a large collection of these objects. These stone hanging weights would have been used to hold the vertical warp threads under tension to facilitate the interweaving of the filling (weft) threads or yarns. However Hodkinson (1987, 47) has suggested that upwards of 20 loomweights would have been required on a warp-weighted loom and has noted the paucity of loomweights in Ireland compared with Anglo-Saxon England. Instead he (1987, 48) has argued that the early Irish did not use a loom that utilised loomweights and the so-called 'loomweights', were used for a different purpose such as sinkers for nets or lines. Heckett (2003, 98-99) has also noted that possible 'loomweights' have been 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 tends to concur 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*).

There is possible evidence for tablet weaving (card weaving) in early medieval Ireland, involving small tablets to intertwine strands of flexible materials together such as fibres or hair to form narrow decorative braids. The tablets (or cards) were made from wood, bone, stone, leather or metal and contained a number of perforated holes through which the warp threads was passed. A square bone tablet with worn holes was found at Rathtinaun crannóg (Raftery Undated) and a possible triangular example was identified at Lagore with three perforations (Hencken 1950, 195-6). Lagore also produced two fragments of tablet-woven braid – one fringed and the other containing a raised chevron pattern woven into it (Start 1950, 214-7). Other weaving tablets have been recorded at Killederdadrum (Manning 1984, 257), and at Bride Street in Scandinavian Wexford (Bourke 1995, 35).

Implements connected with weaving included pins-beaters, which consisted of thin rods of wood or bones (metarsals or tibia) with tapering ends that could have been used to compact the weft threads in either a vertical warp-weighted looms or weaving tablet. Possible bone beater-pins have been recorded at various sites including Carraig Aille (Hodkinson 1987, 49); Shaneen Park, Ballyaghagan (Hodkinson 1987, 49); Raheennamdra (Hodkinson 1987, 50); Raystown (Seaver 2010, 277); Castlefarm (O'Connell 2009b, 51); Clonfad (Stevens 2007, 43); Mount Offaly (Conway 1999) and Scandinavian Dublin (Heckett 2003, 98). An antler single-ended pin-beater associated with the use of the two-beam vertical loom was recorded at Cloghermore cave (Connolly and Coyne 2005, 109), and was dated to the tenth-twelfth century based on similarities from Coppergate, York. A possible pin-beater or spindle was found in the foundation layer of the millpond of mill 2 at Nendrum and its

closest parallel was with the largest of three examples from Deer Park Farms (Earwood 1993, 134-6; 2007, 231-2). Weaving swords were also used for beating the weft threads and have been recorded 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 and bone pin-beaters were also found in Scandinavian Waterford; the former which was recovered from the floor of a sunken building in Olaf Street (Hurley 1997d, 670; Scully 1997b, 470).

If the textile was wool, it needed to be finished after weaving by a process called 'fulling' (or tucking or walking) to make it thicker 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 in Scandinavian Waterford (Scully 1997b, 486). If the cloth was linen, it was finished by smoothing with a polished stone. Possible examples of these have been recorded at Ballyaghagan (Proudfoot 1958, 30), Clea Lakes (Collins and 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).

The production of dye could be regarded as evidence for cloth manufacture, though the two activities may not have occurred on the same site. The early sources 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. They 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). A range of dyestuffs were available in early medieval Ireland (Comber 2008, 237-8). One piece of cloth from Lagore appears to have been dyed with madder and there was evidence for madder or bedstraw on a piece of tabby (plain over and under) weave from Deer Park Farms (Laing 2006, 92). Madder seeds have also been found at Carn, 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 at Deer Park Farms (Lynn 1989, 197). Dye tests on textile samples from Scandinavian Waterford (Walton 1997) showed evidence for madder and similar evidence from Dublin produced traces of madder and woad (Heckett 2003, 94, 128-9).

A species of shellfish known as dog-whelk appears to have been used as a dye in coastal areas as it contained a liquid which, when exposed to the sun, turned purplish-red (Edwards 1990, 82). It has been suggested that the red and purple cloth produced by these dyes could only have been legally worn by high status individuals (Kelly 1997, 263). A growing number of western coastal shellmidden sites at Doonloughan (McCormick and Murray 1997) and Dog's Bay, Roundstone, Co. Galway (O'Rourke 1945, 117) and Dooey (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 dog whelk shells. Rathgurreen and Dooey contained several shallow and deep pits which may have been used in dye manufacture (Comber 2008, 101). Interestingly, a flat stone object at Rathgurreen bore a reddish stain on its flat surfaces (Comber 2002, 181).

The best evidence for the extraction of dye from dog whelks has been identified at Inishkea North. Here, one structure formed of timber and partly of erect slabs (House A, Site 3) has been interpreted as a dye production workshop (Henry 1952, 177). It 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 of the hut was an annex defined by upright stone slabs in which was a pit and 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 it was stepped with salt. Finally, it was boiled for a long time (to reduce the amount

of liquid) with pot-boilers (many of which were found on site), and heated on a hearth. This dye-production may have been associated with textile-working as the site also produced evidence for the manufacture of chlorite spindlewhorls (Edwards 1990, 83).

The final task involved fastening or attaching the different pieces of textiles together using stitches made with needle and thread to form clothes and other daily objects. The early written sources indicate that women were expected to be experts at spinning, weaving, sewing and embroidery (Kelly 1997, 449). However, the presence of needles made of copper alloy or iron for finer work or sometimes bone is often the only evidence for these tasks at early medieval sites. Numerous bone needles are known and a sample of these have been found at Clonmacnoise (Ó Floinn and King 1998, 124; King 2009, 339); Randalstown (Kelly 1976); Nevinstown (Cahill 1977/79); Ninch (McConway 2001); Dowdstown 2 (Cagney and O'Hara 2009, 132); Moone (Hackett 2008); Leggetsrath (Lennon 2006); Bowling Green (Fanning 1970, 16); Johnstown 1 (Clarke 2010, 69); Corbally (Coyne 2010, 83); Parknahown 5 (O'Neill 2010, 256); Cherrywood (Ó Néill and Coughlan 2010, 242-3); Farrandreg souterrain (Murphy 1998); Park North (Coleman 1942, 71) and Kilgreany (Dowd 2002, 87) caves and in pits near the War Memorial Park, Co. Dublin (Healy 1989).

Copper-alloy needles have also been recorded at Nendrum (Lawlor 1925, 149; Bourke 2007, 407, 419); Kells (Byrne 1987); Killegland (Ashbourne) (Kavanagh 2006); Garryduff I (O'Kelly 1963, 40); Baronstown (Linnane and Kinsella 2009b, 115); Castlefarm (O'Connell 2009b, 51). Iron needles were identified at Gragan West (Cotter 1988); Millockstown (Manning 1986, 159); Carraig Aille I (Ó Ríordáin 1949a, 97); Knowth (Eogan 1977, 72) and Ratoath (Wallace 2010, 305). A variety of bone, antler and copper-alloy pins have also been recorded in the various excavations at Clonmacnoise (King 2009, 339-43); Kilpatrick (Swan 1994/95, 13); Rochfort Demesne (Channing 2007, 117) and in Scandinavian Waterford (Scully 1997b, 438-48) and Dublin (e.g. Hayden 1997).

A range of other equipment used in the weaving and sewing process have also been identified including decorated needle cases at Winetavern Street in Scandinavian Dublin (Ó Ríordáin 1971) and Clonmacnoise (King 2009, 343-4); iron tensioners at Raystown (Seaver 2010, 276), Killickaweeny (Walsh 2008, 45-6, 49), Ballinderry I (Hencken 1936, 140) and Gransha (Lynn 1985, 88). Slotted and pointed iron tools have been found at Raytown (Seaver 2010, 276), Killickaweeny (Walsh 2008, 46, 50), Oldcourt (Murphy and O'Cuileanain 1961, 88), Cahercommaun (Hencken 1938, 52-53) and Lagore, one of which was dated to the eighth century (Hencken 1950, 118). Edwards (1990, 88) has suggested that these instruments 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 a 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). 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).

We are still reliant on illuminated manuscripts and carved stone crosses to provide an indication of how the upper echelons of early medieval society dressed. Two panels on the early tenth century carved West Cross at Clonmacnoise depict early medieval dress. The first consists of two men dressed in an ankle-length robe or *léine*, which was usually of linen gathered at the waist with a belt, and a woollen cloak or brat held in place at the shoulder by a brooch. The second 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 upper garment. The hems of the robe and tunic appear to be decorated, probably with tablet-woven borders (Edwards 1990, 83-4). Other figures from carved stone crossed indicate that men may have worn short, tight, knee-length trews 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 early medieval textiles rarely survive, there is growing evidence from crannogs such as Lagore (Start 1950) and Ballinderry II (Hencken 1942, 57-8); the settlement enclosure at Tully (Comber 2008, 104); the monastery at Church Island (O'Kelly 1958, 135) and in the Scandinavian towns of Dublin (Heckett 2003), Waterford (Heckett 1997, 743-9) and Cork (Heckett 2010). One of

the largest assemblage in rural Ireland comprising 77 fragments was recorded at Lagore and all except one came from period 1a, probably dating to the initial occupation of the crannóg (Start 1950, 204-5). Fleece, animal hair, uncarded wool and numerous pieces of textiles were recovered and almost all of the textile fragments (55/56) were of a simple tabby weave. One fragment of tabby-woven cloth contained a finely-worked hem and decorative stitching and a skilful darn was identified on another (Edwards 1990, 83). Lagore also produced one finely woven piece of cloth with a twill weave, possibly dyed with madder, which was interpreted as a Viking manufacture (Edwards 1990, 82) and twelve cords formed by twisting the threads together.

Over 200 fragments of textiles, cordage, basketry and raw fibres were found within the deposits of the excavated houses, ditches and cess/rubbish pits in 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 weaving hair fibres and felted wads and basketry (*ibid*). The excavations in Hiberno-Scandinavian Dublin have produced over 2,000 textiles. Forty one of wool and 27 silk textiles (of tabby weaved fabric) from Fishamble Street and John's Lane were subject to analysis. Many of these were identified as fragments of head-coverings, caps, scarves and bands dating from the early tenth to late twelfth century (Heckett 2003, 1). It was suggested that loom silk weaving was not established in northwest Europe till the end of the medieval period (Heckett 1997, 753), and the evidence from these Irish towns might indicate that these places were part of trading networks which stretched as far as the Silk Road to China.

Coarse tabby weaved cloth was also found in a late eleventh century context from a site at South Main Street, Cork City (Heckett 2010). The cloth from this site 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). The excavations at Fishamble Street also found evidence for caulking: the process used to describe the sealing (and waterproofing) of joints or seams in structures such as wooden boats, by driving fibrous materials into the wedge-shaped seams between planks. At Fishamble Street, sheep and cattle hair along with some horse hair, matted together with tar, were discovered within the overlaps of the planks, having been placed there before the planks were fastened together (McGrail 1993, 87; Heckett 2010, 559).

Contexts of textile-working

It is entirely feasible 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, dye-production was a dirty process and was probably located in the industrial quarters away from the domestic area (Comber 2008, 108). MacNeill (1923) has 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. Proudfoot (1961) has 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.

Leather-Working

Introduction

Leather was a by-product of animal husbandry and consisted primarily of oxhides and calfskins and to a lesser extent, horse hides and sheep and the skins of sheep and goats as well as wild animals such as red deer and seals. The law-tract *Uraicecht Brec* describes the honour-price of a leather-worker as half a *sét* (MacNeill 1923, 151). This compares unfavourably with that of twenty *sets* for a master smith and suggests that the leather-worker was a craftsperson of relatively low social status. However, the documentary sources indicate the clothes and textiles were exported from Ireland suggesting an efficient or 'semi-industrial' character of this craft at some sites in this period and that these products might be key to understanding Ireland's place on long-distance trade and exchange routes.

Artefacts

Shoes are the most common leather early medieval artefacts found and these appear to have been worn at least amongst the upper echelons of society. The eighth century '*Life of Philabert*' of Noirmoutier, on the mouth of the River Loire, mentions the importation of clothes and shoes from Ireland (Doherty 1980, 78) indicating that it was an important commodity of the Irish economy. Though early medieval leather shoes survive in a very fragmentary state, there are enough known examples to allow a reconstruction of the different types. Two major types have been identified: the first was manufactured using a single piece of leather which was cut, folded, stitched and turned inside out and the second type consisted of a separate thick leather sole and a thinner upper piece of leather supported by an insole and perhaps an extra thin band of leather to protect the sewn seams (Lucas 1956, 366-88; Edwards 1990, 80). The single-piece shoes varied greatly in their construction but various examples have been recorded at the crannógs at Ballinderry II (Hencken 1942, 56-7) and Lagore (Hencken 1950, 180-1). Simple multiple-piece shoes, sewn together and then turned inside out, have also been found at Killyliss (Ivens 1984a, 26-8) and Lagore (Hencken 1950, 180-81).

Other leather objects, though rarely found, include knife sheaths, straps, belts, blankets, bags and other containers. The excavations in Scandinavian Waterford produced evidence for leather sheaths and scabbards (Hurley 1997f). One leather scabbard was found within an organic deposit sealed by backfill inside the late eleventh century town ditch. Also recovered were a considerable quantity of twelfth-fourteenth century leather artefacts including shoes, boot fragments, clothing, belts and straps, handles, bag fragments and binding strips (O'Rourke 1997). Many of the shoes and boots demonstrated evidence of repair and patching. The excavations at Moynagh Lough (Bradley 1982/83, 28; 1984b, 91) and Killyvilla (D'Arcy 1897b, 394) also produced evidence for leather knife-sheaths and it is likely that sword scabbards of a similar nature would have also been produced.

Though there are no surviving examples of an early medieval hide boat in Ireland, the ninth century *Navigatio Brendani* (Voyage of Brendan) indicates the importance of such vessels in this period (O'Meara 1991). The production of leather book satchels (budgets) such as that of the *Breac Maodhóg* dating to the twelfth/thirteenth century indicates a considerable knowledge of leather decoration in this period. Another skilled task was the preparation of young calf or occasionally sheep skins to produce the vellum on which manuscripts were written. Here the tanned skins was split into thin sheets and dressed to make them pale and translucent (Edwards 1990, 80). The production of a single manuscript involved a vast number of animal skins indicating the enormous cost of producing a single manuscript.

Tools, raw materials, processes, manufacturing

Leather was produced from the skins and hides of animal by tanning them in an alkaline solution of water and oak bark, often accompanied by beating, so that the hair and skin fat could be scraped away with the use of a draw-knife. The bare skins or hides would then have been submerged in a succession of tanks filled with a progressively stronger solution of oak bark until the tanning of the leather was complete (Edwards 1990, 79). There is no evidence for the tanks or containers involved in tanning, or the residues associated with this process, in early medieval Ireland. The leather was dressed by rubbing oil (sheep tallow?) into it and polishing it with round stones (slickers) to prevent it cracking and to maintain its suppleness (Edwards 1990, 79). Comber (2008, 106) has noted that round stones, which may have had this function, have been found at Ballyaghagan (Proudfoot 1958, 30); Seacash (Lynn 1978b, 67); Rathmullan (Lynn 1981/82, 132-34); Gransha (Lynn 1985, 88); Cahercommaun (Hencken 1938, 58) and Reask (Fanning 1981, 132).

The leather was then worked into the desired object using a range of tools. Iron shears, knives and draw-knives were used for cutting. Metal awls, punches and socketed and pronged implements, including examples from Garryduff I (O'Kelly 1963, 49-50), Cahercommaun (Hencken 1938, 52-53), Carraig Aille I, II and the Spectacles (Ó Ríordáin 1949a, 78, 98, 103), Garranes (Ó Ríordáin 1942, 107), Lagore (Hencken 1950, 120), Ballinderry I (Hencken 1936, 140) and Clonmacnoise (King 2009, 339), were possibly used for scoring and piercing thick leather prior to sewing or lacing with a leather

thong. Another possible iron leather-scorer was discovered in the upper fills of a souterrain at Raheennamadra (Stenberger 1966, 42, 46). Clonfad produced rare bone and antler stamps which were possibly used to decorate leather (Stevens 2010, 92). In Scandinavian Waterford, a large quantity of tools including awls, punches and files were recovered and indirectly indicate evidence for leatherworking at the city (O'Rourke 1997). Wooden shoe lasts found at Deer Park Farms (Lynn and McDowell 1988a, 9) and Lagore (Hencken 1950, 170) were forms made in the approximate shape of a human foot to produce the fit of a shoe or boot.

Evidence for leatherworking is confined to sites with waterlogged deposits and primarily takes the form of leather scraps, off-cuts and leather shoe fragments. In 'rural' contexts, evidence for leatherworking survives best in waterlogged crannógs and raised settlement encolosures. The sites of Lagore (Hencken 1950, 180-1), Ballinderry II (Hencken 1942, 17, 56) and Deer Park Farms (Lynn and McDowell 1988a, 9) have produced considerable evidence. Lagore produced 268 pieces of worked leather which included fragments of leather shoes and scraps as well as a wooden shoe last probably indicative of manufacture on-site. Ballinderry II produced approximately 20 shoes fragments, five pieces of worked leather and over 250 fragments or clippings. Other sites have produced evidence for leather shoe fragments or off-cuts, including Ballinderry I (Hencken 1936, 134, 138, 157); Moylarg (Buick 1894, 328); Craigywarren (Coffey 1906, 116); Rathtinaun (Raftery Undated); Moynagh Lough (Bradley 1994/95, 166); Lissue (Bersu 1947, 54-6); Seacash (Lynn 1978b, 69); Killyliss (Ivens 1984a, 26-28); Church Island (O'Kelly 1958, 136); Nendrum (McErlean and Crothers 2007b, 110); Kilgreany cave (Dowd 2002, 88) and Ballintemple (Stanley and Moore 2004).

In the Scandinavian towns, leather shoes have been recorded in Cork at 40-48 South Main Street (Ní Loingsigh 2005) and Hanover Street (Cleary & Hurley 2003, 365); at various sites such as Castle Street (Hayden 1997) and Temple Bar West (Simpson 1999, 25-6) in Dublin and in Scandinavian Waterford (O'Rourke 1997). The leather-working in Dublin appears to have been concentrated in High Street where there was considerable evidence for shoes and knife-sheaths with some of the latter bearing incised decoration (Ó Ríordáin 1971, 75). Over 700 pieces of footwear and 400 complete or fragments of soles mainly found in the fills of pits, ditches and extramural contexts were recovered from Waterford City dating broadly from the twelfth to fourteenth centuries (O'Rourke 1997, 703-23). An organic layer between two sill-beam houses dating to the later twelfth/early thirteenth century produced a concentration of leather finds, including 'two shoes, three soles, a decorated sheath, a strap, seven worked pieces, 525g of shoes parts, 475g of scraps and 1925g of offcuts' (*ibid*, 703).

Excavations have yet to produce substantive evidence for the industrial scale production of leather in early medieval Ireland and the only plausible examples comes from Dublin where a deposit of leather waste 18m by 6m and 1m deep was discovered in High Street (Anonymous 1973, 16). The material dates from the twelfth and thirteenth century so may fall outside the period under study. A dump of leather scraps and off-cuts was found between twelfth century houses in the *Insula* North in Scandinavian Waterford (McCutcheon and Hurley 1997, 161) and this evidence along with the considerable quantity of leather artefacts and dumped waste within and outside the rampart ditches also indicate the industrial scale production of leather.

Contexts of leather-working

Forty four fragments of leather, mostly in the form of simple turnshoes, were found within the enclosure fosse of Killyliss (Ivens 1984a, 26-28). Several leather pieces were discovered from the bottom of a well on Church Island (O'Kelly 1958, 135). They did not contain any worked features and it was suggested that they may have formed part of a leather vessel. Lawlor (1925, 17) suggested that 'a large number of polished rubbing stones' recovered in the vicinity of the round tower within the inner enclosure were used for leather-working (Bourke 2007, 407, 419). However such smoothing stones have been described above and were also widely employed for finishing linen textiles.

Clay-Working, Pottery and Manufacturing Tools

Introduction

As a raw material, clay was not widely used in early medieval Ireland and few clay artefacts were actually produced in the period. Clay was used to produce native 'souterrain ware' but this pottery appears to have had a predominantly northeastern distribution with large areas of the country aceramic for this period. Clay was also utilised as daub in early medieval Ireland and was often applied to wattle-built houses or used to line other structures such as kilns and furnace bases and superstructures. Artefacts of clay were not widely used in early medieval Ireland though the material was used to produce objects such as crucibles, moulds and *túyeres* that had a functional association with firing or heating. Clay-workers are not mentioned in any of the early Irish literary sources and this might indicate that clay extraction and processing was a non-specialist craft (Comber 2008, 86). It is likely that industrial objects such as crucibles, moulds and *túyeres* were produced by the metalworkers who required them (*ibid*, 86). Native souterrain ware may have been generally produced by non-specialist people on subsistence level though some sites in the northeast may have employed professional potters, perhaps on a seasonal basis.

Tools

The tools used by potters are difficult to identify. Fingers and thumbs were probably the most useful tools for shaping the clay but other implements such as knives, gouges and styli were also probably utilised for shaping and marking clay (Comber 2008, 85). Examples of styli which may have been used for this purpose have been noted by Comber (2008, 85) at Carraig Aille II (Ó Ríordáin 1949a, 73), Gransha (Lynn 1985, 88) and Cathedral Hill, Armagh (Gaskell-Brown and Harper 1984, 132). Lawlor (1925, 166) has also suggested that several small stone tools including bluntly-pointed chisels in the pottery-working area at Nendrum were used 'for making the indents on the rims and strengthening bands found on many potsherds'.

Clay as a resource

Clay was used as daub for lining wattle-built structures (Comber 2008, 83) and fragments of daub with wattle impressions are known from Rath na Frishtawn (O'Connor 1944, 53-55) and possible daub pieces from Ballypalady (Waterman 1972, 31) and Rathbeg (Warhurst 1969). The burnt remains of structures built of wattle-and-daub were identified at Grange (Ó Ríordáin 1949b, 131) and Drumadoon (McSparron and Williams 2009) and 145 fragments of daub were found at Lagore, of which 123 were located in the southern half of the site (Hencken 1950, 127). There appears to have been a general knowledge of the refractory qualities of well-fired clay in early medieval Ireland and most other clay objects such as crucibles, moulds and *túyeres* had some functional association with firing or heating, most notably for cooking, smelting or casting (Comber 2008, 81). A small number of miscellaneous clay artefacts are also known, including a clay lamp from Garranes (Ó Ríordáin 1942, 124-5) and a line sinker from Carraig Aille II (Ó Ríordáin 1949a, 93).

One of the main uses of clay was in the production of native pottery and the best known of these was souterrain ware. These pots were mostly flat-bottomed with straight, nearly vertical sides though round-bottomed carinated bowls were occasionally known. They were constructed entirely by hand using the coil-building technique and impressions of cut grass and other organic matter are a characteristic feature mostly found on the bases of the pots (Edwards 1990, 73). Quantities of local grit were also added as 'fillers' or 'tempers' producing a coarse fabric. The colours of this ware ranged from orange to black while buff or brick-red coloured pots also existed in north Antrim (Ryan 1973, 621). Souterrain ware pots are frequently blackened or 'sooted' indicating their use as cooking objects though other forms such as shallow dishes and small cups may have been served as tableware (Edwards 1990, 73). This pottery has been dated from the seventh to twelfth century (Ryan 1973, 626; Edwards 1990, 74) and appears to have developed from an initial plain style towards increasing decoration in the form of applied cordons (Ryan 1973, 626; Armit 2008, 8). Although souterrain ware has been recovered from the same sites as seventh century E-ware, they have yet to be found together in the same contexts and where stratigraphy occurs the souterrain ware appears to have been deposited at a later date (Armit 2008, 8). It is likely that souterrain ware was in use by A.D. 780 as a sherd from a mill in Drumard appears to pre-date the emplacement of timbers felled in A.D. 782 (Baillie 1986, 106). The pre-rath B levels at Dunsilly contained undecorated souterrain ware (McNeill

1991/92, 100-6) and produced a 2 sigma calibrated radiocarbon range of A.D. 530-780. The evidence suggests that this ware first appeared between the mid seventh to mid eighth century (A.D. 650-780) with decorated assemblages emerging in the ninth century at the earliest (Armit 2008, 8).

Recent excavations have confirmed that the core area of 'souterrain ware' was in northeast Ireland (Antrim and Down) although it does have a wider distribution occurring on approximately 220 sites in 16 counties across eastern Ireland and throughout the northern counties (O'Sullivan *et al* forthcoming). Many sites only produce a handful of sherds though much larger assemblages are known from others such as Movilla Abbey (*c.*3,500 sherds) (Ivens 1984b, 85) and Seacash (*c.*2885 sherds) (Lynn 1978b, 65). A fragment of souterrain ware has also been recently recovered from an enclosure at Carrigrohane, Co. Cork (Moloney 2003) at a significant distance outside its main distribution zone. Souterrain ware has potentially been identified in Scandinavian Dublin, and these jars may have been used to transport honey (Wallace 1987, 203). Connections between souterrain ware and a group of early medieval ceramics in the western isles of Scotland have been recently investigated by (Armit 2008). Other sites such as Ballycatteen (Ó Ríordáin and Hartnett 1943, 37), Reask (Fanning 1981, 112), Lagore (Hencken 1950, 126) and Moynagh Lough (Bradley 1993, 76) have produced other native coarse wares.

There is also evidence for a wide variety of imported Mediterranean and Frankish pottery which have been discussed by Campbell (1996; 2007), Doyle (1998; Doyle 2009) and Kelly (2010). The different types are well known and include Phocaean Red Slipware (PRS); African Red Slip Ware (ARSW); Late Roman Amphorae or 'B-ware'; 'E-ware' and 'D-ware' (DSPA). There has been little discussion of the context of these finds on early medieval settlements. However, Doyle (2009, 34-5) has posited a tentative association of B-ware with funerary contexts ranging from ecclesiastical cemeteries (Rock of Cashel and Derrynaflan, Iniscealtra, Caherlehillan and Reask) to cemeteries and settlement/cemeteries (Mount Offaly, Gracedieu and Colp West and Collierstown). Some of these imported Mediterranean and later Frankish (E ware) ceramics appear to have been deposited in contexts near possible shrines and *leachtaí* at Caherlehillan, Reask and Church Island. Doyle (*ibid*) has suggested that high status items from the Roman Europe carried a symbolic significance for early ecclesiastical communities. It is unclear if this expression of *Romanitas* may have been a motivating force for the growing occurrence of sherds of fifth/sixth century B and D ware at a number of possible non-ecclesiastical cemeteries in northern Leinster. By the seventh century, the archaeological evidence suggests a gradual shift in trade away from the Mediterranean and towards continental Europe. 'E ware' pottery is the most common type of pre-Viking imported pottery in Ireland, identified on over 50 Irish sites (Doyle 2009, 60-1) from high status settlement enclosures, crannogs and ecclesiastical sites. However it is particularly associated with settlement enclosures and its importation into Ireland from the mid sixth to early eighth century coincided with the floruit of the construction of this settlement-type (*ibid*, 31-3). E ware has been identified at various sites in the midlands, southwestern and northern Ireland though two major concentrations have been recorded around Strangford Lough, Co. Down (Campbell 2007, 115) and northeastern Leinster (See Doyle 2009, 29-30).

Raw materials, processes, manufacturing

There is very little evidence for the sourcing of clay in early medieval Ireland but Comber (2008, 81) has identified a number of potential sites. These included a spread of pink clay in the metalworking area (2) on the western side of Moynagh Lough crannóg which was interpreted as the source of the clay used to produce the clay moulds and crucibles discovered on the site (Bradley 1993, 79-80). A small area of unfired whitish clay to the south of a pit (C) in hut (D) at Reask was also interpreted as belonging 'to a deposit of clay used in repairing *túyeres* or relining the pits (Fanning 1981, 107). The excavators at Cathedral Hill, Armagh suggested that two irregularly dug-out hollows (Areas F & G) could have 'begun as an excavation for clay for moulds and crucibles and then continued as a shelter or workshop' (Gaskell-Brown and Harper 1984, 119).

To work the clay, all unwanted materials such as roots and pebbles had to be removed to produce a regular, uniform product. The design and shaping of lumps of clay into moulds or crucibles could have been formed by hand though it is more likely that some form of pattern made from wax, carved

wood, bone or metal may have been used (Comber 2008, 141). A clay mould from Cathedral Hill, Armagh appears to have been formed from a metal pattern, possibly made from a wax original and the use of such a master pattern would have enabled large-scale reproduction of the same model (Gaskell-Brown and Harper 1984, 136-9). The native souterrain ware pottery appears to have been coil-built and traces of this technique are sometimes noticeable as irregularities in the profile of the pots (Edwards 1990, 73). It was suggested that a clay slurry may have been used to improve the surface of pots at Larrybane (Proudfoot and Wilson 1962). A lump of kneaded fired clay was discovered in an enclosure (1) at at Ballyutoag suggesting that pottery was made on the site (Williams 1984, 45) and similar evidence was found at Ballintoy cave (Jackson 1933, 1934). An area of clay-working at Nendrum to the north of the round tower in the north-western area of the inner enclosure also produced clay lumps bearing thumb and finger marks (Lawlor 1925, 166-7).

After the clay was formed into objects or pots of the required form, they were first dried and then fired to increase their strength and set their shape. There is great diversity in the fabric of souterrain ware with some examples well-fired, others hard as to be brittle and others soft and this diversity probably indicates primitive firing techniques using a clamp or bon-fire kiln; a monument which rarely survives in the archaeological record (Edwards 1990, 73-74). Lawlor (1925, 166) described a large quantity of half baked pottery sherds in the clay-working area to the north of the round tower at Nendrum and it is possible that some of these may have broken or cracked in the firing process (Bourke 2007, 414, 421). The deposit also contained several stone chisel-like artefacts which he suggested might have been used in decorating the pots (McErlean 2007a, 369).

Comber (2008, 83-5) has described some earth-cut kilns which may have been utilised for firing clay artefacts though acknowledged their alternative use for corn-drying. The horizontal flue of a possible stone-lined pottery kiln was investigated at Ballintoy cave (Jackson 1933, 1934) and contained souterrain ware sherds, burnt clay and charcoal with lumps of kneaded clay nearby. A small domed stone structure with its interior blackened by burning was also examined on the site and may represent another possible kiln (Comber 2008, 85). The discovery of waste pottery sherds at both Nendrum and Ballintoy would appear to indicate that the firing of pottery was often unsuccessful, irrespective of what type of kiln or open hearth firing structure was employed (*ibid*, 87).

The impressions of cut grass and other organic materials on the base of the souterrain ware pots were originally thought to have been caused by leaving the unfired pots on beds of chopped straw and grass to prevent them from sticking to a drying-slab during the drying process. The firing of these pots inside the kiln would have burnt away the organic material leaving the basal underside of the vessel covered with impressions of the chopped vegetation (Thomas 1968, 323). However, Ivens (1984c) has suggested that the grass-marking occured during the manufacturing process of the pot rather than the drying stage. Adopting an experimental approach, he found that these grass-cuttings were probably laid on a flat surface to prevent adhesion (between the vessel and the board) while facilitating the rotation of the pot during the coil-building process.

Contexts of clay-working

The clay was probably sourced relatively close to metalworking areas (for the production of crucibles, *túyeres* and moulds) at Moynagh Lough, Cathedral Hill, Armagh, Reask and Garryduff (O'Kelly 1963, 101). There are few known early medieval clay-working areas and the only substantive evidence consisted of a large quantity of half-fired pottery sherds at Nendrum in the north-western area of the innermost enclosure to the north of the round tower and some burnt clay, lumps of kneaded clay and waste pottery sherds found in association with a possible flued kiln outside a cave at Ballintoy. McErlean (2007a, 369) has noted that it is puzzling that such an industrial activity should be undertaken within the innermost enclosure at Nendrum close to the church and has postulated whether this clay-working material was either brought from somewhere else on the site to even-up the ground or possibly dates to the site's post-monastic phase. Although there is growing evidence for early medieval kilns on settlements, most of these have been interpreted as corn-drying structures and there is currently relatively little known about pottery kilns or open-fire pottery-firing hearths of this period.

Clay was not widely used for artefactual purposes in early medieval Ireland and such objects like crucibles and moulds may have been produced not by specialist clay-workers but by the metalworkers who required them. The manufacture of the native coarse pottery known as souterrain ware should also be understood largely as a domestic craft and this is supported by the fact that most sites such as Killyliss and Ballykennedy have only produced the remains of a small number of vessels sufficient for internal site use only. However, some sites such as Movilla Abbey or Nendrum in the northeast of Ireland have produced considerable number of sherds which might suggest that these select few occasionally supported professional potters producing surplus vessels, perhaps intended for re-distribution (Comber 2008, 87-88).

Conclusions

Excavations have produced abundant evidence for crafts on early medieval settlements. The most copious evidence comes in the form of iron-working. Although there are limited examples of the raw ore, furnaces and iron slag provide numerous examples for smelting and smithing. The evidence suggests that ironworking was widely practised, both geographically and socially, implying that at least some of this activity was undertaken by non-blacksmiths. It is therefore highly probable that large numbers of the farming community had some rudimentary knowledge of smithing, perhaps of a level which would allow them to repair equipment, but not to create tools from raw materials. Other crafts such as glass-working and non-ferrous metalworking appear to have had a more limited distribution, both geographically and socially. These skills appear to have been limited to ecclesiastical and high status sites as well as urban centres. Some of these sites such as Carraig Aille, Garranes, Lagore, Moynagh Lough, Clogher, Clonmacnoise, Armagh, Dunmisk have revealed large quantities of metal- and glass-working waste and finished items, possibly the products and residues of highly-trained resident smiths. Clay does not appear to have been widely utilised as a resource in early medieval Ireland with much of the island remaining aceramic and the main artefacts in this material such as moulds and crucibles were probably produced by the metalworkers who required them.

Most communities must have had the technical ability to produce simple objects of wood, stone, lignite and bone/antler working at a subsistence level. Wooden vessels and other objects would have been widely produced in an aceramic society but specialist wrights described in the documentary sources must have completed more complex structures such as churches, mills and ships. Other sites such as Cahercommaun or Moynagh Lough appear to have operated as internal trading centres exporting basic and semi-luxury stone items such as whetstones, lignite or jet bracelets or quern-stones. Evidence for ‘specialist’ stone-working is particularly found on monasteries, where groups of highly skilled masons and apprentices were undoubtedly responsible for the construction of highly sophisticated stone crosses, grave-slabs and buildings. With the exception of comb-making, bone-working does not appear to have been a specialist activity and most sites may have had the capacity to produce many artefacts such as pig-fibula pins, beads and needles on a subsistence basis. However, extensive evidence for bone and antler-working has tended to be found on a number of prominent ecclesiastical sites such as Armagh, Clonfad and Clonmacnoise and actual evidence for antler-working on an industrial scale is mainly confined to urban Dublin and Waterford. Supposed ‘loom-weights’ frequently turn up on early medieval settlements - but rarely in considerable numbers - lending support to the idea that spinning and weaving was commonly practiced on most early medieval sites. However, Hodkinson (1987) has queried their association with looms and many sites lack significant other relevant evidence of this craft suggesting that some settlements may have supplied textiles to others. As is the case with textile-production, the limited data-set for leather-working is influenced by its preservation and is represented primarily in the form of off-cuts and shoe fragments. Evidence for tanning is almost completely absent and the only substantive evidence for the industrial scale production of leather comes from Scandinavian Dublin.

There are some interesting patterns emerging about the contexts of craftworking areas and finished objects within early medieval settlements. Glass and fine-metalworking are generally associated with each other. Along with iron-working, these tend to be located on the periphery of sites, particularly in the shelter of enclosing ditches, away from the more central domestic structures. Clay was utilised for a range of metal-working objects and it was probably sourced relatively close to working areas associated with this craft. Only Nendrum and Ballintoy have produced potential evidence for the

production of native pottery in this period. The limited evidence for stone-working and wood-working waste makes it difficult to identify working areas within settlements. Wood-working tools are often invariably scattered across the sites and the discovery of wooden remains in enclosure ditches, probably more accurately reflect dumping and slippage, than actual craft activity within these areas (Comber 2008, 76). As bone and antler are organic materials, it is difficult to identify craftworking areas due to the few known workshops or concentrations of working debris. It appears that the bone and antler may have been retrieved from butchery areas or midden heaps but the final working and completion of the bone or antler artefacts may have been undertaken within or adjacent to dwellings and evidence for this has been found in Hiberno-Scandinavian Dublin and Waterford. It is likely that spinning and weaving and the final working of leather were undertaken within or immediately adjacent to domestic structures, with other tasks such as dye-production or the initial leather-tanning process located in the industrial quarters away from the dwellings. Within the Scandinavian towns, particular streets appear to have been designated different activities. For instance in Dublin, comb-makers were concentrated in High Street; metalworkers in Christchurch Place; cobbler's in High Street; amber-workers and possibly wood-workers and merchants in Fishamble Street; and other groups such as ironworkers outside the town's defences (Wallace 2004, 833). There is now considerable evidence for craft on early medieval settlements and the publication of more recent excavations should greatly add to our understanding of these activities in the next few years.

Conclusions

This INSTAR Early Medieval Archaeology Project (EMAP) report has investigated the archaeological dwelling and settlement evidence of early medieval people in Ireland by moving from their homes out into the farmyards, plots, fields and towns that characterised the early medieval settlement landscape. Houses were places where people spent most of their time, where they were born, where family and social relationships were developed, where work and tasks were performed; essentially they were places where men and women enacted and negotiated multiple social identities of household, kinship, gender, social status and social role. Archaeological excavation has enabled us to reconstruct the types of houses people lived both within the rural landscape and in towns while research has shown that there was a move from round to rectangular-shaped structures. However, each dwelling had its own unique history and the people that occupied early medieval houses left different archaeological traces. These related to the lives they left behind, the activities they performed, their relationships with families and neighbours, their role and status in society, and the everyday challenges of social and economic life that would have imprinted on how dwellings were built, modified and abandoned.

Once we move out into the farmyard or *les*, both the archaeological and historical evidence shows that it was occupied by a variety of buildings, structures and objects indicative of domestic life, agricultural work, craft and industrial activities. These included outhouses, animal pens, barns, industrial areas, outdoor hearths, tools, and rubbish middens. People lived and worked beside animals, hens and chickens and we can imagine that early medieval farmsteads were noisy and smelly places. Movement around settlement enclosures was sometimes directed along pathways while, at certain sites, clear divisions were noted for the separation of domestic, industrial and agricultural activities. Excavations have revealed that animals were enclosed within specific spaces within enclosures while dangerous activities such as iron- and metalworking, and sometimes cereal-drying, was undertaken in specialised areas away from houses. Scandinavian towns were characterised by roads, pathways, and boundaries that demarcated domestic plots and areas for craft, trade and industry. At ecclesiastical settlements, spaces for prayer and dwelling were separated while clear divisions were noted at large monastic settlements whereby religious buildings were located within the sacred core away from dwelling, farm, craft and industrial spaces. Therefore, movement was deliberately negotiated around a broad range of settlements related to the activities within and concepts of private and public space.

The boom in development-led archaeology during the 'Celtic Tiger' years has perhaps, most of all, advanced our knowledge on agricultural practices in early medieval Ireland. The identification of a range of field systems, cereal-drying kilns and watermills has increased dramatically as excavation has occurred in the spaces outside recorded archaeological monuments. This has enabled archaeologists to assess their relationship to neighbouring settlements and it is now apparent that the early medieval settlement and agricultural landscape was a highly managed, ordered and utilised resource. A range of fields have been identified from curvilinear to rectangular-shaped examples and it would appear that the latter were used for crops and the former to enclose livestock. However, there is clearly a need for further research and our knowledge of early medieval field systems, their use and relationship to surroundings settlements and features is at an early stage. Cereal-drying kilns and watermills have been found in large numbers, especially the former, and they point to considerable cereal processing across the countryside. Radiocarbon dating indicates that kilns became a prominent component of the settlement landscape from the fifth century while the earliest watermills have been dated to the beginnings of the seventh century. It seems that the growing and processing of cereals for the production of cereal-based foodstuffs was widespread and that tillage was of equal importance to both the secular and ecclesiastical economies. Its economic value may have risen after the eighth century when the social and economic value of the cow declined.

Of course, agriculture was intimately related to the lives and work of early medieval families and communities because it sustained them providing meat, dairy, cereal and crop-based foodstuffs. The historical sources provides much information into these types of foods as they do on the agricultural

and domestic labour required in gathering, producing and cooking food. Manual labour and work out in the fields and on the farm – herding animals, chopping and carrying wood, reaping corn and so on – was seen mainly as a male activity while women were associated with work in, and around, the house such as food preparation, cooking and clothes mending for example. Children's work was also divided according to gender with boys and girls being taught the work they would do when they were old enough. Unsurprisingly, as early medieval society was highly a stratified one, the noble and royal social grades abstained from any manual work. Conversely, slaves and servants undertook the most demanding and difficult jobs and again their roles were divided according to gender.

Zooarchaeological analysis and archaeobotanical studies offer further insights into the types of meats and cereals consumed and it is evident that cattle were valued primarily for dairy products and that beef was the most common meat consumed. Bacon was another valued meat but sheep were kept primarily for their wool. Oats and barley were the most common cereals used in the preparation of porridges and breads while wheat has only been identified in small quantities on early medieval settlements. The law-tracts list wheat as the most highly valued cereal so we must assume that only the highest ranking social grades in early medieval Ireland had access to it. Coastal and riverine resources were also exploited as were vegetables, wild fruits and berries. Animal bone analysis from Scandinavian towns, such as Dublin, indicate that beef was imported into the town from its hinterland while archaeobotanical studies also show that cereals, vegetables and fruits were consumed within the town. Fishing was also important to town dwellers as a source of food.

There is considerable archaeological evidence for craft and industrial activities within early medieval settlements and small-scale ironworking is present on many sites indicating that early farmers had the relevant knowledge and expertise, presumably passed down from generation to generation, to mend and produce tools and objects required for domestic and farm work. Evidence for copper-alloy-, glass-working and other specialist crafts is largely found on high-status settlements, monastic settlements and in urban centres and was undertaken by trained and skilled smiths. Most communities would have had the technical ability to produce simple objects of wood, stone, lignite and bone/antler working at a subsistence level while wooden vessels were undoubtedly widespread in what was largely an aceramic society. However, specialist wrights are depicted in the early sources and would have had the requisite skills to construct more complex structures such as watermills, churches and ships.

Archaeological excavations since the 1930s have revealed a huge wealth of evidence related to settlement in the early middle-ages. Settlements of all sizes and shapes were constructed, modified and eventually abandoned according to a variety of social, economic, political, religious and ideological influences. All encompassing archaeological terminologies, such as ringfort, have perhaps led to archaeologists overlooking the individuality and complexity of these settlements and times have moved-on rapidly from an early medieval archaeological discourse that focused on ringforts, crannogs and monastic sites. This report has highlighted the abundance of this evidence and it has identified numerous examples of the individuality of early medieval settlement and how human action and performance has left these unique imprints on the archaeological settlement record. EMAP believes this report is a significant addition to archaeological settlement studies and research and we hope to have created a vibrant and interesting account of dwelling practices and daily life in early medieval Ireland.

Bibliography

Aalen, F.H.A., Whelan, K. & Stout, M. 1997. *Atlas of the Irish Rural Landscape*. Cork. Cork University Press.

Allison, F., Hall, A. & Kenward, H. 1999. Technical Report: Living conditions and resource exploitation at the early Christian rath at Deer Park Farms, Co. Antrim, N. Ireland: evidence from plants and invertebrates, pt 1: 'Text'. Unpublished report from the Environmental Archaeology Unit. York, University of York.

Anonymous 1973. *Viking and Medieval Dublin*: Catalogue of Exhibition. Dublin. Elo Press.

Armit, I. 2008. Irish–Scottish connections in the first millennium AD: an evaluation of the links between souterrain ware and Hebridean ceramics. *Proceedings of the Royal Irish Academy*, 108C, 1–18.

Baillie, M. G. L. 1979. An interim statement on dendrochronology at Belfast. *Ulster Journal of Archaeology*, 42, 72–84
—— 1982. *Tree-Ring Dating and Archaeology*. London. Croom-Helm.
—— 1986. A sherd of souterrain ware from a dated context (Drumard, Derry - late 8th century). *Ulster Journal of Archaeology*, 49, 106.

Baker, C. 2007. Augherskea, early medieval cemetery. In E. Grogan, L. O'Donnell & P. Johnston (eds). *The Bronze Age Landscapes of the Pipeline to the West: An Integrated Archaeological and Environmental Assessment*, 316–8. Bray. Wordwell.

Barfield, L. & Hodder, M. 1987. Burnt mounds as saunas, and the prehistory of bathing. *Antiquity*, 61, 370–9.

Barrett, G. 2002. Flights of discovery: Archaeological air survey in Ireland, 1989-2000. *Journal of Irish Archaeology*, 11, 1–29.

Barry, T.B. 1981. Archaeological excavations at Dunbeg promontory fort, County Kerry, 1977. *Proceedings of the Royal Irish Academy*, 81C, 295–329.

Bateson, J.D. 1981. Enamel-working in Iron Age, Roman and Sub-Roman Britain. The Products and Techniques. *British Archaeological Reports*, 93. Oxford. Tempvs Reparatvm.

Bayley, D. 2003. 2003:1286, Newtownbalregan, Co. Louth, ringfort with souterrain. www.excavations.ie.

Bennett, I. 2004/05. Archaeological excavations in Co. Wexford: A review of the last 35 years. *Journal of the Wexford Historical Society*, 20, 184–96.

Bersu, G. 1947. The rath in Lissue townland, Co. Antrim: report on excavation in 1946. *Ulster Journal of Archaeology*, 10, 30–58.
—— 1948. Preliminary report on the excavations at Lissue, 1947. *Ulster Journal of Archaeology*, 11, 131–3.

Bhreathnach, E. 1998a. The Tech Midchuarta,'the house of the mead-circuit': feasting, royal circuits and the king's court in early Ireland *Archaeology Ireland* 12(4), 20–2.
—— 1998b. Topographical Note: Moynagh Lough, Co. Meath. *Ríocht na Mídhe*, 9(4), 16–9.

Bhreathnach, M. 1984. A new edition of Tochmarc Becfhola. *Ériu*, 35, 59–91.

Bibliography

Binchy, D.A. 1941. *Críth Gablach*. Medieval and Modern Series 11. Dublin.

Bitel, L.M. 1996. *Land of Women: Tales of Sex and Gender from Early Ireland* New York. Cornell University Press.

Bolger, T. 2000. 2000:0674. Farrandreg, Co. Louth. www.excavations.ie.
—— 2004. 2004:0647. Kilgobbin, Stepaside, Co. Dublin, environs of early ecclesiastical site. www.excavations.ie

Bornholdt Collins, K. 2010. The Dunmore Cave [2] hoard and the role of coins in the tenth-century Hiberno-Scandinavian economy. In J. Sheehan & D. Ó Corrain (eds) *The Viking Age: Ireland and the West*: Papers from the Proceedings of the Fifteenth Viking Congress, Cork, 18-27 August 2005, 19–46. Dublin. Four Courts Press.

Bourke, C. 1985. 1985:058. Newtownlow, Co. Westmeath. www.excavations.ie.
—— 1986. 1986:078. Newtownlow, Co. Westmeath. www.excavations.ie.
—— 1998. Fine metalwork from the River Blackwater. *Archaeology Ireland*, 12(3), 30–1.
—— 2007. The monastery of Saint Mo-Choí of Nendrum: The early medieval finds. In T. McErlean and N. Crothers (eds). *Harnessing the Tide: The Early Medieval Tide Mills at Nendrum Monastery, Strangford Lough,* 406–21. Belfast. Stationery Office.

Bourke, E. 1987. Glass Vessels in Ireland c. 100-1400. School of Archaeology. (Unpublished M.A.) Dublin. University College Dublin.
—— 1988/89. Two early eleventh century Viking houses from Bride Street, Wexford, and the layout of properties on the site. *Journal of the Wexford Historical Society*, 12, 50–61.
—— 1994. Glass Vessels of the first nine centuries AD in Ireland. *Journal of the Royal Society of Antiquaries of Ireland,* 124, 163–209.
—— 1995. Life in the sunny south-east: housing and domestic economy in Viking and medieval Wexford. *Archaeology Ireland*, 9(3), 33–6.
—— 1997. The glass. In Hurley, M. F., Scully, O. M. B., & S. W. J. McCutcheon (eds) *Late Viking Age and Medieval Waterford: Excavations 1986-1992,* 381–89. Waterford. Waterford Corporation.
—— 2005. A preliminary analysis of the inner enclosure of Skellig Michael, Co. Kerry. In T. Condit & C. Corlett (eds). *Above and Beyond: Essays in Honour of Leo Swan*, 121–37. Bray. Wordwell.

Bowen, P. 2008. Settlement and burial at Faughart Lower. *Seanda* 3, 9–11. Dublin. National Roads Authority.

Bower, N. 2009. Archaeological excavation report E2054 – Loughbown 2, Co. Galway: Ringfort with earlier ringditch. *Eachtra Journal*, 2. http://eachtra.ie/index.php/journal/

Boyle, J., W 2004. Lest the Lowliest Be Forgotten: Locating the Impoverished in Early Medieval Ireland. *International Journal of Historical Archaeology*, 8(2), 85–99.

Bradley, J. 1982/83. Excavations at Moynagh Lough, Co. Meath 1980-81. *Ríocht na Mídhe*, 7 (2), 12–32.
—— 1984a. Excavations at Moynagh Lough, 1980-84. Dublin Unpublished Report for the Department of Antiquities, National Museum of Ireland.
—— 1984b. Excavations at Moynagh Lough, 1982-83, interim report. *Ríocht na Mídhe*, 7(3), 86–93.
—— 1984c. *Viking Dublin Exposed: the Wood Quay Saga*. Dublin. O'Brien Press.
—— 1990/91. Excavations at Moynagh Lough, Co. Meath, 1985 and 1987. *Ríocht na Mídhe*, 8(3), 21–35.
—— 1991. Excavations at Moynagh Lough, County Meath. *Journal of the Royal Society of Antiquaries of Ireland*, 121, 5–26.
—— 1993. Moynagh Lough: an insular workshop of the second quarter of the 8th century. In M. Spearman & J. Higgitt (eds). *The Age of Migrating Ideas: Early Medieval Art in Northern Britain and Ireland: Proceedings of the Second International Conference on Insular Art held in the National Museum of Scotland in Edinburgh, 3-6 January 1991*, 74–80. Edinburgh. Stroud.

—— 1994/95. Excavations at Moynagh Lough, Co. Meath. *Ríocht na Mídhe*, 9(1), 158–169.
—— 1995. Scandinavian Rural Settlement in Ireland. *Archaeology Ireland*, 9(3), 10–12.
—— 1997. Archaeological excavations at Moynagh Lough, Co. Meath 1995-96. *Ríocht na Mídhe*, 9(3), 50–61.
—— 1999. Excavations at Moynagh Lough, Co. Meath, 1997-98. *Ríocht na Mídhe,* 10(1), 1–17.

Bradley, J. & A. Halpin 1992. The topographical development of Scandinavian and Anglo-Norman Waterford. In W. Nolan & T.P. Power (eds). *Waterford History and Society: Interdisciplinary Essays on the History of an Irish County*, 105–29. Dublin. Geography Publications.
—— 1993. The topographical development of Scandinavian and Anglo-Norman Cork. In P. O'Flanagan & C. G. Buttimer (eds). *Cork History and Society: Interdisciplinary Essays on the History of an Irish County*, 15–44. Dublin. Geography Publications.

Brady, N. 1993. Reconstructing a medieval Irish plough. *Jornadas Internacionales Sobre Tecnologia Agraria Tradicional*, 31–44. Madrid. Museo Nacional del Pueble Espanol.
—— 2006. Mills in medieval Ireland: Looking beyond design. In S. Walton (ed.) *Wind and Water, the Medieval Mill*, 39–68. Tempe. Arizona State University Press.

Brady, N. and Gibson, P. 2005. The earthwork at Tulsk, Co. Roscommon: Topographical and Geophysical Survey and Preliminary Excavation. *Discovery Programme Reports 7: Project Results and Reports,* 7, 65–75. Dublin. Royal Irish Academy.

Brannon, N. F. 1980. The excavation of a rath in Ballykennedy townland, County Antrim. *Ulster Journal of Archaeology*, 43, 65–70.
—— 1981/82. A rescue excavation at Lisadoo Fort, Lisnaskea, County Fermanagh. *Ulster Journal of Archaeology* (Third Series), 44/45, 53–9.
—— 1986. Archaeological Excavations at Cathedral Hill, Downpatrick, 1985. *Lecale Miscellany*, 4, 50–2.
—— 1987. Archaeological Excavations at Cathedral Hill, Downpatrick, 1986. *Lecale Miscellany*, 5, 37–40.
—— 1988a. Archaeological Excavations at Cathedral Hill, Downpatrick, 1987, *Lecale Miscellany*, 6, 3–9.
—— 1988b. Life and death at an early monastery – Cathedral Hill, Downpatrick. In A. Hamlin & C.J. Lynn (eds). *Pieces of the Past: Archaeological Excavations by the Department of the Environment for Northern Ireland, 1970-1986*, 61–4. Belfast. HMSO.
—— 1997. 1997:071. Cathedral Hill, Downpatrick, Co. Down, ecclesiastical. www.excavations.ie.

Breen, T. 1988. Excavation of a roadway at Bloomhill Bog, County Offaly. *Proceedings of the Royal Irish Academy*, 88C, 321–39.

Brindley, A. L., Lanting, J. N., & Mook, W. G. 1989/90. Radiocarbon dates from Irish Fulachta Fiadh and other burnt mounds. *Journal of Irish Archaeology*, 5, 25–33.

Buckley, V.M. 1988/89. Meath souterrains: some thoughts on early Christian distribution patterns. *Ríocht na Mídhe*, 8(2), 64–7.

Buick, G.R. 1893. The crannog of Moylarg. *Journal of the Royal Society of Antiquaries of Ireland*, 23, 27–43.
—— 1894. The crannog of Moylarg. *Journal of the Royal Society of Antiquaries of Ireland*, 24, 315–331.

Byrne, G. 1988. 1988:57. Kells, Townparks, Co. Meath. www.excavations.ie.

Byrne, M. E. 1991. Report on the excavation of a cashel at Ballyegan, near Castleisland, Co. Kerry. *Journal of the Kerry Archaeological and Historical Society*, 24, 5–31.
—— 2007. Aghamore. In E. Grogan, L. O'Donnell & P. Johnston (eds). *The Bronze Age Landscapes of the Pipeline to the West*, 333–4. Bray. Wordwell.

Cagney, L., O'Hara, R., Kelleher, G., & Morkan, R. 2009. Report on the Archaeological Excavation of Dowdstown 2, Co. Meath. Unpublished report prepared for Archaeoloigcal Consultancy Ltd. Available at www.M3motorway.ie.

Cagney, L., & O'Hara, R. 2009. An early medieval complex at Dowdstown 2. In M. Deevy & D. Murphy (eds). *Places along the Way: First Findings on the M3*, 123–34. National Roads Authority Scheme Monograph Series 5. Dublin. Wordwell.

Cahill, M. 1977/79. 1977/79:059. Nevinstown, Co. Meath, various. www.excavations.ie.

Campbell, E. (ed.) 1996. *The Archaeological Evidence for External Contacts: Imports, Trade and Economy in Celtic Britain A.D. 400-800*. Woodbridge. Boydell Press.
—— 2007. *Continental and Mediterranean Imports to Atlantic Britain and Ireland, A.D. 400-800*. Council for British Archaeology. York. Alden Press.

Campbell, K. 1985. 1985:044. Randalstown, Co. Meath. www.excavations.ie.
—— 1986. 1986:65. Randalstown, Co. Meath. www.excavations.ie.
—— 1994. 1994:180. Haggardstown, Co. Louth, ringfort. www.excavations.ie.
—— 2002. Souterrain at Muirhevnamore, Marshes Upper, Dundalk. *Journal of the County Louth Archaeological and Historical Society,* 25(2), 202–7.

Carelli, P. 1997. Thunder and lightning, magical miracles: On the popular myth of thunderbolts and the presence of Stone Age artefacts in medieval deposits. In H. Andersson, P. Carelli & L. Esgård (eds). *Visions of the Past: Trends and Traditions in Swedish Medieval Archaeology*, 393–417. Stockholm. Almqvist & Wiksell.

Carlin, N. 2008. Ironworking and production (With contributions from Vicky Ginn and Jonathan Kinsella). In N. Carlin, L. Clarke & F. Walsh (eds). *The Archaeology of Life and Death in the Boyne Floodplain: Findings from the Archaeological Excavations Along the Route of the M4 Motorway*, 87–112. Bray. Wordwell.

Carroll, J. 1993. Report on the 1993 Archaeological Excavation at Aghadegnan Ringfort, Co. Longford. Unpublished report prepared for Judith Carroll Ltd.
—— 1997. 1997:184. The Old Orchard Inn, Butterfield Avenue, Rathfarnham, Co. Dublin, medieval occupation and burials. www.excavations.ie.
—— 2001. Glass bangles as a regional development in early medieval Ireland. In M. Redknap, N. Edwards, S. Young, A. Lane & J. Knight (eds). *Pattern and Purpose in Insular Art*, 101–14. Oxford. Oxbow.
—— 2008. *Archaeological Excavations at Rosepark, Balrothery, Co. Dublin. Volume 1. Balrothery Excavations*. Dublin. Judith Carroll and Co. and the Heritage Council.

Carroll, M. 2005. Archaeological Excavation at Brigown, Mitchelstown, Co. Cork (03E1153). Unpublished report for John Purcell Archaeological Consultancy.

Caulfield, S. 1981. Celtic problems in the Irish Iron Age. In D. Ó Corrain (ed.). *Irish Antiquity: Essays and Studies Presented to Professor M.J. O'Kelly,* 205–15. Dublin. Four Courts Press.

Channing, J. 1992. 1992:179. Petitswood, Co. Westmeath. www.excavations.ie.
—— 2007. Politics, wealth and expansion: the archaeology of a multiperiod enclosure at Rochfort Demesne, Co. Westmeath. In J. O'Sullivan & M. Stanley (eds). *New Routes to the Past: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, August 2006*, 4, 111–21. Bray. Wordwell.

Chapple, R. 2000. 2000:0638. Balgatheran 1, Co. Louth, multi-period: prehistoric, early Christian and medieval. www.excavations.ie.

Bibliography

Chart, D.A. 1940. *A Preliminary Survey of the Ancient Monuments of Northern Ireland (*PSAMNI). Belfast. Stationery Office.

Childe, V. G. 1936. A Promontory fort on the Antrim Coast. *Antiquities Journal*, 16, 179–98.
—— 1938. Doonmore, a castle mound near Fair Head, Co. Antrim. *Ulster Journal of Archaeology* (Third Series), 1, 122–35.

Clarke, L. 2001. 2001:945, Narrow Ways, Bettystown, partial remains of two disarticulated skeletons. www.excavations.ie.
—— 2009. Report on the Archaeological Excavation of Boyerstown 3, Co. Meath. Unpublished report prepared for Archaeoloigcal Consultancy Ltd. Available at www.M3motorway.ie.
—— 2010. Johnstown I, Co. Meath: a multi-period burial, settlement and industrial site. In C. Corlett & M. Potterton (eds). *Death and Burial in Early Medieval Ireland in the Light of Recent Archaeological Excavations,* 61–75. Dublin. Wordwell.

Clarke, L. and Carlin, N. 2008. Living with the dead: an enclosed burial, settlement and industrial site. N. Carlin, L. Clarke & F. Walsh, (eds). *Life and Death in the Boyne Floodplain: Findings from the Archaeological Excavations Along the Route of the M4 Motorway*, 55–86. National Roads Authority Scheme Monographs 2. Bray. Wordwell.

Cleary, R. M. 2003. Hanover Street (96E128). In R. M. Cleary & M. F. Hurley (eds). *Excavations in Cork City 1984-2000*, 31–44. Cork. Cork County Council.
—— 2006. Excavations of an Early-Medieval period enclosure at Ballynagallagh, Lough Gur, Co. Limerick. *Proceedings of the Royal Irish Academy*, 106C, 1–66.
—— 2008. Excavation of an early medieval settlement and other sites at Dromthacker, Tralee, Co. Kerry. *Proceedings of the Royal Irish Academy*, 108C, 19–64.

Cleary, R.M. & Hurley, M.F. (eds) 2003. *Excavations in Cork City 1984-2000*. Cork. Cork City Council.

Cleary, R.M., Hurley, M.F. & Shee Twohig, E. (eds). 1997. *Skiddy's Castle and Christ Church, Cork: Excavations 1974-77 by D.C. Twohig*. Cork. Cork Corporation.

Clinton, M. 2001. *The Souterrains of Ireland*. Bray. Wordwell.

Clutterbuck, R. 2004. 2004:1211. Cookstown, Co. Meath, prehistoric and medieval. www.excavations.ie.

Coffey, G. 1906. Craigywarren crannog. *Proceedings of the Royal Irish Academy*, 26C, 109–18.

Cole, E.E. & Mitchell F.J.G. 2003. Human impact on the Irish landscape during the late Holocene inferred from palynological studies at three peatland sites. *The Holocene*, 13, 507–15.

Coleman, J.C. 1942. Cave Excavation at Midleton, Co. Cork *Journal of the Cork Historical and Archaeological Society,* 47, 63–76.

Coles, J. 1979. *Experimental Archaeology*. London. Academic Press.

Collins, A.E.P. 1955. Excavations at Lough Faughan crannog, Co. Down, 1950-51. *Ulster Journal of Archaeology*, Third Series, 18, 45–82.
—— 1966. Excavations at Dressogagh Rath, Co. Armagh. *Ulster Journal of Archaeology*, 29, 117–129.

Collins, A.E.P. & Proudfoot, V.B. 1959. A trial excavation at Clea Lakes crannóg, Co. Down. *Ulster Journal of Archaeology*, Third Series, 22, 92–101.

Collins, T. & F. Coyne 2007. Shape-shifting: enclosures in the archaeological landscape. In C. Manning (ed.). *From Ringforts to Fortified Houses: Studies on Castles and Other Monuments in Honour of David Sweetman*, 21–32. Bray. Wordwell.

Comber, M. 2002. M.V. Duignan's excavations at the ringfort of Rathgurreen, Co. Galway, 1948-9. *Proceedings of the Royal Irish Academy*, 102C, 137–97.
—— 2004. *Native Evidence of Non-Ferrous Metalworking in Early Medieval Ireland*. British Archaeological Report. International Series 1296. Oxford. Archaeopress
—— 2006. Tom Fanning's excavations at Rinnaraw Cashel, Portnablagh, Co. Donegal. *Proceedings of the Royal Irish Academy* 106C, 67–124.
—— 2008. *The Economy of the Ringfort and Contemporary Settlement in Early Medieval Ireland*. British Archaeological Report. International Series 1773. Oxford. Archaeopress.
—— 2009. Site F: hut-site (B5:F15). In W. O'Brien (ed.). *Local Worlds: Upland Farming and Early Settlement Landscapes in Southwest Ireland,* 266–71. Cork. Collins Press.

Connolly, M. 1992. An iron sickle from a previously unrecorded souterrain at Beaufort, Co. Kerry. *Journal of the Kerry Archaeological and Historical Society*, 25, 20–36.

Connolly, M. & Coyne, F. 2005. *Underworld: Death and Burial at Cloghermore Cave, Co. Kerry*. Bray. Wordwell.

Connolly, S. & Picard, J.M. 1987. Cogitosus: Life of Saint Brigid. *Journal of the Royal Society of Antiquaries of Ireland*, 117, 5–27.

Conway, M. 1999. *Director's First Findings from Excavations at Cabinteely.* Transactions Volume 1. Dublin. Margaret Gowen and Co. Ltd.
—— 2001. 2001:1019. Platin Fort, Co. Meath. www.excavations.ie.
—— 2010. A Bronze Age village at Corrstown, county Londonderry. In E. Murray & P. Logue (eds). *Battles, Boats & Bones: Archaeological Discoveries in Northern Ireland, 1987-2008*, 9–13. Norwich. The Stationery Office.

Conway, M., Gahan, A., Rathbone, S., Lear, M., & Ginn, V. 2007. Final Report for Corrstown. Unpublished report prepared for Archaeological Consultancy Services Ltd.

Coope, G.R. 1981. Report on the coleopetra from an eleventh century house at Christchurch Place, Dublin. In H. Bekker-Nielson, P. Foote & O. Olsen (eds) *Proceedings of the Eighth Viking Congress*, Århus, 24-31 August 1977, 51–67. Odense. Odense University Press.

Corlett, C. 2010. Cracking millstones in Wicklow. *Archaeology Ireland*, 24(1), 16–9.

Cotter, C. 1990. Gragan West – E458. Unpublished excavation reports submitted to the National Monuments Service, DoEHLG.
—— 1993. Western Stone Fort Project: Interim Report. *Discovery Programme Reports* 1. Dublin. Royal Irish Academy.
—— 1994. Atlantic fortifications: The dúns of the Aran Islands. *Archaeology Ireland*, 8(1), 24–28.
—— 1995a. Western Stone Fort Project: Interim Report. *Discovery Programme Reports* 2, 1–11. Dublin. Royal Irish Academy.
—— 1995b. 1995:125. 'Dún Aonghasa', Kilmurvey, Inis Mór, cliff fort. www.excavations.ie.
—— 1995c. 1995:117. 'Dún Eoghanachta', Eoghanacht, Inis Mór, Co. Galway, stone fort. www.excavations.ie.
—— 1996. Western Stone Fort Project. *Discovery Programme Reports* 4, 1–14. Dublin. Royal Irish Academy.
—— 1999. Western Stone Forts Project: Cahercommaun Fort, Co. Clare: A Reassessment of its Cultural Context. *Discovery Programme Reports* 5, 41–95. Dublin. Royal Irish Academy.

Cotter, E. 1998. 1998:362. Loughboy, Co. Kilkenny, ringforts. www.excavations.ie.
—— 1999. Archaeological excavations at Loughboy, Co. Kilkenny. Unpublished report.

—— 2005. Bronze Age Ballybrowney, County Cork. In J. O'Sullivan & M. Stanley (eds). *Recent Archaeological Discoveries on National Road Schemes 2004: Proceedings of a Seminar for the Public, Dublin, August 2004*, 37–43. Bray. Wordwell.

Coughlan, T. 2003. 2003:1490. Site 108, Lisanisk 2, Co. Monaghan, ringfort. www.excavations.ie.
—— 2007. The enigma of Cappydonnell Big. *Seanda* 2, 16–7. Dublin. National Roads Authority.
—— 2009. The continuing enigma of Cappydonnell Big. *Seanda* 4, 42–4. Dublin. National Roads Authority Magazine.

Courtney, L. 2006. Archaeological aerial survey: a bird's eye view of the M7/M8 in county Laois. In J. O'Sullivan & M. Stanley (eds). *Settlement, Industry and Ritual: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, September 2005***,** 103–114. Bray. Wordwell.

Coyne, F. 2004. 2004:0774. Clogher, Lixnaw, Co. Kerry, enclosure with inhumations. www.excavations.ie.
—— 2006. Excavation of an early medieval 'plectrum-shaped' enclosure at Newtown, Co. Limerick. In J. O'Sullivan & M. Stanley (eds) *Settlement, Industry and Ritual: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, September 2005*, 63–72. Bray. Wordwell.
—— 2010. Corbally, Co. Kildare: the results of the 2003-4 excavations of a secular cemetery (with contributions by Linda G. Lynch). In C. Corlett and M. Potterton (eds). *Death and Burial in Early Medieval Ireland in the Light of Recent Archaeological Excavations,* 77–90. Dublin. Wordwell.
—— forthcoming. The 'plectrum-shaped enclosure' at Newtown, Co. Limerick-new site-type, or new site shape? In C. Corlett & M Potterton (eds). *Settlement in Early Medieval Ireland in the Light of Recent Archaeological Excavations,* 252–6. Bray. Wordwell.

Coyne, F. & Collins, T. 2003. Plectrum shaped enclosures-a new site type at Newtown, Co. Limerick. *Archaeology Ireland*, 17(4), 17–9.

Craddock, P.T. 1990. Metalworking techniques. In S. Youngs (ed.) *The Work of Angels, Masterpieces of Celtic Metalwork, 6th to 9th Centuries AD*, 170–213. Texas. University of Texas.

Crothers, N. 1995. The excavation of a rath at Jordanstown, Co Antrim: Preliminary report. Unpublished report prepared for Archaeological Development Services.
—— 1999. Excavations at Upper English Street, Armagh. *Ulster Journal of Archaeology* (Third Series), 58, 55–80.

Cryerhall, A. 2006. Excavations at Hammond Lane, Dublin: from hurdler-ford to iron-foundry. In S. Duffy (ed.) *Medieval Dublin VII: Proceedings of the Friends of Medieval Dublin Symposium 2005*, 7, 9–50. Dublin. Four Courts Press.

Danaher, E. 2002. 2002:0296. Curraheen 1, Co. Cork. www.excavations.ie.
—— forthcoming. An early medieval settlement at Curaheen, Co. Cork. In C. Corlett & M Potterton (eds). *Settlement in Early Medieval Ireland in the Light of Recent Archaeological Excavations*, 7–16. Bray. Wordwell.

Danaher, E., & Cagney, L. 2004. Curraheen. Excavation report on N22 Ballincollig Bypass. Unpublished report prepared for Archaeological Consultancy Services Ltd.

D'Arcy, S.A. 1897a. A crannoge near Clones. *Journal of the Royal Society of Antiquaries of Ireland*, 27, 205–20.
—— 1897b. A crannoge near Clones (Part II.). *Journal of the Royal Society of Antiquaries of Ireland*, 27, 389–403.

Davies, O. 1937/40. Excavations at Lissachiggel. *Journal of the Louth Archaeological and Historical Society*, 9(3), 209–243.

Davison, B.K. 1961/62. Excavations at Ballynarry Rath, Co Down. *Ulster Journal of Archaeology*, 24/25, 39–87.

Deevy, M.B. 2005. The M3 Clonee to North of Kells road scheme, County Meath. In J. O'Sullivan & M. Stanley (eds) *Recent Archaeological Discoveries on National Road Schemes 2004: Proceedings of a Seminar for the Public, Dublin, September 2004*, 2, 83–92. Bray. Wordwell.
—— 2006. The hidden archaeological landscapes of the M3. *Seanda* 1, 10–1. Dublin. National Roads Authority.
—— 2008. The M3 Research framework and the Lismullin Discovery in County Meath. In J. O'Sullivan & M. Stanley (eds). *Roads, Rediscovery and Research: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, August 2007*, 5, 71–82. Bray. Wordwell.

Delaney, F. 2005a. 2005:630. Mackney, Co. Galway, enclosure. www.excavations.ie.
—— 2005b. 2005:622. Loughbown, Co. Galway, enclosure. www.excavations.ie.
—— 2005c. 2005:624. Loughbown, Co. Galway, enclosure. www.excavations.ie
—— 2009. Archaeological excavation report E2444 – Mackney, Co. Galway: Ringfort with killeen burials. Eachtra Journal, 2. http://eachtra.ie/index.php/journal/.
—— forthcoming. A ringfort and later burial ground at Mackney, Co. Galway. In C. Corlett & M Potterton (eds). *Settlement in Early Medieval Ireland in the Light of Recent Archaeological Excavations,* 17–27. Bray. Wordwell.

Delaney, F., Lehane, J., Keefe, K. & O'Sullivan, J. 2009. Medieval life and death by the 'broken river'. *Seanda* 4, 36–9. Dublin. National Roads Authority.

Delaney, S. 2003. 2003:1272. Carn More, Faughart, Co. Louth, Neolithic; ringfort and souterrain. www.excavations.ie.
—— 2010. An early medieval landscape at Balriggan, Co. Louth. In C. Corlett and M. Potterton (eds). *Death and Burial in Early Medieval Ireland in Light of Recent Archaeological Excavations*, 116–29. Dublin. Wordwell.

Delaney, S. and Roycroft, N. 2003. Early medieval enclousure at Balriggan, Co. Louth. *Archaeology Ireland*, 17(2), 16–9.

Delaney, T. G. 1975. Monastic burials and a gilt bronze book-cover fragment from the Cathedral of the Holy Trinity, Downpatrick. *Ulster Journal of Archaeology*, 38, 57–9.

Dennehy, E. 2007. Kiltenan South. In E. Grogan, L. O'Donnell & P. Johnston (eds). *The Bronze Age Landscapes of the Pipeline to the West*, 291. Bray. Wordwell.

Desmond, S. 2006. 4,500 years in 41 kilometers: Scenes beneath the M7 and M8 Motorway Scheme. *Seanda* 1, 28–29. Dublin. National Roads Authority.
—— 2007. Ancient peoples, hidden landscapes: The archaeology of the M7/M8 motorway scheme. In J. O'Sullivan & M. Stanley (eds) *New Routes to the Past: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, August 2006*, 4, 123–31. Bray. Wordwell.

De Paor, L. 1970. 1970:06. Inishcaltra (Holy Island), Co. Clare. www.excavations.ie.
—— 1974. 1974:0009. Inis cealtra (Holy Island), Co. Clare. www.excavations.ie.
—— 1997. Inis Cealtra: report on archaeological and other investigations of the monuments on the island. Unpublished report.

De Paor, L., & Glenn, D. 1995. St. Caimin's, Iniscealtra: Reconstruction of the doorway. *North Munster Antiquarian Journal*, 36, 87–103.

De Valera, R. 1979. *Antiquities of the Irish Countryside by S.P. Ó Ríordáin* (5th Edition). London. Metheun.

Dickinson, C.W. and Waterman, D.M. 1959. Excavations at a rath with motte at Castleskreen, Co. Down. *Ulster Journal of Archaeology*, 22, 67–82.

Dillon, M., Johnston, P. and Tierney, M. 2007. Reading the ashes: charred plant material from two ringforts in county Galway. *Seanda*: National Roads Authority Magazine, 2, 27–29.

Doherty, C. 1980. Exchange and trade in early medieval Ireland. *Journal of the Royal Society of Antiquaries of Ireland,* 110, 67–89.
—— 1985. The monastic towns in early medieval Ireland. In H. Clarke & A. Simms (eds). *The Comparative History of Urban Origins in Non-Roman Europe: Ireland, Wales, Denmark, Germany, Poland and Russia From the Ninth to the Thirteenth Century*, 1, 45–75. Oxford. Oxford University Press.

Donnelly, C., Macdonald, P., Murphy, E. & Beer, N. 2003. Excavation at Boho High Cross, County Fermanagh. *Ulster Journal of Archaeology*, 62, 121–42.

Doody, M.G. 2008. *The Ballyhoura Hills Project*. Bray. Wordwell.

Dowd, M. 2002. Kilgreany, Co. Waterford: Biography of a cave. *Journal of Irish Archaeology*, 11, 77–97.
—— 2004. 2004:0914. Dunmore Cave, Mohil, Co. Kilkenny. www.excavations.ie.
—— 2006. Final excavation report for 2004 & 2005 seasons. Unpublished report for DoEHLG.
—— 2007. Living and dying in Glencurran Cave. *Archaeology Ireland*, 21(1), 36–9.
—— 2009. Middle and Late Bronze Age funerary and ritual activity at Glencurran Cave, Co. Clare. In N. Finlay, S. McCartan & C. Wickham-Jones (eds). *Bann flakes to Bushmills: Papers in Honour of Peter C. Woodman*, 86–96. Oxford. Oxbow.

Dowd, M. & Corlett, C. 2002. Brothers in caves: Lost archives of subterranean Waterford rediscovered. *Archaeology Ireland*, 16(1), 8–10.

Dowd, M., Lynch, L.G. & McCarthy, M. 2007. Recent archaeological discoveries in Dunmore cave, county Kilkenny: Further questions regarding Viking age activity at the site. *Old Kilkenny Review*, 59, 18–37.

Dowling, M. & Taylor, K. 2007. Dollas Lower. In E. Grogan, L. O'Donnell & P. Johnston (eds). *The Bronze Age Landscapes of the Pipeline to the West*, 273–4. Bray. Wordwell.

Doyle, I.W. 1998. The early medieval activity at Dalkey Island, Co. Dublin: a re-assessment. *Journal of Irish Archaeology*, 9, 89–103.
—— 2009. Mediterranean and Frankish pottery imports in early medieval Ireland. *Journal of Irish Archaeology*, 18, 17–62.

Doyle, T. 2008. Hair of the dog. *Seanda* 3, 14–15. Dublin. National Roads Authority.
—— 2009. Hair of the dog: evidence of early medieval food production and feasting at Ballyvass, Co. Kildare. In M. Stanley, E. Danaher & J. Eogan (eds). *Dining and Dwelling: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, August 2008*, 6, 55–64. Bray. Wordwell.

Drew, D.P. & Huddart, D. 1980. Dunmore Cave, County Kilkenny: A reassessment. *Proceedings of the Royal Irish Academy*, 80C, 1–23.

Duignan, M. 1944. Irish agriculture in early historic times. *Journal of the Royal Society of Antiquaries of Ireland,* 74, 124–45.
—— 1951. Early monastic site, Kiltiernan East townland, Co. Galway. *Journal of the Royal Society of Antiquaries of Ireland*, 81, 73–75.

Dunne, N. 2007. An exciting array of finds from the Carlow Bypass. *Seanda* 2, 64–6. Dublin. National Roads Authority.

Earwood, C. 1993. *Domestic Wooden Artefacts in Britain and Ireland from Neolithic to Viking Times*. Exeter. Exeter University Press.
—— 2007. Wood and Woodland: the worked wood from Mills 1 and 2. In T.C. McErlean & N. Crothers (eds). *Harnessing the Tide Mills at Nendrum Monastery, Strangford Lough*, 221–54. Norwich. The Stationery Office.

Edwards, N. 1990. *The Archaeology of Early Medieval Ireland*. London. Batsford.
—— 2004. The archaeology of early medieval Ireland, c.400-1169: Settlement and economy. In D. Ó Cróinín (ed.). *A New History of Ireland, Vol. 1, Prehistoric and Early Ireland*, 549–607. London. Oxford University Press.

Eogan, G. 1968. Excavations at Knowth, Co. Meath, 1962-1965. *Proceedings of the Royal Irish Academy*, 68C, 299–382.
—— 1974. Report on the excavations of some passage graves, unprotected inhumation burials and a settlement site at Knowth, Co. Meath. *Proceedings of the Royal Irish Academy*, 74C, 11–112.
—— 1977. The Iron Age and early Christian settlement at Knowth, Co. Meath, Ireland. In V. Markotic (ed.) *Ancient Europe and the Mediterranean, Studies in Honour of Hugh Hencken*, 69–76. Warminster. Aris & Phillips Ltd.
—— 1991. Prehistoric and early historic culture change at Brugh na Bóinne. *Proceedings of the Royal Irish Academy*, 91C, 105–132.
—— 2004. Knowth, 40 years on. *Ríocht na Mídhe*, 15, 1–11.
—— 2007. Knowth in the early Christian period: The cultural and chronological context of the animal bone assemblage. In F. McCormick, F. & E. Murray. *Knowth and the Zooarchaeology of Early Christian Ireland*. Excavations at Knowth 3, 1–5. Dublin. Royal Irish Academy.

Eogan, J. 1998. 1998:503. Bettystown**,** Co. Meath, prehistoric/multi-period site. www.excavations.ie.

Etchingham, C. 1993. The implications of paruchia. *Ériu*, 44, 139–62.

Evans, E.E. 1950. Rath and souterrain at Shaneen Park, Belfast, townland of Ballyaghagan, Co. Antrim. *Ulster Journal of Archaeology*, 13, 6–27.
—— 1957. *Irish Folkways*. London. Rutledge & Kegan Paul.
—— 1966. *Prehistoric and Early Christian Ireland.* New York. Barnes & Noble.
—— 1968. Archaeology in Ulster since 1920. *Ulster Journal of Archaeology*, 31, 3–8.
—— 1973. *The Personality of Ireland*. London. Cambridge University Press.

Fahy, E.M. 1953. A souterrain at Ballyarra, Co. Cork. *Journal of the Cork Historical and Archaeological Society*, 58, 55–59.

Fairburn, N. 2003. 2003:1759. Site 25(ii), Hughes' Lot East and Kilscobin, Co. Tipperary, ringfort. www.excavations.ie.

Fanning, T. 1970. Excavation of a ringfort at Bowling Green, Thurles, Co. Tipperary. *North Munster Antiquarian Journal*, 13, 6–21.
—— 1972. Excavations of a ringfort at Narraghmore, Co. Kildare. *Journal of the Kildare Archaeological and Historical Society,* 15(2), 171–7.
—— 1981. Excavation of an Early Christian cemetery and settlement at Reask, county Kerry. *Proceedings of the Royal Irish Academy*, 81C, 67–172.

Feehan, J. 2003. *Farming in Ireland: History, Heritage and Environment*. Dublin. University College Dublin.

Fibiger, L., Carlin, N. & Kinsella, J. 2008. The social and economic context of the enclosures. In N. Carlin, L. Clarke and F. Walsh (eds) *The Archaeology of Life and Death on the Boyne Floodplain: The*

Linear Landscape of the M4, 113–29. National Roads Authority Scheme Monograph 2. Bray. Wordwell.

Fitzgerald, M. 2006a. Archaeological discoveries on the N2 Finglas-Ashbourne Road Scheme. *Seanda* 1, 40–43. Dublin. National Roads Authority.
—— 2006b. Archaeological discoveries on a new section of the N2 in counties Meath and Dublin. In J. O'Sullivan & M. Stanley (eds). *Settlement, Industry and Ritual: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, September 2005***,** 3, 29–42. Bray. Wordwell.

Fitzpatrick, E. 2009. Native enclosed settlement and the problem of the Irish 'ring-fort'. *Medieval Archaeology*, 53, 271–307.

Flanagan, L.N.W. 1966. Dark Age sites in Ballymacrea Lower, Co Antrim. *Ulster Journal of Archaeology*, 29, 115–6.

Flynn, C. 2009. Camlin 3: A cemetery-settlement in north Tipperary. In M. Stanley, E. Danaher & J. Eogan (eds). *Dining and Dwelling: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, August 2008*, 6, 133–41. Bray. Wordwell.

Foley, C. 2006. Excavation of a ringfort at Dunbell Big, Co. Kilkenny. *Journal of the Royal Society of Antiquaries of Ireland*, 136, 5–23.

Fowler, P.J. 1966. Ridge and furrow cultivation at Cush, Co. Limerick. *North Munster Antiquarian Journal*, 10, 69–71.

Fredengren, C. 2001. Poor people's crannogs. *Archaeology Ireland*, 15(4), 24–5.
—— 2002. *Crannogs: A Study of People's Interaction with Lakes, with Particular Reference to Lough Gara in the north-west of Ireland*. Bray. Wordwell.

Fredengren, C., Kilfeather, A. & Stuijts, I. 2010. *Lough Kinale: Studies of an Irish Lake. The Lake Settlement Project*. Discovery Programme Monograph 8. Dublin. Wordwell.

Gaffikin, M. & Davies, O. 1938. Lough Island Reevy. *Ulster Journal of Archaeology*, 1, 201–3.

Gaskell-Brown, C. & Harper, A.E.T. 1984. Excavations on Cathedral Hill, Armagh, 1968. *Ulster Journal of Archaeology* (Third Series), 47, 109–61.

Geraghty, S. 1996. *Viking Dublin: Botanical evidence from Fishamble Street.* Medieval Dublin Excavations 1962-1981, Series C, Vol. 2. Dublin. Royal Irish Academy.

Gerritsen, F. 2003. *Local Identities: Landscape and Community in the Late Prehistoric MeuseDemesr-Scheldt Region.* Amsterdam. Amsterdam University Press.

Gibbons, E.K. 1994, 1994:116. 'Cathair Fionnúrach', Ballnavenooragh, Co. Kerry. www.excavations.ie.
—— 1997. 1997:228. Cathair Fionnurach (Cathair A Bhoghasin), Ballynavenooragh, Co. Kerry. www.excavations.ie.

Gibbons, E.K. & Kelly, E.P. 2003. A Viking Age farmstead in Connemara. *Archaeology Ireland*, 17(1), 28–31.

Gibbons, M. 2005. Athlunkard (Ath-an-Longphort): A reassessment of the proposed Viking fortress in Fairyhill Td, County Clare. *The Other Clare*, 29, 22–5.

Gibson, C. & Murray, J. 2003. An Anglo-Saxon settlement at Godmanchester, Cambridgeshire. *Anglo-Saxon Studies in Archaeology and History,* 12, 137–217.

Gillespie, R. 2006. 2006:1466. Lowpark, Co. Mayo. www.excavations.ie.

—— 2007. Prehistory and history on the N5 Charlestown Bypass in counties Mayo and Roscommon. In J. O'Sullivan & M. Stanley (eds) *New Routes to the Past: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, August 2006*, 4, 11–24. Bray. Wordwell.

Gillespie, R. & Kerrigan, A. forthcoming. *Of Troughs and Tuyères: the archaeology of the N5 Charlestown Bypass.* National Roads Authority Scheme Monographs. Dublin. Wordwell.

Gilmore, S. 2000. 2000:0163, Magheramenagh, Co. Derry. www.excavations.ie.

Gittings, A.S.R. 1986. 1986:75. St Peter's Church', Custom House B Ward, Co. Waterford. www.excavations.ie.
—— 1987. 1987:52. St Peter's Church/Bakehouse Lane, Custom House, B Ward, Co. Waterford. www.excavations.ie.
—— 1988. 1988:062. St Peter's Church/Bakehouse Lane, Custom House B, Co. Waterford. www.excavations.ie.

Gosling, P. 1980/84a. 1980-84:0137. Marshes Upper, Co. Louth, early Christian settlement. www.excavations.ie.
—— 1980/84b. 1980-84:0138. Marshes Upper, Co. Louth, early Christian settlement**.** www.excavations.ie

Gowen, M., (ed.) 1988a. *Three Irish Gas Pipelines: New Archaeological Evidence in Munster*. Bray. Wordwell.
—— 1988b. 1988:055. Smithstown, Co. Meath. www.excavations.ie.
—— 1992. Excavation of two souterrain complexes at Marshes Upper, Dundalk, Co. Louth. *Proceedings of the Royal Irish Academy*, 92(C), 55–121.
—— 2001. Excavations at the site of the church and tower of St Michael le Pole. In S. Duffy (ed.) *Medieval Dublin II: Proceedings of the Friends of Medieval Dublin Symposium 2000*, 13–52. Dublin. Four Courts Press.

Gowen, M., Ó Néill, J. & Phillips, M. (eds) 2005. *The Lisheen Mine Archaeological Project 1996-98*. Bray. Wordwell.

Gowen, M. with Scally, G. 1996. Summary Report on Excavations at Exchange Street Upper/ Parliament Street, Dublin. Archaeology in Temple Bar, 4. Dublin. Temple Bar Properties.

Graham, B.J. 1993. Early medieval Ireland: Settlement as an indicator of economic and social transformation c. AD 500-1100. In B.J. Graham and L.J. Proudfoot (eds). *An Historical Geography of Ireland*, 19–57. London. Academic Press.

Hackett, L. 2008. Excavations in Moone, Co. Kildare: An example of early medieval heritage protection? *Archaeology Ireland*, 22(2), 35.
—— 2010. The earliest cereal-drying kiln in Ireland? *Seanda* 5, 34–5. Dublin. National Roads Authority.

Hall, V.A. 2000. The documentary and pollen analytical records of the vegetational history of the Irish landscape: AD 200-1650. *Peritia*, 14, 343–69.
—— 2005. The vegetation history of monastic and secular sites in the midlands of Ireland over the last two millennia. *Vegetation History and Archaeobotany*, 15, 1–12.

Halpin, A. 2005. Development phases in Hiberno-Norse Dublin: a tale of two cities. In S. Duffy (ed.) *Medieval Dublin VI: Proceedings of the Friends of Medieval Dublin Symposium 2004*, 94–113. Dublin. Four Courts Press.

Halpin, E. 1988. 1988:45. Dromiskin, Co. Louth, souterrains, later features. www.excavations.ie.
—— 1998. 1998:115. Cathedral Hill, Downpatrick, Co. Down, multi-phase landscape. www.excavations.ie.

—— 2002. 2002:1430. Betaghstown, Bettystown**,** Co. Meath, various. www.excavations.ie.

Hamerow, H. 2002. *Early Medieval Settlements: The Archaeology of Rural Communities in North-West Europe, 400-900.* Medieval History and Archaeology. Oxford. Oxford University Press.
—— 2006. 'Special Deposits' in Anglo-Saxon Settlements. *Medieval Archaeology*, 50, 1–30.

Hamilton-Dyer, S. 2007. Exploitation of birds and fish in historic Ireland. In E. M. Murphy & N. J. Whitehouse (eds). *Environmental Archaeology of Ireland*, 102–18. Oxford. Oxbow.

Hamlin, A. 1985. The archaeology of the Irish church in the eighth century. *Peritia*, 4, 279–99.
—— 2008. *The Archaeology of Early Christianity in the north of Ireland* (T. R. Kerr ed.), British Archaeological Report 460, Oxford. Archaeopress.

Hamlin, A. & Hughes, K. 1997. *The Modern Traveller to the Early Irish Church.* Dublin. Four Courts Press.

Hanley, K. 1997. 1997:351. Fish Lane/Sir Harry's Mall, King's Island, Co. Limerick, urban medieval. www.excavations.ie.

Harbison, P. 1970. How old is Gallarus oratory? *Medieval Archaeology*, 14, 34–59.
—— 1982. Early Irish churches. In H. Lowe (ed.) *Die Iren und Europa im fruheren Mittelater* I, 618–29. Stutgart. Klett Cotta.

Harden, D.B. 1956. Glass vessels in Britain and Ireland, A.D. 400-1000. In D.B. Harden (ed.) *Dark Age Britain: Studies Presented to E.T. Leeds with a Bibliography of his Works*, 132–67. London. Methuen.
—— 1984. Enamel and glass. In C. Gaskell-Brown & A.E.T. Harper. Excavations on Cathedral Hill, Armagh. *Ulster Journal of Archaeology*, 47, 135–6.

Hardy, C. 2005. 2005:579. Coolagh, Co. Galway, Testing; enclosure. www.excavations.ie.

Harper, A.E.T. 1970. 1970:03. Tully td, Co. Antrim, ringfort. www.excavations.ie.

Harrison, S, O'Hare, M, Kinsella, J, Nicholls, J, McNamara, S & Russell, I, 2007. Woodstown 6 Supplementary Research Project. Unpublished report prepared by Archaeological Consultancy Services for the Department of the Environment, Heritage and Local Government.

Hartnett, P.J. and Eogan, G. 1964. Feltrim Hill, Co. Dublin: A Neolithic and early Christian site. *Journal of the Royal Society of Antiquaries of Ireland,* 94, 1–38.

Hayden, A. 1987. 1987:053. Lady Lane/Bakehouse Lane, Custom House Ward, Co. Waterford. www.excavations.ie.
—— 1988. 1988:063. Bakehouse Lane, Custom House Ward Co. Waterford. www.excavations.ie.
—— 1994a. 1994:119. Coarhabeg, Valentia Island, www.excavations.ie
—— 1994b. Interim report on the archaeological excavation of two sites (94E119 and 94E120) on Valentia Island, Co. Kerry. Unpublished report prepared for Dublin Archaeological Projects Ltd.
—— 1997. 1997:111. 32-34 Castle Street, Dublin. www.excavations.ie.
—— 1998. 1998:267. Bray Head, Valentia Island, www.excavations.ie
—— 1999a. 1999:324. Bray Head, Valentia Island, www.excavations.ie
—— 1999b. 1999:405. Maynooth Castle, Maynooth, Co. Kildare. www.excavations.ie.
—— 2000a. 2000:0423. Bray Head (Valentia Island), Co. Kerry. www.excavations.ie.
—— 2000b. Archaeological Excavations of the Keep, Maynooth Castle, Co. Kildare. Unpublished report.
—— 2002. The excavation of pre-Norman defences and houses at Werburgh Street, Dublin: A summary. In S. Duffy (ed.) *Medieval Dublin III: Proceedings of the Friends of Medieval Dublin Symposium 2001*, 44–68. Dublin. Four Courts Press.

Hayes, A. 2006. Archaeological investigation of a souterrain at Tateetra, Dundalk, County Louth. In J. O'Sullivan & M. Stanley (eds). *Settlement, Industry and Ritual: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, September 2005***,** 3, 53–61. Bray. Wordwell.

Healy, P. 1989. 1989:025. Con Colbert Road, Inchicore North, Co. Dublin. www.excavations.ie.

Heckett, E.W. 1997. Textiles, cordage, basketry and raw fibre. In M. F. Hurley, O. M. B. Scully & S. W. J. McCutcheon (eds) *Late Viking Age and Medieval Waterford: Excavations 1986-1992*, 743–60. Waterford. Waterford City.
—— 2003. *Viking Age Headcoverings from Dublin*. Medieval Dublin excavations 1962-81 (Series B). Dublin. Royal Irish Academy.
—— 2010. Textiles that work for their living: a late eleventh-century cloth from Cork, Ireland. In J. Sheehan & D. Ó Corrain (eds). *The Viking Age: Ireland and the West: Papers from the Proceedings of the Fifteenth Viking Congress, Cork, 18–27 August 2005*, 555–64. Dublin Four Courts.

Hencken, H.O.N. 1933. A gaming board of the Viking Age. *Acta Archaeologica*, 4, 85–104.
—— 1936. Ballinderry Crannog no. 1. *Proceedings of the Royal Irish Academy*, 43C, 103–239.
—— 1938. *Cahercommaun: A stone fort in County Clare*. Special volume for the Royal Society of Antiquaries of Ireland.
—— 1942. Ballinderry Crannog no.2. *Proceedings of the Royal Irish Academy*, 47C, 1–76.
—— 1950. Lagore Crannog: An Irish Royal Residence from the Seventh to Tenth Centuries. *Proceedings of the Royal Irish Academy*, 53C, 1–247.

Henderson, J. 1984. The Glass. In R.J. Ivens. Movilla Abbey, Newtownards, County Down: Excavations 1981. *Ulster Journal of Archaeology*, 47, 98–101.
—— 1988a. Electron-microprobe investigation of early Irish glass and glass-making practices. In E.V. Sayre, P. Vandiver, P. Druzik & C. Stevenson (eds). *Materials Issues in Art and Archaeology: Symposium held April 6-8, 1988,* 141–46. Reno, Navada.
—— 1988b. The nature of the Early Christian glass industry in Ireland: Some evidence from Dunmisk fort, Co Tyrone. *Ulster Journal of Archaeology*, 51, 115–26.

Henry, F. 1945. Remains of the early Christian period on Inishkea North, Co. Mayo. *Journal of the Royal Society of Antiquaries of Ireland,* 75, 127–55.
—— 1951a. Habitation sites on Inishkea North, Co. Mayo. *Journal of the Royal Society of Antiquaries of Ireland*, 81, 75–6.
—— 1951b. New monuments from Inishkea North, Co. Mayo. *Journal of the Royal Society of Antiquaries of Ireland*, 81, 65–9.
—— 1952. A wooden hut on Inishkea North, Co. Mayo (Site 3, House A). *Journal of the Royal Society of Antiquaries of Ireland*, 82, 163–78.

Henry, M. 1999. 1999:765. Cloongownagh, Co. Roscommon, enclosure. www.excavations.ie.

Herity, M. 1995. *Studies in the Layout, Buildings, and Art in Stone of Early Irish Monasteries*. London. Pindar Press.

Hickey, L. & O'Brien, W. 2009. Site E: hut-site (B5:F14). In W. O'Brien (ed.) *Local Worlds: Upland Farming and Early Settlement Landscapes in Southwest Ireland,* 257–66. Cork. Collins Press.

Hodder, M. & Barfield, L. 2003. Bronze Age burnt mounds in Britain and Ireland: Interpretation and reconstruction as sweat baths. In M-C. Frere-Sautot (ed.) *Colloque et Experimentation: Le feu domestique et ses structures au Neolithique aux Auges des Metaux. Collections Prehistoires* (9), 59–66. Editions Monique Morgoil.

Hodkinson, B. 1987. A reappraisal of the archaeological evidence for weaving in Ireland in the Early Christian period. *Ulster Journal of Archaeology*, 50, 47–53.
—— 1990. 1990:081. King's Island, John's Ward B, (site 8), Co. Limerick, urban medieval. www.excavations.ie.

—— 1992. 1992:127. 'St. Mary's Cathedral', Co. Limerick, medieval cathedral. www.excavations.ie.
—— 1994. Excavations at Cormac's Chapel, Cashel, 1992 and 1993: A preliminary statement. Tipperary Historical Journal, 7, 167–74.

Holman, K. 2007. *The Northern Conquest: Vikings in Britain and Ireland*. Oxford. Signal Books.

Hope-Taylor, B. 1977. *Yeavering: An Anglo-British Centre of Early Northumbria*. London. HMSO.

Hull, G. & Comber, M. 2008. Caherconnel, Co. Clare, and cashel chronology. *Archaeology Ireland*, 22(4), 30–3.

Hull, G. and Taylor, K. 2005. Archaeology on the route of the Ennis Bypass. *The Other Clare*, 29, 35–41.
—— 2007. N18 Ennis Bypass and N85 Western Relief Road: Summary of the final archaeological results. *The Other Clare*, 31, 23—9.

Hurl, D. 2002. Excavation of an Early Christian cemetery at Solar, County Antrim, 1993. *Ulster Journal of Archaeology*, 61, 37–82.
—— 2003. Excavations in Abbey St. Armagh. *Ulster Journal of Archaeology*, 62, 97–116.

Hurley, M.F. 1990. 1990:108. Arundel Square, Custom House Ward, Co. Waterford. www.excavations.ie.
—— 1992. Late Viking Age settlement in Waterford City. In W. Nolan & T. P. Power (eds). *Waterford History and Society: Interdisciplinary Essays on the History of an Irish county,* 49–72. Dublin. Geography Publications.
—— 1997a. Medieval settlement and architecture: discussion. In R.M. Cleary, M.F. Hurley & E.S. Twohig (eds). *Skiddy's Castle and Christ Church, Cork: Excavations 1974-77 by D.C. Twohig*, 101–107. Cork. Cork Corporation.
—— 1997b. Topography and Development. In M.F. Hurley, O.M.B. Scully & S.W.J. McCutcheon (eds). *Late Viking Age and Medieval Waterford: Excavations 1986-1992*, 7–10. Waterford. Waterford Corporation.
—— 1997c. The defences. In M.F. Hurley, O.M.B. Scully & S.W.J. McCutcheon (eds). *Late Viking Age and Medieval Waterford: Excavations 1986-1992, 20–33*. Waterford. Waterford City.**********
—— 1997d. Artefacts of skeletal material. In M.F. Hurley, O.M.B. Scully & S.W.J. McCutcheon (eds). Late Viking Age and Medieval Waterford: Excavations 1986-1992, 650–98. Waterford. Waterford City.
—— 1997e. General conclusions. In M. F. Hurley, O. M. B. Scully & S. W. J. McCutcheon (eds). Late Viking age and medieval Waterford: Excavations 1986-1992, 894–99. Waterford. Waterford City.
—— 1997f. Sheaths and scabbard. In M.F. Hurley, O.M.B. Scully & S.W.J. McCutcheon (eds). Late Viking Age and Medieval Waterford: Excavations 1986-1992, 736–42. Waterford. Waterford City.
—— 1998. Viking age towns: archaeological evidence from Waterford and Cork. In M.A. Monk & J. Sheehan (eds). Early Medieval Munster: Archaeology, History and Society, 164–77. Cork. Cork University Press.
—— 2001a. 2001:1250. Exchange Street/High Street, Co. Waterford, urban medieval. www.excavations.ie.
—— 2001b. Domestic architecture in medieval Cork and Waterford (11th-17th century). In M. Glaser (ed.). Lubecker Kolloquium zur Stadlarchaologie im Hanseraum II: Der Hausbeau, 15–34. Lubeck.
—— 2003a. A review of domestic architecture in Cork. In R.M. Cleary & M.F. Hurley (eds). Excavations in Cork City 1984-2000, 151–70. Cork. Cork County Council.
—— 2003b. The infrastructure of medieval and post-medieval Cork. In R.M. Cleary & M.F. Hurley (eds). Excavations in Cork City 1984-2000, 182–9. Cork. Cork County Council.
—— 2003c. Wooden Artefacts. In R.M. Cleary & M.F. Hurley (eds). Excavations in Cork City 1984-2000, 349–58. Cork. Cork County Council.
—— 2010. Viking elements in Irish towns: Cork and Waterford. In J. Sheehan & D. Ó Corrain (eds). The Viking Age: Ireland and the West: Papers from the Proceedings of the Fifteenth Viking Congress, Cork, 18-27 August 2005, 154–64. Dublin. Four Courts Press.

Hurley, M.F. & McCutcheon, S.W.J. 1997. Wooden artefacts. In M.F. Hurley, O.M.B. Scully & S.W.J. McCutcheon (eds). Late Viking Age and Medieval Waterford: Excavations 1986-1992, 553–633. Waterford. Waterford City.

Hurley, M.F., Scully, O.M.B., & S.W.J. McCutcheon (eds) 1997. Late Viking Age and Medieval Waterford: Excavations 1986-1992. Waterford. Waterford Corporation.

Hurley, M.F. & Trehy, J. 2003. South Main Street (00E0124). In R.M. Cleary & M.F. Hurley (eds). Excavations in Cork City 1984-2000, 29–30. Cork. Cork County Council.

Ivens, R.J. 1984a. Killyliss Rath, County Tyrone. Ulster Journal of Archaeology (Third Series), 47, 9–35.
—— 1984b. Movilla Abbey, Newtownards, County Down: Excavations 1981. Ulster Journal of Archaeology, 47, 71–108.
—— 1984c. A note on Grass-marked pottery. Journal of Irish Archaeology, 2, 77–9.
—— 1987. The Early Christian monastic enclosure at Tullylish, Co. Down. Ulster Journal of Archaeology (Third Series), 50, 55–121.
—— 1989. Dunmisk fort, Carrickmore, Co. Tyrone: Excavations 1984-1986. Ulster Journal of Archaeology (Third Series), 52, 17–110.

Jackson, J.W. 1933. Preliminary report on excavations at the caves of Ballintoy, Co. Antrim. Irish Naturalists Journal, 4, 230–35.
—— 1934. Further excavations at Ballintoy Caves, Co. Antrim. Irish Naturalists Journal, 104–14.

Johnson, R. 1999. Ballinderry crannóg No. 1: A reinterpretation. Proceedings of the Royal Irish Academy, 99C, 23–71.

Johnston, E. 2001. Powerful women or patriarchal weapons? Two medieval Irish saints. Peritia, 15, 302–10.

Johnston, P. forthcoming. The crop economies of recently excavated sites at Charlesland, Co. Wicklow: Investigating chronological variation.

Johnston, P. & Tierney, J. 2008. Buildings through the ages in north Cork. Seanda 3, 42–4. Dublin. National Roads Authority.

Jones, C. 1999. 1999:701. IDA Business Park, Kilkarn, Athlumney, Navan, Co. Meath, souterrains. www.excavations.ie.

Jones, M. 2004. 2004:0703. Mackney, Co. Galway, ringfort. www.excavations.ie.

Jope, E.M. 1966. An Archaeological Survey of County Down. Belfast. HMSO.

Jope, E.M. and Ivens, R.J. 1998. The rath at Ballymacash, County Antrim. Proceedings of the Royal Irish Academy, 98C, 101–23.

Kavanagh, J. 2006. 2006:1499. Killegland, Ashbourne, Co. Meath. www.excavations.ie.

Keane, M. 1995. Lough More, Co. Mayo: The crannog. Irish Archaeological Wetland Unit Transactions, 4, 167–82.

Keeley, V. 1985. 1985:26. Scholarstown, Co. Dublin, ringfort. www.excavations.ie
—— 1990. 1990:113. Marlinstown, Co. Westmeath, ringfort. www.excavations.ie
—— 1991. 1991:126. Marlinstown, Co. Westmeath, ringfort. www.excavations.ie

Kelleher, H. 2002. 2002:0291. Washington Street, Cork. www.excavations.ie.
—— 2004. 2004:0244. 35-39 Main Street South, Cork. www.excavations.ie.

——— forthcoming. Excavations for the main Drainage Scheme, Cork.

Kelly, A. 2010. The discovery of Phocaean Red Slip Ware (PRSW) Form 3 and Bii ware (LR1 amphorae) on sites in Ireland: An analysis within a broader framework. Proceedings of the Royal Irish Academy, 110C, 35–88.

Kelly, E.P. 1976. 1976:020. Randalstown, Co. Meath. www.excavations.ie.
——— 1977a. A souterrain at Clongill, Co. Meath. Ríocht na Mídhe, 6(3), 62–4.
——— 1977b. A burial at Ferganstown and Ballymacon, Co. Meath. Ríocht na Mídhe, 6(3), 65–7.
——— 1977/79. 1977/79:059, Betaghstown**,** Co. Meath, Iron Age cemetery. www.excavations.ie.
——— 2010. The Vikings in Connemara. In C.M. Sheehan & D. Ó Corrain (eds). The Viking Age: Ireland and the West: Papers from the Proceedings of the Fifteenth Viking Congress, Cork, 18-27 August 2005, 174–87. Dublin. Four Courts Press.

Kelly, E.P. & Mass, J. 1995. Vikings on the Barrow: Dunrally Fort, a possible Viking longphort in County Laois. Archaeology Ireland, 9(3), 30–2.
——— 1999. The Vikings in the Kingdom of Laois. In P.G. Lane & W. Nolan (eds). Laois: History and Society: Interdisciplinary Studies in the History of an Irish County, 123–59. Dublin. Geography Publications.

Kelly, E.P. & O'Donovan, E. 1998. A Viking Longphort near Athlunkard, Co. Clare. Archaeology Ireland, 12(4), 13–6.

Kelly, F. 1988. A guide to Early Irish Law. Dublin. Dublin Institute for Advance Studies.
——— 1997. Early Irish Farming. Dublin. Dublin Institute for Advanced Studies.

Kendrick, T.D. 1939. Gallen Priory Excavations, 1934-5. Journal of the Royal Society of Antiquaries of Ireland, 69, 1–20.

Kenward, H.K. & Allison, E.P. 1994. A preliminary view of the insect assemblages from the early Christian rath site at Deer Park Farms, Northern Ireland. In J. Rackham (ed.). Environment and Economy in Anglo-Saxon England, 89–107. York. Council for British Archaeology Research Report, 89.

Kenny, N. 2010. Charcoal Production in medieval Ireland. In M. Stanley, E. Danaher & J. Eogan (eds). Creative Minds: Production, Manufacturing and Invention in Ancient Ireland: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, August 2009, 7, 99–115. Dublin. Wordwell.

Kerr, T.R. 2007. Early Christian Settlement in North-West Ulster. British Archaeological Series 430. Oxford. Tempus Reparatum.

Kerr, T.R., Harney, L., Kinsella, J., O'Sullivan, A. and McCormick, F. 2009. Early Medieval Dwellings and Settlements in Ireland, A.D. 400-1100: Draft of Vol. 2 Gazetteer of Site Descriptions. Unpublished Early Medieval Archaeology Project (EMAP) Report 3.2 for the Heritage Council.

Kieran, E. 2004. 2004:1186. Betaghstown**,** Co. Meath, prehistoric enclosing ditch.
www.excavations.ie.

King, H.A. 1992. Excavations at Clonmacnoise. Archaeology Ireland, 6(3), 12–4.
——— 1995. 1995:240. New graveyard, Clonmacnoise, Co. Offaly, early Christian settlement. www.excavations.ie.
——— 2009. The economy and industry of early medieval Clonmacnoise: A preliminary view. In N. Edwards (ed.). The Archaeology of the Early Medieval Celtic Churches, 333–49. Leeds. Maney Publishing.

Kinsella, J. 2005. Locating the poor and unfree of early medieval Ireland. Medieval Settlement Research Group Annual Report, 20, 25–9.

—— 2008. New discoveries and fresh insights: Researching the early medieval archaeology of the M3, Co. Meath. In J. O'Sullivan & M. Stanley (eds). Roads, Rediscovery and Research: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, August 2007, 5, 95–107. Bray. Wordwell.
—— 2010. A new Irish early medieval site type? Exploring the 'recent' archaeological evidence for non-circular enclosed settlement and burial sites. Proceedings of the Royal Irish Academy, 110C, 89–132.

Knott, E. 1975. Togail Bruidne Da Derga (ed.). Medieval and Modern Irish Series 8. Dublin Stationery Office.

Lafferty, S., Commins, P., & Walsh, J.A. 1999. Irish Agriculture in Transition: A Census Atlas of Agriculture in the Republic of Ireland. Dublin. Teagasc.

Laing, L. 2006. The Archaeology of Celtic Britain and Ireland: c. AD 400-1200. Cambridge. Cambridge University Press.

Lane, S. & Sutton, D. 2003. 3 and 5 Barrack Street (99E650). In R.M. Cleary & M.F. Hurley (eds). Excavation in Cork City 1984-2000, 5–12. Cork. Cork County Council.

Larsson, E. 2004a. 2004:0644. Kilgobbin Lane/Enniskerry Road, Stepaside, Co. Dublin, early medieval. www.excavations.ie
—— 2004b. 2004:0645. Kilgobbin Lane/Enniskerry Road, Stepaside, Co. Dublin, early medieval. www.excavations.ie
—— 2004c. 2004:0646. Kilgobbin Lane/Enniskerry Road, Stepaside, Co. Dublin, early historic settlement/fulacht fiadh. www.excavations.ie

Lavelle, D., Crumlish, R., Gallagher, B., Jones, J. & Morahan, L. 1994. An Archaeological Survey of Ballinrobe and District (including Lough Mask and Lough Carra). Castlebar. Lough Mask and Lough Carra Tourism Development Association.

Lawless, C. 1992. Lough More, Bofeenaun, Co. Mayo: Crannog, fulachta fiadh, deer traps and associated archaeological sites. Cathair Na Mart, 12(1), 13–31.

Lawlor, H.C. 1915/16. Some notes on the investigation of dwelling places of prehistoric man in N.E. Ireland. Proceedings of the Belfast Natural History & Philosophical Society, 31–61.
—— 1916/18. Prehistoric Dwelling-Places. Proceedings of the Belfast Natural History & Philosophical Society, 77–103.
—— 1918–1920. Some investigations on the souterrain. Proceedings of the Royal Irish Academy, 35C, 214–217.
—— 1925. The monastery of Saint Mochaoi of Nendrum Belfast. The Belfast Natural History and Philosophical Society.

Lehane, J. 2004. 2004:1187. Bettystown, Co. Meath, prehistoric; early medieval. www.excavations.ie.

Leister, I. 1976. Peasant Openfield Farming and its Territorial Organisation in Co. Tipperary. Marburg. Lahn.

Lennon, A. M. 1993. Excavation of a ringfort, Raheens I, near Carrigaline, Co. Cork. Journal of the Cork Historical and Archaeological Society, 98, 75–89.
—— 1994. Summary report on Excavation of Ringfort, Raheens No. 2 near Carrigaline, Co. Cork. Journal of the Cork Historical and Archaeological Society, 99, 47–65.
—— 2000. 2000:0849. Cloongownagh, Co. Roscommon, enclosure. www.excavations.ie.
—— 2006. Excavation of a ringfort at Leggetsrath West, Co. Kilkenny. In J. O'Sullivan & M. Stanley (eds). Settlement, Industry and Ritual: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, September 2005**,** 3, 43–52. Bray. Wordwell.

Lennon, A.M. & O'Hara, R. forthcoming. Archaeological excavation of an early medieval enclosure at Leggetsrath West, Co. Kilkenny. In C. Corlett & M Potterton (eds). Settlement in Early Medieval Ireland in Light of Recent Archaeological Excavations, 103–17. Bray. Wordwell.

Limbert, D. 1996. Irish ringforts: A review of their origins. The Archaeological Journal, 153, 243–89.

Linnane, S. & Kinsella, J. 2009a. Report on the Archaeological Excavation of Baronstown 1, Co. Meath. Unpublished report prepared for Archaeological Consultancy Services Ltd. Available on www.m3motorway.ie
—— 2009b. Military lords and defensive beginnings: a preliminary assessment of the social role of an impressive rath at Baronstown. In M. Deevy and D. Murphy (eds) Places Along the Way: First Findings on the M3, 101–22. National Roads Authority Scheme Monograph Series 5. Bray. Wordwell.

Liversage, G.D. 1968. Excavations at Dalkey Island, Co. Dublin 1956-59. Proceedings of the Royal Irish Academy, 66C, 53–233.

Long, H. 1994. Three settlements of Gaelic Wicklow 1169-1600: Rathgall, Ballinacor and Glendalough. In K. Hannigan & W. Nolan (eds). Wicklow History & Society: Interdisciplinary Essays on the History of an Irish County, 248–256. Dublin. Geography Publications.

Lucas, A.T. 1956. Footwear in Ireland. Journal of the Louth Archaeological and Historical Society, 13(4), 309–394.
—— 1965. Washing and bathing in ancient Ireland. Journal of the Royal Society of Antiquaries of Ireland, 95, 65–114.
—— 1971/73. Souterrains: The literary evidence. Béaloideas, 39–41, 165–191.
—— 1989. Cattle in ancient Ireland. Kilkenny. Boethius Press.

Lynch, A. & Manning, C. 1990. Dublin Castle: The archaeological project. Archaeology Ireland, 4(2), 65–9.
—— 2001. Excavations at Dublin Castle, 1985–7. In S. Duffy (ed.). Medieval Dublin II: Proceedings of the Friends of Medieval Dublin Symposium 2000, 160–204. Dublin. Four Courts Press.

Lynch, R. 2000. 2000:0774. Platin, Co. Meath. www.excavations.ie.
—— 2001. 2001:1022. Duleek Road, Platin, Co. Meath. www.excavations.ie.

Lynn, C. J. 1975a. The medieval ringfort: An archaeological chimera? Irish Archaeological Research Forum, 29, 29–36.
—— 1975b. The dating of raths: an orthodox view. Ulster Journal of Archaeology, 38, 45–7.
—— 1977. Recent archaeological excavations in Armagh City: An interim summary. *Seanchas Ardmhacha*, 8(2), 275–80.
—— 1978a. Early Christian period domestic structures: a change from round to rectangular plans? Irish Archaeological Research Forum, 5, 29–45.
—— 1978b. A rath in Seacash Townland, County Antrim. Ulster Journal of Archaeology, 41, 55–74.
—— 1977/79. 1977-79:0003. Ballymurphy, Co. Antrim. www.excavations.ie.
—— 1981/82. The excavation of Rathmullan, a raised rath and motte in County Down. Ulster Journal of Archaeology, 44/45, 65–171.
—— 1983a. An early Christian period site in Ballybrolly, County Armagh. Ulster Journal of Archaeology, 46, 47–51.
—— 1983b. Some early ringforts and crannogs. Journal of Irish Archaeology, 1, 47–58.
—— 1984. Some fragments of exotic porphyry found in Ireland. Journal of Irish Archaeology, 2, 19–32.
—— 1985. Excavations at Gransha mound, County Down, 1972 and 1982: Interim report. Ulster Journal of Archaeology, 48, 81–90.
—— 1985/86. Lagore, County Meath and Ballinderry No. I, County Westmeath crannogs: Some possible structural reinterpretations. Journal of Irish Archaeology, 3, 69–73.
—— 1987. Deer Park Farms. Current Archaeology, 113, 193–98.

—— 1988a. Ulster's oldest wooden houses: Deer Park Farms, Co. Antrim. In A. Hamlin & C.J. Lynn (eds). Pieces of the Past: Archaeological Excavations by the Department of the Environment for Northern Ireland 1970-1986, 44–7. Belfast. HMSO.
—— 1988b. A thousand year-old farm: Ballywee, Co Antrim. In A. Hamlin & C.J. Lynn (eds). Pieces of the Past: Archaeological Excavations by the Department of the Environment for Northern Ireland 1970-1986, 32–5. Belfast. HMSO.
—— 1988c. Civil Engineering in the early Christian period: Big Glebe, Co. Londonderry. In A. Hamlin & C.J. Lynn (eds). Pieces of the Past: Archaeological Excavations by the Department of the Environment for Northern Ireland, 1970-1986, 41–4. Belfast. HMSO.
—— 1988d. The story in a mound: Gransha, Co. Down. In A. Hamlin & C.J. Lynn (eds). Pieces of the Past: Archaeological Excavations by the Department of the Environment for Northern Ireland 1970-1986, 38–41. Belfast. HMSO.
—— 1988e. Excavations at 46-48 Scotch Street, Armagh, 1979-80. Ulster Journal of Archaeology (Third Series), 51, 69–84.
—— 1989. Deer Park Farms: A visit to an early Christian settlement. Current Archaeology, 113, 193–98.
—— 1991. Early medieval houses. In M. Ryan (ed.). The Illustrated Archaeology of Ireland, 126–31. Dublin. Town House and Country House.
—— 1994. Houses in rural Ireland, A. D. 500-1000. Ulster Journal of Archaeology, 57, 81–94.

Lynn, C.J. & McDowell, J.A. 1988a. A note on the excavation of an early Christian period settlement in Deer Park Farms, Glenarm, 1984–1987. The Glynns, 16, 2–16.
—— 1988b. The Oldest City in Ireland: Armagh. In A. Hamlin & C.J. Lynn (eds). Pieces of the Past: Archaeological Excavations by the Department of the Environment for Northern Ireland 1970-1986, 23–4. Belfast. HMSO.
—— 1989. Deer Park Farms Report Project IAPA Newsletter: Bulletin of the Irish Association of Professional Archaeologists, 10, 23–4.
—— forthcoming. Excavations at an early Christian settlement at Deer Park Farms, Glenarm, Co. Antrim.

Macalister, R.A.S. 1935. The excavation of Kiltera, Co. Waterford. Proceedings of the Royal Irish Academy, 43C, 1–16.
—— 1943. Two ringforts submerged by the Pollaphuca reservoir. Journal of the Royal Society of Antiquaries, 73, 145–9.

Macalister, R.A.S. & Praeger, R. L. 1928. Report on the Excavation of Uisneach. Proceedings of the Royal Irish Academy, 38C, 69–127.
—— 1929. Report on excavation recently conducted in Killeen Cormac, Co. Kildare. Proceedings of the Royal Irish Academy, 38C, 247–61.
—— 1931. The excavation of an ancient structure on the townland of Togherstown, Co. Westmeath. Proceedings of the Royal Irish Academy, 40C, 54–83.

MacDonagh, M. 2005. Valley bottom and hilltop: 6,000 years of settlement along the route of the N4 Sligo Inner Relief Road. In J. O'Sullivan & M. Stanley (eds) Recent Archaeological Discoveries on National Road Schemes 2004: Proceedings of a Seminar for the Public, Dublin, September 2004, 2, 1–7. Bray. Wordwell.

MacGregor, A. 1985. Bone, Antler, Ivory and Horn: The Technology of Skeletal Materials Since the Roman Period. London. Crook Helm.

MacLean, D. 1995. The status of the sculptor in Old-Irish law and the evidence of the crosses. Peritia, 9, 125–55.

MacNeill, E. 1923. Ancient Irish law: The law of status or franchise. Proceedings of the Royal Irish Academy, 36C, 265–316.

McCarthy, A. 1986. 1986:29. Ballybunion, Co. Kerry. www.excavations.ie.

McCarthy, M. 1997. Faunal remains: Christ Church. In R.M. Cleary, M.F. Hurley & E. Shee Twohig (eds). Skiddy's Castle and Christ Church, Cork: Excavations 1974-77 by D. C. Twohig, 349–59. Cork. Cork Corporation.
—— 2003. The faunal remains. In R. M. Cleary & M. F. Hurley (eds). Cork City Excavations 1984-2000, 375–89. Cork. Cork City Council.

McConway, C. 1995. 1995:220. Haggardstown, Co. Louth, souterrain. www.excavations.ie.
—— 2001. 2001:1007. Ninch, Laytown, Co. Meath. www.excavations.ie.
—— 2002a. 2002:1489. Ninch, Laytown, Co. Meath. www.excavations.ie.
—— 2002b. Excavations at Laytown reveal coastal settlement in Meath. Archaeology Ireland, 16(1), 16–9.
—— 2010. Successive early medieval enclosed settlements at Ninch, Co. Meath. In C. Corlett and M. Potterton (eds). Death and Burial in Early Medieval Ireland in Light of Recent Archaeological Excavations, 157–71. Dublin. Wordwell.

McCormick, F. 1983. Dairying and beef production in early Christian Ireland: The faunal evidence. In T. Reeves-Smyth & F. Hammond (eds.). Landscape Archaeology in Ireland, 253–67. Oxford. Tempus Reparatum.
—— 1984. The animal bones. In R.J. Ivens. Killyliss Rath, County Tyrone. Ulster Journal of Archaeology (Third Series), 47, 9–35.
—— 1986. The animal bones. In C. Manning. Archaeological excavation of a succession of enclosures at Millockstown, Co. Louth. Proceedings of the Royal Irish Academy, 86C, 135–81.
—— 1987. The animal bones. In C. Manning. Excavations at Moyne graveyard, Shrule, Co. Mayo. Proceedings of the Royal Irish Academy, 87C, 63–8.
—— 1995. Cows, ringforts and the origins of early Christian Ireland, Emania, 13, 33–7.
—— 1997. The animal bones. In M.F. Hurley, O.M.B. Scully & S.W.J. McCutcheon (eds). Late Viking Age and Medieval Waterford: Excavations 1986-1992, 819–53. Waterford. Waterford City.
—— 2007. Mammal bones from prehistoric Irish sites. In E.M. Murphy & N.J. Whitehouse (eds). Environmental Archaeology in Ireland, 77–101. Oxford. Oxbow.
—— 2008. The decline of the cow: Agricultural and settlement change in early medieval Ireland. Peritia, 20, 210–25.

McCormick, F. & Crone, F. 2000. A destroyed enclosure at Site 5, Marshes Upper, County Louth. Journal of the County Louth Archaeological and Historical Society, 24(4), 553–62.

McCormick, F., Gibbons, M., McCormac, F.G. & Moore, J. 1996. Bronze Age to medieval coastal shell middens near Ballyconneely, co. Galway. Journal of Irish Archaeology, 7, 77–84.

McCormick, F. & MacDonald, P. 2010. Dunnyneil Island: an early medieval emporium in Strangford Lough. In E. Murray and P. Logue (eds). Battles, Boats and Bones: Archaeological Discoveries in Northern Ireland, 1987-2008, 51–4. Norwich. The Stationery Office.

McCormick, F. & Murray, E. 1997. 1997:197. Doonloughan, Co. Galway. www.excavations.ie.
—— 2007. Excavations at Knowth 3: Knowth and the Zooarchaeology of Early Christian Ireland. Dublin. Royal Irish Academy.

McClintock, H.F. 1950. Old Irish and Highland Dress. Dundalk Dundalgan Press.

McCutcheon, S.W.J. 1997a. Bakehouse Lane, Insula South. In M.F. Hurley, O.M.B. Scully & S.W.J. McCutcheon (eds). Late Viking Age and Medieval Waterford: Excavations 1986-1992, 164–75. Waterford. Waterford City.
—— 1997b. Olaf Street, High Street and Arundel Square. In M.F. Hurley, O.M.B. Scully & S.W.J. McCutcheon (eds). Late Viking Age and Medieval Waterford: Excavations 1986-1992, 137–53. Waterford. Waterford City.
—— 1997c. The stone artefacts. In M.F. Hurley, O.M.B. Scully & S.W.J. McCutcheon (eds). Late Viking Age and Medieval Waterford: Excavations 1986-1992, 404–31. Waterford. Waterford City.

—— 2003. 11-13 Washington Street (E625). In R.M. Cleary & M.F. Hurley (eds). Excavations in Cork City, 1984-2000, 45–54. Cork. Cork County Council.

McCutcheon, S.W.J. and Hurley, M.F. 1997. Insula North. In M.F. Hurley, O.M.B. Scully & S.W.J. McCutcheon (eds). Late Viking Age and Medieval Waterford: Excavations 1986-1992, 154–63. Waterford. Waterford City.

McDermott, C. 1998a. 1998:488. Frenchgrove, Co. Mayo, crannog. www.excavations.ie.
—— 1998b. 1998:553. Lemanaghan, Co. Offaly, trackway. www.excavations.ie.

McDowell, J.A. 1987. Excavation in an ecclesiastical enclosure at Doras, county Tyrone. Ulster Journal of Archaeology, 50, 137–54.

McErlean, T.C. 2007a. The mills in their monastic context, the archaeology of Nendrum reassessed. In T.C. McErlean & N. Crothers (eds). Harnessing the Tides: The Early Medieval Tide Mill at Nendrum Monastery, Strangford Lough, 324–404. Norwich. The Stationery Office.
—— 2007b. Timber and woodland. In T.C. McErlean & N. Crothers (eds). Harnessing the Tides: The Early Medieval Tide Mill at Nendrum Monastery, Strangford Lough, 250–54. Norwich. The Stationery Office.

McErlean, T.C. & Crothers, N. (eds) 2007. Harnessing the Tides: The Early Medieval Tide Mill at Nendrum Monastery, Strangford Lough. Norwich. The Stationery Office.
—— 2007a. The first mill, c. AD 619. In T.C. McErlean & N. Crothers (eds). Harnessing the Tides: The Early Medieval Tide Mill at Nendrum Monastery, Strangford Lough, 25–77. Norwich. The Stationery Office.
—— 2007b. The second mill, c. AD 789. In T.C. McErlean & N. Crothers (eds). Harnessing the Tides: The Early Medieval Tide Mill at Nendrum Monastery, Strangford Lough, 80–113. Norwich. The Stationery Office.

McErlean, T.C., McConkey, R., & Forsythe, W. 2002. Strangford Lough: An Archaeological Survey of the Maritime Cultural Landscape. Belfast. Blackstaff Press.

McGrail, S. 1976. Problems in Irish nautical archaeology. Irish Archaeological Research Forum, 3(1), 21–31.
—— 1993. Medieval Boat and Ship Timbers from Dublin. Medieval Dublin Excavations, Series B. Dublin. National Museum of Ireland
—— 1997. The boat timbers. In M.F. Hurley, O.M.B. Scully & S.W.J. McCutcheon (eds). Late Viking Age and Medieval Waterford: Excavations 1986-1992, 636–42. Waterford. Waterford City.

McKinstry, L. 2008. Everyday life in early medieval Galway. Seanda 3, 12. Dublin. National Roads Authority.

McKitterick, R. 2008. Charlemagne: The Formation of a European Identity. Cambridge. Cambridge University Press.

McLoughlin, C. 1999. 1999:610. Mullagharlin/Haggardstown, Dundalk, Co. Louth.

McMahon, M. 2002. Early medieval settlement and burial outside the enclosed town: Evidence from archaeological excavations at Bride Street, Dublin. Proceedings of the Royal Irish Academy, 102(C), 67–135.

McNeill, T.E. 1991/92. Excavations at Dunsilly, County Antrim. Ulster Journal of Archaeology, 54–55, 78–112.

—— 1997. Castles in Ireland: Feudal Power in a Gaelic World. London Routledge.

McQuillan, L. & Long, C. 1999. 1999:018, Tullaghgarley, Co. Antrim. www.excavations.ie.

McSparron, C. 2001a. The excavation of an unenclosed house of the early Christian period at Drumadonnell, County Down. Ulster Journal of Archaeology, 60, 47–56.
—— 2001b. 2001:014. Markstown, Co. Antrim. www.excavations.ie.
—— 2007. Excavations at Terryhoogan, Co. Armagh. Ulster Journal of Archaeology, 66, 120–31.

McSparron, C. & Williams, B.B. 2004. A brief interim account of excavations at Drumadoon, Co. Antrim, 2003. The Glynns: Journal of the Glens of Antrim Historical Society, 32, 9–13.
—— 2009. The excavation of an early Christian rath with later medieval occupation at Drumadoon, Co. Antrim. Proceedings of the Royal Irish Academy, 109C, 105–64.
—— 2010. Bell, bank and souterrain: Excavations at Drumadoon, county Antrim. In E. Murray & P. Logue (eds). Battles, Boats and Bones: Archaeological Discoveries in Northern Ireland, 1987-2008, 13–6. Norwich The Stationery Office.

Mallory, J.P. & T.E. McNeill 1991. The Archaeology of Ulster From Colonization to Plantation. Belfast. The Institute of Irish Studies, Queen's University of Belfast.

Mallory, J.P. & Woodman, P.C. 1984. Oughtymore: An Early Christian shell midden. Ulster Journal of Archaeology, 47, 51–62.

Manning, C. 1984. The excavation of the Early Christian enclosure of Killederdadrum in Lackenavorna, Co. Tipperary. Proceedings of the Royal Irish Academy, 84C, 237–68.
—— 1986. Archaeological excavation of a succession of enclosures at Millockstown, Co. Louth. Proceedings of the Royal Irish Academy, 86C, 135–81.
—— 1987. Excavation at Moyne graveyard, Shrule, Co Mayo. Proceedings of the Royal Irish Academy, 87C, 37–70.
—— 1989. 1989:078. 'Clonmacnois', Clonmacnois, Co. Offaly. www.excavations.ie.
—— 2009. A suggested typology for Pre-Romanesque Stone Churches in Ireland. In N. Edwards (ed.). The Archaeology of the Early Medieval Celtic Churches: Proceedings of a Conference on the Archaeology of the Early Medieval Celtic Churches, September 2004, 265–79. Leeds. Maney.

Marshall, J.W. & Rourke, G.D. 2000. High Island: An Irish Monastery in the Atlantic . Dublin. Town House & Country House.

Marshall, J.W. and Walsh, C. 2005. Illaunloughan Island: An Early Medieval Monastery in County Kerry. Bray. Wordwell.

Martin, F.X. 1993. Allies and an overlord, 1169-72. In A. Cosgrove (ed.). A New History of Ireland: Medieval Ireland, 1169-1534, II, 67–97. Oxford. Clarendon.

May, A.M. 1943. Portbraddan Cave, County Antrim. Ulster Journal of Archaeology, 6, 39–60.

Meenan, R. 1996. 1996:142. Vicinity of St Maelruan's (Docfield development), Tallaght, Co. Dublin, ecclesiastical enclosure. www.excavations.ie.
—— 2002. Archaeological excavations at 16-17 Cook Street, Dublin. In S. Duffy (ed.). Medieval Dublin III: Proceedings of the Friends of Medieval Dublin Symposium 2001, 128–39. Dublin. Four Courts Press.
—— 2004. The excavation of pre-Norman burials and ditch near St. Michan's church, Dublin. In S. Duffy (ed.). Medieval Dublin V: Proceedings of the Friends of Medieval Dublin Symposium 2003 91–110. Dublin. Four Courts Press.

Meighan, I.G. 2007. Sourcing the Nendrum Millstone Material. In T.C. McErlean & N. Crothers (eds). Harnessing the Tides: The Early Medieval Tide Mill at Nendrum Monastery, Strangford Lough, 204–5. Norwich. The Stationery Office.

Meyer, K. 1894. The death of the Three Sons of Diarmait mac Cerrbeóil. In K. Meyer (ed.). Hibernica Minora (Anecdota Oxoniensia), 70–5. Oxford. Clarendon Press.

Mitchell, F & Ryan, M. 1998. Reading the Irish Landscape. Dublin. Town House.

Mitchell, F.A. Hayden, A. & Walsh, C. 1998. A tattered agricultural palimpsest: Ten centuries of farming on Bray Head, Valencia Island, Co. Kerry. Unpublished report prepared for Archaeological Projects Ltd.

Moloney, A & Keane, M. 1992. 1992:141, Bofeenaun, Co. Sligo, crannóg and fulachta fiadh. www.excavations.ie.

Moloney, C. 2003. 2003:0188, Carrigrohane, Co. Cork. www.excavations.ie**.**

Mongey, L. 1933. Ringfort and souterrain at Ballykilmurry, Parish of Kilrossanty, Co. Waterford (note). Journal of the Royal Society of Antiquaries of Ireland, 63, 248–50.

Monk, M. 1986. Evidence from macroscopic plant remains from crop husbandry in prehistoric and early historic Ireland. Journal of Irish Archaeology, 3, 31–6.
—— 1988. Excavations at Lisleagh Ringfort, north Cork. Archaeology Ireland 2(2), 57–60.
—— 1994. Post-Roman drying kilns and the problem of function: a preliminary statement. In D. Ó Corráin (ed.) Irish Antiquity: Essays and Studies Presented to Professor M.J. O'Kelly, 216–30. Dublin. Four Courts Press.
—— 1995. A tale of two ringforts: Lisleagh I and II. Journal of the Cork Historical and Archaeological Society, 100, 105–16.

Monk, M. & Kelleher, E. 2005. An assessment of the archaeological evidence for Irish corn drying kilns in the light of the results of archaeological experiments and archaeobotanical studies. Journal of Irish Archaeology, 14, 77–114.

Monk, M., Tierney, J., & Hannon, M., 1998. Archaeobotanical studies and early medieval Munster. In Monk, M. & Sheehan, J. (eds). Early Medieval Munster: Archaeology, History and Society, 65–75. Cork. Cork University Press.

Moore, D. 2001a. 2001:1055. Site 2, Sheephouse, Co. Meath, multi-phase habitation site. www.excavations.ie.
—— 2001b. 2001:858. Haggardstown, Dundalk, Co. Louth, multi-period settlement/souterrain?. www.excavations.ie.

Moore, F. 2007. Ardfert Cathedral: Summary of Excavation Results. Dublin. Stationery Office.

Moran, J. 1999. 1999:0852. 17-18 Broad Street, Waterford. www.excavations.ie.

Morrison, M. 1953. Report on charcoal and carbonised seeds. In V.B. Proudfoot. Excavation of a rath at Boho, Co. Fermanagh. Ulster Journal of Archaeology, 16, 53–4.

Moss, R.J. 1927. A chemical examination of the crucibles in the collection of Irish antiquities in the Royal Irish Academy. Proceedings of the Royal Irish Academy, 37C, 175–93.

Mossop, M. 2002a. Archaeological monitoring and investigations. Dundalk Institute of Technology, Co. Louth. Unpublished report prepared for Archaeological Consultancy Services Ltd.
—— 2002b. Archaeological Investigation, Area 16. Dundalk Institute of Technology, Co. Louth. Unpublished report prepared for Archaeological Consultancy Services Ltd.
—— 2002c. Archaeological Investigation, Area 17. Dundalk Institute of Technology, Co. Louth. Unpublished report prepared for Archaeological Consultancy Services Ltd.

Mount, C. 1995. Excavations at Killanully, County Cork. Proceedings of the Royal Irish Academy, 95C, 119–57.
—— 2002. The promontory fort, inhumation cemetery and sub-rectangular enclosure at Knoxspark, Co, Sligo. In M.A. Timoney (ed.). A Celebration of Sligo: First Essays for Sligo Field Club, 103–16. Sligo. Sligo Field Club.
—— 2010. Excavation of an early medieval promontory fort and enclosed cemetery at Knoxspark, Co. Sligo (with a contribution by Niamh Whitfield). In C. Corlett and M. Potterton (eds). Death and Burial in Early Medieval Ireland in Light of Recent Archaeological Excavations, 186–216. Dublin. Wordwell.

Movius, H.L. 1935. Kilgreany Cave, County Waterford. Journal of the Royal Society of Antiquaries of Ireland, 65, 254–96.

Mullins, G. 2005. 2005:644. Rahally, Co. Galway, multi-period. www.excavations.ie.
—— 2008. Three thousand years of human activity at Rahally, Co. Galway. In J. O'Sullivan & M. Stanley (eds). Roads, Rediscovery and Research: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, August 2007, 5, 25–36. Bray. Wordwell.

Murphy, Deirdre. 1998. Archaeological excavation of a souterrain at Farrendreg, Dundalk, County Louth. Journal of the Louth Archaeological and Historical Society, 24(2), 261–80.
—— 2003. 2003:347. Skahanagh North 3, Co. Cork, enclosure and barrow. www.excavations.ie.
—— 2004. 2004:1186. Betaghstown**,** Co. Meath, prehistoric enclosing ditch. www.excavations.ie.
—— 2005. 2005:1158. Betaghstown**,** Co. Meath, habitation site. www.excavations.ie.
—— 2006. Final report on archaeological excavation of Skahanagh North 3 (03E1132), Co. Cork. Unpublished report prepared for Archaeological Consultancy Services Ltd.

Murphy, Donald. 2003. Excavation of an early monastic enclosure at Clonmacnoise. In H. King (ed.) Clonmacnoise Studies, Vol. 2, 1–35. Dublin. Wordwell.

Murphy, D. & Conway, M. 1999. 1999:590. Dromiskin, Co. Louth, cemetery and possible trackways. www.excavations.ie.

Murphy, D. & Danaher, E. 2001. N18/N19 Ballycasey-Dromoland Road Improvement Scheme, Contract 2: Interim report on archaeological excavation of Site AR27 (Killulla townland). Unpublished report prepared for Archaeological Consultancy Services Ltd.

Murphy, D. & Rathbone, S. 2006. Excavations of an early medieval vertical watermill at Killoteran, County Waterford. In J. O'Sullivan & M. Stanley (eds). Settlement, Industry and Ritual: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, September 2005**,** 3, 19–28. Bray. Wordwell.

Murphy, E. 2007. Osteological report on the mammal bones from the excavations. In T.C. McErlean & N. Crothers (eds). Harnessing the Tides: The Early Medieval Tide Mill at Nendrum Monastery, Strangford Lough, 256–84. Norwich. The Stationery Office.

Murphy, T.F. and O'Cuileanain, C. 1961. A ringfort at Oldcourt, Co. Cork. Journal of the Cork Historical and Archaeological Society, 66, 79–92.

Murray, E.V. 2007. Molluscs and middens. In E.M. Murphy & N.J. Whitehouse (eds). Environmental Archaeology of Ireland, 119–35. Oxford. Oxbow.

Murray, H. 1979. Documentary evidence for domestic buildings in Ireland, c.400-1200 in the light of archaeology. Medieval Archaeology, 23, 81–97.
—— 1983. Viking and Early Medieval Buildings in Dublin. BAR British Series 119. Oxford. Archaeopress.

Murtagh, B. 1993. The Kilkenny Castle archaeological project, 1990–1993: Interim Report. Old Kilkenny Review (Second Series), 4(5), 1101–17.

Murtagh, B., & Hurley, M. F. 1989. 1989:093. Custom House B Ward. www.excavations.ie.

Murtagh, D. 1989. 1989:034. 1-3 High Street, Wood Quay Ward, Co. Dublin. www.excavations.ie.

Mytum, H. 1992. The Origins of Early Christian Ireland. London. Routledge.

Neill, K. 2008. An Archaeological Survey of County Armagh. Belfast. Stationery Office.

Nelis, E. 2005. 2005:007. St. Patrick's Church, Armoy, Co. Antrim. www.excavations.ie.

Newman, C. 1986. The archaeology of Ballinderry Lough. Unpublished MA thesis, NUI.

Nicholls, T. 2005. The use of domestic space in early medieval round houses: An experimental archaeological approach. Trowel, 10, 27–32.

Ní Ghabhláin, S. 1997. 1997:221. Mainistir Chiaráin, Oghill, Inis Mór, Co. Galway, early Christian and medieval monastery, post-medieval house site and midden. www.excavations.ie.
—— 1998. 1998:259. Mainistir Chiaráin, Oghill, Inis Mór, Co. Galway, Early Christian/medieval monastery. www.excavations.ie.
—— 1999. 1999:306. Mainistir Chiaráin, Inis Mór, Co. Galway, Early Christian/medieval monastery. www.excavations.ie.
Ní Ghabhláin, S & Moran, J. 1996. 1996:161. Mainistir Chiaráin, Oghill, Inis Mór, Co. Galway, monastery. www.excavations.ie.

Ní Loingsigh, M. 2003. 2003:0225. Main Street South, Cork. www.excavations.ie.
—— 2005. 2005:0226. 40-48 Main Street South, Cork. www.excavations.ie.

Noonan, D. 2001. 2001:115, Ballynacarriga 1, Co. Cork, early Christian enclosures. www.excavations.ie.

Noonan, D., Conway, C., O'Hara, R. & O'Meadhra, J. 2004. Ballynacarriga: early Christian settlement. Unpublished report prepared for Archaeological Consultancy Services Ltd.

Norman, E. R. & St. Joseph, J. K. S. 1969. The Early Development of Irish Society: The Evidence of Aerial Photography. Cambridge. Cambridge University Press.

Ó Baoill, R. 1992. 1992:034. Downpatrick, Cathedral Hill, Co. Down, Early Christian/medieval. www.excavations.ie.
—— 2000a. 2000:0352. Aghavea Church, Aghavea, Co. Fermanagh, Early Christian/medieval church enclosures. www.excavations.ie.
—— 2000b. Excavations at Aghavea, County Fermanagh. Centre for Archaeological Fieldwork (CAF) Structure Report No. 046. Queen's University Belfast.

O'Brien, E. 1990. 1990:043. Old Bawn Road, Tallaght, Co. Dublin. www.excavations.ie.
—— 1993. Contacts between Ireland and Anglo-Saxon England in the seventh century. Anglo-Saxon Studies in Archaeology and History, 6, 93–102.
—— 2003. Burial practices in Ireland: First to seventh centuries A.D. In J. Downes & A. Ritchie (eds). Sea change: Orkney and Northern Europe in the Later Iron Age, A.D. 300-800, 63–72. Angus. Pinkfoot Press.

O'Brien, R. 2010. Spindle-whorls and hand-spinning in Ireland. In M. Stanley, E. Danaher & J. Eogan (eds). Creative Minds: Production, Manufacturing and Invention in Ancient Ireland: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, August 2009, 7, 15–26. Dublin. Wordwell.

O'Brien, R., Quinney, R. & Russell, I. 2005. Preliminary report on the archaeological excavation and finds retrieval strategy of the Hiberno-Scandinavian site of Woodstown 6, Co. Waterford. Decies: Journal of the Waterford Archaeological & Historical Society, 61, 13–122.

O'Brien, R. & Russell, I. 2004. A preliminary note on the archaeological site of Woodstown 6, Co. Waterford. Decies: Journal of the Waterford Archaeological & Historical Society, 60, 65–70.
—— 2005. The Hiberno-Scandinavian site of Woodstown 6, County Waterford. In J. O'Sullivan & M. Stanley (eds) Recent Archaeological Discoveries on National Road Schemes 2004: Proceedings of a Seminar for the Public, Dublin, September 2004, 2, 111–24. Bray. Wordwell.

O'Brien, W. 2004. Ross Island: Mining, Metal and Society in Early Ireland. Bronze Age Studies. Galway National University of Ireland
—— (ed.) 2009. Local Worlds: Upland Farming and Early Settlement Landscapes in Southwest Ireland. Cork. Collins Press

Ó Carragáin, T. 2003. The architectural setting of the cult of relics in early medieval Ireland. Journal of the Royal Society of Antiquaries of Ireland, 133, 130–76.
—— 2005a. Regional variation in Irish pre-Romanesque architecture. Antiquaries Journal, 85, 23–56.
—— 2005b. Habitual masonry styles and the organisation of church building in early medieval Ireland. Proceedings of the Royal Irish Academy, 105C, 99–149.
—— 2006. 2006:1929. Toureen, Co. Tipperary. www.excavations.ie.
—— 2009. The architectural setting of the mass in early medieval Ireland. Medieval Archaeology, 53, 119–54.

O'Carroll, E. 1999a. A trek through the bogs. Archaeology Ireland, 13(3), 32–3.
—— 1999b. 1999:742. Killaghintober Bog, Castlearmstrong, Co. Offaly, remains of linear trackway. www.excavations.ie.
—— 1999c. 1999:743. Killaghintober Bog, Castlearmstrong, Co. Offaly, remains of linear trackway. www.excavations.ie.

O'Carroll, F. 1999. 1999:544. Haggardstown, Blackrock, Co. Louth, various. www.excavations.ie.

O'Connell, A. 2004. Recent archaeological investigations at Kill St. Lawrence, Waterford, carried out as part of the realignment of the R708 airport road. Decies: Journal of the Waterford Archaeological and Historical Society, 60, 27–64.
—— 2006. The many lives of Castlefarm. Seanda 1, 19–24. Dublin. National Roads Authority.
—— 2007. Iron Age enclosure at Lismullin, Co. Meath. Archaeology Ireland, 21(2), 10–3.
—— 2009a. Excavations at Castlefarm—director's first findings. In M. Deevy and D. Murphy (eds.) Places Along the Way: First Findings on the M3, 43–56. National Roads Authority Scheme Monograph Series 5. Bray. Wordwell.
—— 2009b. Excavations at Church Road and the early monastic foundation at Lusk, Co. Dublin. In C. Baker (ed.) Axes, Warriors and Windmills: Recent Archaeological Discoveries in North Fingal, 51–63. Dublin. Fingal County Council.
—— 2009c. Director's first findings from excavations at Lismullin 1. In M. Deevy and D. Murphy (eds.) Places Along the Way: First Findings on the M3, 21–42. National Roads Authority Scheme Monograph Series 5. Bray. Wordwell.

O'Connell, A & Clark, A. 2009. Report on the Archaeological Excavation of Castlefarm 1, Co. Meath. Unpublished report prepared for Archaeological Consultancy Services Ltd. Available at www.m3motorway.ie

O'Connor, K. 1993. Souterrain at Killoran South, Co. Sligo. Topographical Files, OPW.

O'Connor, L. 1991. Irish Iron Age and early Christian whetstones. Journal of the Royal Society of Antiquaries of Ireland, 121, 45–76.

O'Connor, M. 1944. The excavation of three earthen ring-forts in the Liffey valley (note). Journal of the Royal Society of Antiquaries of Ireland, 74, 53–60.

O'Connor, N. 2005. Clay casting moulds of the early Historic period from Ireland: A preliminary site list and summary. In T. Condit & C. Corlett (eds). Above and Beyond: Essays in Memory of Leo Swan, 239–47. Bray. Wordwell.

Ó Corráin, D. 1972. Ireland Before the Normans. Dublin. Gill & Macmillan.
—— 1983. Some legal references to fences and fencing in early historic Ireland. In T. Reeves-Smyth & F. Hammond (eds.). Landscape Archaeology in Ireland, 247–51. Oxford. Tempus Reparatum.
—— 2002. Early medieval law, c.700-1200. In A. Bourke, S. Kilfeather, M. Luddy, M. Mac Curtain, G. Meaney, M. Ní Dhonnchadha, M. O'Dowd & C. Wills (eds). The Field Day Anthology of Irish Writing: Irish Women's Writing and Traditions, 4, 6–43. Cork.Cork University Press.
—— 2004. Ireland c.800: Aspects of society. In D. Ó Cróinín (ed.) A New History of Ireland. Vol. 1. Prehistoric and Early Ireland. 549–608. Oxford. Oxford University Press.

Ó Cróinín, D. 1995. Early Medieval Ireland, c. AD 400–AD 1200. London. Longman history of Ireland.

Ó Cuileanáin, C. 1955. Excavations of a circular stone house at Glannafeen, Co. Cork. Journal of the Royal Society of Antiquaries of Ireland, 85, 94–9.

Ó Drisceoil, C. 2000. 2000:721. Site 2, Whiterath, Co. Louth, souterrain and enclosures. www.excavations.ie.

Ó Droma, M. 2008. Archaeological investigations at Twomileborris, Co. Tipperary. In J. O'Sullivan & M. Stanley (eds). Roads, Rediscovery and Research: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, August 2007, 5, 45–59. Bray. Wordwell.

O'Daly, M. 1962. Lánellach tigi rích 7 ruirech. Ériu, 19, 81–6.

O'Donnell, M.G. 1997. 1997:246. Scrahane, Co. Kerry, cropmark. www.excavations.ie.
—— 1998. 1998:284. Scrahane 1, Co. Kerry, enclosure and smelting site. www.excavations.ie.
—— 1999. 1999:0851. Bailey's New Street, Co. Waterford. www.excavations.ie.
—— 2003. Tuckey Street (97E0040). In R. M. Cleary & M. F. Hurley (eds). Excavations in Cork City 1984-2000, 13–28. Cork. Cork County Council.

O'Donovan, E. 2008. The Irish, the Vikings and the English: new archaeological evidence from excavations at Golden Lane, Dublin. In S. Duffy (ed.). Medieval Dublin VIII: Proceedings of the Friends of Medieval Dublin Symposium 2006, 36–130. Dublin. Four Courts Press.

O'Flaherty, B. 1985. 1985:34. Loher, Co. Kerry, cashel. www.excavations.ie.

Ó Floinn, R. 1985. 1985:53. Lurgoe (Derrynaflan), Co. Tipperary. www.excavations.ie.
—— 1998. The archaeology of the early Viking age in Ireland. In H. Clarke, M. Ní Mhaonaigh & R. Ó Floinn (eds). Ireland and Scandinavia in the Early Viking Age, 131–65. Dublin. Four Courts Press.
—— 1999. The date of some metalwork from Cahercommaun reassessed. In C Cotter. Cahercommaun Fort, Co Clare: a Reassessment of its Cultural Context. Discovery Programme Reports, 5, 73–9. Dublin. Royal Irish Academy/Discovery Programme.

Ó Floinn, R. & King, H. 1998. Archaeological invertigations at St Ciaran's National School. In H. King (ed.). Clonmacnoise Studies 1: Seminar Papers 1994, 119–32. Dublin. Dúchas.

Ó hEochaidhe, M. 1962. A preliminary report on the archaeological investigations carried out at the cross block. Dublin Castle Unpublished manuscript dated November 1961-February 1962. Dublin.

O'Hara, R. 2002. Archaeological Investigation, Area 6. Dundalk Institute of Technology, Co. Louth. Unpublished report prepared for Archaeological Consultancy Services Ltd.

—— 2007. Roestown 2, Co. Meath: an excavation on the M3 Clonee to North of Kells. In J. O'Sullivan & M. Stanley (eds). New Routes to the Past: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, August 2006, 4, 141–52. Bray. Wordwell.
—— 2009a. Report on the Archaeological Excavation of Roestown 2, Co. Meath. Unpublished report prepared for Archaeological Consultancy Ltd. Available at www.M3motorway.ie.
—— 2009b. Early medieval settlement at Roestown 2. In M. Deevy & D. Murphy (eds). Places Along the Way: First Findings on the M3, 57–82. National Roads Authority Scheme Monograph Series 5. Bray. Wordwell.
—— 2009c. Collierstown 1: A late Iron Age—early medieval enclosed cemetery. In M. Deevy and D. Murphy (eds) Places Along the Way: First Findings on the M3, 83–100. National Roads Authority Scheme Monograph Series 5. Bray. Wordwell.

O'Keeffe, P. 2007. Through the valleys and the hills: travels on the N7. Seanda 2, 44–6. Dublin. National Roads Authority.

O'Keeffe, T. 1998. Architectural traditions of the early medieval church in Munster. In M.A. Monk & J. Sheehan (eds.). Early Medieval Munster: Archaeology, History and Society, 112–24. Cork. Cork University Press.
—— 2000. Medieval Ireland: An Archaeology. Stroud. Tempus.
—— 2003. Romanesque Ireland: Architecture and Ideology in the Twelfth Century. Dublin. Four Courts Press.
—— 2004. Ireland's Round Towers. Stroud. Tempus.

O'Kelly, M.J. 1951. An early Bronze Age ringfort at Carrigillihy, Co. Cork. Journal of the Cork Historical and Archaeological Society, 57, 69–86.
—— 1952. St. Gobnet's House, Ballyvourney, Co. Cork. Journal of the Cork Historical and Archaeological Society, 57, 18–40.
—— 1954. Excavations and experiments in Ancient Irish cooking-places. Journal of the Royal Society of Antiquaries of Ireland, 84, 105–55.
—— 1956. An island settlement at Beginish, Co. Kerry. Proceedings of the Royal Irish Academy, 57C, 159–94.
—— 1958. Church Island near Valencia, Co. Kerry. Proceedings of the Royal Irish Academy, 59C, 57–136.
—— 1962. Béal Ború. Journal of the Cork Historical and Archaeological Society, 67, 1–27.
—— 1963. Two ringforts at Garryduff, Co. Cork. Proceedings of the Royal Irish Academy, 63C, 17–125.
—— 1967. Knockea, Co. Limerick. In E. Rynne (ed.). North Munster Studies: Essays in Commemoration of Monsignor Michael Moloney, 72–101. Limerick. Thomond Archaeological Society.

O'Kelly, M.J. and Shee Twohig, E. 1968. Three souterrains in Co. Cork. Journal of the Cork Historical and Archaeological Society, 73, 40–7.

O'Meadhra, U. 1987. Irish, insular, Saxon and Scandinavian elements in the motif-pieces from Ireland. In M. Ryan (ed.). Ireland and Insular Art, A.D. 500-1200: Proceedings of a Conference at University College Cork, 31 October - 3 November 1985, 159–65. Dublin. Royal Irish Academy.
—— 1997. Motif-pieces and other decorated bone and antler work. In M.F. Hurley, O.M.B. Scully & S.W.J. McCutcheon (eds). Late Viking Age and Medieval Waterford: Excavations 1986-1992, 699–702. Waterford. Waterford City.

O'Meara, J.J. 1991. The voyage of Saint Brendan: Journey to the Promised Land. Translated with an introduction by John J. O'Meara. Gerrard's Cross. Colin Smythe.

Ó Néill, J. 1999. A Norse settlement in rural county Dublin. Archaeology Ireland, 13(4), 8–10.
—— 2004a. Excavations at Longford Street Little, Dublin: An archaeological approach to Dubh Linn. In S. Duffy (ed.). Medieval Dublin V: Proceedings of the Friends of Medieval Dublin Symposium 2003, 73–90. Dublin. Four Courts Press.

—— 2004b. 2004:0008. St. Patrick's Church, Glebe, Armoy, Co. Antrim, medieval ecclesiastical centre. www.excavations.ie.
—— 2004c. Lapidibus in igne calefactis coquebatur: The historical burnt mound 'tradition'. Journal of Irish Archaeology, 12 & 13, 79–85.
—— 2006. Excavation of pre-Norman structures on the site of an enclosed Early Christian cemetery at Cherrywood, County Dublin. In S. Duffy (ed.). Medieval Dublin VII: Proceedings of the Friends of Medieval Dublin Symposium 2005, 66–88. Dublin. Four Courts Press.

Ó Néill, J. & Coughlan, J. 2010. An enclosed early medieval cemetery at Cherrywood, Co. Dublin In C. Corlett and M. Potterton (eds). Death and Burial in Early Medieval Ireland in Light of Recent Archaeological Excavations, 239–50. Dublin. Wordwell.

O'Neill, T. 2003. 2003:1661. Site 2B, Magheraboy, Co. Sligo, ringfort and Neolithic causewayed enclosure. www.excavations.ie.
—— 2007. The hidden past of Parknahown, Co. Laois. In J. O'Sullivan & M. Stanley (eds). New Routes to the Past: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, August 2006, 4, 133–9. Bray. Wordwell.
—— 2008. Unearthing the past: discoveries at Parknahown, Co. Laois. Ossory, Laois and Leinster, 3, 1–24.
—— 2010. The Changing character of early medieval burial at Parknahown 5, Co. Laois. In C. Corlett and M. Potterton (eds). Death and Burial in Early Medieval Ireland in Light of Recent Archaeological Excavations, 251–60. Dublin. Wordwell.

Ó Ríordáin, B. 1971. Excavations at High Street and Winetavern Street, Dublin. Medieval Archaeology, 15, 73–85.
—— 1974. 1974:0014. Dublin City: Christchurch Place, Co. Dublin. www.excavations.ie.
—— 1984. Excavations in old Dublin. In J. Bradley (ed.). Viking Dublin Exposed: The Wood Quay Saga, 134–43. Dublin. O'Brien Press.

Ó Ríordáin, B., & Rynne, E. 1961. A settlement in the sandhills at Dooey, Co. Donegal. Journal of the Royal Society of Antiquarians of Ireland, 91, 58–64.

Ó Ríordáin, S.P. 1940. Excavations at Cush, Co. Limerick. Proceedings of the Royal Irish Academy, 45C, 83–181.
—— 1942. The excavation of a large earthen ring-fort at Garranes, Co. Cork. Proceedings of the Royal Irish Academy, 47C, 77–150.
—— 1949a. Lough Gur excavations: Carrig Aille and the 'Spectacles'. Proceedings of the Royal Irish Academy, 52C, 39–111.
—— 1949b. Lough Gur excavations: three marshland habitation sites. Journal of the Royal Society of Antiquaries of Ireland, 79, 126–39.
—— 1953. Antiquities of the Irish Countryside (3rd Edition). London. Metheun.
—— 1979. Antiquities of the Irish Countryside (Revised by Ruadhrí de Valera- 5th Edition). London. Methuen.

Ó Ríordáin, S.P. & Foy, J.B. 1941. The excavation of Leacanabuile Stone Fort, near Cahirciveen, Co. Kerry. Journal of the Cork Historical and Archaeological Society, 46, 85–99.

Ó Ríordáin, S.P. & Hartnett, P.J. 1943. The excavation of Ballycatteen Fort, Co. Cork. Proceedings of the Royal Irish Academy, 49C, 1–44.

Ó Ríordáin, S.P. & MacDermott, M. 1952. The excavation of a ringfort at Letterkeen, Co. Mayo. Proceedings of the Royal Irish Academy, 54C, 89–119.

O'Rourke, D. 1997. Leather artefacts. In M.F. Hurley, O.M.B. Scully & S.W.J. McCutcheon (eds). Late Viking Age and Medieval Waterford: Excavations 1986-1992, 703–36. Waterford. Waterford City.

O'Rourke, F.J. 1945. A kitchen-midden at Dog's Bay, Roundstone, Co. Galway (note). Journal of the Royal Society of Antiquaries of Ireland, 75, 115–8.

O'Sullivan, A. 1994. Trees, woodland and woodmanship in early medieval Ireland. Botanical Journal of Scotland, 46, 674–81.
—— 1998. The Archaeology of Lake Settlement in Ireland. Dublin. Royal Irish Academy.
—— 2000. Crannogs: Lake Dwellings of Early Ireland. Dublin. Country House.
—— 2001. Foragers, Farmers and Fishers in a Coastal Landscape: An Intertidal Archaeological Survey of the Shannon Estuary. Dublin. Royal Irish Academy.
—— 2003. Place, memory and identity among estuarine fishing communities: Interpreting the archaeology of early medieval fish weirs. World Archaeology, 35(3), 449–68.
—— 2005a. Houses. In S. Duffy, A. MacShamhráin and J. Moynes (eds). Medieval Ireland: An Encyclopedia, 224–26. New York. Routledge.
—— 2005b. Medieval fish traps on the Shannon estuary, Ireland: interpreting people, place and identity in estuarine landscapes. *Journal of Wetland Archaeology*, 5, 65–77.
—— 2008. Early medieval houses in Ireland: Social identity and dwelling spaces. *Peritia*, 20, 225–56.

O'Sullivan, A. & Boland, D. 1998. Medieval Irish engineers bridge the River Shannon. Discovering Archaeology, 1, 32–7.
—— 2000. The Clonmacnoise Bridge: An Early Medieval River Crossing in County Offaly. Bray. Wordwell.

O'Sullivan, A. & Breen, C. 2007. Maritime Ireland: An Archaeology of Coastal Communities. Stroud. Tempus.

O'Sullivan, A. & Kenny, N. 2008. A matter of life and death. Archaeology Ireland, 22(4), 8–11.

O'Sullivan, A. & Kinsella. J. forthcoming. Living by a sacred landscape: interpreting the early medieval archaeology of the Hill of Tara and its environs, AD 400-1100. In M. O'Sullivan (ed.) Tara: From the Past to the Future: Proceedings of the Tara Symposium at UCD. Dublin. University College Dublin/Wordwell.

O'Sullivan, A., McCormick, F., Kerr, T.R. and Harney, L. 2008. Early medieval Ireland: Archaeological excavations, 1930-2004. Report 2.1 submitted for Irish National Strategic Archaeological Research (INSTAR) programme 2008.
—— 2009. Early medieval Ireland: Archaeological excavations, 1930-2004. Report 3.4 submitted for Irish National Strategic Archaeological Research (INSTAR) programme 2009.
—— forthcoming. Early Medieval Ireland: Archaeological Excavations, 1930-2004. Dublin. Royal Irish Academy.

O'Sullivan, A. & Nicholls, T. 2010. Early medieval settlement enclosures in Ireland: Dwellings, daily life and social identity. Proceedings of the Royal Irish Academy, 110c

O'Sullivan, A., Sands R, & E.P. Kelly 2007. Coolure Demesne Crannog, Lough Derravaragh: An Introduction to its Archaeology and Landscapes. Bray. Wordwell.

O'Sullivan, A. & Van de Noort, R. 2007. Temporality, cultural biography and seasonality: Rethinking time in wetland archaeology. In J. Barber, C. Clark, M. Cressy, A. Crone, A. Hale, J. Henderson, R. Housley, R. Sands & A. Sheridan (eds). Archaeology from the Wetlands: Recent Perspectives: Proceedings of the 11th WARP Conference, Edinburgh 2005, 67–78. Edinburgh. Society of Antiquaries of Scotland.

O'Sullivan, A. & Sheehan, J. 1996. The Iveragh Peninsula: An Archaeological Survey of South Kerry. Cork. Cork University Press.

O'Sullivan, E. 1997. 1997:424. Athlumney House, Kilcarn, Co. Meath, possible souterrain. www.excavations.ie.

O'Sullivan, J. 1998. Nationalists, archaeologists and the myth of the Golden Age. In M.A. Monk and J. Sheehan (eds). Early Medieval Munster: Archaeology, History and Society, 178–89. Cork. Cork University Press.
—— 2006. When did the Irish become Christians? Seanda 1, 3. Dublin. National Roads Authority.
—— 2007a. Search and discovery on an east Galway road scheme. Seanda 2, 22–5. Dublin. National Roads Authority.
—— 2007b. The quiet landscape: Archaeological discoveries on a road scheme in east Galway. In J. O'Sullivan & M. Stanley (eds). New Routes to the Past: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, August 2006, 4, 81–100. Bray. Wordwell.

O'Sullivan, J., Hannon, M. & Tierney, J. 1998. Excavation of Lisnagun ringfort, Darrava, Co. Cork, 1987–89. Journal of the Cork Historical and Archaeological Society, 103, 31–66.

O'Sullivan, J. & Ó Carragáin, T. 2008. Inishmurray: Monks and Pilgrims in an Atlantic Landscape Archaeological Survey and Excavations. Cork. Collins Press.

O'Sullivan, M. & Downey, L. 2006. Watermills. Archaeology Ireland, 20(3), 36–8.

Oskamp, H.P.A. 1970. The Voyage of Máel Dúin: A Study in Early Irish Voyage Literature (ed. and tr.). Groningen. Wolters-Noordhoff.

Patterson, N. 1994. Cattle Lords and Clansmen: The Social Structure of Early Ireland. New York. University of Notre Dame Press.

Patterson, R. 1955. Hand distaffs from Lough Faughan, Lagore and Ballinderry. Ulster Journal of Archaeology, 18, 81–2.

Photos-Jones, E. 2008a. Analysis of metallurgical waste from Johnstown 1 (Appendix 6: Part I in the CD Excavation Reports). In N. Carlin, L. Clarke and F. Walsh (eds). The Archaeology of Life and Death on the Boyne Floodplain: The Linear Landscape of the M4. National Roads Authority Scheme Monograph 2. Bray. Wordwell.
—— 2008b. The technical examination of metallurgical waste for Killickaweeny (Appendix 2 in the CD Excavation Reports). In N. Carlin, L. Clarke and F. Walsh (eds). The Archaeology of Life and Death on the Boyne Floodplain: The Linear Landscape of the M4. National Roads Authority Scheme Monograph 2. Bray. Wordwell.
—— 2008c. Analysis of Metallurgical Waste from Hardwood 3 (CD Excavation Reports), In N. Carlin, L. Clarke and F. Walsh (eds). The Archaeology of Life and Death on the Boyne Floodplain: The Linear Landscape of the M4. National Roads Authority Scheme Monograph 2. Bray. Wordwell.
—— 2008d. Analysis of metallurgical waste from Newcastle 2 (CD Excavation Reports). In N. Carlin, L. Clarke and F. Walsh (eds). The Archaeology of Life and Death on the Boyne Floodplain: The Linear Landscape of the M4. National Roads Authority Scheme Monograph 2. Bray. Wordwell.

Plunkett, G. 2007. Pollen analysis and archaeology in Ireland. In E.M. Murphy and N.J. Whitehouse (eds). Environmental Archaeology in Ireland, 221–40. Oxford. Oxbow Books.

Proudfoot, V.B. 1954. Excavations at the Cathedral Hill, Downpatrick, Co Down. Preliminary report on excavations in 1953. Ulster Journal of Archaeology, 17, 97–102.
—— 1956. Excavations at Cathedral Hill, Downpatrick, Co. Down: 1954. Ulster Journal of Archaeology, 19, 57–72.
—— 1958. Further Excavations at Shaneen Park, Belfast, Ballyaghagan Townland, Co Antrim. Ulster Journal of Archaeology, 21, 18–38
—— 1959. Note on a rath at Croft Road, Holywood, Co Down. Ulster Journal of Archaeology, 22, 102–6.
—— 1961. The economy of the Irish rath. Medieval Archaeology, 5, 94–122.

Proudfoot, V.B. & Wilson, B.C.S. 1962. Further excavations at Larrybane promontory fort, Co. Antrim, Ulster Journal of Archaeology, 24–5, 91–115.

Quinn, B. 2002. 2002:0716. Cahernalee, Co. Galway. www.excavations.ie.

Quinn, B. & Moore, D. 2007. Ale, brewing and fulachta fiadh. Archaeology Ireland, 21(3), 8–11.

Raftery, B. 1994. Pagan Celtic Ireland: The Enigma of the Irish Iron Age London. Thames and Hudson.

Raftery, J. 1944. The Turoe Stone and the Rath of Feerwore. Journal of the Royal Society of Antiquaries of Ireland, 74, 23–52.
—— 1957. Lake-dwellings in Ireland. Scientific Service, 4(3), 5–15.
—— 1966. Drainage and the past. Oibre, 4, 11–3.
—— Undated. Rathtinaun crannog excavations archive. School of Archaeology, University College Dublin.

Rathbone, S. 2007. Seeing the light at Garretstown, Co. Meath. Seanda 2, 55–6. Dublin. National Roads Authority.

Reilly, A. 1999. 1999:130. Magheramenagh, Co. Derry. www.excavations.ie.

Reilly, E. 2003. The contribution of insect remains to an understanding of the environment of Viking-age and medieval Dublin. In S. Duffy (ed.). Medieval Dublin IV: Proceedings of the Friends of Medieval Dublin Symposium 2002**,** 40–62. Dublin. Four Courts Press.

Reilly, F. 1999. 1999:047. Carrigoran, Co. Clare, Area EX1, multiphased. www.excavations.ie
—— 2000. 2000:0055. Carrigoran, Co. Clare, Area EX1, multiphased. www.excavations.ie

Richey, A.G., O'Mahoney, T., Hennessy, W.M., O'Donovan, J. and O'Curry, E. 1879. Ancient Laws of Ireland. Dublin.

Ritchie, G. & Ritchie, A. 1981. Scotland: Archaeology and Early History. London. Thames and Hudson.

Rourke, G.D. & Marshal, J.W. 2005. The drystone oratories of western Kerry. In J.W. Marshall & F. Walsh (eds). Illaunloughan: An Early Medieval Monastery in County Kerry. 103–24. Bray. Wordwell.

Roycroft, N. 2005. Around the bay on the Great North Road: The archaeology of the M1 Dundalk Western Bypass. In J. O'Sullivan & M. Stanley (eds) Recent Archaeological Discoveries on National Road Schemes 2004: Proceedings of a Seminar for the Public, Dublin, September 2004, 2, 65–82. Bray. Wordwell.
—— 2008. Before, during and after the Kingdom of Ely. Seanda 3, 34–5. Dublin. National Roads Authority.

Ryan, F. 2001. 2001:1171. Magheraboy, Co. Sligo. www.excavations.ie.

Ryan, M. 1973. Native pottery in Early Historic Ireland. Proceedings of the Royal Irish Academy, 73C, 619–45.
—— 1988. Fine metalworking and early Irish monasteries: The archaeological evidence. In J. Bradley (ed.). Settlement and Society in Medieval Ireland, 33–48. Kilkenny. Boethus.
—— 2000. Furrows and browse: Some archaeological thoughts on agriculture and population in early medieval Ireland. In A.P. Smyth (ed.). Seanchas; Studies in Early and Medieval Irish Archaeology, History and Literature in Honour of Francis. J. Byrne, 30–6. Dublin. Four Courts Press.

Rynne, C. 1998. The craft of the millwright in early medieval Munster. In M.A. Monk & J. Sheehan (eds). Early Medieval Munster: Archaeology, History and Society, 87–101. Cork. Cork University Press.

—— 2007. Recent archaeological research on early medieval watermills in Ireland. International Molinology, 74, 32–4.

Rynne, C., Rourke, G.D., & Marshall, J.W. 1996. An early medieval monastic watermill on High Island. Archaeology Ireland, 37, 24–7.

Rynne, E. 1956. Excavation of a ringfort at Ardcloon, Co. Mayo. Journal of the Royal Society of Antiquaries of Ireland, 86, 203–14.
—— 1958. Two souterrains at Bawntaaffe, near Monasterboice, County Louth. Journal of the Louth Archaeological and Historical Society, 14(2), 96–102.
—— 1968. Excavation of a house-site in Fanore Sandhills, Co. Clare. North Munster Antiquarian Journal, 11, 7–12.
—— 1974. Excavations at "Madden's Hill", Kiltale, Co. Meath. Proceedings of the Royal Irish Academy, 74C, 267–75.
—— 1992. Dún Aengus (and some similiar Celtic ceremonial centres). In A. Bernelle (ed.). Decantations: A Tribute to Maurice Craig, 196–207. Dublin. Lilliput.

Scally, G. 2002. The earthen banks and walled defences of Dublin's north-east corner. In S. Duffy (ed.). Medieval Dublin III: Proceedings of the Friends of Medieval Dublin Symposium 2001, 11–33. Dublin. Four Courts Press.

Scott, B.G. 1991. Early Irish Ironworking. Belfast. Ulster Museum.

Scully, O.M.B. 1990. 1990:109. Bakehouse Lane 11, Custom House Ward, Co. Waterford. www.excavations.ie.
—— 1997a. Domestic architecture: Introduction and discussion. In M.F. Hurley, O.M.B. Scully & S.W.J. McCutcheon (eds). Late Viking Age and Medieval Waterford: Excavations 1986-1992, 34–9. Waterford. Waterford City.
—— 1997b. Metal artefacts. In M.F. Hurley, O.M.B. Scully & S.W.J. McCutcheon (eds). Late Viking Age and Medieval Waterford: Excavations 1986-1992, 438–89. Waterford. Waterford City.
—— 1998. 1998:639. Deanery Garden, Co. Waterford, medieval undercroft. www.excavations.ie.
—— 1999. 1999:850, Bailey's New Street, Co. Waterford, urban medieval, post-medieval. www.excavations.ie.

Scully, O.M.B. & McCutcheon, S. W. J. 1997. Peter Street. In M.F. Hurley, O.M.B. Scully & S.W.J. McCutcheon (eds). Late Viking Age and Medieval Waterford: Excavations 1986-1992, 53–136. Waterford. Waterford City.

Seaver, M. 2005. From mountain to sea: Excavations in the townlands of Glebe and Laughanstown, Co. Dublin. In J. O'Sullivan & M. Stanley (eds) Recent Archaeological Discoveries on National Road Schemes 2004: Proceedings of a Seminar for the Public, Dublin, September 2004, 2, 51–64. Bray. Wordwell.
—— 2006. Through the mill: Excavation of an early medieval settlement at Raystown. In J. O'Sullivan & M. Stanley (eds). Settlement, Industry and Ritual: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, September 2005**,** 3, 73–88. Bray. Wordwell.
—— 2007. Final Report on the Archaeological Excavation of a Ringfort, Glebe Townland, Co. Dublin. Unpublished report prepared for Valerie J. Keeley Ltd.
—— 2010. Against the grain: Early medieval settlement and burial on the Blackhill: Excavations at Raystown, Co. Meath. In C. Corlett and M. Potterton (eds). Death and Burial in Early Medieval Ireland in Light of Recent Archaeological Excavations, 299–319. Dublin. Wordwell.
—— forthcoming. Inter-change: Excavations in an early medieval landscape at Glebe and Laughanstown, Co. Dublin. In C. Corlett & M Potterton (eds). Settlement in Early Medieval Ireland in Light of Recent Archaeological Excavations, 136–69. Bray. Wordwell.

Sexton, R. 1998. Porridges, gruels and breads: The cereal foodstuffs of early medieval Ireland. In Monk, M. & Sheehan, J. (eds). Early Medieval Munster: Archaeology, History and Society, 76–86. Cork. Cork University Press.

Sheehan, C. 2002. 2002:1934, Shaw's, 62–68 Main Street North, Co. Wexford, urban medieval. www.excavations.ie.

Sheehan, J. 1998. 1998:268. Caherlehillan, Co. Kerry. www.excavations.ie.
—— 2009. A peacock's tale: excavations at Caherlehillan, Iveragh, Ireland. In N. Edwards (ed.) The Archaeology of Early Medieval Celtic Churches, Society for Medieval Archaeology Monograph 29, 191–206. Leeds. Maney Publishing.

Sheehan, J., Hansen, S.S. & Ó Corrain, D. 2001. A Viking Age maritime haven: A reassessment of the island settlement at Beginish, Co. Kerry. Journal of Irish Archaeology, 10, 93–119.

Shee Twohig, E. 2000. Excavation of a ringfort at Sluggary, Co. Limerick. North Munster Antiquarian Journal, 40, 1–27.

Sherlock, R. 2001. 2001:130. Carrigaline Middle, Co. Cork, ringfort. www.excavations.ie.
—— 2002. 2002:0246. Carrigaline Middle, prehistoric; ringforts. www.excavations.ie.
——2003. Excavations at Carrigaline Middle, Co. Cork. Unpublished report for Sheila Lane and Associates Ltd.

Simpson, D.D.A. 1987. 1987:46. 'Lislear', Baronscourt, Co. Tyrone. www.excavations.ie.

Simpson, L. 1999. Director's Findings: Temple Bar West. Temple Bar Archaeological Report, 5. Dublin. Temple Bar Properties.
—— 2000. Forty years a-digging: A preliminary synthesis of archaeological investigations in medieval Dublin. In S. Duffy (ed.). Medieval Dublin I: Proceedings of the Friends of Medieval Dublin Symposium 1999, 11–68. Dublin. Four Courts Press.
—— 2003. Ninth-century Viking burials in Dublin. Archaeology Ireland, 17(3), 5.
—— 2004. Excavations on the southern side of the medieval town at Ship Street Little, Dublin. In S. Duffy (ed.). Medieval Dublin V: Proceedings of the Friends of Medieval Dublin Symposium 2003, 9–51. Dublin. Four Courts Press.
—— 2005a. Viking warrior burials in Dublin: Is this the longphort? In S. Duffy (ed.). Medieval Dublin VI: Proceedings of the Friends of Medieval Dublin Symposium 2004, 11–63. Dublin. Four Courts Press.
—— 2005b. The ecclesiastic enclosure at Dunshaughlin, Co. Meath: some dating evidence. In T. Condit & C. Corlett (eds). Above and Beyond: Essays in Memory of Leo Swan, 227–38. Bray. Wordwell.

Simpson, W.G. 1972. A gaming board of Ballinderry-type from Knockanboy, Derrykeighan, Co. Antrim. Ulster Journal of Archaeology, 35, 63–4.

Spence, R. 1972. Examination of slag samples from Mullaghbane. In A.E.T. Harper. The excavation of a rath in Mullaghbane townland, Co Tyrone. Ulster Journal of Archaeology, 35, 43.

Stanley, M. & Moore, C. 2004. Medieval peatland dwellings. Archaeology Ireland 18(4), 12–4.

Start, L. 1950. The textiles. In H. Hencken. Lagore crannog: An Irish royal residence from the seventh to tenth centuries. Proceedings of the Royal Irish Academy, 53C, 204–24.

Stelfox, A.W. 1930/31. Kilgreany Cave, Co. Waterford. Irish Naturalists Journal, 3, 118–23.

Stenberger, M. 1966. A. ringfort at Raheennamadra, Knocklong, Co. Limerick. Proceedings of the Royal Irish Academy, 65C, 37–54.

Stevens, P. 2006. A monastic enclosure site at Clonfad, Co. Westmeath. Archaeology Ireland, 20(2), 8–11.

—— 2007. Clonfad 3: A unique glimpse into early monastic life in county Westmeath. Seanda 2, 42–3. Dublin. National Roads Authority.
—— 2010. For whom the bell tolls: The monastic site at Clonfad 3, Co. Westmeath. In M. Stanley, E. Danaher & J. Eogan (eds). Creative Minds: Production, Manufacturing and Invention in Ancient Ireland: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, August 2009, 7, 85–98. Dublin. Wordwell.

Stout, G. & Stout, M. 2008. Excavation of a Secular Cemetery at Knowth Site M, County Meath, and Related Sites in North-East Leinster. Bray. Wordwell.

Stout, M. 1997. The Irish Ringfort. Dublin. Four Courts Press in association with the Group for the Study of Irish Historic Settlement.
—— 1998. Early Christian settlement, society and economy in Offaly. In W. Nolan & T. P. O'Neill (eds). Offaly: History & Society: Interdisciplinary Essays on the History of an Irish County, 29–92. Dublin. Geography Publications.
—— 2000. Early Christian Ireland: settlement and environment. In T.B. Barry (ed.). A History of Settlement in Ireland, 81–109. London. Routledge.

Sutton, D. 2004. 2004:0236. Citi Carpark, Grand Parade, Cork. www.excavations.ie.

Swan, D.L. 1973. 1973:0036. Kilpatric (td. Corbetstown), Co. Westmeath, ecclesiastical enclosure. www.excavations.ie.
—— 1975.1975:0036. Killucan (Kilpatrick), Co. Westmeath, religious enclosure. www.excavations.ie.
—— 1976. Excavations at Kilpatrick Churchyard, Killucan, Co. Westmeath, July/August 1973 and 1975. Ríocht na Mídhe, 6(2), 89–96.
—— 1980. 1980/84:0199. Corbetstown (Kilpatrick), Co. Westmeath, early ecclesiastical site. www.excavations.ie.
—— 1983. Enclosed ecclesiastical sites and their relevance to settlement patterns of the first millenium A.D. In T. Reeves-Smyth & F. Hammond (eds). Landscape Archaeology in Ireland, 269–80. Oxford. Tempus Reparatum.
—— 1985. Monastic proto-towns in early medieval Ireland: The evidence of aerial photography, plan analysis and survey. In H.B. Clarke & Simms, A (eds). The Comparative History of Urban Origins in Non-Roman Europe, 77–102. British Archaeological Report, International Series 255. Oxford. Archaeopress.
—— 1994/95 Excavations at Kilpatrick, Killucan, Co. Westmeath, evidence for bone, antler and iron working. Ríocht na Mídhe, 9(1), 1–21.
—— 1995. Fine metalwork from the early Christian site at Kilpatrick, Co Westmeath. In C. Bourke (ed.). From the Isles of the North: Early Medieval Art in Ireland and Britain: Proceedings of the Third International Conference on Insular Art, held in the Ulster Museum, Belfast, 7-11 April, 1994, 75–80. Belfast. HMSO.

Sweetman, D. 1983. Souterrain and burials at Boolies Little, Co. Meath. Ríocht na Mídhe, 7(2), 42–57.

Swift, C. 1997. Ogam stones and the earliest Irish Christians. Maynooth. St. Patrick's College, Department of Old and Middle Irish.

Taylor, K. 2004. 2004:0767. Site AR05, Kilmaniheen West, Co. Kerry. www.excavations.ie.
—— 2006. Site AR128, 04E0029, Cahircalla More, Co. Clare, N18 Ennis Bypass, Unpublished excavation report (available http://www.tvasireland.ie/Reports/n18ar128.pdf).
—— 2007. Prehistoric features and an early medieval enclosure at Coonagh West, Co. Limerick. In J. O'Sullivan & M. Stanley (eds). New Routes to the Past: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, August 2006, 4, 73–9. Bray. Wordwell.

Thomas, C. 1968. Grass-marked pottery in Cornwall. In J.M. Coles and D.D.A. Simpson (eds). Studies in Ancient Europe: Essays Presented to Stuart Piggott, 311–32. Leicester. Leicester University Press.
—— 1971. Britain and Ireland in Early Christian times: A.D. 400-800. London. Thames and Hudson.

Tierney, J. 1997. Plant remains. In M.F. Hurley, O.M.B. Scully & S.W.J. McCutcheon (eds). Late Viking Age and Medieval Waterford: Excavations 1986-1992, 854–93. Waterford. Waterford City.
—— 2008. Early medieval iron- and copper-smelting: Area 25, Cooltubrid East TD. In P. Johnston, J. Kiely & J. Tierney (eds). Near the Bend in the River: The archaeology of the N25 Klmacthomas Realignment: National Roads Authority Scheme Monographs 3, 107–9. Bray. Wordwell.

Tierney, J. & Elliot, R. 2008. Early medieval iron smithing and corn drying kiln: Area 16, Aghanagloch TD. In P. Johnston, J. Kiely & J. Tierney (eds). Near the Bend in the River: The archaeology of the N25 Klmacthomas Realignment: National Roads Authority Scheme Monographs 3, 101–6. Bray. Wordwell.

Tobin, R. 2003. Houses, Enclosures and Kilns, Excavations at Corbally, Co. Kildare. Archaeology Ireland, 17(3), 32–7.

Twohig, D.C. 1990. Excavation of three ring-forts at Lisduggan North, County Cork. Proceedings of the Royal Irish Academy, 90C, 1–33.

Twohig, D.C. & O'Kelly, M.J. 1972. Excavation of two ring-forts at Lisduggan North, Co. Cork. Journal of the Cork Historical and Archaeological Society, 77, 105–7.

Tylecote, R. 1986. The Prehistory of Metallurgy in the British Isles. London. The Institute of Metals

Van de Noort, R. & O'Sullivan, A. 2006. Rethinking Wetland Archaeology. London. Duckworth.

Van der Veen, M. 1989. Charred grain assemblages from Roman-period corn driers in Britain. Archaeological Journal, 146, 302–19.

Van Griffen, A.E. 1963. Het bouwoffer uit de oudste hoeve te Ezinge. Helinium, 3, 246–53.

Waddell, J. 2005. Foundation Myths: The Beginnings of Irish Archaeology. Bray. Wordwell.

Waddell, J. & Holland, P. 1990. The Pekaun Site: Duignan's 1944 investigations. Tipperary Historical Journal, 3, 165–86.

Waddell, J. & Clyne, M. 1995. M.V.Duignan's excavations at Kiltiernan, Co. Galway, 1950–1953. Journal of the Galway Archaeological and Historical Society, 47, 149–204.

Wallace, A. 2002. 2002:1864. Gneevebeg, Co. Westmeath. www.excavations.ie.

Wallace, A. (contributions by Montgomery, J. & Grimes, V.) 2010. Excavation of an early medieval cemetery at Ratoath, Co. Meath. In C. Corlett & M. Potterton (eds) Death and Burial in Early Medieval Ireland, in Light of Recent Archaeological Excavations, 295–316. Bray. Wordwell.

Wallace, A. and Anguilano, L. 2010. Iron-smelting and smithing: new evidence emerging on Irish road schemes. In M. Stanley, E. Danaher & J. Eogan (eds). Creative Minds: Production, Manufacturing and Invention in Ancient Ireland: Proceedings of a Public Seminar on Archaeological Discoveries on National Road Schemes, August 2009, 7, 69–84. Dublin. Wordwell.

Wallace, P. 1984. A reappraisal of the archaeological significance of Wood Quay. In J. Bradley (ed.) Viking Dublin Exposed, 112–33. Dublin. O'Brien Press.
—— 1987. The economy and commerce of Viking Age Dublin. In K. Duwel, H. Jankuhn, H. Siems and D. Timpe (eds). Untersuchungen zu handel und verkehr der vor- und fruhgeschichtlichen zeit in mittel- und Nordeuropa Vol. 4, 200–45. Gottingen.
—— 1992a. The Viking Age Buildings of Dublin, Series A, Volume 1. Dublin. Royal Irish Academy.
—— 1992b. The archaeology of the Hiberno-Norse town. Journal of the Royal Society of Antiquaries of Ireland, 122, 35–66.

—— 2001. Ireland's Viking towns. In A.C. Larsen (ed.) The Vikings in Ireland, 37–50. Roskilde. Viking Ship Museum.
—— 2004. The archaeology of Ireland's Viking-age towns. In D. Ó Cróinín (ed.) A New History of Ireland, Vol. 1, 814–41. Oxford. Clarendon.

Wallace, P.F. & Ó Floinn, R. (eds). 2002. Treasures of the National Museum of Ireland: Irish Antiquities. Dublin. Gill & Macmillan in association with The Boyne Valley Honey Company.

Walsh, C. 1997a. Sunken Buildings, in M.F. Hurley, O.M.B. Scully and S.W.J. McCutcheon (eds) Late viking age and medieval Waterford: Excavations 1986-1992 /Maurice F. Hurley, Orla M.B. Scully with Sarah W.J. McCutcheon; based on excavations and stratigraphic reports by Andrew S.R. Gittins ... [et al.]; editors: Terry Barry, Rose M. Cleary and Maurice F. Hurley, 45–52. Waterford. Waterford Corporation.
—— 1997b. 1997:187. St Maelruan's, Tallaght, Co. Dublin, early ecclesiastical. www.excavations.ie.
—— 2001. Dublin's southern town defences, tenth to fourteenth centuries: the evidence from Ross Road. S. Duffy (ed.) Medieval Dublin II: Proceedings of the Friends of Medieval Dublin Symposium 2000, 88–127. Dublin. Four Courts Press.
—— 2009. An early medieval roadway at Chancery Lane: from Duibhlinn to Áth Cliath? In S. Duffy (ed.) Medieval Dublin IX: Proceedings of the Friends of Medieval Dublin Symposium 2007, 9–37. Dublin. Four Courts Press.

Walsh, F. 2002. 2002:1348. Haggardstown, Co. Louth, early medieval industrial activity. www.excavations.ie.
—— 2008. Killickaweeny 1: High-class early medieval living. In N. Carlin, L. Clarke and F. Walsh (eds). The Archaeology of Life and Death on the Boyne Floodplain: The Linear Landscape of the M4, 27–54. National Roads Authority Scheme Monograph 2. Bray. Wordwell.
—— forthcoming. An early medieval enclosed farmstead at Killickaweeny 1, Co. Kildare. In C. Corlett & M Potterton (eds). Settlement in Early Medieval Ireland in Light of Recent Archaeological Excavations, 170–81. Bray. Wordwell.

Walsh, F. & Harrison, J. 2003. Early medieval enclosure at Killickaweeny, Co. Kildare. Archaeology Ireland, 17(1), 33–6.

Walsh, G. 1992. 1992:146. 'Lislackagh', Lislackagh, Co. Mayo, ringfort. www.excavations.ie.

Walton, R. P. 1997. Tests for dye in textile samples. In M.F. Hurley, O.M.B. Scully & S.W.J. McCutcheon (eds). Late Viking Age and Medieval Waterford: Excavations 1986-1992, 760–1. Waterford. Waterford City.

Warhurst, C. 1969. Excavations at Rathbeg, Co. Antrim, Ulster Journal of Archaeology, 32, 93–100.
—— 1971. Excavation of a rath at Shane's Castle, Co Antrim Ulster Journal of Archaeology, 34, 58–64.

Warner, R.B. 1973. The excavations at Clogher and their context. Clogher Record 8(1), 5–12.
—— 1979. The Irish souterrains and their background. In H. Crawford (ed.). Subterranean Britain, Aspects of Underground Archaeology, 100–44. New York. St. Martin's Press.
—— 2000. Clogher: An archaeological window on early medieval Tyrone and Mid Ulster. In C. Dillon, & H. A. Jeffries (eds). Tyrone: History and Society, 39–54. Dublin. Geography Publications.

Waterman, D.M. 1951. Excavations at Dundrum Castle, 1950. Ulster Journal of Archaeology, 14, 15–29.
—— 1956a. The excavation of a house and Souterrain at Craig Hill, Co. Antrim. Ulster Journal of Archaeology, 19, 87–91
—— 1956b. The excavation of a house and Souterrain at White Fort, Drumaroad, Co. Down. Ulster Journal of Archaeology, 19, 73–86
—— 1958. Excavations at Ballyfounder Rath, Co Down. Ulster Journal of Archaeology, 21, 39–61.
—— 1969. An early medieval horn from the River Erne. Ulster Journal of Archaeology, 32, 101-104.

—— 1971. A marshland habitation site near Larne, Co Antrim. Ulster Journal of Archaeology, 34, 65–76
—— 1972. A group of raths at Ballypalady, County Antrim. Ulster Journal of Archaeology, 35, 29–36

Wiggins, K. 1990. 1990:084. King John's Castle, St Mary's Parish, Co. Limerick. www.excavations.ie.
—— 1991. Strange Changes at King John's Castle. *Archaeology Ireland*, 5(3), 13–5.
—— 1993. 1993:146. King John's Castle, Co. Limerick, castle. www.excavations.ie.
—— 1994. 1994:160. King John's Castle, Co. Limerick, castle. www.excavations.ie.
—— 1995. 1995:182. King John's Castle, Co. Limerick, castle. www.excavations.ie.
—— 1996. 1996:245. King John's Castle, Co. Limerick, castle. www.excavations.ie.
—— 1997. 1997:353. King John's Castle, Co. Limerick, castle. www.excavations.ie.
—— 1998. 1998:407. King John's Castle, Co. Limerick, castle. www.excavations.ie.
—— 2000. Anatomy of a Siege: King John's Castle, Limerick, 1642. Bray. Wordwell.
—— 2006. A tale of two cemeteries. Seanda 1, 33–5. Dublin. National Roads Authority.

Wiggins, K., Duszynski, B. & Ginn, V. 2009. Report on the Archaeological Excavation of Ross 1, Co. Meath. Unpublished report prepared for Archaeological Consultancy Services Ltd. Available at www.m3motorway.ie

Wilkins, B., & Lalonde, S. 2008. An early medieval settlement/cemetery at Carrowkeel, Co. Galway. Journal of Irish Archaeology, 17, 57–83.

Williams, B.B. 1983. Early Christian landscapes in Co. Antrim. In T. Reeves-Smyth & F. Hamond (eds). Landscape Archaeology in Ireland, 233–46. Oxford, Tempus Reparatum.
—— 1984. Excavations at Ballyutoag, County Antrim. Ulster Journal of Archaeology, 47, 37–49.
—— 1985a. Excavations at Ballyvollen townland, County Antrim Ulster Journal of Archaeology, 48, 91–102.
—— 1985b. Excavation of a rath at Coolcran, County Fermanagh. Ulster Journal of Archaeology, 48, 69–80.
—— 1986. Excavations at Altanagh, Co Tyrone. Ulster Journal of Archaeology, 49, 33–88.

Wincott Heckett, E. 1997. Textiles, cordage, basketry and raw fibre. In M.F. Hurley, O.M.B. Scully & S.W.J. McCutcheon (eds). Late Viking Age and Medieval Waterford: Excavations 1986-1992, 743–60. Waterford. Waterford City.

Wood-Martin, W.G. 1886. The Lake-Dwellings of Ireland London. Hodges, Figgis & Co.

Wren, J. 1994. 1994:229. Wexford Town, Co. Wexford, urban. www.excavations.ie.
—— 1995. 1995:287. Wexford Main Drainage, Co. Wexford. www.excavations.ie.
—— 1998. 1998:638. 9 Arundel Square. www.excavations.ie.
—— 2000. 2000:1006. Lady Lane, Waterford. www.excavations.ie.
—— 2001. 2001:1254. Lady Lane, Waterford. www.excavations.ie.
—— 2002. 2002:1813. Lady Lane, Waterford. www.excavations.ie.

Yates, M.J. 1983. Preliminary excavations at Movilla Abbey, county Down, 1980. Ulster Journal of Archaeology, 46, 53–66.

Zajac, S. 2002. 2002:1382. Carrowkeel, Co. Mayo, ringfort, children's burial-ground and enclosure. www.excavations.ie.
—— 2003. 2003:1307. Carrowkeel, Co. Mayo, ringfort. www.excavations.ie.

Zajac, S. & Scully, F. 2004. Excavations of an Enclosure at Castlegar, County Mayo. Journal of the Galway Archaeological and Historical Society, 56, 22–36.

UCD School of Archaeology

An Chomhairle Oidhreachta
The Heritage Council

Queen's University Belfast

Irish National Strategic Archaeological Research
(INSTAR) Programme 2010