UNDERGROUND ARCHAEOLOGY

Studies on Human Bones and Artefacts from Ireland's Caves

Edited by

MARION DOWD

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Linda G. Lynch is a consultant human osteoarchaeologist. Her PhD (2014, UCC) examined the evidence of health in post-medieval Ireland based on socio-economic status, and particularly focused on workhouses and paupers. Her particular areas of interest are the archaeology of burial and disposal of the dead, deviant burials, and the archaeology and analysis of cremations. She has lectured and published widely.

Stephen Mandal is an expert on the geological identification of stone tools found in archaeological contexts and has published widely on the topic, most notably through his work with Professor Gabriel Cooney on the *Irish Stone Axe Project*. He is co-founder and managing director of CRDS Ltd, the Irish Archaeology Field School, Cultural Tourism Ireland and Dig it Kids.

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Peter Woodman is a graduate of Queen's University Belfast and was employed as Assistant Keeper of Antiquities in the then Ulster Museum until 1983 when he moved to UCC to become Professor of Archaeology. His research has primarily concentrated on the Mesolithic of Ireland and adjacent areas, the origins of Ireland's landscape and ecology, and the history of Irish archaeology, especially in relation to the search for the earliest settlers.

Introduction

Marion Dowd

Caves are unique archaeological environments that have attracted attention over the entire span of human occupation of the island of Ireland. The vast majority of caves of archaeological significance are multi-period sites, with evidence revealing use by people in different eras for a variety of different purposes. Though the enclosed and protective nature of caverns affords a greater degree of preservation to artefacts and bones than on open sites, these are also dynamic environments where stratification is highly disturbed. I often think of caves as akin to early collectors' cabinets of curiosities. They contain fascinating and varied archaeological and palaeontological collections from an array of time periods, each artefact or bone potentially telling a particular story. However, because these objects are frequently jumbled together, disentangling those stories can be quite difficult and at times impossible.

In an attempt to unravel some of the stories behind the human bones that are so frequently found in Irish caves, the *Human Remains from Irish Caves Project* was established by this writer in 2005 with funding from the Heritage Council and the Department of the Environment Heritage and Local Government, and with support from the National Museum of Ireland. The project came from a frustration encountered during my doctoral work (Dowd 2004): namely, while many caves excavated in the late nineteenth and early twentieth centuries had produced assemblages of human bones, almost none of these had been subject to modern osteological analysis and there was usually no idea as to the date of the remains involved. The absence of basic information on collections from the 24 identified caves meant that it was not prudent to date a particular human bone when the overall assemblage was not understood. For instance, how many individuals were represented in these assemblages? Were these all burial sites or did the remains reflect a broader range of activities? Was there any age or gender bias in the collections? We now know the answers to these questions thanks to the sterling work of the HRICP project osteoarchaeologist, Linda Fibiger, who devised the recording programme and analysed the assemblages from 23 caves (Chapter 1). Osteoarchaeologist Linda Lynch focussed on the remains from Dunmore Cave (Chapter 2). Because of their work, published here in detail for the first time, we now have a complete record of all human bones that survive from Irish caves. This data can be assessed alongside assemblages of human remains from recently excavated caves both in Ireland and further afield. It also allows for future site-specific projects, such as radiocarbon dating and isotope analyses, and provides a guide to those approaching cave assemblages elsewhere in the world. When modern cave excavations are included, we are now in the relatively unique position of having up-to-date osteoarchaeological data on *all* surviving human bones that have been recovered from *all* caves in Ireland.

With the creation of a comprehensive dataset on the human bone assemblages from caves, it then became possible to interrogate the material by radiocarbon dating. Many dates were obtained by this writer via the Royal Irish Academy and Chrono Centre (Queen's University Belfast) *Radiocarbon Dates Offer* between 2004 and 2009 (all published in Dowd 2015). A major development, however, came in the form of the Irish Research Council funded *Irish Cave Archaeology Project* (ICAP), which I was awarded in 2009–2010. The project had three strands:

1. To radiocarbon date 19 human bones from 12 different caves.
2. To analyse groups of artefacts that had not been previously studied.
3. To publish a major synthesis on how Irish caves had been used through time.

The new suite of radiocarbon dates, when combined with earlier dating projects, revealed particular patterns in cave usage. In particular, the use of caves in the Neolithic and Bronze Age for funerary and ritual activities including burial, votive deposition and excarnation was highlighted. More surprisingly, perhaps, was the identification of human bones that represented early medieval and medieval activities at caves. These dates have now all been published (Dowd 2015). The second objective of the project, to analyse groups of artefacts that had hitherto been neglected, is the subject of this book and is discussed further below. The third aim of the ICAP brought together the osteoarchaeological studies, the radiocarbon dates and the artefact analyses within an interpretative framework, which led to the publication of *The archaeology of caves in Ireland* (Dowd 2015) – the first in-depth exploration of how caves in the Irish landscape were used and perceived over 10,000 years.

At the inception of the ICAP, the artefact analyses were intended as appendices to *The archaeology of caves in Ireland* (Dowd 2015). What soon emerged, however, was that these studies deserved an independent stand-alone publication, resulting in the present monograph, which should be seen as a companion volume to the aforementioned book.

The original paucity of information surrounding the human bones from caves also extended to artefacts, and for the same reasons: the vast majority of the artefacts in question were recovered prior to 1950 either as a consequence of casual finds or antiquarian excavations. Some artefacts had been described and illustrated in the late nineteenth and early twentieth century, but almost all of these artefact assemblages had been neglected by archaeologists in more recent decades. In the course of my own postgraduate research (Dowd 1997; Dowd 2004) I identified groups of artefacts in the National Museum of Ireland, Dublin and the Ulster Museum, Belfast that required specialist analysis, namely pottery and lithics. The lack of specialist input led to obvious problems in the identification of periods of activity at a particular site, as well as in the identification of broader patterns of cave usage through time. For instance, did some of the large lithic assemblages represent a single event? Or were multiple periods and activities represented? What types of vessels were represented in the prehistoric pottery assemblages, and what roles might these vessels have played? These questions have now been addressed by the comprehensive studies on lithics by Peter Woodman (Chapter 3), prehistoric pottery by Helen Roche (Chapter 4), early medieval pottery by Alison Kyle (Chapter 9) and medieval and post-medieval pottery by Clare McCutcheon (Chapters 13 and 14).

It was also apparent that there were some unusual cave-specific assemblages of artefacts. For instance, in Ireland perforated animal teeth and perforated seashells have been found almost exclusively in caves (Dowd 2004, 85–9). This curious and significant association clearly signalled the need for a more indepth analysis of the artefacts in question; Rory Connolly examines perforated shells in Chapter 6 while Fiona Beglane analyses perforated animal teeth in Chapter 7. In a similar vein, some of the elements of the late prehistoric metalwork hoards from caves were exotic or relatively rare, thus forming the subject of Katharina Becker's Chapter 8; while the seemingly simple stone rings from Robber's Den, examined in Chapter 12 by Alison Sheridan, are also unique in late prehistoric Ireland. The stone axes from caves comprised a specific group of material that warranted focus, not least because many of the axes only survive in documentary sources and have been lost – these axes are described and discussed by Stephen Mandal, Emmett O'Keeffe and Gabriel Cooney in Chapter 5.

One of the traditional popular *and* academic perceptions, dating from the nineteenth century and common to other parts of Europe, is that caves were associated with prehistory. Yet increasingly, and surprisingly for many, there is a growing body of evidence indicating that caves were much-used and much-visited places in historic times (Dowd 2015, chapter 8). This is illustrated here by John Sheehan's review of Viking-age artefacts from caves (Chapter 11) and Griffin Murray's fascinating exploration of ecclesiastical shrine fragments from two caves in the south of the country (Chapter 10).

Many valuable insights have emerged from the analyses in the following pages, and in many instances the studies have confirmed previous assertions about cave archaeology generally, or a particular site. One point that emerges quite strongly is the multi-period nature of almost all caves in Ireland. For instance, during her analysis of the early medieval pottery from six caves and rockshelters along the Antrim coast, Kyle identified Neolithic and Bronze Age pottery from Potter's Cave. This pottery, and the periods of activity represented, had not previously been recognised and thus provides new opportunities and insights on the role this cave played in prehistory. Similarly, of the hundreds of lithics from Irish caves, only the most diagnostic had ever featured in publications – items such as, for example, hollow scrapers or convex scrapers. Manufacturing debris and undiagnostic pieces were typically ignored and remained silent but Woodman's analysis reveals specific activities at caves – places people returned to time and time again, sometimes to knap, leaving debris behind, and sometimes to deposit lithics with burials. McCutcheon's close reading of the material culture from Kilgreany Cave provides an intriguing and hitherto unique insight into the use of a cave as a hideout by someone of means in the late seventeenth century.

This book is thanks to the work and support of many individuals and institutions. For funding both the original human bone and artefact studies, as well as this publication, I would like to thank the Irish Research Council for the Humanities and Social Sciences (now the Irish Research Council); the Department of the Environment, Heritage and Local Government (now the National Monuments Service);

the National Museum of Ireland; and the School of Science at the Institute of Technology, Sligo. For facilitating access to the artefacts and human bone assemblages in their collections, and for their assistance and advice, I would like to thank the National Museum of Ireland (both Antiquities Division and Natural History Division) and the Ulster Museum (Archaeology and Natural Sciences).

My sincere gratitude to each of the contributors for undertaking their particular study, for their cooperation and most especially for their patience during the long gestation of this volume. In this regard I would particularly like to thank Linda Fibiger for her support, kindness and great patience.

A large number of the artefact illustrations that appear here and in *The archaeology of caves in Ireland* were drawn by Malgorzata Kryczka as part of the ICAP. The quality of her work adds significantly to this book and the individual chapters. Similarly, the National Museum of Ireland generously provided images of many of artefacts for inclusion in these two books again making important contributions to both publications. I wish to thank all those who kindly gave permission to use their images here: they are credited in the relevant figure and plate captions. Thorsten Kahlert prepared all the illustrations for publication and, as ever, I am grateful to him for his advice and expertise. My thanks to Robert Hensey who proofread early versions of many of the chapters contained here, and Eve MacSearraigh who proofread the final manuscript.

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The references McConkey (2012) and Wallace and Ó Floinn (2002) below relate to colour images further on in the book.

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Part I

Human remains

1

Osteoarchaeological analysis of human skeletal remains from 23 Irish caves

Linda Fibiger

The *Human Remains from Irish Caves Project* (HRICP) was initiated by Marion Dowd in 2004, funded by the Heritage Council, and conducted in 2004–2005 (Dowd, Fibiger and Lynch 2005). The main objective of the project was to redress the fact that due to their early discovery, most collections of human bones from caves had either never been scientifically examined or were accompanied by reports with an emphasis on anatomical identification and metric analysis only. Consequently, available data was of a mostly quantitative nature (e.g. Fawcett 1928). The HRICP aim was to analyse the skeletal remains according to current osteoarchaeological standards and create a detailed record of the available material as the basis for further research and comparison (Pl. 1). A total of 24 caves with human bones from 11 counties were identified for analysis or re-analysis (Table 1.1). The project osteoarchaeologist (L. Fibiger) analysed 23 of the assemblages while Linda Lynch examined the Dunmore Cave remains (see Chapter 2); her results are incorporated in the discussion here.

Seven adult teeth from Brothers' Cave, Ballygambon Lower td., Co. Waterford were inadvertently overlooked in the course of the project. The teeth comprise a right mandibular canine (1948:211); a right maxillary molar (permanent, probably M2, 1948:212); a canine (probably right and mandibular, 1948:217); and a mandibular molar (M2, root broken, probably right, 1948:279). The latter was labelled 'Whitechurch Cave' and may have originated from either Oonaglour Cave or Brothers' Cave. Two further molars from Brothers' Cave were direct dated in 2002 and 2010 and both returned Early Bronze Age results (Dowd 2015, 127). The seventh tooth from this site could not be located in 2010.

In 2002, several years prior to the HRICP, 11 bones from the assemblages that formed the basis of the present study were radiocarbon dated (Dowd 2015). These bones are mentioned in the site catalogue here but are not included in the main report which is concerned only with what was available for analysis in 2005. A human femur discovered in a cave at Gorteenroe townland, Co. Mayo in 1980, and deposited in the NMI, could not be located for analysis in 2004 or 2010. An occipital fragment from Knocknarea Cave C, Carrowbunnaun td., Co. Sligo and an adult right upper molar from Coffey Cave (Keash), Cloonagh td., Co. Sligo were destroyed during the dating process; these were the only human bones from these sites and are not discussed further here. Assemblages of human bones from recent excavations at Moneen Cave, Acres td., Co. Clare; Glencurran Cave, Tullycommon td., Co. Clare; Cloghermore Cave, Cloghermore td., Co. Kerry; Annagh Cave, Annagh td., Co. Limerick; Killuragh Cave, Killuragh td., Co. Limerick; and Knocknarea Cave K, Carrowbunnaun td., Co. Sligo, were analysed to osteoarchaeological standards and are excluded from this chapter.

Methodology

The 23 cave assemblages analysed ranged from a few isolated bones to thousands of complete bones and bone fragments. The material was located in the Antiquities Division and the Natural History Division of the National Museum of Ireland, Dublin; the Ulster Museum, Belfast; and the Department of Archaeology, University College Cork, Cork. Osteoarchaeological analysis included identifying, measuring, weighing and recording each bone; calculating the minimum

Table 1.1 Sites included in the Human Remains from Irish Caves Project (HRICP).

	County	*Townland*	*Cave name*
1	Antrim	Ballintoy Demesne	Boat Cave
2	Clare	Ballynahown	Robber's Den
3	Clare	Barntick	Barntick Cave
4	Clare	Cahircalla Beg	Alice and Gwendoline Cave
5	Clare	Edenvale	the Catacombs
6	Clare	Newhall	Bats' Cave
7	Clare	Newhall	Elderbush Cave
8	Cork	Ballymacmoy	Killavullen Cave 3
9	Cork	Castlekevin or Killuragh	Killura Cave
10	Cork	Connaberry	Connaberry Cave C
11	Cork	Connaberry	Main Earth Cave
12	Fermanagh	Legg	Pollthanacarra
13	Kerry	Dunkerron	Dunkerron Cave
14	Kilkenny	Mohil	Dunmore Cave
15	Leitrim	Sramore	Graineater's Cave (Sramore Cave in Dowd 2008; Dowd 2015)
16	Limerick	Knockfennell	Red Cellar Cave
17	Mayo	Unknown	Achill Island Cave
18	Sligo	Cloonagh	Plunkett Cave (Keash)
19	Sligo	Cloonagh	Cave O (Keash)
20	Waterford	Ballinacourty	Quinlan's Quarry Cave
21	Waterford	Ballynamintra Lower	Ballynamintra Cave
22	Waterford	Ballynamintra Middle	Carrigmurrish Cave
23	Waterford	Bridgequarter	Oonaglour Cave
24	Waterford	Kilgreany	Kilgreany Cave

number of individuals (MNI) present; identifying different age groups; identifying different sexes; recording standard osteological measurements; identifying pathologies and anomalies; and identifying taphonomic changes. All human remains were sorted, re-bagged and re-labelled according to anatomical region. A number of the assemblages had not seen extensive handling or analysis since their excavation (typically by antiquarians), making the retrieval of the remains from their crates, snuff boxes and early twentieth century newspaper wrappings almost an excavation in itself. No attempt was made to refit fragments within the larger assemblages as this was beyond the scope of the project. Standard methods were employed throughout (Brickley and McKinley 2004; Buikstra and Ubelaker 1994; Ubelaker 1989).

The vast majority of human remains from the caves studied comprised disarticulated bones and bone fragments and thus it was decided that the most suitable recording system was the zonation method adapted from systems devised by Dobney and Rielly for faunal remains (Dobney and Rielly 1988; Knüsel and Outram 2004; CD Appendix 1: Fibiger). Rather than creating lengthy descriptions for each bone or bone fragment, anatomical elements are divided into several numbered zones that are defined by drawings and a written description. This method is particularly suited for the detailed investigation of taphonomic changes and fragmentation patterns. Each bone or bone fragment was recorded according to zones present, even if a particular zone is only partly preserved (CD Zonation diagrams). In addition, each bone fragment is identified to side. Unidentifiable fragments are divided by size and recorded according to whether they belong to the axial skeleton (includes cranium, mandible, vertebrae, hyoid, manubrium, sternum, ribs) or appendicular skeleton (includes arms, hands, shoulders, pelvis, legs, feet). Fragments that could be identified to element level (e.g. cranium, humerus, femur etc.) but not to a particular zone were recorded as 'General cranium', 'General humeral diaphysis' etc. The definitions for each zone were adapted from work by Knüsel and Outram (2004).

The palaeopathological examination of disarticulated and fragmented remains for diseases and injuries presents a particular challenge. Skeletal changes or anomalies seen on isolated specimens preclude the consideration of patterns of pathological changes distributed throughout the skeleton, or the opportunity to compare the size and shape of bilateral elements to identify anomalies. As a result, some of the pathological skeletal changes noted during analysis could only be tentatively attributed to a wider disease category. As the same pathological conditions were sometimes found in a number of assemblages, a brief summary of recordable characteristics of different pathological changes is given here.

Dental disease

Recording of overall tooth wear for complete or partial dentitions as well as tooth wear of individual teeth was based on the grading system by Brothwell (1981, 72) and noted as slight, moderate or severe. Each tooth was also examined for the presence of calculus, a mineralised plaque deposit, and deposits were graded for each tooth as slight, moderate or severe (*ibid*., 55). Caries varies in appearance from discoloration of the enamel surface to large cavities and is the combined result of bacterial activity and the presence of carbohydrates and food sugars. All teeth were examined for its presence. Dental abscesses are caused by infections, either as a result of the exposure of the pulp cavity or root of a tooth to bacteria or secondary to the occurrence of periodontal disease. Eventually, this increasing pressure results in a characteristic sinus (hole) in the bone which

allows the pus to drain (Roberts and Manchester 1995, 50). The presence of a dental abscess was scored when evidence for a draining sinus was present. Ante-mortem tooth loss was identified when an observable tooth socket had been partially or completely filled in with newly formed bone. Finally, hypoplastic enamel defects can occur as lines, grooves or pits on the enamel of a tooth. They are the result of episodes of nutritional, pathological, physiological or psychological stress during enamel formation, resulting in growth disturbances recognisable as lines, grooves or pits on the enamel surface (Hillson 1996, 165). The presence or absence of enamel hypoplasia was recorded for each tooth.

Degenerative joint disease (DJD)

Degenerative joint disease is the result of wear and tear of the bone and soft tissue components of a joint throughout life. Although it is primarily age-related, in some cases it can have an inflammatory origin or occurs secondary to trauma or other pathological conditions that alter the mechanics or strength of a joint (Rogers and Waldron 1995). The changes associated with DJD, which are visible on the bone, are the immediate result of wear and tear of joint tissue, especially joint cartilage. They include porosity (pitted appearance of a joint surface), osteophytes (bony growth around the margin of a joint), eburnation (polishing of an area of the joint surface), and joint contour change (changes in the size or profile of the joint), which were recorded for each joint surface where present.

Metabolic disease

Metabolic diseases are often the result of a deficiency of one or several essential nutrients. This deficiency can result in nutritional stress and adversely affect maintenance of soft tissue as well as development and maintenance of bone. *Cribra orbitalia* describes changes to the orbital roof, visible as increased porosity and thinning of the outer layer of the bone. In the past these changes have been regarded as pathognomonic of acquired iron-deficiency or anaemia, but in recent years the term has attained a more descriptive function (Ortner pers. comm.). Some of the numerous factors that can contribute to iron deficiency and anaemia, apart from dietary deficiencies, are physiological processes within the body that can cause inadequate iron absorption, excessive bleeding and gastrointestinal infections (Stuart-Macadam 1991, 105; Ortner 2003). Each preserved orbit was examined for the presence of *cribra orbitalia* lesions, which were scored based on the system of Stuart-Macadam (1991, fig. 9.3a).

Infectious disease

Changes related to infectious conditions noted on skeletal remains are the result of more chronic diseases that the individual survived for weeks, months or even years. These conditions can be divided into specific and non-specific infections. Skeletal changes resulting from infectious conditions are either lytic (reduction of bone tissue) or proliferative (additional bone tissue is laid down). Assessing the distribution pattern of new bone formation across the skeleton is essential for recognising different diseases. Isolated or unilateral lesions have to be distinguished from bilateral or multi-focal changes that indicate the presence of a systemic rather than a localised condition. As this is not possible when analysing disarticulated and fragmented remains, only a more general diagnosis of skeletal changes related to infection was possible.

Trauma

Fractures can occur either as primary injuries, secondary to pathological conditions that reduce the mechanical strength of a bone, or as stress fractures after periods of repetitive mechanical stress. Occasionally, inflammation, irritation or micro-trauma to muscles, tendons or ligaments will also result in changes visible on the skeleton (Pavlov 1995, 3246). Each fracture or connective tissue injury was assessed with regard to appearance, possible origin (including whether the trauma was likely to be accidental or violence related) and degree of healing.

Size of the assemblages

One of the most obvious and striking features of the assemblages of human bones from caves is the variation in the number of elements present and overall weight, ranging from an isolated bone fragment from Cave O, Keash, to an assemblage weighing in excess of 18kg from Kilgreany Cave (Figs. 1.1 and 1.2). Exceptions in weight like Killavullen Cave 3 and Carrigmurrish Cave are the result of the presence of substantial calcite deposits adhering to the remains (Pls. 3 and 4), which add considerably to the overall weight.

Minimum number of individuals (MNI)

Closely linked to the inventory of fragment numbers and weight (Figs. 1.1 and 1.2) is the MNI count for each site (Table 1.2). To calculate the MNI represented by the disarticulated skeletal remains from each cave, the total number of diagnostic zones present for the cranium, mandible, shoulder and long bones in each age group (adult, juvenile/adolescent, infant) were assessed. Even zones that are only partly preserved will be recorded as 'present' through the zonation method. This might result in a slight overestimation of MNI, especially when considering long bone fragments. The MNI calculations, therefore, mostly relied on the number of zones including joint surfaces. A more detailed assessment of the MNI of

different age groups within the juvenile/adolescent sample proved to be difficult, especially for the Kilgreany Cave assemblage. Unlike the clear division between skeletally mature (i.e. adult) individuals and non-adults, ageing juveniles and adolescent remains based on isolated bones has to rely on assessing relative size and development on a rather less clear-cut, continuous scale. It was, therefore, decided to use very broad age categories (neonate/infant, juvenile/adolescent), but list elements that had been aged more precisely to indicate sub-groups within these categories.

In the smaller assemblages, one single bone can represent at least one individual or the presence of a certain age group. For larger assemblages, detailed inventories of the total number of diagnostic zones for the cranium, mandible, shoulder and long bones in each age group (adult, juvenile/adolescent, infant) had to be conducted. MNI was then based on the most frequently counted diagnostic zone in each age group.

Over half the cave assemblages were only represented by one individual; with one exception these individuals were all adults (Table 1.2). All of these sites had very small overall fragment counts of between one and 18 bones. A further nine sites gave an MNI of between two and four individuals, with seven sites including adult as well as

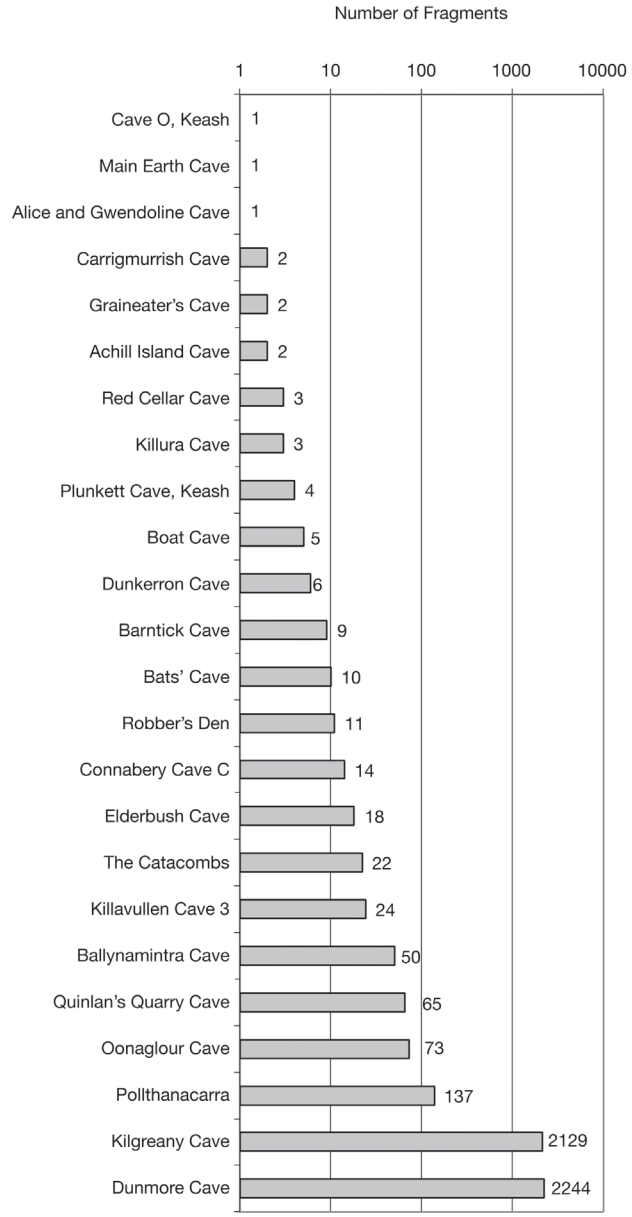

Figure 1.1 Number of human bones and bone fragments recorded from each cave.

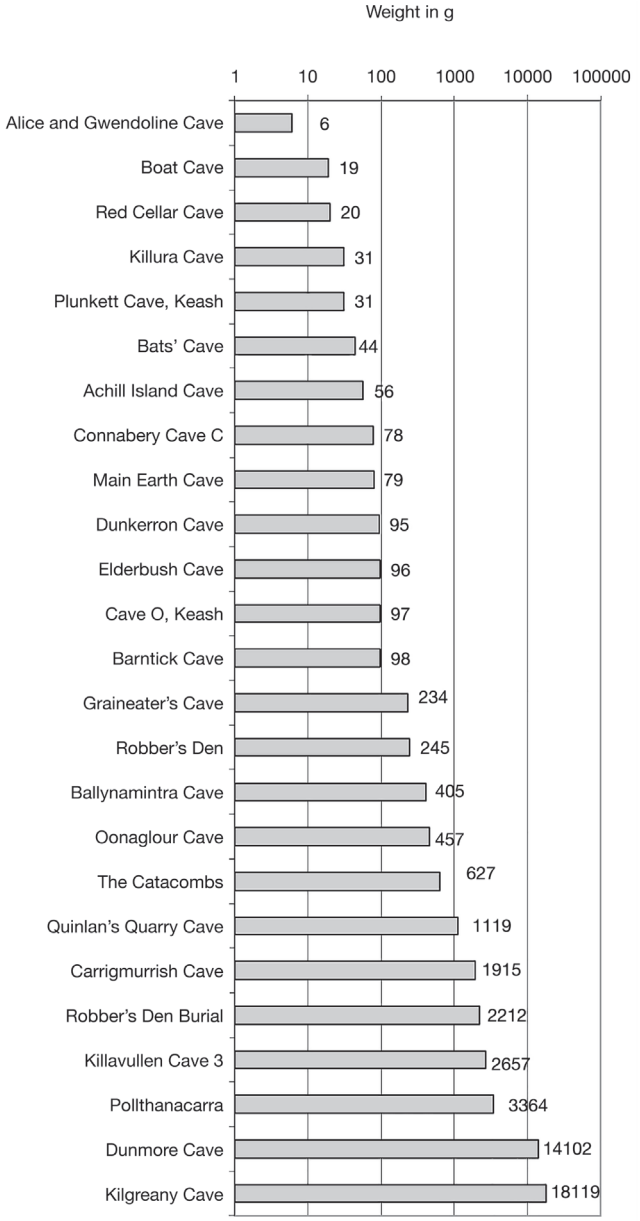

Figure 1.2 Total human bone weights (in grammes) from each cave.

non-adult remains. Fragment count in this group ranged from three to 173 bones, but included mostly the more substantial of the smaller assemblages. Unsurprisingly, the MNI for the two largest assemblages – from Kilgreany Cave and Dunmore Cave – was considerably higher and included adult as well as non-adult remains. Although at some sites the MNI present was calculated as just one overall, or one within a particular age group, it is important to keep in mind that the MNI is just that – a *minimum* number that may well have been higher.

Age and sex

Neonates and young infants were aged by recording long bone length where possible (Scheuer *et al*. 1980), whereas ageing of juveniles and adolescents was based on observing dental calcification, growth and eruption (Ubelaker 1989, fig. 71; Smith 1991; Scheuer and Black 2000). After skeletal maturity in the mid-20s, age-assessment is mostly based on recording degenerative changes. Depending on the skeletal element present, adult age assessment was based on observing the final stages of epiphyseal fusion and dental eruption (third molar) in early adulthood as well as recording other degenerative changes that take place throughout life. Where possible, the stages of fusion of the medial clavicle and iliac crest (Webb and Suchey 1985) were observed to distinguish young adults from older individuals, whereas pelvic remains of middle adult and mature individuals were aged based on morphological changes of the auricular surface of the ilium (Lovejoy *et al*. 1985) – if these elements were present and observable. As preservation was frequently insufficient, elements could mostly only be classified as 'adult' based on size and robusticity.

It should also be noted that some of the non-articular fragments present recorded as 'adult' might possibly belong to older adolescents. However, without being able to assess stages of epiphyseal fusion, any bone fragments robust enough to belong to adults were classed as such. Age categories used here are as follows:

Foetus	<38 foetal weeks
Neonate	Around the time of birth (≤1 month)
Infant	<1 year
Juvenile	1–12 years
Adolescent	13–17 years
Young Adult	18–25 years
Young Middle Adult	26–35 years
Old Middle Adult	36–45 years
Mature Adult	45+ years
Adult	>17 years

Only in cases where femoral or humeral head size appeared to be either noticeably smaller or larger than existing standards, was sex ascribed as female, possibly female, male, or possibly male. To sex adult skeletal elements up to ten morphological features of the pelvis and 13 morphological features of the skull and mandible were observed. These were scored as male, possibly male (male?), female, possibly female (female?), or indeterminate, resulting in a final composite score based on all observable traits (Buikstra and Ubelaker 1994, 16; after Herrmann *et al*. 1990, 73) (Table 1.3).

The fact that age brackets for adult age assessment are wider in general makes ageing of disarticulated remains even less specific. Most adult age groups (young, young middle and old middle adult) appeared to be present throughout the cave assemblages. Accurate age assessment for adult

Table 1.2 Minimum number of individuals (MNI) by site.

Site	*MNI Adult/ Adolescent*	*MNI Juvenile*	*MNI Infant*	*MNI total*
Boat Cave			1	1
Robber's Den*	3	1		4
Barntick Cave	1			1
Alice and Gwendoline Cave	1			1
The Catacombs	2	1		3
Bats' Cave	1	1	1	3
Elderbush Cave	1			1
Killavullen Cave 3	2			2
Killura Cave	1			1
Connaberry Cave C	1			1
Main Earth Cave	1			1
Pollthanacarra	4			4
Dunkerron Cave	1			1
Dunmore Cave	18	14	11	43
Graineater's Cave	1			1
Red Cellar Cave	1	1		2
Achill Island Cave	1			1
Plunkett Cave, Keash	1			1
Cave O, Keash	1			1
Quinlan's Quarry Cave	2	1		3
Ballynamintra Cave	2	1		3
Carrigmurrish Cave	1			1
Oonaglour Cave	1	1		2
Kilgreany Cave	15	3	3	21

**The Robber's Den MNI includes the bones of a partial burial, which was not included in the overview of the number of fragments present.*

bones from Kilgreany and Dunmore was rarely possible, but included young and middle adults. Adult sex assessment at the sites summarised in Table 1.3 appears to be slightly biased towards males, though at both Dunmore Cave and Kilgreany Cave a larger proportion of sexed bones appear to belong to females. This, however, could be related to the fact that remains are more likely to be classified as female if pronounced sexual dimorphism is absent in the host population, rather than being the result of a real bias during deposition of remains.

There is a general paucity of non-adult bones when considering the total number of assemblages studied. Although non-adult bones are present at ten of the 24 caves, remains mostly consist of single or very few bones and fragments, even in caves where the majority of anatomical regions were represented of adult remains (see Robber's Den, Quinlan's Quarry Cave, Ballynamintra Cave and Oonaglour Cave). This appears to indicate that burial or deposition of human skeletal remains in caves was subject to an age bias. Dunmore is unusual in this regard as more non-adult than adult fragments were found at the site. As no difference in the spatial distribution pattern between adult and non-adult remains was noted, it is possible that the activities practised at Dunmore were deemed suitable for individuals of all ages. Interestingly, Boat Cave is the only site that yielded exclusively non-adult remains. The bones from this cave comprised cranial remains of a neonate or very young infant in good condition. Considering different age groups throughout the assemblages, there appears to be a bias towards younger juveniles (under six years) and neonates/young infants. This trend might reflect ritual practice, but is as likely to be the result of higher mortality rates in this age group due to the frequent occurrence of childhood diseases in younger juveniles as well as susceptibility of infants to gastro-intestinal infections and other pathological conditions (Stuart-Macadam 1995).

In order to record the physical characteristics of the skeletal remains from each cave, sets of measurements based on the standards in Buikstra and Ubelaker (1994) were taken on those skeletal elements that were sufficiently preserved. The majority of these are adult measurements, though maximum length measurements of the long bones of non-adult remains were recorded whenever possible. Due to the fragmented nature of the remains, very few measurements could be taken. Length measurements of complete long bones were included in each site-specific entry, and in the case of adult bones, sex assessment of long bones was carried out whenever possible. Stature of sexed adult long bones was calculated based on the regression formulae developed by Trotter (1970). A small selection of non-metric traits was scored on various skeletal elements, but as the remains from each cave did not necessarily represent population groups and the number of observable traits was small, this data was not further analysed.

Table 1.3 Overview of elements and methods used for age and sex assessment.

Site	*Element*	*Age*	*Sex*	*Morphology/ development*	*Metrics/ general size*
Boat Cave	Cranium	Neonate/ Young Infant	–	X	X
Robber's Den burial	Skull	> 35 years	Female	X	
Barntick Cave	Occipital	Adult	Male?	X	
The Catacombs	Cranium	Adult	Male	X	
	Radius, Ulna, Fibula, Metatarsals	Juvenile > 3years	–	X	X
Bats' Cave	Scapula, Rib, Tibia	Juvenile > 3 years	–	X	X
	Vertebrae	Infant	–	X	X
Pollthanacarra	Femur	Adult	Male		X
	Femoral head	Adult	Male		X
	Femoral head	Adult	Female		X
Graineater's Cave	Mandible	> 20 years	Male	X	
Quinlan's Quarry Cave	Os coxae	18-25 years	Female	X	
	Femoral head	Adult	Male	X	X
	Vertebrae	Juvenile 5+ years	–	X	X
Ballynamintra Cave	Metatarsals	Juvenile <10 years	–	X	X
Carrigmurrish Cave	Skull	26–45 years	Male	X	

Representation of anatomical regions

When considering the representation of different body parts across all caves, those sites with larger numbers of bone fragments naturally tend to cover a greater number of anatomical elements (Table 1.4). The most frequently noted element is the cranium, followed by the mandible, spine and ribs. The importance and special treatment of the head in ceremonial contexts, during Irish prehistory in particular, has previously been noted (Cooney and Grogan 1999, 146), and ethnographic parallels further illustrate this idea, whereas in later historic Ireland, the collection and display of skulls becomes a means for punishment and intimidation (Ó Donnabháin and Cosgrave 1994). The importance of the head could have resulted in especially careful treatment and a greater likelihood of formal deposition of the skull in cases of excarnation and exposure. Although complete or partial crania were present at Carrigmurrish Cave, the Catacombs, Boat Cave, Kilgreany Cave and Dunmore Cave, the majority of cranial remains consisted of cranial vault fragments. The more fragile bones of the facial skeleton were virtually absent, which is most likely linked to taphonomy and differential survival.

Long bones of the arms and legs were present in all of the more substantial assemblages (15+ fragments). However, the smaller bones of the hand and feet as well as more fragile elements such as vertebrae and ribs were also frequently represented. An inventory of the minimum number of individuals based on any of the latter usually does

Table 1.4 Distribution of anatomical elements across all cave sites.

Site	*Cranium*	*Mandible*	*Clavicle*	*Scapula*	*Vertebrae*	*Sternum*	*Ribs*	*Pelvis*	*Humerus*	*Radius*	*Ulna*	*Hand*	*Femur/Patella*	*Tibia*	*Fibula*	*Foot*
Boat	j															
Alice & Gwendoline			A													
Barntick	A	A									A	A	A			
Bats'				A/j			j			A				j		
Elderbush			A		A		A	A			A	A		A	A	A
Robber's Den	A	A/j		A	A		A		A				A	A		
Catacombs	A				A		A	A	A	A/j	A/j	A/j			J	A/j
Connaberry Cave C	A	A		A	A							A				A
Killavullen Cave 3					A		A	A			A		A	A	A	A
Killura	A								A			A				
Main Earth														A		
Pollthanacarra	A	A		A	A			A	A	A	A	A	A	A	A	A
Dunkerron					A		A			A						
Dunmore	A/j	A/j	A/j	A/j	A/j	A/j	A/j	A/j	A/j	A/j	A/j	A/j	A/j	A/j	A/j	A/j
Graineater's		A							A							
Red Cellar							j									
Achill Island	A	A														
Cave O, Keash														A		
Plunkett Cave, Keash	A	A							A							
Quinlan's Quarry	A			A	A/j		A	A	A	A	A	A	A		A	A
Ballynamintra	A	A	A		A		A		A	A	A	A	A		A	A/j
Carrigmurrish	A	A														
Kilgreany	A/j	A/j	A/j	A/j	A/j	A	A/j	A/j	A/j	A/j	A/j	A/j	A/j	A/j	A/j	A/j
Oonaglour	A	A	A	A			A	A	A	A	A	A	A/j	A		A
TOTAL	15	12	6	8	12	2	12	8	11	9	10	11	9	10	7	10

A = Adult; j = Juvenile/Non-adult; Light grey = Adult remains only; Dark grey = Includes juvenile remains.

not necessarily reflect the minimum number of individuals calculated from other parts of the skeleton. However, their presence indicates that if bodies were exposed or previously buried elsewhere and then brought to a cave, great care was taken to collect and preserve even the smallest elements. At the same time, if caves were used as sites for excarnation or exposure, with bones being collected and deposited elsewhere at a later stage, there appeared to be no particular preference towards collection of certain anatomical elements, though smaller elements might have been more easily missed during any collection process.

Alternatively, the presence of a large variety of anatomical regions can be interpreted as supporting the idea that fleshed bodies rather than bones only were brought to some caves. At least four sites – Robber's Den, Pollthanacarra, Dunmore and Kilgreany – produced evidence for partially articulated human remains, and it is possible that the larger assemblages in this study result from the deposition of complete bodies that were subsequently disturbed by environmental processes, human activities or animal activities. In this context it should be noted that while no unambiguous skeletal evidence for excarnation, such as defleshing cutmarks, was recorded in the assemblage, this certainly does not mean that excarnation did not take place.

A number of assemblages included the majority of, or virtually all, anatomical regions (Robber's Den, the Catacombs, Elderbush Cave, Pollthanacarra, Dunmore Cave, Quinlan's Quarry Cave, Ballynamintra Cave, Oonaglour Cave and Kilgreany Cave), and all of these sites had MNI counts greater than one. When comparing the MNI with the overall weight and total number of fragments present at these sites, however, it becomes clear that the respective quantities of bone do not even come close to the figures expected for the number of individuals present. An adult human skeleton usually weighs between 2,000g and 3,500g (McKinley 2000). Even when considering the large assemblages from Kilgreany and Dunmore, their overall bone weight comes to less than half of the expected figure. A closer look at the weight distribution of different anatomical regions at these two substantial assemblages also reveals that skull remains are slightly over-represented at both sites (Table 1.5).

Table 1.5 Kilgreany Cave and Dunmore Cave: comparison of percentage weight (after McKinley 1989).

Area of skeleton	*Expected % of total weight*	*Kilgreany Cave % of total weight*	*Dunmore Cave % of total weight*
Skull (cranium and mandible)	18.2%	24.7%	22.8%
Axial skeleton (vertebrae, sternum, ribs, shoulders, pelvis)	23.1%	18.5%	31.2%
Upper limb (humerus, radius, ulna, hand)	20.6%	14.5%	16.9%
Lower limb (femur, patella, tibia, fibula, foot)	38.1%	42.3%	29.1%

The axial skeleton is over-represented at Dunmore, whereas the upper limb is under-represented at both sites. The lower limb is under-represented at Dunmore, whereas the figure for Kilgreany lies slightly above the expected value. It is difficult to explain the exact processes behind these figures. It should be borne in mind that both sites have suffered disturbance and Dunmore has seen extensive removal of skeletal remains over the years (Dowd 2002; Dowd 2015, chapter 2; Dowd, Lynch and McCarthy 2007), so neither can be considered a complete collection of the human remains originally deposited at the sites – as is the case for all of the cave assemblages discussed here. The slight overrepresentation of skull remains at both sites again seems to underline the importance of this part of the body during deposition and burial. However, this may also reflect the collection of more easily recognisable elements by antiquarians, especially in the case of Dunmore Cave. In order to explain the general discrepancy between MNI and expected bone weight characterising all assemblages, however, it is necessary to consider taphonomic factors as well as ritual behaviour.

Taphonomic changes

In order to assess the pattern of taphonomic changes resulting from human interference, animal scavenging and exposure in each assemblage, every bone and bone fragment was examined for the following features, which were mostly scored as absent or present: breaks present; broken while still 'wet' or already 'dry'; morphology of breaks present; animal activity; staining; adhering calcite deposits (Pl. 4); surface erosion; cracking/flaking; scorching/burning (Pl. 5) and cutmarks associated with defleshing. Generally, the condition of the bones from most sites was moderate to good. Only in one case, at Oonaglour Cave, post-excavation treatment of the remains included washing and boiling them in a glue mixture, rendering the bones poorly preserved with an almost friable consistency. Almost all of the assemblages showed some evidence for taphonomic changes that had affected the remains in the burial or depositional environment (Table 1.6). These ranged from small areas of staining, cracking or flaking of the cortex and adhering calcite deposits, to substantial surface erosion and total encasing of the bone with calcite (Pls. 3 and 4).

Evidence for scavenging or rodent activity was minimal, and only two possible and one definite case were recorded (Ballynamintra Cave, Kilgreany Cave and Dunmore Cave).

At the same time, the widespread presence of calcite throughout all the assemblages appears to indicate that at least a proportion of the remains were exposed on cave floors for some time rather than buried. Although the majority of caves would have been relatively accessible, and open exposure on cave floors would make bodies or bones easy prey for scavengers, it appears that scavenging or gnawing has not visibly affected the remains. This is interesting considering that the majority of caves in this study yielded various quantities of animal bone, ranging from small rodents to large mammals. Deposition of fleshed human bodies, body parts or 'wet' bones would have resulted in a greater likelihood of scavenging compared to the deposition of 'dry' bones (Haglund 1997). Accessibility and behavioural patterns of scavenging rodent and mammal species also have to be taken into consideration and an absence of scavenging marks on the human bones themselves might simply indicate that a complete anatomical element was removed for consumption elsewhere or completely digested on site and redeposited in scats at another location (Carr and Knüsel 1997; Haglund 1997). At present it appears that the most likely effect of animal activity in the caves under study would have been an increase in disarticulation, dispersal and breakage of bones. There is a high susceptibility of exposed human remains to disarticulation and displacement once soft tissue has decomposed, and this type of damage could have been enhanced by human activities and through other mechanisms such as localised flooding and extreme temperature changes (Lyman 1994, 381; Weiss-Krejci 2012). Bones could also have been deliberately removed in antiquity for a variety of practical or ritual-related reasons, or may have been taken away as souvenirs by more recent visitors to caves.

The vast majority of breaks seen on the remains are dry bone breaks, which occurred after a considerable post-mortem interval and decay of a proportion of the collagen content of the bones. Sediment pressure and trampling are the most likely causes for this and again emphasise the potential impact of animal or human activity in the caves on preservation, disarticulation and completeness of the assemblages. Some of the fresher-looking breaks are probably the result of excavation and curation damage. At three sites (the Catacombs, Oonaglour Cave and Kilgreany Cave), breaks were noted that appeared to have occurred

Table 1.6 Overview of taphonomic changes present at different cave sites.

Site	*Animal activity*	*Staining*	*Adhering calcite*	*Surface erosion*	*Cracking/ flaking*
Boat Cave		X			
Alice and Gwendoline Cave		X	X	X	X
Barntick Cave		X		X	X
Bats' Cave		X	X	X	X
Elderbush Cave		X	X	X	X
Robber's Den		X	X		
The Catacombs		X	X	X	X
Connaberry Cave C		X		X	
Killavullen Cave 3			X		
Killura Cave				X	
Main Earth Cave				X	X
Pollthanacarra		X	X	X	X
Dunkerron Cave			X	X	
Dunmore Cave	X	X	X	X	X
Graineater's Cave		X			
Achill Island Cave				X	
Cave O, Keash				X	
Plunkett Cave, Keash			X	X	
Ballynamintra Cave	?	X	X	X	X
Carrigmurrish Cave			X		
Kilgreany Cave	?	X	X	X	X
Oonaglour Cave		X	X	X	X
Quinlan's Quarry Cave		X	X	X	X

while collagen content was still relatively high and the bone still 'wet', though not necessarily during the immediate post-mortem interval. 'Wet' bone is a lot harder to break than 'dry' or weathered remains; any breaks or fractures present may be the result of deliberate action or may be accidental and secondary to other activities in a cave.

The microclimate of caves is also likely to have influenced the degree of preservation and disarticulation. Although caves offer a high degree of protection from the weather, conditions within them can vary considerably depending on the season. Oonaglour Cave, for example, is subject to flooding during wet months. While limiting access, flooding is also likely to significantly contribute to the disturbance of archaeological deposits as well as disarticulation and dispersal of human remains and other material inside the cave.

Pathologies and anomalies

Although it can be difficult to diagnose specific diseases on disarticulated remains, a number of pathological conditions and anomalies were noted (Table 1.7). The majority were degenerative (Pl. 6) and dental conditions (Pl. 7), as well as micro-trauma to sites of muscle and ligament insertions. Also present were a number of healed fractures as well as traumatic injuries that might be related to activity or work-load (e.g. *os acromiale* and spondylolysis). The majority of these can be interpreted as reflecting lifestyles that were physically demanding. It should be kept in mind that age assessment was difficult as a result of the disarticulated nature of the assemblages and that degenerative joint disease is one of the most frequently diagnosed conditions in archaeological population as it almost inevitably develops with increasing age. Its presence at the cave sites is, therefore, not unusual or surprising, but at the very least indicates that some individuals would probably have been aged at least 30 years or older.

Table 1.7 Overview of main pathologies and anomalies recorded.

Site	*Pathologies and anomalies*
Elderbush Cave	Degenerative joint disease
Robber's Den	Ante-mortem tooth loss; dental abscess; cortical defect (humerus)
Connaberry Cave C	Caries
Pollthanacarra	Enamel hypoplasia; degenerative joint disease; cortical defect (humerus); periarticular erosion
Dunkerron Cave	Degenerative joint disease
Dunmore Cave	Ante-mortem tooth loss; caries; enamel hypoplasia; degenerative joint disease; cribra orbitalia; infection; accidental trauma; cleft vertebral arch
Graineater's Cave	Ante-mortem tooth loss; degenerative joint disease
Cave O, Keash	Cortical defect (tibia)
Ballynamintra Cave	Retained metopic suture
Kilgreany Cave	Ante-mortem tooth loss; dental abscess; enamel hypoplasia; degenerative joint disease; osteoporosis; cribra orbitalia; infection; accidental and non-accidental trauma; cortical defect; enthesopathy
Quinlan's Quarry Cave	Cortical defect (femur; humerus); trauma

Of particular interest are two incidences of intentional trauma from Kilgreany Cave. The first case affected a disarticulated occipital fragment belonging to a juvenile or possibly adolescent individual and consisted of at least two unhealed sharp force injuries (Pl. 5). As the injury affected the back of the head, it would have been inflicted from a posterior position or from above while the victim was lying face-down on the ground. The injuries themselves are not fatal, but the absence of signs of healing indicates that the individual died around the time the wounds were sustained. In the absence of a radiocarbon date, it is difficult to suggest what kind of instrument or weapon could have caused the injuries, but the linearity and well-defined outline of the cuts certainly would have required the use of an extremely sharp and fine-bladed weapon or instrument. Highly magnified scanning electron microscopy images based on detailed casts of the specimens could aid in exploring the exact nature of the injury (e.g. single stroke or repeated cuts) and could provide further detail on the surface properties of the instrument that caused it (Wakely 1997; Orschiedt 1999, 94–95).

The second case was noted on the left mandibular ramus of an adult female skull from Kilgreany ('Kilgreany A') (Pl. 2). The individual had suffered a penetrating injury to the mandible that had partially healed but continued to exhibit a low-grade chronic infection, which evidently affected the individual's ability to move her jaw for eating and speaking (Pl. 9). The pathological changes observed were most likely the result of penetrating sharp force trauma, possibly even a projectile injury caused by an arrowhead. The specimen has been dated to the Neolithic (Dowd 2002) and is important because it confirms the presence of inter-personal violence during this period in Ireland, as well as demonstrating that violence and conflict could affect both sexes. This case also contributes to the debate on the origins of violence and warfare, which has experienced widespread attention in recent years (Keeley 1997; Guilaine and Zammit 2005; Parker Pearson and Thorpe 2005). Even when considering the relative dearth of human remains of prehistoric date from Ireland compared to, for example, the first millennium AD, diagnosis of non-accidental trauma is relatively scarce. A rare published case is presented by an arrowhead found embedded in a pelvic bone and a

healed cranial blunt force injury from the Neolithic portal tomb at Poulnabrone, Co. Clare (Lynch and Ó Donnabháin 1994, 7; Lynch 2014). The arrow injury showed no signs of healing. British examples appear to be more frequent. In their study of British skeletal material, Schulting and Wysocki (2002) demonstrated an overall frequency of 7.4% of non-accidental trauma in a sample of 350 Neolithic crania. Males and females were equally affected. A third of these injuries showed no signs of healing and the majority were the result of blunt force rather than sharp force. Another recent study of 1,012 crania from Neolithic north-west Europe indicated even higher frequencies in some areas of Denmark and Germany, as well as changes in the prevalence and pattern of violence-related head injuries over the course of the European Neolithic (Fibiger 2009; Fibiger *et al*. 2013; Schulting and Fibiger 2012).

Ritual behaviour

Considering ritual behaviour as well as taphonomic factors, two types of assemblages were evident in this study. The small number of bones and low MNI counts at about half of the caves is most probably the immediate result of deliberate depositional practice. These remains could have been brought to caves individually or in small groups, as disarticulated bones rather than fleshed body parts, to play a part in specific ritual activities. Alternatively, they could be the remnants of the use of caves for exposure, excarnation or defleshing of remains, followed by deposition of the majority of the skeleton elsewhere. Although no obvious skeletal evidence for excarnation, such as defleshing cutmarks, has been noted, the use of caves for excarnation may be the reason for the high number of small skeletal elements retrieved from some of them. At the same time, larger skeletal elements may also have been moved by visitors (both human and faunal) to the caves through the ages (Weiss-Krejci 2012).

Larger assemblages are characterised by a higher MNI as well as a wider variety of anatomical elements present. This is more consistent with their interpretation as occasional burial and depositional sites for specific individuals within a community or population group. At Kilgreany and Dunmore, the apparent funerary use of the caves appears to have continued over a period of time, converting them into small cemetery sites for the disposal or deposition of a larger number of individuals during the Neolithic/Bronze Age and early medieval period respectively. Drawing on the accounts of articulated remains at Kilgreany Cave (Tratman 1929; Movius 1935; Dowd 2002), as well as considering the relative good presentation of all four main anatomical regions by weight at both Kilgreany and Dunmore (Table 1.5), it appears likely that burial or deposition of complete, articulated fleshed bodies may have been the predominant burial rite at these sites, though the wide date range for Kilgreany in particular means that the pattern of use and deposition is likely to have changed over time. A combination of natural degenerative processes, animal and human activities, as well as microclimatic factors would have resulted in the disturbance and eventual disarticulation of the majority of remains (Weiss-Krejci 2012).

A small amount of cremated bone (149g) was present at Kilgreany Cave (Pl. 5) and included fragments of an adult cranium, mandible, clavicle, vertebrae, humerus, hand, pelvis, patella, femur and fibula, as well as a juvenile clavicle fragment. When considered as a separate deposit, the remains presented a minimum of two individuals, an adult and a juvenile. The total weight of the cremation deposit, however, does not correspond with the expected bone weight for two individuals. This is a common feature of cremation deposits found in Ireland, which are frequently more consistent with token deposits rather than complete burials (Fibiger 2004). The degree of fragmentation and small size of the Kilgreany deposit did not allow for a more detailed analysis of age or sex. The fissuring and distortion pattern indicated that the remains appeared to have been burned while still fleshed. No other evidence for cremation of human bones was found during the project, indicating that cremation seems to have been a minority rite for cave burials and cave deposits.

Concluding remarks

The analysis of skeletal assemblages from 24 caves in Ireland by the *Human Remains from Irish Caves Project* has allowed for a fresh look at the nature and variety of burial and deposition of human bones in Irish caves. These assemblages are not easily analysed and interpreted osteologically, either individually or as a group. This is primarily a result of the accessibility of these sites from the time of their earliest human and faunal usage up to the present day, which has resulted in continuous disturbance, occasional damage and the removal and reduction of some osteological and artefactual material. Issues of disturbed context and stratigraphy may be partially alleviated through radiocarbon dating. In an Irish context, this has provided a surprisingly broad timeframe for the deposition of human skeletal remains in caves, ranging from the Mesolithic to the post-medieval period (Dowd 2015; see Catalogue below). At the same time, the obvious needs to be emphasised: a radiocarbon date only dates a specific bone, and multi-period sites such as Kilgreany Cave remind us that while the human remains discussed in this chapter and associated catalogue are presented by site, they often represent multiple events, practices and periods. What survives are interesting but incomplete collections of remains, which provide exciting glimpses into the demography and health-profile of past populations. Whether the human remains found in caves represent a

select subset of the living population, and the resulting assemblages were created through deliberate selection or omission, is often difficult to answer osteologically. While Leach (2008) suggests a degree of selection based on particular pathologies for Neolithic cave burials from the Yorkshire Dales, this is not apparent in the Irish cave assemblages. Neither is a clear preference relating to age, as apparent in some Neolithic and Copper Age caves from Portugal (Weiss-Krejci 2012). Some aspects of post-mortem treatment and processing of skeletal remains, especially excarnation, remain osteologically elusive, though this does not oppose the possibility that these practices took place. This study certainly does not aim to present the final word on such issues, and the large number of smaller skeletal elements in a number of caves makes their use for excarnation a viable conjecture.

Caves certainly stand out as otherworldly, dark and silent sites (Dowd 2015), but in terms of fully understanding their osteological assemblages, a broader comparison with non-cave remains presents the next challenge. Despite the limitations outlined above, it is hoped that this discussion of the human skeletal remains from Irish caves provides an impetus for further research and the recognition of the breadth of information to be gained from the systemised recording of disarticulated assemblages and the revaluation of antiquarian excavation material. As more human and faunal skeletal collections from caves and other archaeological sites are analysed based on comparable, reproducible recording methods, the closer we are to moving towards a more informed appreciation and interpretation of the diversity of Irish burial, funerary and ritual practices.

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CATALOGUE OF SITES

Abbreviations used

NMI (AD):	National Museum of Ireland, Antiquities Division, Dublin.
NHM (MS):	Natural History Museum, Merrion Square, Dublin.
NHM (BB):	Natural History Museum, Beggar's Bush, Dublin.
UM:	Ulster Museum, Belfast.
UCC (Arch. Dept.):	University College Cork (Archaeology Department), Cork.

Dental Abbreviations

AMTL:	Ante-mortem tooth loss
U:	Unerupted X: Tooth lost ante-mortem
/:	Tooth lost post-mortem

C: Caries
A: Abscess
C: Calculus
R: Root only present
H: Hypoplasia
B: Broken post-mortem
Con: Congenitally absent
NP: Not present (unobservable)
P: Proximal
B: Buccal
D: Distal
L: Lingual

Permanent Dentition

Right Maxilla	Left Maxilla
8 7 6 5 4 3 2 1	1 2 3 4 5 6 7 8
8 7 6 5 4 3 2 1	1 2 3 4 5 6 7 8
Right Mandible	Left Mandible

General Abbreviations (CD Appendix 1: Fibiger)

a: Slight
b: Medium
c: Severe
MC: Metacarpal
MT: Metatarsal
UF: Unfused

1. Antrim, Ballintoy Demesne td., Boat Cave
Number of bones: 5
Weight: 19g
Fragment size: 3.1–8.8cm
Description: Five cranial fragments including right frontal, left and right parietal, occipital and left temporal.
MNI: 1 (Neonate/Young Infant)
Age and sex: The remains belonged to a neonate or young infant (size, robusticity).
Colour: Dark yellow to brownish
Condition: Good condition. The only taphonomic change noted were areas of dark staining.
Date: One cranial fragment returned an Iron Age date of 1854±32 BP (UBA-6710) (Dowd 2015, 163).

2. Clare, Ballynahown td., Robber's Den
Disarticulated remains, Second Chamber
Number of bones: 11
Weight: 245g
Fragment size: 2.2–25.5cm
Description: A mandible (removed for dating in 2010), one deciduous tooth, two cranial fragments, a partial left humerus, a right scapula fragment, one thoracic and one lumbar vertebra, a left first rib, a left femoral diaphysis fragment and a right tibial diaphysis fragment.
MNI: 2 (Adult and Juvenile)
Age and sex: Deciduous juvenile tooth representing an individual not older than five years (root development). All other remains appeared to be those of an adult individual (robusticity and epiphyseal fusion). The mandible possibly belonged to an adult female (dental eruption and dental health; mandibular morphology).
Colour: Light yellow to brownish
Condition: Good. The only taphonomic changes were isolated areas of dark staining. Any breaks present appeared to have occurred after a considerable post-mortem interval.
Dental health and anomalies: All 16 tooth positions observed. Dental health good. Eleven teeth had been lost post-mortem. The only changes present were slight calculus deposits on two of the three teeth present. Virtually no dental wear. Slight calculus deposit noted on deciduous incisor. Both third molars appeared to be congenitally absent.
Pathologies and anomalies: The only minor pathology noted was a cortical defect at the insertion of *M. pectoralis major* of the left humerus.
Date: An adult female? The mandible returned an early medieval date of 1210±40 BP (Beta-277382) (Dowd 2015, 184).

Near-complete skeleton, Third Chamber
Number of bones: 72
Weight: 2,212g
Fragment size: 2.2–25.5cm
Description: Cranium and mandible, right scapula and clavicle, left scapula, four cervical, eight thoracic and five lumbar vertebrae, a minimum of four left and four right ribs (some removed for dating in 2002), the left and right humerus, radius and ulna, one left metacarpal, one right metacarpal, one proximal hand phalanx, the left pubis, left and right femur and tibia, left fibula, one left tarsal and two left metatarsals. Also present were a right tibia (removed for dating in 2010) and a proximal fibula of a second individual.
MNI: 2 (Adult)
Age and sex: Majority of remains derived from an adult female (cranial morphology), probably aged over 35 years (dental eruption and dental health; degree of degenerative joint changes). The remains were previously analysed by Catryn Power (1991).
Colour: Light yellow
Condition: Very good. The only taphonomic changes noted were isolated areas of brownish-grey staining and small adhering calcite deposits. Any breaks present appeared to have occurred after a considerable post-mortem interval.

Dental health: All 16 maxillary and 15 mandibular tooth positions observed. Dental health poor. Ten teeth had been lost post-mortem, and three maxillary and three mandibular teeth had been lost ante-mortem. Evidence for two dental abscesses present. Moderate to severe calculus deposits on 13 of the 15 teeth present. Individual also appeared to suffer from periodontal disease. Dental wear was slight to moderate.

xA	C	C	/	X	c		/	x	/		c	/	C	c	c	/
8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	
8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8	
/	C	C	x	X	xA	/		/	NP	/	C	C	c	/	C	

Dental pathology: Ante-mortem tooth loss (6/31), dental abscess (2/31), calculus (13/15-moderate to severe), moderate periodontal disease and slight to moderate dental wear.

Pathologies and anomalies: Entheseal changes were noted at the insertion of *M. pectoralis major* on the left humerus. Also present were degenerative changes of the spine. This included vertebral body osteophytosis (C4, T3-4, 7-8 and 10), porosity (C2, 4 and 7, T1 and 7-10) and Schmorl's nodes (T8-9, LV4) as well as vertebral articular facet porosity (L3 and 5). Extra-spinal degenerative joint changes included porosity of the right sterno-clavicular joint, marginal osteophyte formation on one left rib head and the left knee, porosity and marginal osteophyte formation of the right clavicle and gleno-humeral joint and porosity and eburnation (osteoarthritis) of the left glenohumeral joint.

Stature: Calculated based on the regression formula for the left femur (Trotter 1970). This gave a result of 158±3.72cm.

Date: Rib fragments produced a Late Bronze Age/Early Iron Age date of 2490±60 BP (GrN-27381) (Dowd 2015, 127). A right adult tibia returned a medieval date of 320±40 BP (Beta-277383) (*ibid*., 213).

3. Clare, Barntick td., Barntick Cave

Number of bones: 10

Weight: 98g

Fragment size: 1.3–8.6cm

Description: Four cranial fragments, one partial left mandible, one proximal left ulna fragment, one proximal hand phalanx, one left and one unsided femoral fragment and a mandible fragment (removed for dating in 2002).

MNI: 1 (Adult)

Age and sex: All remains appeared to belong to an adult individual (dental development; epiphyseal fusion; size), possibly a male as indicated by the morphology of one occipital fragment.

Colour: Light yellow to brownish

Condition: Moderate condition. Taphonomic changes included areas of dark staining, surface erosion and cracking/flaking. Any breaks present appeared to have occurred after a considerable post-mortem interval.

Dental health: The mandibular fragment presented with one observable tooth position. The tooth present displayed a slight calculus deposit and moderate dental wear.

Date: An adult mandible fragment produced a Neolithic date of 4530±50 BP (GrA-21498) (Dowd 2015, 97).

4. Clare, Cahircalla Beg td., Alice and Gwendoline Cave

Number of bones: 1

Weight: 6g

Fragment size: 4.8cm

Description: One left clavicular diaphysis fragment (removed for dating in 2007). The original assemblage, which cannot be located at present, included phalanges, carpals, metacarpals and arm bones identified at the time of excavation as representing at least one individual, a young adult (Scharff *et al*. 1906, 62–3).

MNI: 1 (Adult)

Age and sex: The remains appeared to belong to an adult individual (size; robusticity).

Colour: Light to darker yellow

Condition: Moderate condition. Taphonomic changes present included areas of dark staining, surface erosion and cracking/flaking. Breaks present appeared to have occurred after a considerable post-mortem interval.

Date: The clavicular diaphysis fragment returned an unsatisfactory date (Dowd 2015, 63).

5. Clare, Edenvale td., the Catacombs

Number of bones: 22

Weight: 627g

Fragment size: 2–23.3cm

Description: A partial cranium (fragment removed for dating in 2002), one thoracic and one lumbar vertebral fragment, three left ribs, a partial right os coxae, one left and one right humeral fragment, one left and one right partial radius (left radius removed for dating in 2007), two partial right ulnae (one removed for dating in 2007 and the other in 2010), one left and one unsided ulnar fragment, four metacarpals, one proximal fibula fragment and two metatarsals. At the time of excavation, the assemblage was said to include a juvenile clavicle and left humerus; and adult remains included a complete skull, cranial fragments, mandible and maxilla fragments, vertebrae, ribs, calcaneus, a humerus, radii, ulnae, metacarpals, fibulae, metatarsals,

phalanges, femora, tibiae, clavicles, scapulae, and a talus. The presence of at least four individuals – three adults and a child – were estimated at that time (Scharff *et al*. 1906, 10, 60–2; unpublished excavation diary, NMI).
MNI: 3 (Adult, Adolescent and Juvenile)
Age and sex: The majority of the surviving remains appear to belong to adult or adolescent individuals (size; epiphyseal fusion; robusticity). Based on the morphology of the partial cranium and the partial right os coxae present, this probably included one male. Juvenile elements present consisted of a partial left radius, a left ulnar fragment, an unsided proximal fibular fragment, a metacarpal and a left metatarsal, all belonging to an individual over three years of age (size).
Colour: Light yellow to brownish-black
Condition: Moderate condition. Taphonomic changes present included areas of dark staining and adhering calcite deposits, surface erosion, cracking and flaking. The majority of breaks present appeared to have occurred after a considerable post-mortem interval. The surface of the proximal break of an ulnar diaphysis was smoother than comparable breaks on other elements in the assemblage, indicating that the bone collagen content might still have been relatively high when the break occurred. However, this did not appear to have taken place peri-mortem but some time after death.
Date: An adolescent ulna returned a Late Bronze Age date of 2488±27 BP (UBA-8150) (Dowd 2015, 127). An adult (male?) cranium and an adult right ulna returned early medieval dates of 1240±50 BP (GrA-22110) and 1160±40 BP (Beta-277394) respectively (*ibid*., 184). A juvenile radius returned a medieval date of 855±24 BP (UBA-8149) (*ibid*., 213).

4. or 5. Clare, Alice and Gwendoline Cave and/or **the Catacombs**

The remains from Alice and Gwendoline Cave and the Catacombs were stored together following the antiquarian excavation. Unfortunately, not all the bones were marked to indicate which cave they came from (EA for Alice and Gwendoline Cave; EC for the Catacombs). The bones described in this section could therefore belong to either cave.
Number of bones: 4
Weight: 29g
Fragment size: 4.5-10.7cm
Description: A partial right clavicle and three ilial fragments
MNI: 1 (Adult) The MNI of one adult applies only when considering the remains as an isolated assemblage. Were they to be added to either the Alice and Gwendoline Cave or the Catacombs assemblages they would not result in any changes to the MNI for those caves.
Age and sex: All remains appeared to belong to an adult individual (size; epiphyseal fusion; robusticity).
Colour: Light yellow to brownish-black
Condition: Moderate condition. Taphonomic changes present included areas of dark staining, adhering calcite deposits, surface erosion and cracking/flaking. Any breaks present appeared to have occurred after a considerable post-mortem interval.

6. Clare, Newhall td., Bats' Cave

In the excavation report the human remains from Bats' Cave and Elderbush Cave were described jointly (Scharff *et al*. 1906). The overall assemblage recorded at that time comprised 150 bones but only 34 of these can be located at present. Unfortunately, not all the bones were marked to indicate which cave they came from (NH1, NH2, NH113–NH151 and NH195–NH222 for Bats' Cave).
Number of bones: 12
Weight: 44g
Fragment size: 1.4–13.3cm
Description: Two scapula fragments (one removed for dating in 2002), one thoracic and one lumbar vertebral body, one unsided rib fragment, one left ulna fragment, two left proximal tibial epiphyses (one removed for dating in 2010), and two unidentified appendicular fragments.
MNI: 3 (Adult/Adolescent, Juvenile, Infant)
Age and sex: The majority of remains appeared to belong to adult or adolescent individuals (size; epiphyseal fusion; robusticity). Juvenile elements present included an unsided rib fragment, two scapula fragments and an unfused proximal tibial diaphysis, belonging to an individual over three years of age (size). Infant remains consisted of one thoracic and one lumbar vertebral body (size; degree of fusion).
Colour: Light yellow to brownish
Condition: Moderate condition. Taphonomic changes present included areas of dark staining, adhering calcite deposits, surface erosion and cracking/flaking. Any breaks present appeared to have occurred after a considerable post-mortem interval.
Date: A juvenile scapula returned a Neolithic date of 4430±50 BP (GrA-21489) (Dowd 2015, 97). An adolescent tibia returned a medieval or post-medieval date of 270±40 BP (Beta-277395) (*ibid*., 213).

7. Clare, Newhall td., Elderbush Cave

In the excavation report the human remains from Bats' Cave and Elderbush Cave were described jointly (Scharff *et al*. 1906). The overall assemblage comprised 150 bones but only 34 bones from both sites can be

located at present. Unfortunately, not all the bones were marked at the time of excavation to indicate which cave they came from (NH3–NH112 and NH156–NH194 for Elderbush Cave).
Number of bones: 20
Weight: 96g
Fragment size: 1.8–11.6cm
Description: A partial left clavicle, one thoracic vertebral fragment, a sacrum, one left rib fragment, two pelvic fragments, one left ulna fragment, two metacarpals (one removed for dating in 2010), seven intermediate hand phalanges, one left proximal tibial fragment, one tarsal and one proximal foot phalanx. An additional adult pelvic fragment was sent for radiocarbon dating in 2002.
MNI: 2 (Adult)
Age and sex: All remains appeared to belong to an adult individual (epiphyseal fusion; size; robusticity). However, the radiocarbon dates indicate the presence of two individuals.
Colour: Light yellow to brownish
Condition: Moderate condition. Taphonomic changes present included areas of dark staining, adhering calcite deposits, surface erosion, cracking and flaking. All breaks present appeared to have occurred after a considerable post-mortem interval.
Pathologies and anomalies Evidence for early degenerative changes of the first sacral vertebra in the form of slight to moderate vertebral body porosity.
Date: An adult pelvic fragment produced a Neolithic date of 4800±50 BP (GrA-24192) (Dowd 2015, 97). An adult right metacarpal 5 was dated to the Late Neolithic–Early Bronze Age 3930±40BP (Beta-277398) (*ibid*., 97).

6. or 7. Clare, Bats' Cave and/or **Elderbush Cave**
In the excavation report the human remains from Bats' Cave and Elderbush Cave were described jointly and not all bones were marked with their own unique excavation code to indicate which site they came from (Scharff *et al*. 1906). The bones described here could therefore belong to either cave.
Number of bones: 2
Weight: 1g
Fragment size: 2.6–2.8cm
Description: A scapular fragment and a right proximal tibial epiphysis.
MNI: 2 (Adult and Juvenile). The MNI of one adult and one juvenile applies only when considering the remains as an isolated assemblage. Were they to be added to either the Bats' Cave or Elderbush Cave assemblage this would have only resulted in a change to the MNI of juveniles at Bats' Cave, adding another individual (juvenile). The adult bone would not have changed the overall MNI of either cave.
Age and sex: The scapular fragment appeared to belong to an adult individual (size; robusticity). Juvenile remains present consisted of a right proximal tibial diaphysis of an individual probably aged over two years (size).
Colour: Light yellow to brownish
Condition: Moderate condition. Taphonomic changes present included cracking and flaking. All breaks present appeared to have occurred after a considerable post-mortem interval.

8. Cork, Ballymacmoy td., Killavullen Cave 3
Number of bones: 25
Weight: 2,657g
Fragment size: 1.1–35.2cm
Description: One cervical, three thoracic and one lumbar vertebrae/vertebral fragments, two rib fragments, one right os coxae, one right ilium fragment (removed for dating in 2004), one proximal ulna fragment, three femoral fragments, one left tibia and one left tibial fragment, five fibular fragments, one left calcaneus, one right talus and three unidentified appendicular fragments.
MNI: 2 (Adult)
Age and sex: All remains appeared to belong to late adolescent or adult individuals (epiphyseal fusion; size; robusticity).
Colour: Light to darker yellow
Condition: Good condition though the majority of elements were virtually encased in calcite. This contributed considerably to the overall weight of the assemblage as well as obscuring most of the bone surfaces (Pls. 3 and 4). Where the original bone surface was visible, taphonomic changes included staining, surface erosion and cracking/flaking. Any breaks present appear to have occurred after a considerable post-mortem interval.
Date: An adult ilium fragment returned a Neolithic date of 4544±39 BP (UBA-6409) (Dowd 2015, 97).

9. Cork, Castlekevin or Killuragh td., Killura Cave
Number of bones: 3
Weight: 31g
Fragment size: 5–7.7cm
Description: One cranial fragment, one right humeral fragment (removed for dating in 2010) and one right metacarpal.
MNI: 1 (Adult)
Age and sex: All remains appeared to be those of an adult individual (size; robusticity).
Colour: Light yellow

Condition: Moderate to good condition. The only taphonomic change noted were small areas of surface erosion. Any breaks present appeared to have occurred after a considerable post-mortem interval.
Date: An adult humerus fragment returned a Neolithic date of 4680±40 BP (Beta-277397) (Dowd 2015, 97).

10. Cork, Connaberry td., Connaberry Cave C
Number of bones: 15
Weight: 78g
Fragment size: 1.6–11.5cm
Description: One partial left maxilla, a right maxilla fragment (removed for dating in 2002), four disarticulated maxillary teeth, two disarticulated mandibular teeth, one partial left scapula, two cervical vertebra (one removed for dating in 2010), one thoracic vertebra, one right metacarpal, one proximal hand phalanx and one metatarsal.
MNI: 2 (Adult)
Age and sex: All remains appeared to belong to an adult individual (dental development; epiphyseal fusion; size). Radiocarbon dates indicated the presence of two individuals.
Colour: Light to darker yellow
Condition: Moderate condition. Taphonomic changes included areas of dark staining and surface erosion. Any breaks present appeared to have occurred after a considerable post-mortem interval.
Dental health and anomalies: The partial left maxilla presented with three observable tooth positions. Only one tooth was preserved *in situ*, displaying slight calculus deposits and slight tooth wear. Of the four disarticulated mandibular teeth, two had slight calculus deposits and one displayed a carious lesion at the cemento-enamel junction. Tooth wear was slight to moderate. Of the two disarticulated mandibular teeth present, one had a slight calculus deposit whereas the other presented with occlusal caries. Virtually no tooth wear was recognisable. The third molar of the left maxilla present appeared to be congenitally absent.
Date: A right maxilla fragment returned a Neolithic date of 4730±50 BP (GrA-22115) (Dowd 2015, 97). An adult cervical vertebrae (C2) returned a medieval date of 470±40 BP (Beta-277399) (*ibid*., 213).

11. Cork, Connaberry td., Main Earth Cave
Number of bones: 1
Weight: 79g
Fragment size: 20.8cm
Description: A right partial tibial diaphysis (part removed for dating in 2005).
MNI: 1 (Adult)
Age and sex: The remains appeared to belong to an adult individual (size).
Colour: Light yellow
Condition: Moderate condition. Taphonomic changes included surface erosion and cracking/flaking. Any breaks present appeared to have occurred after a considerable post-mortem interval.
Date: A tibia fragment returned a medieval date of 306±32 BP (UBA-6678) (Dowd 2015, 213).

12. Fermanagh, Legg td., Pollthanacarra
Number of bones: 137
Weight: 3,364g
Fragment size: 1.8–48.6cm
Description: 25 cranial fragments, 11 disarticulated maxillary teeth, three mandibles, ten disarticulated mandibular teeth, one partial right scapula and two unsided scapular fragments, one partial sacrum, four cervical, seven thoracic and three lumbar vertebrae/vertebral fragments, one hyoid body, one partial right os coxae, three partial left humeri (all three removed for dating in 2007), two partial right humeri, one left and one right humeral fragment, one partial left radius, one left ulna, three left carpals, six left and four right metacarpals, twelve proximal, four intermediate and three distal hand phalanges, one right femur, one partial right and one partial left femur, one left, one right and one unsided femoral fragment, one left and one right tibia, two left and two right fibular fragments, two left and one right tarsal, one left and one right calcaneus, two left and one right talus, two left and four right metatarsals and one proximal foot phalanx.
MNI: 4 (Adult)
Age and sex: All remains appeared to belong to late adolescent or adult individuals (size, robusticity; epiphyseal fusion), including at least two adult males (cranial morphology; femoral and humeral maximum length; femoral head size). One of these appeared to be remarkably tall and robust, indicated by a right femur and left humerus (Table 1.8). Also present was at least one young adult female (cranial morphology; size), recognisable from the morphology of a partial right os coxae, the visible fusion lines on a relatively small and slender right scapula, and the small size of a left femoral head.
Colour: Light yellow to brownish
Condition: Moderate to good condition. Taphonomic changes included areas of dark staining, adhering tufa/calcite deposits, surface erosion and cracking and flaking. Some elements were almost entirely encased in tufa/calcite which contributed noticeably to the overall weight of the assemblage. Any breaks present appeared to have occurred after a considerable post-mortem interval.
Dental health: One partial right maxilla presented with six observable tooth positions. Four teeth had

been lost post-mortem and two teeth were preserved *in situ*, both of which displayed slight calculus deposits and tooth wear. Three complete or partial mandibles were present. The first included 16 observable tooth positions. Eight teeth had been lost post-mortem. Of the eight teeth present, seven displayed slight calculus deposits. Overall, tooth wear was slight to moderate. The second mandible included 14 observable tooth positions. Twelve teeth had been lost post-mortem and only two teeth were present. Calculus was noted on one of these, and tooth wear was slight. The third mandible presented with eight observable tooth positions, but all the teeth had been lost post-mortem. Of the 11 disarticulated maxillary teeth present, nine showed slight calculus deposits. Tooth wear was slight. Of the ten disarticulated mandibular teeth, eight presented with slight to moderate calculus deposits and one displayed linear enamel hypoplastic defects. Again, tooth wear was slight.

Pathologies and anomalies: A minor pathology present was a cortical defect at the insertion of *M. teres major* of one partial right humerus. Also present were degenerative changes on three cervical and three thoracic vertebral bodies as well as on the vertebral facets of one cervical and three thoracic vertebrae, including porosity and osteophytosis. One cervical vertebra also displayed eburnation of the articular facets, pathognomonic of osteoarthritis. In addition, one left humerus presented with slight porosity of the humeral head and circular erosive lesions were present at the femoral head-neck junction of one right femoral head. These are probably indicative of the presence of subchondral cysts.

Metrics:

Table 1.8 Long bone measurements from Pollthanacarra.

Age	*Bone*	*UM reg. no.*	*Max. length (cm)*	*Head diam. (cm)*	*Sex*	*Adult stature*
Adult	L. humerus	K 24297	34.7	5.5	Male	177.3±4.05cm
Adult	R. femur	K 24300	48.6	5.2	Male	177±3.27cm
Adult	R. femur	–	–	4.5	Male	–
Adult	L. femur	K24300	–	4.1	Female?	–
Adult	R. tibia	–	34.1	–	Male?	164.6±3.37cm

Date: The three left humeri all returned Early Bronze Age dates of 3804±34 BP (UBA-8154), 3745±34 BP (UBA-8153) and 3629±37 BP (UBA-8152) (Dowd 2015, 127).

13. Kerry, Dunkerron td., Dunkerron Cave
Number of bones: 6
Weight: 95g
Fragment size: 4.8–10.6cm
Description: Three thoracic and one lumbar vertebra, one unsided rib fragment and one distal radial fragment. One thoracic vertebra (T10 or T11) was removed for dating in 2010.
MNI: 1 (Adult)
Age and sex: All remains appeared to belong to an adult individual (epiphyseal fusion; size/robusticity; degenerative changes).
Colour: Light to darker yellow
Condition: Good condition. Taphonomic changes included surface erosion and adhering calcite deposits. All breaks present appeared to have occurred after a considerable post-mortem interval.
Pathologies and anomalies: The only pathology noted was degenerative changes of the thoracic spine, including vertebral articular facet porosity of one vertebra and a Schmorl's node present on another vertebral body.
Date: A thoracic vertebra produced an early medieval date of 1060±40 BP (Beta-277381) (Dowd 2015, 184).

14. Kilkenny, Mohil td., Dunmore Cave: see Chapter 2, this volume

15. Leitrim, Sramore td., Graineater's Cave (called Sramore Cave in Dowd 2008; Dowd 2015) Number of bones: 3
Weight: 357g
Fragment size: 12.1–30.3cm
Description: A mandible, a right humerus and right femoral diaphysis fragment (part removed for dating in 2004).
MNI: 1 (Adult)
Age and sex: The mandible belonged to an adult individual, possibly male (mandibular morphology) and aged over 20 years (dental eruption). The humerus also belonged to an adult, indicated by the complete fusion of the epiphyses as well as the presence of early degenerative changes of the elbow joint.
Colour: Light to darker yellow

Condition: Condition very good. The only taphonomic changes noted were small areas of dark staining
Dental health: All 16 tooth positions observed. Dental health relatively good. The right medial incisor had been lost ante-mortem and five other teeth had been lost post-mortem. The only other changes were slight to moderate calculus deposits on seven of the ten teeth present. Dental wear severe.
Pathologies and anomalies: Early degenerative joint changes in the form of very mild marginal osteophyte formation present on distal humerus.
Date: A mandibular molar and a femoral fragment returned Late Mesolithic dates of 5227±36 BP (UBA-15772) and 5202± 39 BP (UBA-6407) (Dowd 2015, 82).

16. **Limerick, Knockfennell td., Red Cellar Cave**
Number of bones: 3
Weight: 20g
Fragment size: 2.8–4.7cm
Description: One unsided rib fragment, one proximal foot phalanx and one right talus (removed for dating in 2005).
MNI: 2 (Adult and Juvenile)
Age and sex: The foot bones appeared to be those of an adult individual (size; epiphyseal fusion), whereas the rib fragment belonged to a juvenile (size).
Colour: Brownish
Condition: Good condition. No taphonomic changes noted. The only break present appeared to have occurred after a considerable post-mortem interval.
Date: An adult right talus returned a Neolithic date of 4671±38 BP (UBA-6679) (Dowd 2015, 97).

17. **Mayo, Achill Island (unknown td.), cave Number of bones:** 2
Weight: 56g
Fragment size: 5.1–8.5cm
Description: A left maxilla and left mandible.
MNI: 1 (Adult)
Age and sex: The remains appeared to be those of an adult individual, probably aged under 25 years (dental development).
Colour: Greyish-white
Condition: Moderate condition. Taphonomic changes included surface erosion and an almost bleached greyish-white surface appearance of the bone, probably the result of long-term sea or surface exposure. Breaks present appeared to have occurred after a considerable post-mortem interval.
Pathologies, anomalies and dental health: No pathological changes or anomalies were noted. The partial left maxilla presented with eight observable tooth positions. Four teeth had been lost postmortem. Out of the remaining four teeth, two displayed slight calculus deposits. Tooth wear was slight. A total of thirteen tooth position could be observed on the mandible. Four teeth had been lost post-mortem. Nine teeth were present, eight of which showed slight to moderate calculus deposits.
Date: Unknown.

18. **Sligo, Cloonagh td., Plunkett Cave (Cave P), Keash**
Number of bones: 5
Weight: 31g
Fragment size: 1.5–8.2cm
Description: One mandibular and two maxillary teeth and the distal half of a left humerus. An adult 2nd or 3rd right maxillary molar was removed for dating in 2002.
MNI: 1 (Adult)
Age and sex: All remains appeared to belong to adult individual(s) (dental development; epiphyseal fusion; size).
Colour: Light to darker yellow
Condition: Good to moderate. Taphonomic changes included areas of surface erosion and adhering calcite deposits. Any breaks present appeared to have occurred after a considerable post-mortem interval.
Dental health: The three disarticulated teeth all displayed slight calculus deposits.
Date: An adult maxillary molar returned an early medieval date of 1450±50 BP (GrA-22111) (Dowd 2015, 184).

19. **Sligo, Cloonagh td., Cave O, Keash**
Number of bones: 1
Weight: 97g
Fragment size: 19.1cm
Description: Proximal half of a left tibia (part removed for dating in 2005).
MNI: 1 (Adult)
Age and sex: The remains appeared to be those of an adult individual (epiphyseal fusion).
Colour: Light to darker yellow
Condition: Good. Minimal surface erosion. The break present appeared to have occurred after a considerable post-mortem interval.
Pathologies and anomalies: The only minor pathology noted was a cortical defect at the insertion of *M. soleus*.
Date: A fragment of a tibia returned an early medieval date of 963±33 BP (UBA-6680) (Dowd 2015, 184).

20. **Waterford, Ballinacourty td., Quinlan's Quarry Cave**
Number of bones: 65
Weight: 1,119g
Fragment size: 2–43.2cm
Description: Three cranial fragments, one right and one unsided scapular fragment, four thoracic, one

cervical and five lumbar vertebrae/vertebral fragments (one lumbar removed for dating in 2010), seven left, seven right and one unsided ribs/rib fragments, two right os coxae, one left partial os coxa (removed for dating in 2010), one partial right humerus, one unsided radial fragment, one partial left ulna, two right carpals, one left metacarpal, one proximal hand phalanx, one complete and one partial left femur (removed for dating in 2010), one proximal left fibular fragment, one right talus, eight left metacarpals, eight right metacarpals, two proximal foot phalanges, one distal foot phalanx and two tarsal fragments.
MNI: 3 (2 Adults, 1 Juvenile)
Age and sex: The majority of the remains appeared to belong to adult individuals (epiphyseal fusion; size; robusticity). This included at least one female indicated by the morphology of a pair of pelvic bones. Considering the surface morphology of the auricular surface and the unfused iliac crest, the individual was probably a young adult aged between 18 and 25 years. Further, epiphyseal fusion lines were still clearly distinguishable on a proximal fibula fragment, also indicating the presence of a young adult individual. The presence of a male individual is indicated by the size of a left femoral head. Juvenile remains present consisted of one thoracic vertebral body and three partial lumbar vertebrae. These belonged to an individual aged at least 5 years or older (size, degree of fusion).
Colour: Light yellow to brownish
Condition: Moderate to good. Taphonomic changes included areas of brownish-black staining, adhering calcite deposits, surface erosion and cracking/flaking. All breaks present appeared to have occurred after a considerable post-mortem interval.
Pathologies and anomalies: Minor pathologies noted were two cortical defects, one at the insertion of *M. gluteus maximus* of one left femur and the second at the insertion of *M. pectoralis major* of a partial left humerus. Also present was a case of *os acromiale* of the right scapula. *Os acromiale* is the incomplete bony fusion of the acromion process of the scapula which usually fuses by approximately 20 years (Liberson 1937; Scheuer and Black 2000, 270). Although traditionally it is thought to have a developmental origin, its high prevalence among the skeletal remains of soldiers recovered from the Mary Rose wreck and the combatants from the Battle of Towton indicates that at least in some cases it might present an activity-related skeletal adaptation rather than a developmental defect (Knüsel 2000, 115; Stirland 2000, 121). In those cases, non-fusion of the acromion process would have allowed for a greater range of movements of the shoulder joint.
Date: An adult male left femur returned a Neolithic date of 4920±40 BP (Beta-277392) (Dowd 2015, 97) while an adult female pelvis returned a Bronze Age date of 2990±40 BP (Beta-277391) (*ibid*., 127).

21. Waterford, Ballynamintra Lower td., Ballynamintra Cave
Number of bones: 51
Weight: 405g
Fragment size: 2.4–13.4cm
Description: Three disarticulated mandibular teeth, thirteen cranial fragments, one partial left clavicle, two cervical and two lumbar vertebrae/vertebral fragments, two left ribs/rib fragments, one humeral fragment, two left and one right radial fragment, one left and one right ulnar fragment, three left metacarpals, one proximal hand phalanx, one right femoral fragment, one right patella, one left and four unsided fibular fragments, nine metatarsals and one proximal foot phalanx. A radius was removed for radiocarbon dating in the 1990s (Woodman *et al*. 1997); in 2010 two left adult metatarsals (both MT5) were removed for dating.
MNI: 3 (2 Adult/Adolescent, 1 Juvenile)
Age and sex: The majority of remains appeared to belong to adult or late adolescent individuals (epiphyseal fusion; size/robusticity; dental development). The only juvenile remains present were two metatarsals, representing an individual under ten years of age (size, epiphyseal fusion).
Colour: Light yellow to brownish
Condition: Moderate to poor condition. Taphonomic changes included areas of brownish to black staining, surface erosion, cracking and flaking and adhering calcite deposits. One possible case of rodent activity was noted. Nick-like defects were present along the interosseous border of an adult left ulnar fragment. They strongly resembled the pattern resulting from rodent gnawing, but as the bone had undergone considerable erosion it was not possible to securely identify the defect as rodent-related. One rib was embedded in a calcite deposit which contributed considerably to the overall weight. Any breaks present appeared to have occurred after a considerable post-mortem interval.
Dental health and anomalies: Three disarticulated mandibular teeth were present, each displaying slight calculus deposits and slight dental wear. One first premolar had a bifurcated root, a trait more commonly noted on maxillary molars.
Pathologies and anomalies: A retained metopic suture present on an adult left frontal fragment; this suture usually closes by age four.
Date: A radius returned a Neolithic date of 4230±75 BP (OxA-4250) (Dowd 2015, 97). A left adult metatarsal (MT5) returned a Late Neolithic/Early Bronze Age date of 3930±40 BP (Beta-277385) (*ibid*., 97). A left adult

metatarsal (MT5) returned an Early Bronze Age date of 3720±40 BP (Beta-277384) (*ibid*., 127).

22. Waterford, Ballynamintra Middle td., Carrigmurrish Cave
Number of bones: 2
Weight: 1,915g
Fragment size: 11.8–17.8cm
Description: Complete articulated cranium and mandible (sampled for radiocarbon dating in 2010).
MNI: 1 (Adult)
Age and sex: An adult male (cranial and mandibular morphology), probably aged over 25 years (dental eruption).
Colour: Light yellow
Condition: Very good though both cranium and mandible were partially encased in extensive calcite deposits. As well as obscuring a proportion of the bone surface, these deposits contributed considerably to the overall weight of the skull. The remaining bone surface was clean with a polished appearance.
Dental health: All 32 tooth positions observed; 24 teeth present. Overall, dental health was good. The only changes observed were slight to moderate calculus deposits on 22 teeth. Dental wear was slight.

/	C	c	C	C	C	C	/	/	/	c	c	C	c	c	c
8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
c			C	C	C	/	/	/	/	c	c	C	c	c	C

Dental pathology: Calculus (13/15-slight to moderate) and slight dental wear.
Pathologies and anomalies: No other skeletal changes were noted.
Date: The mandible returned a Neolithic date of 4460±40 BP (Beta-277386), though depleted $^{13}C/^{12}C$ ratios in the sample indicate that this date needs to be assessed with caution (Dowd 2015, 97).

23. Waterford, Bridgequarter td., Oonaglour Cave
Number of bones: 74
Weight: 457g
Fragment size: 1–17.8cm
Description: Forty-four cranial fragments, three mandibular fragments, a partial right clavicle, one left scapular fragment, one unsided rib fragment, one left and one right pelvic fragment, eleven left humeral fragments, one proximal right and one unsided radial fragment, two left ulnar fragments, one proximal hand phalanx, one unsided patella, one right tibial fragment, one left talus, one left metatarsal and one proximal foot phalanx. A left proximal radial diaphysis fragment (probably adult) was removed for dating in 2005.
MNI: 2 (Adult and Juvenile)
Age and sex: Virtually all the remains appeared to belong to an adult individual (epiphyseal fusion; robusticity; size; dental development). Only one juvenile element, an unsided patella, was present (size).
Colour: Light yellow to brownish black
Condition: Moderate to poor. Some of the fragments had a soft, almost friable consistency, probably the result of post-excavation treatment in the early twentieth century. This, according to an accompanying note, involved washing and boiling the remains in glue. Taphonomic changes included widespread brownish to black staining, surface erosion, cracking and flaking as well as adhering calcite deposits. The majority of breaks appeared to have occurred after a considerable post-mortem interval. One parietal fragment presented with a well-defined curvilinear break possibly indicating that the bone collagen content had still been relatively high when the damage occurred. However, no endocranial flaking or other endo- or ectocranial changes were present, suggesting that the defect was the result of violent trauma, or had occurred around the time of death.
Dental health: One partial left maxilla presented with three observable tooth positions. Two teeth had been lost post-mortem and only one tooth was present. It showed severe dental wear. No other changes were noted. Another partial right maxilla included one observable tooth position and tooth. No pathological changes were noted. Also present were a mandible with six observable tooth positions. No teeth were actually present; one of the teeth had been lost ante-mortem.
Date: An adult left radial fragment returned a Neolithic date of 4503±38 BP (UBA-6677) (Dowd 2015, 97).

24. Waterford, Kilgreany td., Kilgreany Cave
The archaeological excavation and retrieval of human bones from Kilgreany Cave took place in 1928 and 1934 (Tratman 1929; Movius 1935). Decades of storage in drawers and cardboard boxes has resulted in the mix-up of several of the accompanying cardboard and paper labels indicating find locations. While the contextual and spatial find information for many of the remains is lost, each bone can still be identified as belonging to either the 1928 or 1934 excavation based on the number inked on the bone. In the CD database this is accompanied by information on find location whenever available. It should be noted that not all the individual find numbers assigned by the excavators and referred to in the reports are unique numbers, and multiple use of numbers does occur – possibly indicating bones retrieved from the same location in the cave.

Number of bones: 2,129
Weight: 18,119g
Fragment size: 0.9–40.8cm
Date: Ribs and phalanges of an adult female ('Kilgreany A') produced a Neolithic date of 4580±150 BP (BM-135) (Dowd 2015, 97). A skull fragment and a molar of an adult male ('Kilgreany B') also produced Neolithic dates of 4820±60 BP (Pta-2644) and 4393±45 BP (UBA-15767) (*ibid*., 97). A fragment of a second adult male mandible (Kilgreany 3) was removed for dating in 2002 and returned a Neolithic date of 4790±50 (GrA-21499) (*ibid*., 97). In 2004, the right humerus of a neonate (0–1 months) returned an Early Bronze Age date of 3267±35 BP (UBA-6408) (*ibid*., 127). Four bones were removed for dating in 2010. An infant left humerus (KII 1414) and a left mandible (Kh 453) of a 10–12 year old child both returned Neolithic dates of 4960±40 BP (Beta-277387) and 4450±40 BP (Beta-277388) respectively (*ibid*., 97). A right maxilla (KII 854 B) of a 3–4 year old child and a cremated adult cranial vault fragment (KII 1201) returned Bronze Age dates of 3470±40 BP (Beta-277389) and 3120±40 BP (Beta-277390) respectively (*ibid*., 127).
Colour: Light yellow to brownish
Condition: Although the condition of the remains ranged from good to poor, the majority of elements were in either good or moderate condition. Most breaks present appeared to have occurred after a considerable post-mortem interval. In the case of a left femoral diaphysis fragment, the anterior aspect of the proximal fracture appeared to be relatively smooth. The break might have happened while the collagen content of the remains was still relatively high, but not necessarily peri-mortem. Another break that might have occurred while the bone was still relatively fresh was noted on the distal end of an unsided fibular diaphysis fragment. The fracture outline appeared to be helical and the fracture surface relatively smooth, though part of it was obscured by adhering calcite deposits. One possible case of rodent activity was noted on a right femoral diaphysis fragment, but again surface erosion prevented an accurate assessment of the changes. Other taphonomic changes present included adhering calcite deposits, staining, surface erosion and cracking/flaking.
Cremated bone: Also recorded was a small deposit of cremated bone (149g) (Pl. 5). It was greyish-white in appearance and included fragments of adult cranium, mandible, clavicle, vertebrae, humerus, hand, pelvis, patella, femur and fibula as well as juvenile clavicle. The MNI for the cremated remains is two, including an adult and a juvenile. Fissuring and distortion were present, indicating relatively high cremation temperatures, up to 600°C. The pattern of the fissures on the long bone diaphyses suggested that the remains were burnt while still fleshed, which would be standard practice for the majority of Irish prehistoric cremation burials.
MNI: 21/22 (14/15 Adults, four Juveniles/Adolescents, three Neonates/Infants).
Calculation of the minimum number of individuals at Kilgreany Cave was based on summarising the number of elements present for diagnostic zones of the skull, shoulder, long bones and feet for different age groups (Tables 1.12 and 1.13). For long bones, a large number of epiphyses that are recorded through the zonation method only develop throughout infancy and childhood. They are initially very small and easily displaced, lost or broken. As a result, only those zones in the non-adult remains that were actually represented were listed in the MNI overview.
Based on the left mandible and left talus respectively, a minimum of 21 or 22 individuals were represented by the skeletal remains from Kilgreany (Tables 1.9, 1.10, 1.11). This included 14 or 15 adults (based on the left mandible or left talus respectively), four juveniles/adolescents (based on the left proximal tibia) and three neonates/infants (based on the left proximal tibia).

Table 1.9 Adult MNI from Kilgreany Cave.

Element	*Adult (general) Left*	*Adult (general) Right*	*Male*	*Female*
Petrous temporal	13 12 + Kh 2 (Zone 16)	9 6 + Kh 2 and Kh 65 (Zone 17)		
Maxilla	12 11 + Kh 2 (Zone 12)	13 12 + Kh 2 (Zone 13)	1 (M)	1 (F)
Mandible	15 13 + Kh 2 and Kh 65 (Zone 1)	14 12 + Kh 2 and Kh 65 (Zone 1)	3 (2 M; 1 M?)	3 (2 F; 1 F?)

(Continued)

Table 1.9 Adult MNI from Kilgreany Cave. (Continued)

Element	*Adult (general) Left*	*Adult (general) Right*	*Male*	*Female*
Medial clavicle	6 (Zone 1)	4 (Zone 1)		
Lateral clavicle	11 (Zone 2)	8 (Zone 2)		
Superior glenoid	8 (Zone 2)	4 (Zone 2)		1 (F)
Inferior glenoid	5 (Zone 3)	4 (Zone 3)		1 (F)
Humeral head	2 (Zone 2)	2 (Zone 2)		1 (F)
Deltoid area/humerus	6 (Zone 9)	9 (Zone 9)		
Humeral capitulum	5 (Zone 5)	4 (Zone 5)		
Humeral trochlea	5 (Zone 6)	4 (Zone 6)		
Radial head	3 (Zones 1,2)	4 (Zones 1,2)		
Proximal diaphysis and tuberosity/radius	4 (Zone 5)	5 (Zone 5)		
Olecranon/ulna	8 (Zone 1)	7 (Zone 1)		
Trochlear notch/ulna	9 (Zone 2)	9 (Zone 2)		
Femoral head	6 (Zone 4)	2 (Zone 4)		1 (F)
Gluteus maximus area/femur	8 (Zone 3)	4 (Zone 3)		
Medial condyle and epicondyle/femur	6 (Zone 9)	3 (Zone 9)		
Lateral condyle and epicondyle/femur	7 (Zone 10)	1 (Zone 10)		
Medial proximal condyle/tibia	6 (Zone 1)	2 (Zone 1)		
Lateral proximal condyle/tibia	6 (Zone 2)	2 (Zone 2)		
Medial malleolus/ tibia	3 (Zone 5)	1 (Zone 5)		
Lateral malleolus/ tibia	3 (Zone 6)	3 (Zone 6)		
Fibular proximal epiphysis	4 (Zone 1)	4 (Zone 1)		
Fibular distal epiphysis	5 (Zone 2)	5 (Zone 2)		
Calcaneus	8 (Zone 2)	12 (Zone 2)		
Talus	15 (Zone 2)	12 (Zone 2)		

Table 1.10 Juvenile and adolescent MNI from Kilgreany Cave.

Element	*Juvenile Left*	*Juvenile Right*
Petrous temporal	1 (Zone 16)	2 (Zone 17)
Maxilla	1	1
Mandible	1	1
Medial clavicle	–	1 (Zone 1)
Lateral clavicle	1 (Zone 2)	3 (Zone 2)
Superior glenoid	–	1 (Zone 2)
Inferior glenoid	–	1 (Zone 3)
Humeral head	3 (Zone 2)	–
Deltoid area/humerus	1 (Zone 9)	2 (Zone 9)
Humeral capitulum	–	2 (Zone 5)
Humeral trochlea	–	3 (Zone 6)
Proximal diaphysis and tuberosity/radius	2 (Zone 5)	–
Trochlear notch/ulna	–	3 (Zone 2)
Gluteus maximus area/ femur	1 (Zone 3)	1 (Zone 3)
Medial condyle and epicondyle/ femur	1 (Zone 9)	–
Lateral condyle and epicondyle/ femur	1 (Zone 10)	–
Medial proximal condyle/tibia	4 (Zone 1)	1 (Zone 1)
Lateral proximal condyle/tibia	4 (Zone 2)	1 (Zone 2)
Medial malleolus/tibia	1 (Zone 5)	–
Lateral malleolus/tibia	1 (Zone 6)	–

Table 1.11 Neonate and infant MNI from Kilgreany Cave.

Element	*Infant/Neonate Left*	*Infant/Neonate Right*
Mandible	–	1 (Zone 1)
Lateral clavicle	1 (Zone 2)	–
Deltoid area/humerus	1 (Zone 2)	–
Humeral capitulum	1 (Zone 5)	–
Humeral trochlea	1 (Zone 6)	–
Trochlear notch/ulna	–	2 (Zone 2)
Gluteus maximus area/ femur	2 (Zone 3)	–
Medial proximal condyle/tibia	2 (Zone 1)	3 (Zone 1)
Lateral proximal condyle/tibia	2 (Zone 2)	3 (Zone 2)
Medial malleolus/tibia	2 (Zone 5)	2 (Zone 5)
Lateral malleolus/tibia	2 (Zone 6)	2 (Zone 6)

Table 1.12 Weight of cranial and mandibular bones and bone fragments from Kilgreany Cave.

Element	*Total number present*	*Weight (g)*
Cranial fragments	512	
Disarticulated permanent maxillary teeth	78	3978
Disarticulated deciduous maxillary teeth	5	
Mandibles/mandibular fragments	36	
Disarticulated permanent mandibular teeth	78	490
Disarticulated deciduous mandibular teeth	3	

Two virtually complete articulated skulls (Kh 2 and Kh 65) were present in the cranial/mandibular sample. These specimens will be discussed separately.

Age and sex

Although it was not possible to sex most of the adult remains or ascribe narrow age ranges to the majority of bones, individual elements that could be aged or sexed gave an indication of the representation of different age groups and adult males and females in the sample (Tables 1.14 and 1.15). An equal proportion of males (at least three) and females (at least three) appear to be represented. Only two adults could be aged more specifically, one based on the morphology of the auricular surface and fusion stages of the pelvic epiphyses, the other through considering development and eruption of the third molar. Both were young adults, probably aged between 18 and 25 years. In addition, the degree of spinal and extra-spinal joint disease noted in the assemblage indicates the presence of older

Table 1.13 Post-cranial bones and bone fragments from Kilgreany Cave.

Element	*No. right*	*No. left*	*No. unsided*	*No. total*	*Weight in g*
Clavicle	17	20	3	40	239
Scapula	12	12	8	32	316
Sternum	–	–	–	4	20
Vertebrae	–	–	–	220	1276
Hyoid	–	–	1	1	<1
Ribs	67	65	44	176	358
Pelvis	24	15	25	64	1125
Humerus	24	22	18	64	1194
Radius	13	14	8	35	359
Ulna	28	18	12	58	678
Carpals	12	21	1	34	
Metacarpals	32	34	26	92	
Proximal hand phalanx	–	–	–	88	379 (all hand bones)
Intermediate hand phalanx	–	–	–	35	
Distal hand phalanx	–	–	–	3	
Femur	12	30	29	71	3254 (femur and patella)
Patella	11	3	2	16	
Tibia	13	24	25	62	2123
Fibula	10	12	40	62	563
Tarsals	26	18	–	44	
Metatarsals	50	46	9	105	596 (all foot bones)
Proximal foot phalanx	18	11	21	50	
Distal foot phalanx	–	–	2	2	
Calcaneus	12	8	1	21	582
Talus	12	15	–	27	531
Axial	–	–	3	3	9
Appendicular	–	–	8	8	49

individuals, probably including adults who were at least in their late 30s or 40s. In the sub-adult group, individuals under 1 year of age, neonates, and older infants were present. In the juvenile group, younger individuals aged less than 6 years of age as well as at least one individual aged between 10 and 12 years were recorded.

Dental health

A juvenile left maxilla (Kh 295) presented with five observable deciduous tooth positions. Three teeth had been lost post-mortem. The remaining two teeth displayed slight calculus deposits. Also present was a right juvenile maxilla (KII 854 B), again including five observable deciduous tooth positions. Three teeth had been lost post-mortem and the remaining teeth presented with slight calculus deposits. A complete left and right adult maxilla with 16 observable tooth positions (Kh 160) included six teeth present *in situ*, two of which had slight calculus deposits. Ten teeth had been lost post-mortem. Both third molars present were unerupted and overall tooth wear was slight.

Ten partial or complete left adult maxillae with preserved tooth positions were examined. The first included only one observable tooth position and the tooth had been lost post-mortem. The second left maxilla had two observable tooth positions, but again both teeth were lost post-mortem. The third left maxilla (Kh 158) included eight observable tooth positions. Three teeth appeared to have been lost ante-mortem, whereas the remaining five were lost post-mortem. Also noted was a dental abscess affecting two teeth. The fourth left maxilla (Kh 157) included eight observable tooth positions. Six teeth had been lost post-mortem and the remaining tooth displayed slight calculus. The third molar appeared to be congenitally absent, and tooth wear was slight. The fifth left maxilla (KII 844 X)

Table 1.14 Kilgreany Cave: adult skeletal elements that could be sexed and the method used.

Element	*Registration no.*	*Sex*	*Morphology*	*Metrics*
Left temporal	Kh 25	Female?	X	
Left frontal	Kh 33	Male?	X	
Occipital	Kh 520	Male	X	
Occipital	Kh 515	Male	X	
Occipital	Kh 515	Male	X	
Occipital and right parietal	Kh 517	Female?	X	
Left and right frontal	Kh 517	Male	X	
Left frontal	Kh 517	Female	X	
Right temporal	Kh 517	Female?	X	
Right temporal, occipital and right parietal	Kh 517	Female?	X	
Left temporal	Kh 519	Male	X	
Right temporal	Kh 519	Male?	X	
Left temporal	KII 1123	Female?	X	
Left and right mandible	KII 854 B	Male	X	
Right mandible	Kh 457	Female	X	
Right humeral head	Kh 77	Female		X
Left os coxae	Kh 85	Female?	X	
Right os coxae	Kh 198	Male?	X	
Left os coxae	Kh 22	Female?	X	
Left os coxae	Kh 392	Male	X	
Left os coxae	KII 1259 D	Female?	X	
Left os coxae	KII 898	Male	X	
Right os coxae	KII 898	Female?	X	
Right femoral head	Kh 81	Female		X
Left femur	Kh 82	Female		X
Right femur	KII 898	Male?		X

Table 1.15 Kilgreany Cave: non-adult skeletal elements that could be aged.

Element	*Registration no.*	*Age*
Left mandible	Kh 453	10–12 years
Left maxilla	Kh 295	3–5 years
Right maxilla	KII 854 B	3–4 years
Left and right maxilla	Kh 160	Young Adult? (18–25 years)
Left humerus	KII 1414	6–12 months
Right ulna	KII 1257 G	Neonate
Right ulna	KII 1252 C	Neonate
Left os coxae	KII 898	Young Adult (18–25 years)
Left femur	KII 1265	Neonate
Right tibia	KII 1414	Neonate
Right tibia	KII 1255 DI	Neonate
Left tibia	KII 1280	Neonate

included six observable tooth positions. Four teeth had been lost post-mortem and two teeth were present *in situ*. Both displayed slight to moderate calculus deposits, and dental wear also was slight to moderate. In the case of the sixth left maxilla (KII 1201), eight observable tooth positions were present. No teeth remained, but one tooth had been lost ante-mortem. The seventh left maxilla (KII 914) included five observable tooth positions, but again, all teeth had been lost post-mortem. Three tooth positions were preserved on the eighth left maxilla (KII 914). All teeth had been lost post-mortem. Five tooth positions could be observed on the ninth left maxilla (KII 1240). Three teeth were present, two with slight calculus deposits, and two teeth had been lost postmortem. Dental wear was moderate to severe and one tooth suffered from a dental abscess. Finally, only one tooth position could be observed on the tenth left maxilla (KII 1240). The tooth was present and displayed slight calculus deposits and moderate to severe dental wear.

Also present were nine partial or complete right adult maxillae with observable tooth positions. In the case of the first right maxilla (Kh 202), five tooth positions were recorded. In four cases, the tooth had been lost ante-mortem. For the second right maxilla (Kh 158), six tooth positions could be observed. Four teeth had been lost post-mortem, whereas two teeth were lost during life. Another tooth had suffered from a dental abscess. The third (Kh 162) and fourth (Kh 161) right maxilla included five observable tooth positions each. All teeth had been lost postmortem. The fifth right maxilla (Kh 163) presented with six observable tooth positions. All teeth had been lost ante-mortem. In case of the sixth right maxilla (Kh 416), five observable tooth positions but no teeth were present, and all had been lost post-mortem. Two tooth positions were recorded on the seventh right maxilla (Kh 159). Both teeth were preserved *in situ*, and one displayed a slight calculus deposit. For the eighth maxilla (KII 1240), six tooth positions could be observed. Three teeth were present, one with a slight calculus deposit, and three had been lost postmortem. Eight observable tooth positions were recorded on the ninth right maxilla (KII 874). Five teeth had been lost post-mortem and the remaining three teeth displayed slight calculus deposits. Dental wear was slight.

Of the 83 disarticulated maxillary teeth examined, 72 were fully developed permanent teeth, three were erupted but not fully developed permanent teeth, three were probably unerupted still developing permanent teeth, and five were probably erupted deciduous teeth. Of the 83 maxillary teeth, 61 presented with slight to moderate calculus deposits. Two permanent molars had additional cusps (Carabelli's cusps) and overall dental wear ranged from slight to severe. One permanent right medial incisor had a distinct wear pattern, running inferior-medial to superior-lateral. Although in isolation the origin of this pattern is difficult to assess, it indicates the habitual use of teeth either as a tool or for holding an object.

One partial right mandible of a neonate or young infant (Kh 274) was recorded, but no teeth were present. A juvenile left mandible (Kh 453) included four observable tooth positions of permanent teeth. Two unerupted permanent teeth were present and two teeth had been lost postmortem. One partial mandible (Kh 298) presented with seven observable tooth positions, though all teeth had been lost post-mortem. The second partial mandible (KII 1258 B) included 16 observable tooth positions. Ten teeth had been lost post-mortem. Five teeth were present, two of which had slight to moderate calculus deposits. One tooth had been lost ante-mortem and evidence for two dental abscesses was present. Dental wear was severe. Twelve tooth positions were observable on a third partial mandible (Kh 417), with only one tooth root present. Four teeth had been lost ante-mortem and three dental abscesses were present. Seven teeth had been lost post-mortem. On a fourth partial mandible (KII 854 B), twelve tooth positions were observable. Only one tooth was present, displaying moderate calculus deposits. The remaining teeth had been lost post-mortem.

Eight left and five right partial mandibles/mandibular fragments with observable tooth positions were also present. The first left mandible (Kh 300) included four tooth positions but only one tooth. It displayed slight calculus deposits and had suffered from a dental abscess. The remaining teeth were lost post-mortem. On the second left mandible (Kh 248) four observable tooth positions were present, but all teeth had been lost post-mortem. Three observable tooth positions but no teeth were recorded for the third left mandible (Kh 456). Again, all teeth had been lost postmortem. Five tooth positions could be observed on the fourth left mandible (Kh 455). Three teeth had been lost post-mortem and the two teeth present displayed slight calculus deposits and slight to moderate dental wear. Only two tooth positions and no teeth present were observed for the fifth left mandible (Kh 521). Four observable tooth positions but no teeth were present on the sixth left mandible (KII 1234). In both cases all teeth appeared to have been lost post-mortem. The seventh left mandible (KII 1160 C) included four observable tooth positions. Two teeth, one of which displayed slight calculus deposits, were present and another two had been lost post-mortem. On the eighth left mandible (KII 1201), four tooth positions were present but all teeth had been lost postmortem.

The first right mandible (Kh 244) included four observable tooth positions and three teeth. Two teeth had slight calculus deposits and the third molar was impacted. One tooth had been lost post-mortem. This mandible returned a Neolithic date. For the second right mandible (Kh 454), eight tooth positions and four teeth were present, all of which displayed slight calculus deposits. The third molar appeared to be congenitally absent and dental wear was slight. Three teeth had been lost post-mortem. Six observable tooth positions but no teeth were recorded for the third right mandible (Kh 418). Two of the teeth had been lost ante-mortem, probably as a result of the two dental abscesses present, and the remaining teeth were lost post-mortem. The fourth right mandible included two tooth positions and only one tooth root (Kh 419), the second tooth having been lost post-mortem. Finally, only one tooth position was present on the fifth right mandible (KII 1254 E) but the tooth had been lost post-mortem.

Of the 81 disarticulated mandibular teeth present, 76 were fully developed permanent teeth, one was an erupted but not fully developed permanent tooth, one was an unerupted permanent tooth crown and three were probably erupted deciduous teeth. Of the total, 58 presented with slight to moderate calculus deposits. Two teeth had linear enamel hypoplastic defects, including the erupted but not fully developed permanent tooth. Dental wear ranged from slight to severe.

Summary of dental disease

Due to the disarticulated nature of the Kilgreany Cave remains, comprising individuals from different archaeological periods,

no detailed discussion of the occurrence of dental diseases was attempted. When considering the dental disease summary of permanent teeth present, however, it is interesting to note that caries is completely absent (Table 1.16). Percentage rates for dental abscesses and enamel hypoplasia are relatively low, whereas calculus affected over three quarters of all teeth present. Ante-mortem tooth loss affected just over 10% of observable tooth positions.

Dental anomalies

Carabelli's cusps, congenitally absent or impacted molars, and supernumerary teeth are a relatively common finding during osteological analysis of larger skeletal assemblages (Table 1.17). The wear pattern of a right maxillary incisor indicates the possible use of teeth as tools, but without the remaining dentition this cannot be assessed further.

Pathologies and anomalies

Degenerative Joint Disease (DJD)

Spinal Degenerative Joint Disease

A total of 207 adult and 13 juvenile and infant vertebrae and vertebral fragments were recorded. This included 60 cervical, 97 thoracic, 39 lumbar and 24 sacral vertebrae and vertebral fragments (Table 1.18).

Degenerative changes noted in the adult assemblage included osteophytosis, porosity and Schmorl's nodes for vertebral bodies; and osteophytosis, porosity and eburnation for vertebral articular facets (Table 1.19; Pl. 6).

Again, it should be emphasised that the zonation method will record the presence of a given zone even if it is only partially represented. For the calculation of joint disease, frequencies will mean a possible overestimation of available observable joint surfaces. Bearing these limitations in mind, however, calculations based on these figures will still result in a valuable indication of the distribution of degenerative changes over the various spinal segments and extra-spinal joints.

Cervical vertebrae are characterised by the highest degree of mobility within the spine regarding flexion, extension and rotation. The lower spinal segments, especially the lumbar spine, consist of larger vertebrae with a lesser degree of mobility and are primarily designed as weight-bearing elements. Although degenerative joint changes are to a large extent age-related, their distribution can give an indication of different levels of habitual or strenuous movements affecting different joints within a population.

An overview of the approximate percentage frequencies for different changes shows that degenerative changes of vertebral bodies appeared to be highest in the lower spine (lumbar and sacral segments), followed closely by the neck region (cervical segment) (Table 1.20). Overall, figures for the thoracic region were comparatively low. Considering vertebral articular facets, overall figures were lower than for vertebral bodies. The highest percentage of degenerative changes was recorded for the cervical spine, followed by the lumbar region. Again, figures for the thoracic spine were comparatively low. As the assemblage only consists of isolated, disarticulated remains only, which had probably built up over a considerable period of time, no further conclusions could be drawn.

Extra-spinal DJD

Mandible: The right mandibular fossa of one temporal bone out of 14 right temporal bones present (7.1%) showed evidence for osteophytosis.

Table 1.16 Dental disease (permanent teeth) from Kilgreany Cave.

	Teeth present	*Observable tooth positions*	*Ante-mortem tooth loss*	*Post-mortem tooth loss*	*Calculus*	*Dental abscess*	*Dental enamel hypoplasia*
Maxilla	97	111	16	73	74	4	0
Mandible	98	98	7	70	86	8	2

Table 1.17 Dental anomalies from Kilgreany Cave.

Registration no.	*Anatomical element*	*Anomaly present*
Kh 160	Left maxilla	Supernumerary tooth behind left medial incisor
KII 914	Left maxillary 1st molar	Carabelli's cusp
KII 914	Right maxillary 1st molar	Carabelli's cusp
Kh 157	Left maxilla	3rd molar congenitally absent
Kh 244	Right mandible	Impacted 3rd molar
Kh 454	Right mandible	3rd molar congenitally absent
KII 914	Right medial maxillary incisor	Unusual wear pattern

Table 1.18 Summary of spinal elements present at Kilgreany Cave.

Spinal segment	*Vertebral body (Zone 1)*	*Right transverse process and articular facets (Zone 2)*	*Left transverse process and articular facets (Zone 3)*	*Spinous process (Zone 4)*
Cervical	43	28	35	23
Thoracic	64	60	44	42
Lumbar	30	22	21	14
1st sacral vertebra	8	4	3	–

Table 1.19 Summary of adult elements affected by spinal DJD from Kilgreany Cave.

Spinal region	*Osteophytosis*	*Porosity*	*Schmorl's nodes*	*Eburnation*
Cervical vertebral bodies	10	8	–	–
Thoracic vertebral bodies	2	6	3	–
Lumbar vertebral bodies	6	7	3	–
1st sacral vertebral body	3	3	1	–
Cervical articular facets	5	5	–	1
Thoracic articular facets	1	1	–	–
Lumbar articular facets	2	2	–	1
1st sacral vertebra articular facets	–	–	–	–

Table 1.20 Adult spinal DJD percentages from Kilgreany Cave.

Spinal region	*Osteophytosis*	*Porosity*	*Schmorl's nodes*	*Eburnation*
Cervical vertebral bodies	23.2%	18.6%	–	–
Thoracic vertebral bodies	3.1%	9.3%	4.6%	–
Lumbar vertebral bodies	20%	23.3%	10%	–
1st sacral vertebral body	37.5%	37.5%	12.5%	–
Cervical articular facets	14.2–17.8%	14.2–17.8%	–	2.8–3.5%
Thoracic articular facets	1.6–2.2%	1.6–2.2%	–	–
Lumbar articular facets	9– 9.5%	9–9.5%	–	4.5–4.7%
1st sacral vertebra articular facets	–	–	–	–

Clavicles: A total of 40 clavicular fragments were present: 19 left, 12 right and three unsided adult; one left and four right juvenile; and one right infant. Degenerative joint changes in the form of porosity or marginal osteophyte formation affected the acromial aspect of two out of a total of 14 left adult acromial zones present (14%), and one out of nine right adult acromial zones present (11.1%).

Scapula: A total of 32 scapular fragments were present: 12 left, 10 right and eight unsided adult; and two right juvenile. No degenerative joint changes were recorded.

Ribs: A total of 176 adult ribs and rib fragments were recorded: 61 left, 58 right and 40 unsided adult/adolescent; three left, three right and four unsided juvenile; and three left and four right infant. The only degenerative changes noted in the adult sample were one incidence of porosity of a right rib head out of 18 observable right ribs heads present (5.5%) and one case of osteophytosis of a right costal facet out of 31 observable costal facets present (3.2%).

Pelvis: A total of 64 pelvic fragments were examined: 20 left, 13 right and 22 unsided adult; three left, two right and three unsided juvenile; and one left infant. No degenerative changes of the hip joint were recorded for any of the zones including acetabular regions in the adult sample.

Humerus: A total of 64 humeri and humeral fragments were recorded: 17 left, 14 right and 17 unsided adult; six left, eight right and one unsided juvenile/adolescent; and one left infant. No degenerative joint changes were present.

Radius: A total of 35 radial fragments were recorded: ten left, 13 right and six unsided adult; and three left, one right and two unsided juvenile/adolescent. One right distal adult radius showed degenerative changes in the form of osteophytosis, but these appeared to have developed secondary to trauma and will be discussed below.

Ulna: A total of 58 partial ulnae and ulnar fragments were examined: 18 left, 22 right and 11 unsided adult; four right and one unsided juvenile/adolescent; and two right neonate. Degenerative joint changes in the form of marginal osteophytosis and porosity affected the distal aspect of one partial left ulna out of nine recorded left distal zones (Zone 7 and 8) (11.1%) and one right partial ulna out of seven recorded distal zones (14.2%).

Hand: A total of 252 hand bones and bone fragments were present. This included 12 left, 21 right and one unsided adult carpals. In addition, there were 33 left, 31 right and 22 unsided adult and one left, one right and four unsided juvenile/adolescent metacarpals or metacarpal fragments. A total of 79 proximal, 34 intermediate and three distal adult; eight proximal and one intermediate juvenile/adolescent; and one infant hand phalanges/fragments were recorded. Degenerative changes in the form of eburnation were noted on the articular surfaces of one of the 12 left metacarpals (8.3%) and one of the 21 right metacarpals (4.7%). Three of the 26 (11.5%) observable left and one of the 28 (3.6%) observable right proximal metacarpals presented with degenerative changes including osteophytosis, porosity, eburnation and joint contour change. One of the 22 observable distal left metacarpals (4.5%) also showed degenerative changes including osteophytosis, porosity and joint contour change. Of the hand phalanges present, only one of the 33 observable intermediate adult hand phalanges was affected by joint disease of the distal surface (3%). It displayed gross degenerative changes including osteophytosis, porosity, eburnation and joint contour change.

Femur: A total of 71 femora and femoral fragments were examined: 24 left, ten right and 28 unsided adult; two left, two right and one unsided juvenile/adolescent; and four left infant. The only degenerative change noted was the presence of porosity on one possible right femoral head out of a total of three right femoral heads present (33.3%).

Patella: A total of 16 patellae and patella fragments were present: three left, 11 right and two unsided adult. No degenerative joint changes were noted.

Tibia: A total of 62 tibiae and tibial fragments were analysed: 18 left, nine right and 24 unsided adult; five left, one right and one unsided juvenile/adolescent; and one left and three right infant. No degenerative joint changes were noted.

Fibula: A total of 62 fibulae and fibular fragments were recorded: 12 left, ten right and 40 unsided adult/adolescent. No degenerative joint changes were noted.

Table 1.21 Adult extra-spinal joint disease present at Kilgreany Cave.

Bone	*Left*	*Right*
Mandibular fossa of temporal	No DJD present	1/14 (7.1%)
Lateral clavicle	2/14 (14%)	1/9 (11.1%)
Rib head	No DJD present	1/18 (5.5%)
Rib costal facet	No DJD present	1/31 (3.2%)
Distal ulna	1/9 (11.1%)	1/7 (14.2%)
Carpal	1/12 (8.3%)	1/21 (4.7%)
Proximal metacarpal	3/26 (11.5%)	1/28 (3.5%)
Distal metacarpal	1/22 (4.5%)	No DJD present
Distal intermediate hand phalanx	1/33 (unsided) (3%)	No DJD present
Proximal femur	No DJD present	1/3 (33.3%)
Talus	No DJD present	1/12 (8.3%)
Distal metatarsal	1/25 (4%)	No DJD present

Foot: A total of 249 foot bones and bone fragments were present. This included 15 left and 12 right adult tali. In addition there were eight left, 12 right and one unsided adult calcanei; plus 18 left and 26 right adult tarsals. Also recorded were 41 left, 46 right and eight unsided adult metatarsals; and five left, four right and one unsided juvenile/adolescent metatarsals. A total of 46 proximal and two distal adult foot phalanges and four proximal juvenile/adolescent foot phalanges were included. The only degenerative joint change noted was osteophytosis of one right talus out of a total of 12 present (8.3%). Another condition recognised was a periarticular erosive defect present at the distal end of a left second metatarsal out of a total of 25 observable distal metatarsals present (4%). It is probably the result of an erosive arthropathy or joint inflammation.

Summary of extra-spinal DJD

Relatively little evidence for extra-spinal degenerative joint disease was found at Kilgreany Cave, and the majority of cases were present in the wrist or hand region (Table 1.21). This is not surprising in view of several

factors. Although hand and wrist bones are the smallest contributors to the overall weight of the assemblage, they were the second most commonly retrieved element at Kilgreany Cave when considering overall number of bones and bone fragments (Figs. 1.3 and 1.4). In addition, probably due to their small size but relatively robust structure, wrist and hand bones appeared to have survived relatively intact, thus providing a disproportionate number of observable joint surfaces when compared to long bones and bones of the shoulder and pelvis. On a biomechanical level, hand and wrist will be involved in a multitude of everyday habitual as well as strenuous activities throughout life and degenerative changes would be expected in most populations.

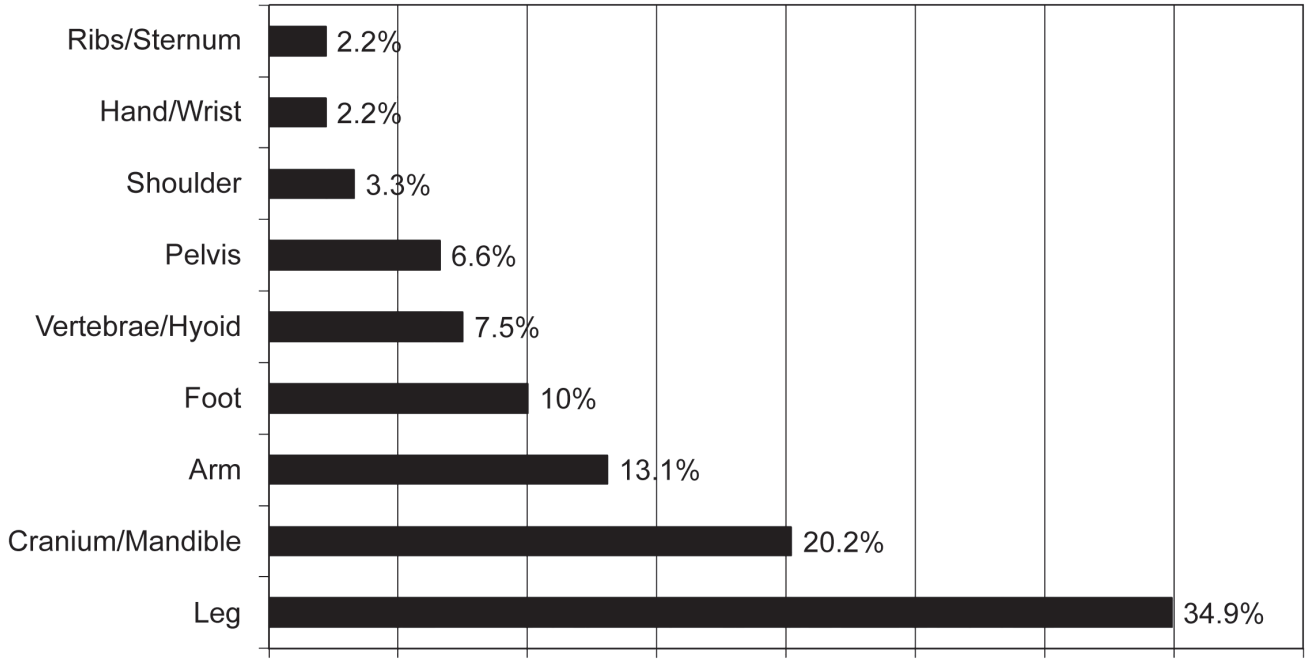

Figure 1.3 Representation of anatomical regions from Kilgreany Cave by bone weights.

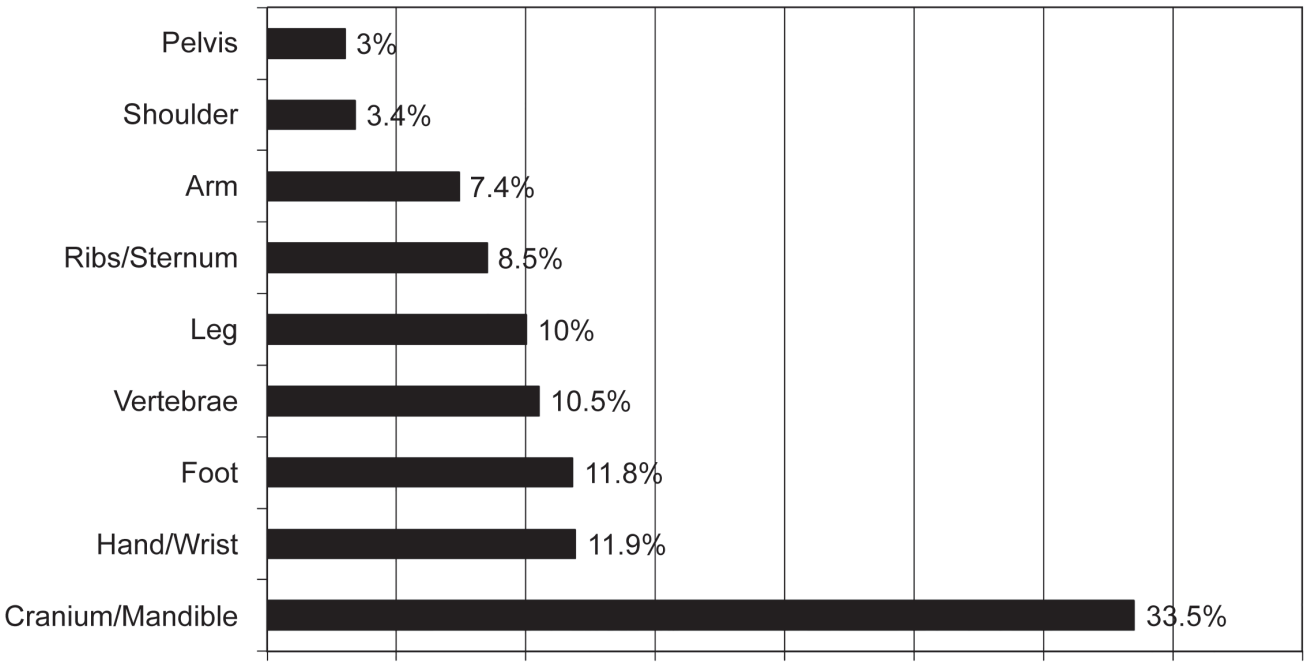

Figure 1.4 Representation of anatomical regions from Kilgreany Cave by number of fragments present.

Metabolic disease

One partial left frontal of a possible female individual (Kh 517) displayed healed cribra orbitalia (Type II) of the left orbit.

Osteoporosis

A first lumbar vertebra (Kh 403) presented with collapse of the superior and inferior vertebral body surface and significant anterior compression of the body. This type of lesion is typically found in cases of senile osteoporosis.

Infectious disease

One occipital fragment (Kh 515) displayed an area of ecto-cranial porosity, which could be related to either a localised irritation or inflammation of the overlying soft tissue, or indicate the presence of a more systemic condition such as a metabolic disorder. A network of capillary erosive lesions was present on the endo-cranial aspect of another occipital fragment (Kh 517). Some lesions had a vascularised appearance bridged by new bone formation; others were deeper, more extensive and irregular in shape. These are indicative of a relatively long-standing systemic condition, possibly an inflammation or infection. A possible perforating, erosive defect was present in the glabella area of a frontal fragment (KII 1240). As the area had suffered extensive surface erosion, it is difficult to determine whether the lesion is a post-mortem effect or related to a pathological condition present during life. Extensive sinusitis can result in similar defects when untreated, presenting a possible differential diagnosis. A circular lytic defect was present on the ecto-cranial aspect of an unidentified cranial fragment (KII 1336). The lesion had a trabecular floor and was possibly the result of an infectious condition.

Trauma

A juvenile or adolescent occipital fragment (Kh 515) presented with at least two peri-mortem sharp force injuries (Pl. 8). A superficial cut extended horizontally across the fragment, measuring 0.7cm in maximum length. The superior edge was smooth and polished and the inferior edge irregular. Another defect was present at the inferior extent of the fragment. Only the superior, smooth margin of this wound was preserved and the injury would have extended beyond the preserved fragment. A third superficial cut was noted superior to the first wound. It measured 0.6cm in maximum length and again would have extended beyond the preserved fragment. This latter defect, however, could not be positively assessed as peri-mortem. The cuts are all well-defined and appear to have been created by a very sharp and yet fine-bladed instrument. One unidentified cranial fragment presented with a rather well-defined curvilinear break suggesting that the defect occurred while the bone collagen content was still relatively high. Preservation of the fragment was poor, though the presence of some endo-cranial flaking indicates that the break might have occurred peri-mortem.

A fifth lumbar vertebra (Kh 281) presented with a possible case of Scheuermann's disease, although post-mortem damage makes a secure diagnosis difficult. The anterior half of the superior body had a grossly porous, step-like defect common for the condition. An alternative diagnosis is spondylolysis with accompanying spondylolisthesis of the overlying vertebrae. Slipping of the adjacent vertebral body can result in gross changes to the anterior-superior aspect of the vertebral body below.

One possible healed fracture of a right radius was present (Kh 79). The distal end of the bone presented with a slight posterior curvature and thickening of the distal diaphysis due to deposits of remodelled compact bone. Secondary degenerative changes (osteophytosis) were also present. The changes are compatible with those resulting from a Smith's fracture which in a clinical context occurs predominantly in young males. This type of fracture of the distal forearm is caused by a fall or blow on the back of the flexed wrist (Salter 1999, 573). Another healed fracture recorded involved both bones of the forearm. An unsided juvenile distal radial and ulna diaphysis fragment appeared to have suffered a diaphyseal fracture that resulted in the displacement of the radial shaft fragment. Both diaphyseal fragments were embedded in a substantial ossified callus. An adult right ulna presented with what appeared to be a healed fracture of the styloid process, which had also resulted in secondary degenerative joint disease, characterised by marginal osteophytosis and porosity of the joint surface.

A possible healed fracture was noted on a partial left adult metacarpal (Kh 275), which had been broken mid-shaft. Thickening as a result of a remodelled new bone deposit as well as a slight angulation of the diaphysis were visible at the break. They are most likely the result of a healed ante-mortem fracture. Another possible healed fracture affected an adult proximal hand phalanx (Kh 205). Again, pronounced thickening due to the presence of remodelled new bone was present at midshaft. This deposit had a smooth surface and was continuous with the original bone surface, indicating longstanding healing of the injury. A healed fracture of the proximal diaphysis was present on a right partial fibula (Kh 333). The ossified callus had fused the fibular and proximal tibial diaphyses.

Entheseal changes and cortical defects

Cortical defects were noted on six elements. The first was recorded at the insertion of the costoclavicular ligament of a right partial adult clavicle. Another was present at the insertion of *M. latissimus dorsi* of a right partial adult

humerus (KII 1201). A right partial adult femur (KII 1257 G) presented with a cortical defect at the insertion of *M. gluteus maximus*. Two partial left tibiae had cortical defects at the insertion of *M. soleus* (KII 854 B; KII 898) and a right distal fibular fragment (KII 914) presented with a cortical defect at the insertion of the interosseous ligament. Entheseal changes were present at the insertion of *M. gluteus maximus* of a left partial femur (KII 722).

Metrics

The available long bone measurement have been summarised in Table 1.22.

Kilgreany skulls: 'Kilgreany A' and 'Kilgreany B'

Two articulated skulls (Pl. 2) in the assemblage, 'Kilgreany A' and 'Kilgreany B', had originally been part of two crouched burials excavated in the cave in 1928 and both were later radiocarbon dated to the Neolithic (Tratman 1929; Dowd 2002; Dowd 2015, 97). Unfortunately, following the excavation the skeletons were not stored separately but mixed together with all the other human remains retrieved from the site. It was thus not possible to attribute any post-cranial remains to these skulls.

'Kilgreany B' (Kh 2)

Human remains analysed included a virtually complete cranium and mandible (total weight 612g) representing an adult male (cranial and mandibular morphology), probably aged over 25 years (dental eruption and dental health). The remains were light yellow in colour and were in moderate to good condition. Taphonomic changes noted included small areas of dark staining, adhering calcite deposits, occasional surface erosion and some cracking/flaking. Parts of the skull were glued and reconstructed with red, putty-like material, which contributed to the overall weight of the bone. Breaks present appeared to have occurred after a considerable post-mortem interval.

All 16 maxillary and 16 mandibular tooth positions could be observed. Dental health was rather poor. A total of 24 teeth were present. Four maxillary teeth had been lost ante-mortem and one maxillary and one mandibular dental abscess were present (Pl. 7). Slight calculus deposits were noted on 15 of the 24 teeth present. Dental wear was severe.

Dentition:

/		c	x	X	R	/	R	x	x	c	/	RAc	c	c	
8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
C	RA			C	C	c	c	/	c	c	c	c		c	

Dental pathology: Ante-mortem tooth loss (4/32), dental abscess (2/32), calculus (15/24-slight) and severe dental wear.

In his original analysis of the remains, Fawcett (1928, 129) diagnosed the presence of healed blunt force trauma on the cranium of Kilgreany B. On re-examining the

Table 1.22 Kilgreany Cave long bone measurements.

Age	*Bone*	*Reg. no.*	*Max. length (cm)*	*Head diam. (cm)*	*Sex*	*Adult stature*
Adult	Right humerus	Kh 77	27.8	3.7	Female	151.4±4.45cm
Adult	Right humerus	KII 1201	–	4.3	?	–
Infant	Left humerus	KII 1414	9.2	–	–	–
Adult	Left ulna	Kh 6	26.7	–	?	–
Juvenile	Right ulna	KII 1396	7.7	–	–	–
Neonate	Right ulna	KII 1257 G	6.2	–	–	–
Neonate	Right ulna	KII 1252 C	6	–	–	–
Adult	Right femur	Kh 81	–	3.9	Female	–
Adult	Left femur	Kh 82	40.8	3.9	Female	154.9±3.72cm
Adult	Right femur	KII 898	45	–	Male?	168.5±3.27cm
Neonate	Left femur	KII 1265	7.58	–	–	–
Adult	Right tibia	Kh 74	33.9	–	?	–
Neonate	Right tibia	KII 1414	6.54	–	–	–
Neonate	Right tibia	KII 1255 DI	6.41	–	–	–
Neonate	Left tibia	KII 1280	6.32	–	–	–
Adult	Left fibula	Kh 75	32.8	–	?	–

remains, this diagnosis was found to be highly uncertain. What Fawcett describes as a 'comma-shaped' depression, on reexamination measures 5.8cm × 3.1cm in maximum extent and 0.5–1.2mm in maximum depth, and appears to be present on the left posterior frontal and anterior parietal region. However, the area has suffered extensive and highly irregular surface erosion, which is contributing disproportionately to the optical impression of a dip in the cranial surface. Furthermore, the depression is not noticeable on the endocranial aspect of the specimen. Based on these observations, the changes are more likely to be of a taphonomic rather than a traumatic origin.

'Kilgreany A' (Kh 65)

Human remains analysed comprised a relatively complete cranium (including frontal, left and right parietal, occipital, right temporal, right sphenoid and right zygomatic) and mandible (total weight 317g) representing an adult female (cranial and mandibular morphology), probably aged over 25 years (dental eruption and dental health). The remains were light yellow in colour and were in moderate to good condition. Taphonomic changes noted included small areas of dark staining, adhering calcite deposits, occasional surface erosion and some cracking/flaking. Parts of the skull were glued and reconstructed with red, putty-like material, which contributed to the overall weight of the bone. In addition, the mandible was glued to the cranium. Breaks present appeared to have occurred after a considerable post-mortem interval.

Sixteen mandibular tooth positions could be observed. Seven teeth had been lost ante-mortem and only five teeth were present. Slight calculus deposits were noted on three teeth and tooth wear was severe. The right third mandibular molar appeared to be congenitally absent.

Dentition:

8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
Con	X	x	x	/	/	c	c	/	c	R	R	x	x	X	x

Dental pathology: Ante-mortem tooth loss (7/15), calculus (3/5-slight) and severe dental wear.

A well-healed, perforating traumatic injury was present on the left mandibular ramus (Pl. 9). The perforating defect was noted at the anterior extent of the ramus-body angle. It measured 1.4cm in inferior-superior direction and 0.5cm in medio-lateral direction. A small slice of bone appeared to have been separated during the injury at its superior extent. During the healing phase of the wound, it fused again with the remaining mandibular ramus in a slightly overlapping fashion. Remodelling of the bone surface is evident on the external anterior half of the ramus, indicated by some faint porosity or pitting. Sinuses are present at the primary point of injury as well as at the superior external extent of the mandibular ramus. The left coronoid process is underdeveloped compared to the right side. Minimum ramus breadth is visibly smaller on the left.

According to the initial osteological report completed by Fawcett (1928), the mandibular changes present are the result of a dental abscess originating in the third molar region. Even though abscesses can lead to extensive infectious changes of the bone surrounding the affected tooth, such as the remodelling and pitting seen on Kh 65, this cannot account for the overlapping segment of bone along the anterior ramus. This is clearly a traumatic injury which had become infected but partially healed. Most likely it was caused by horizontal penetration with a sharp object from a lateral or slightly posterior-lateral direction. Removal of the blade appears to have caused the vertical crack along the mandibular ramus. Although the injury appeared to have healed slowly, evidence for chronic low-grade infection is evident in the sinus near the mandibular notch. Apart from the obvious damage to the bony part of the mandible, it would also have affected and possibly permanently impaired the overlying muscular and nervous tissue, such as *M. masseter*, which is essential for movement of the jaw and cheeks during chewing and speaking. Permanent damage to some of the mechanical functions of this region would also account for the atrophy of the left mandibular ramus.

2

Osteoarchaeological analysis of human skeletal remains from Dunmore Cave, Co. Kilkenny

Linda G. Lynch

This chapter details the analysis of the surviving disarticulated human skeletal remains currently available from Dunmore Cave, Mohil townland, Co. Kilkenny – in total 2,598 bones and bone fragments. It is based on work undertaken as part of the *Human Remains from Irish Caves Project* (HRICP), which examined all available human bones recovered from the site up to that point (Dowd *et al*. 2006), in addition to an assemblage recovered during archaeological monitoring in late 2004 and early 2005 (Dowd *et al*. 2007). In 2006 the Department of the Environment, Heritage and Local Government granted Marion Dowd funding to radiocarbon date seven human bones from Dunmore Cave: she selected samples from different parts of the cave and from both her 2004/5 monitoring works as well as older finds (Table 2.12) (M. Dowd pers. comm.). The resultant dates suggested two main phases of activity in Dunmore Cave: in the mid- to late ninth century, and the mid-tenth century (Dowd 2015, 204). Although skeletal remains have been noted in Dunmore Cave since at least 1699 (*ibid*., 25), the earliest date of recovery of any available bones for this study was 1858. Most of the earlier bone finds were collected arbitrarily by visitors and antiquarians from various areas of the cave. The surviving examined human skeletal remains were recovered from eight areas in the cave: Town Hall, Crystal Hall, The Well, Rabbit Burrow, Market Cross Chamber, the Cathedral (or Haddon Hall), Main Chamber, and outside the cave (Fig. 2.1). These represent relatively distinct areas within the cave. However, in many instances, bones were recovered from passages and various 'nooks and crannies' within the cave, as well as from unrecorded locations – particularly in the case of older discoveries. Despite the significant quantities of bones recovered from the cave over the years, only a tiny proportion have previously been studied using modern osteoarchaeological techniques (Buckley 2000).

The Dunmore Cave aspect of the HRICP had four primary aims:

- to separate human remains from faunal remains
- to osteoarchaeologically examine all of the available human bones
- to repackage and relabel some of the collections as necessary
- to consolidate the remains

The human remains examined were housed in the National Museum of Ireland (Antiquities Division); the Natural History Museum and its stores at Beggar's Bush; and on display in the visitor centre at Dunmore Cave. Apart from those bones in the visitor centre, all of the remains were separated out from the animal remains and were re-bagged separately. All original documentation including letters, photographs, and labels that were associated with bone finds were retained. All of the skeletal remains – both human and faunal – were relabelled using the original find location information. In many instances findspots were unknown because of ambiguous labelling or places that are not currently recognised in the cave. For example, one collection of bones was labelled from 'west side of camel'.

Prior to the present study, an estimate of the number of individuals from Dunmore Cave was established by Dowd (2004) based on documentary sources (Table 2.1). According to these records, most human bones were

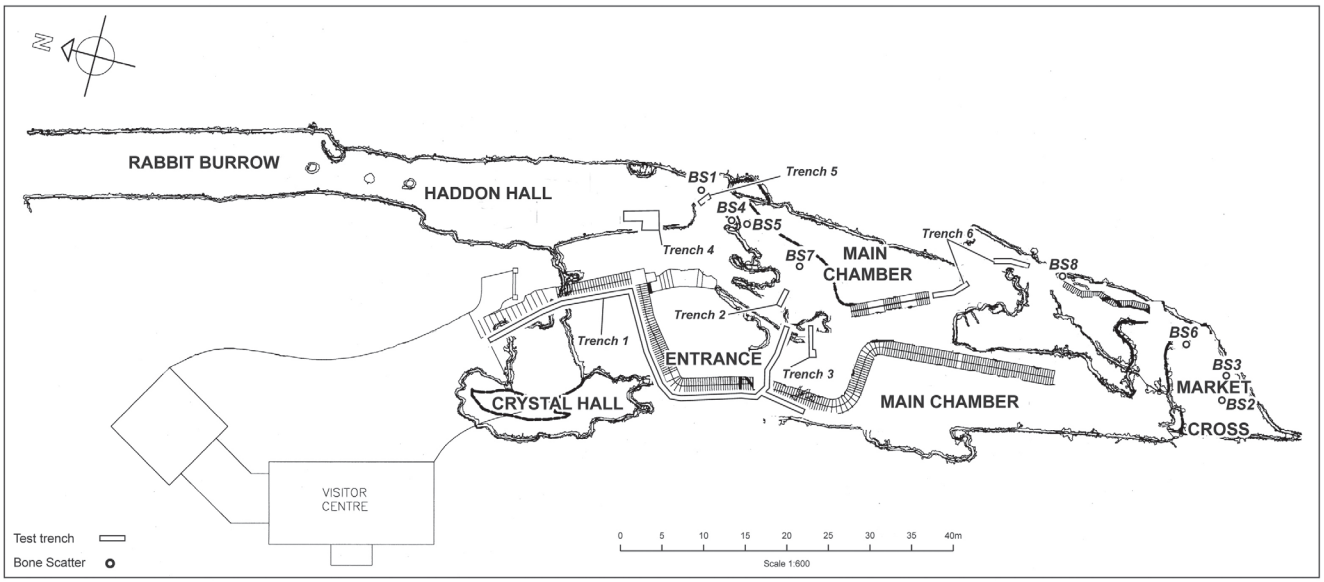

Figure 2.1 Dunmore Cave: the principal chambers where human bones have been discovered are indicated (Dowd et al. 2007, 8).

Table 2.1 Summary of MNI counts of human remains from Dunmore Cave based on documentary sources only (Dowd 2004, 276, table 9.5).

Area	*Adult*	*Adolescent*	*Child/infant/ foetus*
Rabbit Burrow	13	4	2 (7–11yrs) 5 (foetal–6yrs)
The Well	–	2 (<15 yrs; 18 yrs)	1 (infant) 1 (5–6 yrs) 1 (10yrs)
Recess: Market Cross Chamber	–	1	5 (0–6yrs)
Basin: Market Cross Chamber	5	–	3 (foetal–6yrs) 6 (7–11yrs)
Town Hall	3	–	1 (foetus) 2 (children)
Total	21	7	27

concentrated in the Rabbit Burrow and in the Market Cross Chamber. However, the results of the present study reveal a different pattern.

A number of important factors were taken into account for the osteoarchaeological analysis of the remains from Dunmore Cave. Firstly, this chapter does not assess *all* of the human remains that have been retrieved from the site because the present location of many bones is unknown – primarily because people have been exploring the cave and removing bones for many centuries. Secondly, much of the site remains unexcavated, and it is likely that significant quantities of archaeological material and human remains survive in the cave. Thus the MNIs as established here are unlikely to be truly reflective of the actual numbers of individuals that were originally deposited in the cave. Rather, this chapter represents a snapshot of the *potential* osteoarchaeological information from Dunmore Cave. If the 'lost' human remains are ever recovered, or if further excavations are carried out in future, then the findings presented here will either be challenged and/or enhanced.

The present collection of bones comprises a commingled or disarticulated assemblage. A specific method of recording was required for a detailed catalogue of the bones, one that could be extensively accessed and manipulated to provide the necessary information. The recording system devised by Fibiger (this volume) was utilised for the Dunmore Cave assemblage (CD Appendix 2: Lynch).

Minimum Number of Individuals (MNI) and demography

Human remains have been recovered from eight discrete areas in Dunmore Cave (Fig. 2.1). The minimum number of adults as identified from each location is shown in Table 2.2.

It was possible to determine the sex of a number of adults based on traits present in individual bones, particularly morphological characteristics in the pelvis, cranium and mandible, as well as metrical analysis of some long bones. Using a single bone to determine sex is, of course, not as reliable as assessing multiple elements in a complete skeleton. However, as no articulated skeleton has ever been recognised or recovered from Dunmore Cave, the assessment of individual bones is the only way to examine the sex profile of adults; sexing also allowed for a refinement of the MNI (see Table 2.3).

The correlation of all information on bone counts, findspot location and sex indicates that there may be the remains of at least 20 adults in the current bone assemblage from Dunmore Cave. The frequency of female and male adults is relatively even at six females and five males. However, there are at least nine other adults for whom it is not possible to determine sex. Furthermore, one adult, from 'Outside the cave', is identified only by the presence of a single right 4th metacarpal.

It was only possible to determine accurately the age-at-death of four adult bones. These were four ilia (pelvis), two left and two right, and all were female. One individual (right) was a young adult aged 20–24 years. One left ilium and one right ilium both displayed degenerative changes indicative of an age-at-death of 35–39 years, as did one other left ilium. Due to the disarticulated nature of the assemblage, it was not possible to further assess the age profile of the adults.

With juvenile individuals (17< years), it is usually possible to determine their age-at-death with more accuracy than adult individuals, due to the more reliable and consistent pattern of development and growth of bones and teeth. When these specific ages-at-death are correlated with bone counts and the findspots of bones, it is possible to established quite nuanced MNIs. The final juvenile MNI, based on the human remains currently available, is summarised in Table 2.4.

Perinate refers to individuals aged between 24 gestational weeks (that is, *in utero*) to 7 days post-natal. A minimum of three perinates were present in the assemblage: the remains of at least two were recovered in the Town Hall – including an individual identified by Buckley (2000), while another was recovered from the Market Cross Chamber. Those from Town Hall were both probable full-term foetuses, while the latter perinate was an individual aged approximately just 28 weeks *in utero*. These individuals may have been still-born, died soon after birth, or perhaps were still *in utero* at the time of death and, with time, became separated from the mother's remains.

Infant refers to individuals aged from 0–12mths, where it cannot be established beyond doubt that they are perinates. Seven infants, all aged between birth and 1 year, were present from Dunmore Cave. In addition, there was a minimum of 15 juveniles aged 1–6 years; three juveniles aged 7–12 years; and one individual aged 12–17 years at the time of death. It is likely, more so than with the adults, that there is some overlap between the juvenile categories and the true numbers are likely to be higher.

Table 2.2 Adult MNI from Dunmore Cave based exclusively on bone counts.

Location	*Adult MNI*
Town Hall	6
Crystal Hall	2
The Well	2
Rabbit Burrow	2
Market Cross Chamber	3
Cathedral	1
Main Chamber	1
Outside cave	1
Total	18

Table 2.3 Adult MNI from Dunmore Cave using information on sexed bones correlated with bone counts and cave area.

Location	*Females*	*Males*	*Unsexed adults*	*Total*
Town Hall	5	2	–	7
Crystal Hall	–	–	2	2
The Well	–	–	2	2
Rabbit Burrow	–	1	1	2
Market Cross Chamber	–	1	2	3
Cathedral	–	–	1	1
Main Chamber	1	1	–	2
Outside Cave	–	–	1	1
Total	6	5	9	20

Table 2.4 Juvenile MNI from Dunmore Cave determined by bone counts, age-at-death and cave area.

Age-at-death	*Town Hall*	*Crystal Hall*	*The Well*	*Rabbit Burrow*	*Market Cross Chamber*	*Cathedral*	*Main Chamber*	*Outside cave*	*Total*
Perinate	2	–	–	–	1	–	–	–	3
Infant	4	–	–	1	1	1	–	–	7
1–6 yrs	6	1	1	2	3	–	2	–	15
7–12 yrs	–	–	1	1	–	–	1	–	3
13–17 yrs	–	–	1	–	–	–	–	–	1
	12	1	3	4	5	1	3	–	29

Dental remains

A number of dentitions (alveolar bone with intact teeth) and loose teeth were present in the current sample. These represented both erupted and unerupted permanent and deciduous teeth (summarised in Table 2.5).

On the basis that developing permanent teeth and all deciduous teeth are from juvenile individuals, a total of 55 mandibular teeth, 62 maxillary teeth, and two fully formed permanent teeth were from juvenile individuals. A summary of the observable dental diseases and conditions on all of the permanent adult teeth is provided in Table 2.6.

Given the disarticulated nature of the Dunmore assemblage, quantification of prevalence rates of various dental processes is limited. However, in order to attempt some level of interpretation, the prevalence rates of calculus, caries, and hypoplastic defects in all observable adult teeth is summarised in Table 2.7.

The rates of calculus or calcified plaque, which varied in severity from slight to moderate, on the Dunmore Cave adult teeth are quite low. At just 48.9%, the prevalence was lower than that recorded for the broadly contemporaneous site of Cloghermore Cave, Co. Kerry, where a prevalence rate of 68.1% was recorded (Lynch 2005a, 257, table 12). This was also similar to the 63% prevalence recorded in the early medieval cemetery at Rathoath, Co. Meath (Fibiger 2010). It is unlikely that the low rates from Dunmore Cave are due to advanced oral hygiene. Rather, it is possible that the diet was relatively low in protein (after Lieverse 1999). However, it is noted that the sample size is very small and, as with many other aspects of this assemblage, may have biased the results.

Just 1.1% of all adult teeth from Dunmore Cave had carious lesions. This is very low compared with the prevalence of 7.1% in the disarticulated early medieval remains from Cloghermore Cave (Lynch 2005a, 257, table 12), and also when compared to the 8.0% and 8.3% recorded in the contemporaneous cemeteries at Corbally, Co. Kildare and Dysart, Co. Kilkenny respectively (Lynch 2005b, 2003). However, very low prevalence rates have been identified in other early medieval populations such as at Raystown (0.6%) and Rathoath (0.5%), both in Co. Meath (Fibiger 2010). Carious lesions occur through the consumption of sugars and refined carbohydrates (Hillson 1986, 293; Woodward and Walker 1994; Mays 1998, 148). The disease became particularly prevalent from the post-medieval period onwards, when diets changed significantly. The prevalence rates from Dunmore are in the lower echelons of the prevalence rates of the disease in a period when caries was relatively rare to begin with. This suggests a significantly unrefined diet.

Dental enamel hypoplastic defects can appear as a depressed line, or series of lines, or pits, on the surface of the enamel. The defects are associated with a cessation in enamel growth for a short period of time caused by a physiological insult. When the individual recovers, the enamel begins to develop again, but will leave a distinct mark on the enamel as a testament to the stress (Hillson 1986; Mays 1998, 156). A significant number of diseases and/or nutritional deficiencies can result in stunted enamel growth including diarrhoea, parasitic infestations of the gut, scurvy, rickets, allergic reactions, and general malnutrition (*ibid*., 158). Stress during weaning may also be a major contributing factor. As teeth calcify in childhood, the defects are a reflection of stresses suffered by an individual in youth. A total of 6.5% of the adult teeth from Dunmore Cave had lesions of enamel hypoplastic defects, indicative of at least some level of physiological stresses in childhood.

Table 2.5 Maxillary and mandibular teeth, deciduous and permanent (erupted and unerupted).

Skeletal element	*Unerupted deciduous*	*Erupted deciduous*	*Unerupted permanent*	*Erupted permanent*	*Total*
Maxilla	10 (inc. 2 loose)	27 (inc. 7 loose)	25 (inc. 6 loose)	75 (inc. 26 loose)	137
Mandible	5	25 (inc. 5 loose)	25 (inc. 7 loose)	111 (inc. 23 loose)	166
Total	15	52	50	186	303

Table 2.6 Summary of dental diseases and conditions on all adult permanent teeth

	Teeth	*Sockets*	*AM loss*	*PM loss*	*CA loss*	*Caries*	*Calculus*	*Hypo. s*
L. Max.	51	61	8	15	2	1	23	6
R. Max.	49	61	6	15	2	–	30	6
L. Mand.	49	43	–	9	–	–	30	–
R. Mand.	34	40	–	15	–	1	7	–
Total	184*	205	14	54	4	2	90	12

*(includes one unsided upper permanent premolar).

Table 2.7 Summary of dental conditions in adult teeth from Dunmore Cave.

Dental condition	
Calculus	48.9% (90/184)
Carious lesions	1.1% (2/184)
Hypoplastic defects	6.5% (12/184)

Deposits of calculus were present on just 8 of the 52 erupted deciduous teeth. No carious lesions or enamel hypoplastic defects were present in any of the deciduous teeth. No calculus or carious lesions were recorded in the juvenile permanent teeth (that is, permanent teeth that were unerupted or erupting at the time of death), which is due, of course, to the fact that these teeth were unerupted. Hypoplastic defects were recorded on a single unerupted permanent upper left canine.

Pathological conditions

Degenerative Joint Disease (DJD)

As with most populations, one of the most frequent pathological processes observed on the human remains from Dunmore Cave was joint disease. Joint disease (degenerative joint disease, DJD, or arthropathies) is one of the most commonly observed pathological conditions on the human skeleton. It primarily occurs as a result of repeated 'wear and tear' on the joints through degeneration of the articular cartilage, and generally exponentially increases in severity with age. The disease can be accelerated by occupational activities and/or trauma. In skeletal remains the disease manifests in the form of porosity or pitting of the joint surface and/or additional bone growths or osteophytes, often at the margins. In more advanced cases, eburnation or polishing of the bone can occur as the bones of the joint rub off one another. The presence of eburnation is pathognomonic of osteoarthritis (Rodgers and Waldron 1995; Ortner 2003). The DJD in the Dunmore Cave sample primarily comprised porosity and osteophytic growths; no eburnation was recorded. Lesions known as Schmorl's nodes were present on a number of vertebral bodies. A Schmorl's node is a depression in the disk of a vertebra, caused by the herniation of the intervertebral disk as a result of pressure (Ortner and Putschar 1981, 323; Mann and Murphy 1990, 52). The burst disk may be caused by a fall or by carrying heavy objects, and the lesions are believed to occur in childhood when the bone is still relatively soft. Table 2.8 presents information on all of the observable joint surfaces and those that exhibited DJD.

Technically, the highest prevalence of DJD in this population was in the clavicle (collarbone), followed by elements of the spine. However, there is a significant disparity in the numbers of observable joint surfaces, which may be skewing the results. In reality, there are only three left clavicles and two of those had DJD (66.7%) compared with 112 observable vertebral bodies of which 27 (24.1%) presented with evidence of joint disease. DJD presented on the left elbow and wrist, and left hip. Somewhat surprisingly, no joint disease was identified in any of the lower limbs, which is possibly linked to occupational biases. Given the context of these remains it is not possible, or practical, to quantify joint disease in more detail. However, it does appear that DJD, while present, may not have been very common in the host primary population. The lack of lesions may be related to a young-age-at-death profile or to occupational trends during life. Both are difficult to assess given the disarticulated nature of the assemblage.

Non-specific infection

Periostitis occurs when the fibrous layer directly overlying the bone – the periosteum, becomes infected. The process of inflammation, with the accumulation of pus and infected matter, forces the periosteum to rise and a new layer of bone may form underneath. When the lesions are active, the layer of bone may be grey in colour and may be striated or disorganised. With time, the new layer of bone can heal and be remodelled into lamellar bone. Periostitis is confined to the surface of the bone. In the Dunmore assemblage, remodelled fibre bone or periostitis was present on the medial diaphysis of the left tibia of a young juvenile, aged approximately 1–1.5 years at the time of death. This indicates that s/he had undergone a period of physiological stress sometime prior to death, but had subsequently recovered.

Metabolic conditions

Certain porotic lesions of the eye orbits (cribra orbitalia) and skull vault (porotic hyperostosis) are readily identifiable as specific pathological lesions due to the process of their formation. Distinctive lesions form when the middle spongy layer of the bone expands and there is a corresponding thinning of the outer surface of the bone. This can result in the diagnostic appearance of small holes or foramina on the outer surface. In the past, such lesions were interpreted as a sign of iron deficiency anaemia. However, recent studies indicate that when a body is under stress from an invading organism (such as a parasitic infestation of the gut), the system increases its output of iron to counteract the stress. Thus this pathological process may actually be a sign of a healthy defence system (Stuart-Macadam 1991, 105; Roberts and Manchester 1995, 166–167; Mays 1998, 142). A more recent study links these lesions with a diet deficient in vitamin B12, which may be derived from foods of animal origin (Walker *et al*. 2009). Lesions indicative

Table 2.8 Numbers of all observable adult joint surfaces, with reference to DJD.

Bone	*Joint surface*	*DJD/ observable Left*	*DJD/ observable Right*
Cranium	Mandib. fossa of temporal	0/4	0/4
Mandible	Condyle	0/5	0/4
Clavicle	Medial	2/3 66.7%	2/6 33.3%
	Lateral	2/3 66.7%	1/3 33.3%
Scapula	Glenoid	0/4	0/5
	Acromion	0/1	–
Humerus	Proximal	0/3	0/2
	Distal	0/6	0/6
Radius	Proximal	0/7	0/5
	Distal	0/5	0/5
Ulna	Proximal	1/8 (ops/por) 12.5%	0/9
	Distal	1/9 (ops/por) 11.1%	0/5
Carpals		0/15	0/20
Metacarpals	Proximal	1/17 (MC1, ops) 5.9%	0/39
	Distal	0/16	0/33
Vertebrae	Bodies	27/112 24.1% 5 cervical 15 thoracic (6 SNs) 5 lumbar (2 SNs) 2 sacral All porosity and/or osteophytes	
	Apophyseal facets	13/93 10.5% 3 cervical 8 thoracic 1 lumbar 1 sacral All porosity and/or osteophytes	
Ribs	Head	3/39 (ops/por) 7.7%	2/52 (ops/por) 3.8%
	Costal	2/29 (ops/por) 6.9%	0/42
Pelvis	Acetabulum	1/6 (ops) 16.7%	0/6
Femur	Proximal	0/2	0/2
	Distal	0/3	0/3
Tibia	Proximal	0/3	0/5
	Distal	0/1	0/4
Fibula	Proximal	0/1	0/4
	Distal	0/3	0/3
Talus		0/10	0/6
Calcaneus		0/3	0/6
All other tarsals		0/18	0/8
Metatarsals	Proximal	0/25	0/32
	Distal	0/25	0/24

of this condition were identified in two individuals from Dunmore Cave, both juveniles. One was an infant who had active porotic hyperostosis on the ectocranial surface of the posterior aspect of the left parietal. A young juvenile (possibly 1–3 years) also had active cribra orbitalia in both the left and right orbits. Both individuals may have been actively fighting a physiological insult at the time of death.

Unusual manifestations of fibre bone were present on a number of skeletal elements. A layer of active grey fibre bone was present *overlying* the normal surface of the left orbit of a young infant. Similar lesions were present on the left orbit of an older infant. In addition, active fibre bone was present on the ectocranial surface of the right frontal of an infant (it is possible that the latter two are actually from the same individual). The location of these lesions would initially indicate cribra orbitalia and porotic hyperostosis (see above). However, in all three cases it was very clear that this was *new* bone *overlying* the normal surface. In the orbit, bone such as this would be deposited as a result of haemorrhaging, particularly associated with Vitamin C deficiency or scurvy (Ortner and Ericksen 1997; Aufderheide and Rodríguez-Martín 1998, 311; Ortner 2003, 386; Brickley and Ives 2006). Scurvy was a common childhood disease in Europe, particularly in urban contexts, until at least the eighteenth century (Ortner *et al*. 2001, 343). At that stage the association was made between scurvy and a lack of fresh fruit and vegetables in the diet. If scurvy was the cause of the lesions in these young individuals, they were in the process of recovering at the time of death as the lesions only appear when the deficiency has been corrected.

Developmental abnormalities

Four cases of developmental abnormalities were identified, in two instances involving a vertebra. The neural arch of an adult lower cervical vertebra (complete) had failed to fuse at the spinous process (Pl. 10). This defect is known as a cleft vertebra or spina bifida rachischisis (Aufderheide and Rodríguez-Martín 1998, 61), and is a very mild manifestation of the more serious spinal defect of spina bifida. A second case of a possible cleft arch was identified in a fragmented juvenile vertebra. In the latter, the left arch had failed to fuse to the right arch, again indicating a cleft arch (this element typically fuses in the first year of life). In both instances it is likely that the individuals in question were unaware of the deformities.

In addition, an anomaly was present on the blade of the right scapula of an adult. The articular facet for the lateral end of the clavicle was larger than normal. This is simply an anomaly and is unlikely to have affected the lifestyle of this individual. Finally, a sesamoid had fused onto the plantar aspect of the lateral side of the distal epiphysis of an adult right first metatarsal (that is, a small bony nodule had fused onto the base of the joint of the right big toe). There are typically two sesamoid bones within the tendon at the proximal end of the first metatarsal. The seasmoids act to absorb and disperse weight bearing from the metatarsal head, as well as protecting the tendon (the flexor hallucis longus) (Boike *et al*. 2011). The fusion is likely to have led to some restriction in movement and also possibly some discomfort and/or pain (*ibid*.).

Trauma

Three instances of trauma were identified from Dunmore Cave – all likely to be associated with repeated activity stress. Two adult left scapulae (2/6 or 33.3%) had instances of *os acromiale*. This lesion involves the non-union of the acromion process of the scapular blade. It can occur as a result of either an actual fracture or through non-union of the epiphysis (Roberts and Manchester 1995, 76), and is believed to occur in as much as 15% of the modern population (Murphy and McNeill 1993, 128; Resnick 1995, 4281). Although this condition may be genetically linked (see Hunt and Bullen 2007), most osteological analysis links the process more to culturally induced factors (Roberts and Manchester 1995, 113). In a study of the condition on the skeletal remains recovered from Henry VIII's sixteenth century flagship *The Mary Rose*, the high prevalence of *os acromiale* were attributed to the possible long term use of longbows, where the defect may have allowed additional movement and use of the shoulder joint (Stirland 2000). The rate recorded in the disarticulated assemblage from Dunmore Cave is considerably higher than would normally be expected, but the assemblage is rife with biases and thus the prevalence may be deceptive.

Spondylolysis was identified in a single fragment of the left arch of an adult probable fifth lumbar vertebra. This fracture results in the separation of elements of the vertebra, typically the vertebral body, the pedicles, and the transverse and superior articular processes from the laminae, spinous process, and interior articular processes (Aufderheide and Rodríguez-Martín 1998, 63). The defect occurs as a result of repeated stress (Ortner 2003, 147–148).

A single tooth also had evidence of trauma. The enamel of an adult permanent upper right second incisor had been broken ante-mortem. The smoothness of the irregular edges attests to the ante-mortem nature of the breakage, which may have been related to an accident rather than through stress associated with a repeated occupational activity.

Non-metric traits

A limited number of non-metric traits were recorded on the human bones from Dunmore Cave (see Table 2.9). As before, however, given the incomplete and disarticulated nature of the assemblage, it is not viable to assess the prevalence rates of the non-metric traits.

Table 2.9 Non-metric traits from Dunmore Cave.

Non-metric trait	*Present*	*Observable*
Metopic suture	0	6
Left supraorbital foramen	1	6
Right supraorbital foramen	1	6
Parietal foramen	2	4
Coronal ossicle	0	5
Sagittal ossicle	0	4
Lambdoid ossicle	0	1
Divided hypoglossal canal	2	3
Maxillary torus	1	6
Palatine torus	0	2
Mandibular torus	0	9
Septal aperture	1L 0R	5L 5R
Vastus notch	0L 0R	8L 6R
Squatting facets	0L 0R	1L 2R

Taphonomic considerations: fragmentation and preservation

A total of 2,598 human bones and bone fragments from Dunmore Cave were analysed: 2,247 from the *Human Remains from Irish Caves Project* and 351 from the 2004/5 archaeological monitoring (Table 2.10). Numerous complete adult and juvenile bones were recovered. No peri-mortem breaks, or breaks that occurred while bones were still relatively fresh, were identified. All of the breaks happened either a significant time after decomposition, when bones had defleshed and dried, or upon recovery/excavation/storage. Thus there was no evidence of deliberate fragmentation at the time of deposition.

In general, the human bones from Dunmore Cave were well preserved, and at times the preservation of juvenile bones was exceptional. Many of the adult bones were very eroded through water action, or were dried and cracked (Pl. 11). In contrast, other bones – particularly foetal and infant remains – were complete, undamaged and in an excellent state of preservation. Adhesions to bones, exclusively in the form of natural calcite from the cave environment, occurred in several instances. Most of the human remains from the Crystal Hall were in excellent condition, while those from the Town Hall varied significantly in terms of preservation. These differences may relate both to the sequence of deposition of remains, as well as the particular chamber within the cave. The Crystal Hall, for instance, is difficult to access and is rarely visited, whereas the Town Hall has experienced visitor stress for several centuries, which is likely to have contributed to the fragmentation.

No articulated burials have ever been recorded in Dunmore Cave. However, there are strong indicators that articulated skeletons originally occurred there. Many of the individual bags of human remains retrieved, especially from the 1940s, clearly comprised the remains of single individuals. For example, the incomplete skeletal remains of a juvenile aged 2–5 years at the time of death were recovered on the 26th January 1946 'from the bottom of the rock pool' (NMI files). These bones were excellently preserved and partially coated in calcite. Although incomplete, the recovery of these remains in close proximity in an active environment suggests that this was a complete skeleton that became disarticulated over time.

A number of features indicate that many of the bodies were laid, or lay, directly on the cave floor and were not buried. As stated above, in general bones from the Crystal Hall were immaculately preserved and were invariably a pale yellow in colour. Both the colour and the excellent preservation are likely due to the fact that, soon after decomposition and the exposure of bones, the latter were naturally covered in calcite. This calcite easily flaked off

Table 2.10 Number of fragments and complete bones identified per bone element, adults and juveniles.

Bone	*Number of fragments*
Cranium (including loose teeth)	435
Mandible (including loose teeth)	88
Sternum	7
Clavicle	48
Scapula	38
Humerus	48
Radius	40
Ulna	46
Carpals	36
Metacarpals	77
Proximal hand phalanges	47
Intermediate hand phalanges	29
Distal hand phalanges	15
Vertebrae	424
Ribs	618
Pelvis	72
Femur	61
Patella	16
Tibia	51
Fibula	38
Tarsals	71
Metatarsals	69
Proximal foot phalanges	25
Intermediate foot phalanges	3
Distal foot phalanges	6
Axial unidentified	50
Appendicular unidentified	140
Total	2,598

during analysis and had not damaged the underlying bone in any way (Pl. 12). In most cases bones from this chamber were completely encased in calcite. A more definitive example is a younger juvenile from an unrecorded location. The bones of the spinal column and the ribs were completely encased in calcite, *while the bones were still in an articulated position* (Pl. 13). This could only happen if the body had been lying on the surface of the cave floor. Two adult ribs from the Town Hall were also articulated and encased in calcite (Pl. 14).

Given the evidence that fresh corpses lay decomposing on the cave floor, scavenging by animals might be expected, particularly given the relative accessibility of the cave. However, evidence of carnivores or scavengers within the cave is minimal. Just a single bone was identified with evidence of rodent gnawing (Pl. 15). This was a juvenile humerus from the Town Hall. This is somewhat unusual, but perhaps the dead were physically protected in some manner or the cave entrance was blocked.

Bone weights

(This section includes all 2,247 fragments examined for the HRICP, representing a minimum of 18 adults and 25 juveniles. It excludes the 351 fragments that were later recovered during monitoring works in 2004/5. The latter were not weighed at the time of osteoarchaeological analysis).

The adult bone recovered from Dunmore Cave weighed a total of 11,115g while the juvenile bone reached a weight of 2,987g; combined, these produce an overall weight of 14,102g of human bone from the site (Table 2.11). The variation in weights between adults and juveniles is primarily due to normal variation between mature and immature individuals, but weights may also have been affected by water erosion, fragmentation and calcite adhesions *etcetera*. Three adult femora (thigh bones) from the Town Hall illustrate well the variation that can occur in the weight of a single bone. Two almost complete adult femora had the same segments preserved, yet one weighed 159g while the other weighed 276g. A complete femur, again from the Town Hall, weighed 227g. This is an indication not only of natural variation between living individuals, but also of factors of degeneration after deposition (see above). Figure 2.2 illustrates the comparison between the weights of the actual known adult bones from the cave with the overall expected rates.

The bone weights from Dunmore Cave are affected by a number of taphonomic factors that may increase or decrease normal weights, though Figure 2.2 acts as an approximate guide. The under-representation of limb bones may be related to visitors over the centuries removing identifiable and complete bones (Dowd 2015, chapter 2). Conversely, the bones of the torso may not have been considered such an attractive prize, which may account for their over-representation. The cranium and mandible rates are slightly over-represented. This is unusual. A number of complete

Table 2.11 Bone weights by age-at-death and bone element from the HRICP.

Bone	*Adult (g)*	*Juvenile (g)*	*Total (g)*
Cranium	1786	931	2,717
Mandible	365	86	451
Sternum	16	4	20
Clavicle	181	34	215
Scapula	254	43	297
Vertebra	1264	268	1,532
Ribs	969	283	1,252
Pelvis	815	208	1,023
Humerus	825	175	1,000
Ulna	530	62	592
Radius	334	44	378
Hands	352	25	377
Femur	1214	377	1591
Patella	148	–	148
Tibia	816	272	1088
Fibula	245	70	315
Foot	873	45	918
Axial unidentified	56	22	78
Appendicular unidentified	72	38	110
Total	11,115	2987	14,102

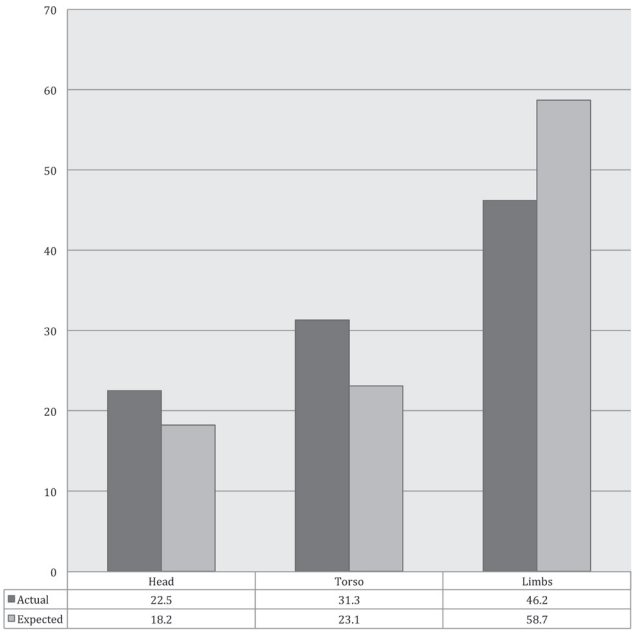

Figure 2.2 Actual adult bone weights (%) from Dunmore Cave compared with expected bone weights (%) (after McKinley 1989).

skulls were present in the current sample. The skull holds a morbid fascination for most people and is the skeletal element that someone taking bones from the cave might naturally seek.

Discussion

One of the primary aims of osteoarchaeological analysis of a disarticulated bone assemblage is to establish the minimum number of individuals present. The remains of at least 20 adults and 29 juveniles have been identified in the surviving assemblage from Dunmore Cave. Radiocarbon dates (Table 2.12) suggest two phases of burial/deposition: one in the mid-late ninth century and a second in the mid-tenth century (Dowd 2015, 204).

Admittedly, the apparent phasing reflected by the dates may be entirely due to chance in terms of the bones chosen for dating and there may in fact have been continuous burial/deposition at the site. That said, the dates are remarkable clustered and certainly suggest two distinct phases of activity. Whatever the case, it seems very unlikely that the human remains relate to the much-quoted record in the *Annals of the Four Masters* that states, 'Godfrey, son of Imhar with the foreigners of Dublin plundered Dearc Fearna and killed 1000 people in 928 AD' (O'Donovan 1854). It was O'Donovan who first identified *Dearc Fearna*, 'the Cave of the Alders', as possibly being Dunmore Cave (Drew and Huddart 1980, 1). However, modern analysis of the cave's archaeology provides clear evidence of burials/depositions occurring in the cave both before and after the date of the alleged massacre (Dowd 2015, 204–205). It seems illogical to suppose that any of the individuals identified in the extant skeletal assemblage died a violent death when there is not a single instance of violence trauma on the bones. *Dearc Fearna* may actually relate to a large ringfort close to the cave entrance, rather than the cave itself (Drew and Huddart 1980, 1). Perhaps somewhat surprisingly, the human remains, along with the numerous finds from the site and the radiocarbon dates, suggest that Dunmore Cave may have functioned as a burial ground, or at least a site for the disposal of the dead, of a Viking population in the surrounding area (Dowd *et al*. 2007; Dowd 2015, 201–204).

Before proceeding with a discussion of the osteoarchaeological results, it is important to outline the inherent biases. The majority of the human bones from Dunmore Cave were not retrieved using modern archaeological techniques, but represent a mixture of material somewhat randomly recovered over more than a century and a half of explorations and investigations. Almost certainly large quantities of human remains are still extant in this vast cave system. Further archaeological excavations would probably produce significantly more human bones,

Table 2.12 Radiocarbon dates on human bones from Dunmore Cave (Dowd 2015, 184; M. Dowd pers. comm.).

Chamber Recovered by Date found	*Lab code*	*Age–at–death*	*Element*	*δ13C*	*Measured years (BP)*	*Calibrated date (2σ) AD*
Market Cross M. Dowd 2004: 04E1517	UBA–7283	Juvenile (1–2 yrs)	L radius	-22.0	1151±31	780–975
Town Hall W. Monks 20/04/1946	UBA–7279	Infant (6–12 mths)	R tibia	-21.0	1132±32	780–990
Rabbit Burrow A. Halpin, NMI 11/03/2000	UBA–7280	Juvenile (2–6 yrs)	R radius	-21.0	1128±33	780–990
Main Chamber C. Murray, OPW 22/04/2005	UBA–7282	Adult	R humerus	-23.0	1125±31	785–990
Crystal Hall. W. Monks 09/09/1946	UBA–7278	Adult	R navicular	-21.0	1100±32	890–1015
Main Chamber M. Dowd 2004: 04E1517	UBA–7281	Juvenile (6–7 yrs)	R femur	-22.0	1091±31	890–1015
Haddon Hall (Cathedral) M. Dowd 2005: 04E1517	UBA–7284	Adolescent (11–16 yrs)	L 3rd metatarsal	-20.0	1091±30	890–1015

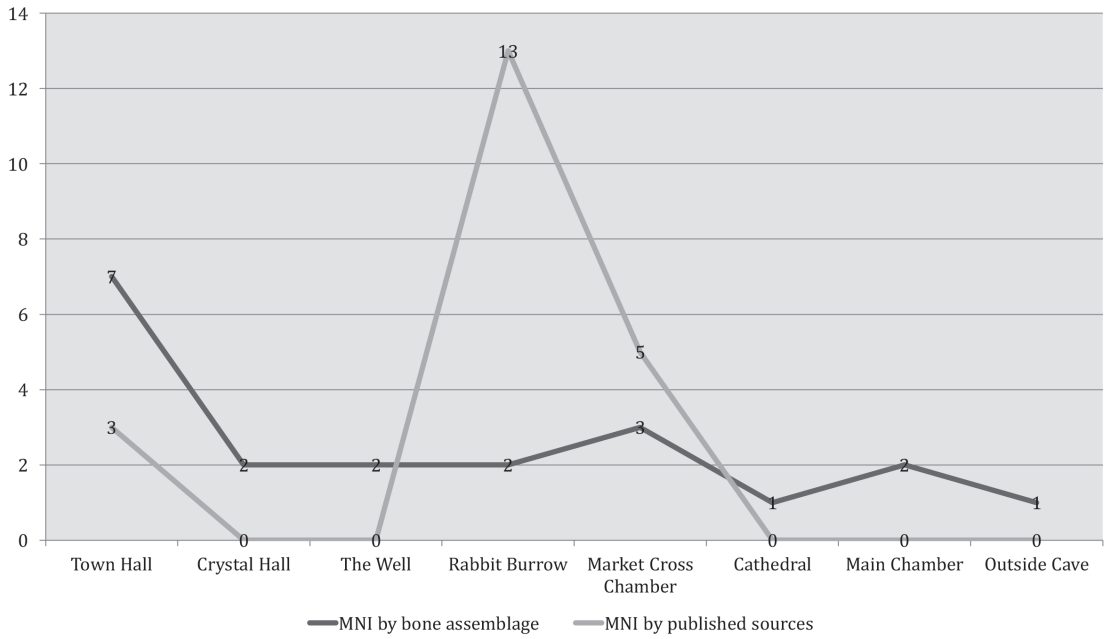

Figure 2.3 MNI (adults only) present in surviving human bone assemblage from Dunmore Cave compared to previous MNI (adults only) estimates based on published sources (latter data from Dowd 2004, 276, table 9.5).

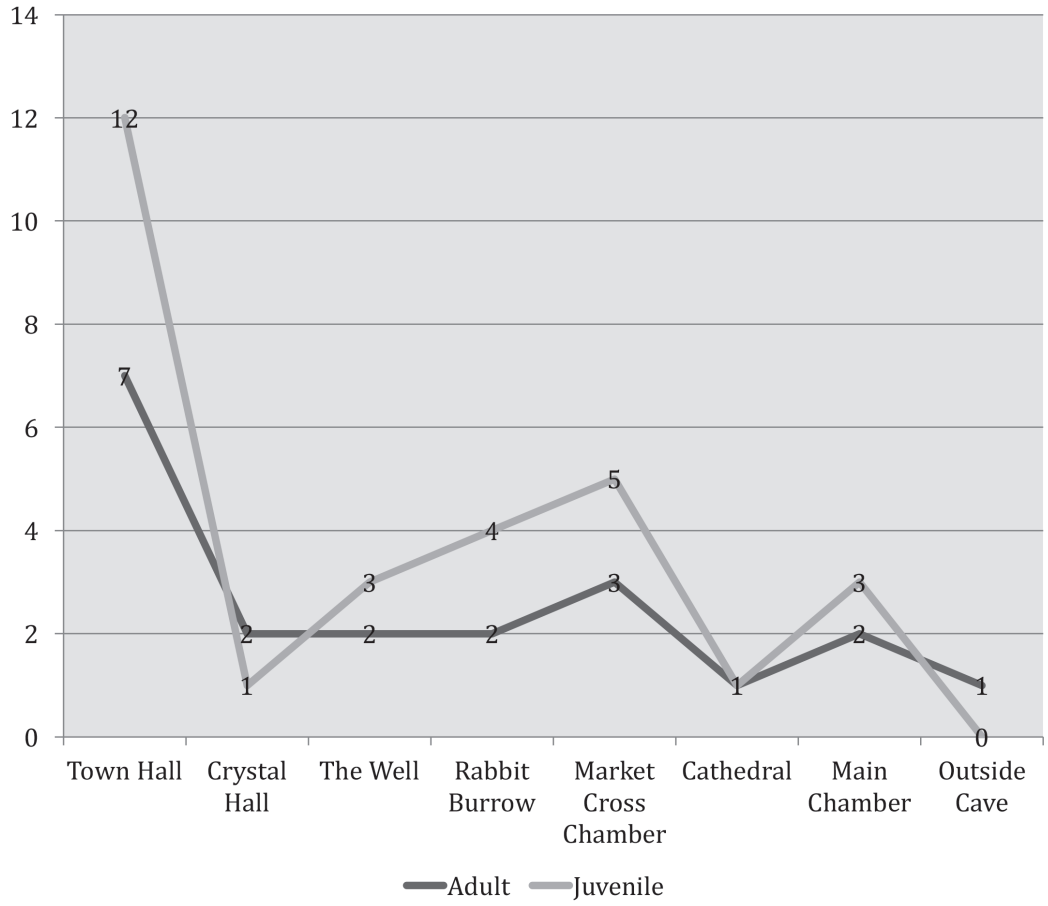

Figure 2.4 MNI of adults and juveniles according to chamber or area in Dunmore Cave.

which could entirely alter the interpretations that have resulted from the present analysis. The cave itself has been the subject of interest since at least 1699 and the quantity of material that has been removed in the interim is unknown; undoubtedly significant assemblages of human bones have been removed and are lost forever. This is especially true when one considers that at least some of the corpses originally lay on the surface of the floor (easier for later visitors to remove bones as little digging would have been required) and that a significant volume of bones remained complete over such a long period (a complete bone is a more attractive trophy that bone fragments). In addition, it became clear when the human skeletal remains were being consolidated from their various repositories during the HRICP that significant quantities could not be located, such as the large assemblage recovered during excavations in 1973 (Drew and Huddart 1980). Figure 2.3 compares the adult MNI as established in this present osteoarchaeological analysis with the MNI established from an assessment of the older paper records of all of the known human remains recovered from Dunmore Cave (Dowd 2004, 276). The disparity in the figures is too great to be due simply to inter-observer variation. This is particularly the case in the Rabbit Burrow where the remains of up to 13 adults seem to have been recovered, yet only two were identified in the present surviving assemblage.

The bone weights also suggest underrepresentation of skeletal remains. The bones from Dunmore (excluding the ones recovered during monitoring in 2004/5) weighed a total of 14,102g, representing 43 individuals (Dowd *et al*. 2007).

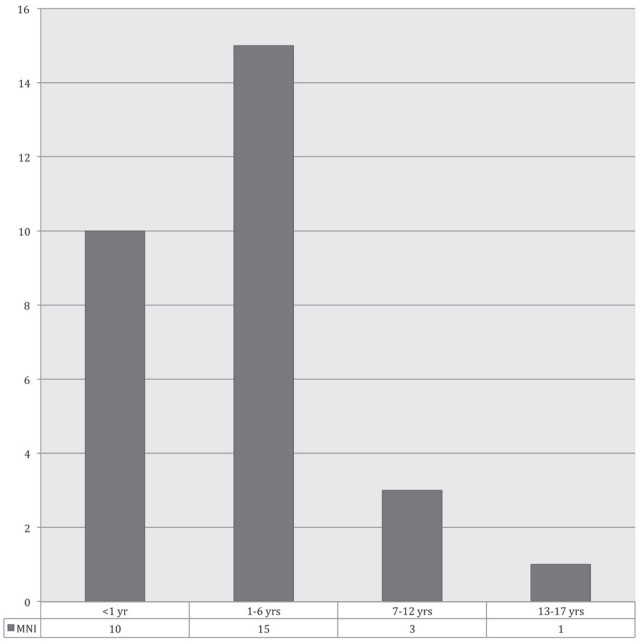

Figure 2.5 Juvenile MNI from Dunmore Cave; determined by bone counts, age-at-death and location in cave.

In contrast, the disarticulated bones from Cloghermore Cave weighed 19,657g and represented a minimum of 30 individuals (Lynch 2005a). Even taking into account the normal variations that can occur between humans in terms of bone weight, it is clear that the extant skeletal remains from Dunmore comprise only very small portions of skeletons. Of course, almost all the human bones from Cloghermore were retrieved during modern scientific excavations, which would account to some extent for the greater bone weights there. However, the variation is significant, and it confirms the very incomplete nature of the Dunmore assemblage.

Dunmore Cave is a large and complex system, linked by numerous passages and galleries, with significant variation in levels (Fig. 2.1). While it is likely that there was at least some post-depositional movement of bones within the cave, either through natural or intentional intervention, it is generally unlikely that any such movement was significant. Thus the principal areas where human bones were found are *in general* likely to be reflective of the original place of deposition. That said, where small quantities of bone occur, such as outside the entrance, this more plausibly represents post-depositional movement. Figure 2.4 demonstrates quite clearly that the prevalence of juveniles significantly exceeded the number of adults in many areas of the cave. In this study most human bones were recovered from the Town Hall. However, according to the antiquarian records, the highest number of adults was actually from the Rabbit Burrow (Fig. 2.3) (Dowd 2004, 276).

The osteological analysis of the extant human remains, while limited due to the nature of the assemblage, has provided information about Dunmore that was previously unknown. Greater numbers of juveniles (59.2%) than adults (40.8%) were identified (Fig. 2.4). Initially, this may hint at some form of selective burial, such as found in the later site type of *cillíní* (children's burial grounds). In reality, the presence of large numbers of juveniles is reflective of normal mortality patterns in pre-modern populations, where juveniles would have been subject to higher death rates. In Cloghermore Cave, for instance, 50% (15/30) of the identified individuals were juveniles (Connolly *et al*. 2005). It has been proposed that any burial ground where more than half the individuals are juveniles should be interpreted as a *cillín* (Buckley 2010). However, the radiocarbon dates from Dunmore predate, by centuries, the most prolific period of *cillíní* use, that is, the post-medieval period (Donnelly and Murphy 2008). In addition, activities in the cave appear to be primarily Viking related, which would negate any interpretation of a Christian-linked tradition of burying children separately. Perhaps the very high percentage of young juveniles in the Dunmore Cave assemblage is further confirmation of the unique nature of this site in terms of early medieval Ireland.

The ages-at-death and numbers of juveniles identified from Dunmore are summarised in Figure 2.5. In total, 86.2% (25/29) of juveniles were aged 6 years or younger while

at Cloghermore Cave 73.3% (11/15) of juveniles fell into this age category. Infants and young children are typically among the most vulnerable in any society, particularly in the absence of modern healthcare. However, there were surprisingly few infants (aged less than one year) from Dunmore: just 34% (10/29). Infant mortality would have been very high, and if Dunmore reflects normal pre-modern mortality rates, more infants should be present. The disparity may be related to something as simple as infants being buried in an area of the cave not yet subject to investigation. Linked to this are the biases inherent in this particular assemblage as outlined above.

With regard to adults, it was only possible to determine the sex of 11 of the 20 individuals. At least 54.5% (6/11) were female, while 45.5% (5/11) were male. The initial assessment of bones during the HRICP indicated a possible bias towards females. However, the inclusion of the small volume of bone recovered during archaeological monitoring in 2004/5 suggests this bias may not be accurate with relatively equal numbers of females and males present. Assessment of the age-at-death of adults was significantly hampered by the random collection strategies of the past two centuries. At least one young adult female and two middle adult females were identified, but it is not possible to be more specific.

In terms of physiological stress, the skeletal evidence is somewhat sparse. The prevalence of non-specific infection is low, as are the rates of cribra orbitalia and porotic hyperostosis. All of the aforementioned were only identified in juvenile individuals. A possible instance of scurvy was also tentatively identified. This may suggest these juveniles suffered stresses, which may have contributed to an early death. Could it possibly be the case that their parents, presumably whose remains are also in the cave, were not subject to the same stresses? The presence of dental hypoplastic defects in adult teeth certainly indicates that adults were not immune to physiological stress, but perhaps the nature of those trials changed from one generation to the next. The possibility of two phases of activity in the cave, however, somewhat complicates this interpretation.

Conclusions

Dunmore Cave has become inextricably linked in the public mind to the site of a Viking massacre. Although there is virtually no evidence of such, it cannot be entirely ruled out. The site may have been used for the deposition of the dead, but may also have acted as a failed shelter for those fleeing a Viking raid. Although there is no evidence of violence, it is possible that some individuals were trapped during such a raid and died in the cave, particularly given the evidence that some corpses lay exposed on the cave floor. Some of the juvenile remains indicate dietary stress in the time immediately preceding death, which may support a theory of a population under stress from outside influences.

Alternatively, if the human skeletal assemblage represents the burial/deposition of Vikings, the presence of women and children is not counter to that premise: women and children were part of Viking incursions from the beginning (McLeod 2011). However, the very inadequate contextual information makes the interpretation of deposition and/or burial extremely difficult. It is important to note that whatever those practices were, they were in stark contrast to the prescribed Christian burial rite of the period. Add to this the actual supreme effort involved in transporting a heavy corpse into the depths of a large cave (assuming that most individuals did not actually die in the cave) and the complexity of this method of disposal of the dead can be more fully appreciated. More than most human bone assemblages, the Dunmore sample is truly a random snapshot of the true nature of the original events. Nonetheless, this recent osteoarchaeological analysis has provided vital insights into an important site, has challenged traditional interpretations of the cave, and has perhaps also raised some new questions.

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Part II

Artefact assemblages

3

Mesolithic, Neolithic and Bronze Age lithics from Irish caves

Peter C. Woodman

One of the most striking observations is that the lithic assemblages recovered from caves, especially in terms of retouched tools, are relatively sparse. A significant number of caves have produced no lithics. Some of these, such as Castlepook Cave, Co. Cork, may not have been open during the Holocene, though there is also a remarkable paucity of lithics from caves in Fermanagh, at Keshcorran, Co. Sligo, and from the Edenvale-Newhall complex in Co. Clare. A lack of archaeological excavation cannot be the full explanation. For instance, almost 100 caves across the island have produced archaeological material yet lithics have only been recovered from 20 sites – 18 caves and two rockshelters – located across nine counties. The Irish evidence can be contrasted with the large and abundant lithic assemblages from caves in many parts of Belgium, France, Germany and Britain.

Few Irish caves have produced large assemblages, particularly sites located away from the Antrim coast. Seven of the twenty sites that have produced lithics are dotted along the Antrim coast at Ballintoy, where they are within easy access to flint from the Ulster White Limestone Formation (UWLF) deposits, as well as beach flint. Consequently, the relatively larger lithic assemblages from those sites are not surprising. If the assemblages from recently excavated sites such as Glencurran Cave, Co. Clare and Killuragh Cave, Co. Limerick are considered, one must wonder whether the lack of modern excavation techniques – and in particular sieving – may have biased what was recovered from earlier cave investigations. Aside from these two caves, in addition to Kilgreany Cave, Co. Waterford and the Ballintoy sites, the lithic assemblages from all the other caves each comprise less than ten objects.

In some cases, lithic material appeared to be in a secondary context rather than reflecting *in situ* activities. The most notable examples are two very fresh, tanged, butt-trimmed Late Mesolithic forms from Potter's Cave and Boat Cave at Ballintoy. It is probable that both artefacts pre-date the creation of these caves and were introduced into the cave strata significantly later than the Mesolithic. The Boat Cave specimen is in such fresh condition that it probably did not come from the Ballintoy area. Similarly, what may be a very battered and weathered remnant of a flake axe from Brothers' Cave is unlikely to have been deposited at this site during the Mesolithic. It would require a much more active set of environmental conditions than might be found in a cave to reduce the implement to such a condition. Perhaps the most intriguing artefact is the rock crystal core from Kilgreany Cave. This may have been a prehistoric artefact that was discovered and retained for use during the early medieval period. Ground down and polished, it could have served as a centrepiece in an item of early medieval metalwork similar to the centrepiece in the Cross of Cong. Of note in this respect is the fragment of an eight or early ninth century shrine from Kilgreany Cave (see Chapter 10).

In general, lithics from Irish caves tend to post-date the Mesolithic. Indeed, many of the possible Mesolithic artefacts recovered are isolated finds and cannot be dated to the Mesolithic with absolute certainty. Of note, however, are the microliths and distinctive blades from Killuragh Cave, Co. Limerick, which are clearly from the earlier half of the Mesolithic. This material may have been deliberately placed in the vicinity of the main cave entrance. Other possible artefacts of Early Mesolithic date include blades from Annagh Cave, Co. Limerick, Oonaglour Cave, Co. Waterford, and Carrigagour Cave, Co. Cork – as well as a core from the latter site. In contrast, it is much more difficult to find any unequivocal evidence for a Late Mesolithic presence in cave assemblages. Blades from Knockninny Cave, Co. Fermanagh and Foley Cave, Co. Cork might be of such date, but this is

by no means certain. As noted earlier, the two Late Mesolithic butt-trimmed forms from Potter's Cave and Boat Cave are likely to have been introduced at a much later date, while the third example from Boheeshane Bay Cave 2 – a small rockshelter near Boat Cave – is in such poor condition that it may have been a more recent introduction.

Not many caves contain diagnostic Neolithic lithics; the most obvious are an arrowhead and an invasively retouched piece from Annagh Cave, and a hollow scraper from Kilgreany Cave. In the latter case, identifying how much of the remainder of the lithic assemblage is Neolithic is problematic. Much of the Kilgreany assemblage – especially the scrapers – is more likely to date to the Bronze Age. There is no simple way of dating the flakes, split pebbles and bipolar cores, but it is probable that most post-date the Neolithic. Other Neolithic finds include a large blade struck from a polished flint axe from Brothers' Cave, Co. Waterford, and at least three convex end scrapers from the Catacombs, Co. Clare.

A number of sites contain significant quantities of material that appear to date to the Chalcolithic and/or Bronze Age, but with few of the most diagnostic types of tools that are associated with the Bronze Age. Most notable is the lack of barbed and tanged arrowheads and hollow based arrowheads. Another implement type often associated with the Bronze Age would be the small so-called slug knives (Woodman, Finlay and Anderson 2006, 167–170). There can be difficulties ascertaining the particular period of convex end scrapers. While end of blade scrapers are most likely to be earlier Mesolithic in date, smaller scrapers need not necessarily be Bronze Age (*ibid*., 155–161). One class, small domed scrapers often associated with Beaker assemblages, do not appear to occur in caves with the exception of one possible example from the Catacombs, Co. Clare and a second from Park North Cave, Co. Cork.

What follows is a description of the lithics from 20 caves and rockshelters (Table 3.1). These assemblages are almost all a consequence of investigations conducted before 1980. Prior to the current study, these lithic assemblages had not been subject to modern analysis. Not included here are lithic assemblages from recent excavations that have received specialist analysis including Oweyberne Cave 3 and Dunseverick Cave, both in Co. Antrim; Moneen Cave and Glencurran Cave, both in Co. Clare; Badger Cave, Co. Cork; and Ross Island Cave, Co. Kerry.

1. Antrim, Ballintoy Demesne td., Boat Cave

In total, 46 flint artefacts were recovered from Boat Cave during excavations in 1935 and 1936 (Jackson 1936; Jackson 1938). Most were fresh and unpatinated, though a small selection of weathered and heavily patinated pieces were also found. These latter items were probably inadvertently intrusive

Table 3.1 Caves and rockshelters that have produced the lithic assemblages analysed here.

	County	*Townland*	*Cave name*
1	Antrim	Ballintoy Demesne	Boat Cave
2	Antrim	Ballintoy Demesne	Boheeshane Bay Cave 2 (rockshelter east of Boat Cave)
3	Antrim	Ballintoy Demesne	Chimney Cave
4	Antrim	Ballintoy Demesne	Masked Rockshelter (west of Potter's Cave)
5	Antrim	Ballintoy Demesne	Potter's Cave
6	Antrim	Templastragh	Portbraddan Cave
7	Antrim	White Park	Park Cave
8	Clare	Edenvale	The Catacombs
9	Cork	Carrigagour	Carrigagour Cave 1
10	Cork	Connaberry	Foley Cave
11	Cork	Park North (Imokilly By.)	Park North Cave
12	Dublin	Quay	Unidentified cave at Portrane
13	Fermanagh	Sheehinny	Knockninny
14	Kerry	Cloghermore	Cloghermore Cave
15	Limerick	Annagh	Annagh Cave
16	Limerick	Killuragh	Killuragh Cave
17	Waterford	Ballygambon Lower	Brothers' Cave
18	Waterford	Bridgequarter (Decies without Drum By.)	Oonaglour Cave
19	Waterford	Kilgreany	Kilgreany Cave
20	Wicklow	Dunbur Head	Dunbar rockshelter

and do not necessarily reflect *in situ* activities within the cave. For instance, the most enigmatic piece is a butt-trimmed form, which not only belongs to the Late Mesolithic but, due to the fact that it is tanged, is unlikely to belong to the final stages of the Late Mesolithic, i.e. it could date to earlier than 5000 cal BC and could, therefore, pre-date the creation of the cave. It is in remarkably good condition. It seems unlikely that it was deliberately brought into the cave during the Mesolithic.

The assemblage from Boat Cave has certain attributes that are similar to some of the other caves along the Antrim coast, notably few traces of cores or debitage. However, at Boat Cave there was a greater selection of better quality flakes and at least seven retouched pieces. These include two simple convex scrapers made on large flakes, two flakes with areas of invasive retouch, and two pieces that retained a series of notches. As a group, these seven pieces seem to be more typical of the Neolithic and certainly very different from the more *ad hoc* retouching seen on pieces from the other Antrim caves. The Boat Cave assemblage is unnumbered and is catalogued here according to the labelled boxes in which it is stored.

From front of Boat Cave 1

Blade. Heavily water-rolled red-stained blade that has been heavily damaged since rolled.

Flake. Fresh flake, cortex on platform; 45×29mm.

Flake. Fresh flake with smooth platform; 31×30mm.

Broken flake. Fresh broken flake, struck from an older artefact; 30×27mm.

Broken flake. Broken proximal end of a flake with red staining on the interior of the break, perhaps due to burning; 24×42mm.

Level I

Broken flake. Broken fresh flake, retains an area of fresh cortex on left lateral edge. Distal end missing, smooth platform; 51×41mm.

Broken flake. Broken fresh flake, retains an area of fresh cortex on left lateral edge. Distal end missing, smooth platform; 36×34mm.

Flake. Small fresh unpatinated blade-like flake; 29×13mm.

Flake fragments. Two possible flake fragments.

Level I possible alcove

Scraper? Possible crude end scraper with retouch across the distal end of a small flake, with a smooth platform. Very weathered; 31×33mm.

Flake. Weathered and patinated white blade-like flake with areas of slight damage on both lateral edges. One area of modern damage on the smooth striking platform; 56×33mm.

Flake fragment. Very fresh, possibly fractured, piece of a larger flake, which now has a laminar form. It retains portion of two flake facets; 55×25mm.

Level I 1935

Nodule/core. Small irregular nodule patinated orange brown and weathered; it has several flakes removed. It could be regarded as an irregular core and may be an intrusive piece; 31×29mm.

Retouched flake. Trapezoidal flake in fresh condition. Part of distal edge missing; surviving left edge is peripherally retouched. The platform indicates that it was struck from a patinated surface. A small part is retouched from the dorsal face. Although it is not retouched to a hollow, it is reminiscent of a hollow scraper.

Retouched flake. Retouched portion of large fresh unpatinated flake. Extensive semi-invasive retouch on the ventral face has been used to remove the striking platform and portions of the proximal end of the flake; more abrupt dorsal retouch has been used across the distal end; 39×61mm.

Primary flake. Irregular primary laminar flake, retaining some evidence of original surface of nodule. Struck from surface of nodule; 55×28mm.

Flake. Small burnt flake reddish in colour, distal tip missing, smooth platform; 25×18mm.

Flake. Slightly patinated yellowish in colour retouched flake, distal end partially missing. Slight peripheral retouch along right lateral edge, smooth platform; 38×42mm.

Flake. Small unpatinated flake, smooth platform; 19×31mm.

Flake. Weathered, thick, triangular-shaped flake with fresh cortex on right lateral edge. Some crude irregular retouch across distal edge, smooth platform; 30×37mm.

Flake fragment. Triangular-shaped heavily patinated orange brown and weathered portion of a flake.

Flake fragment. Fractured portion of a fresh flint flake; max. 31mm.

Level I

Hammerstone. A large granite hammerstone that has been heavily bruised on an originally narrow edge; 91×85×62mm; 635 g.

Hammerstone. A black stained possible hammerstone which is bruised on one end and on the corner of the other end; 130×92×68mm; 1420g.

Pebbles. Three elongated pebbles; two showed no signs of use and one of these was broken. The third pebble was heavily used at one end, having some flakes spalled off and then intensely bruised across the end. More bruising, though of a less intense form, occurred at the other end; 117×40×35mm.

Level I near back of cave above crazy paving

Nodule fragment. Broken portion of flint nodule retaining large area of relatively fresh cortex; 81mm.

Scraper. Large thin oval flake retaining cortex on left lateral edge. Distal edge is retouched to form a rounded scraping edge; 56×42mm.

Retouched flake. Fresh small triangular flake with cortex on left lateral edge and on platform. Very small area of slight peripheral retouch on distal edge; 28×39mm.

Primary flake. Weathered or slightly rolled large dome-shaped cortical flake that came from a beach nodule of flint; 56×58mm.

Flake fragment. Fresh proximal portion of thin flake with point platform; 25×39mm.

Level I and II

Retouched flake. Large very fresh flake with right edge quite steep and feathering across to a thin left lateral edge. Light peripheral retouch has been used to form several slight hollows primarily on the left lateral edge, though there is also one at the distal tip of the right edge. It retains a large cortical-covered platform; 53×44mm.

Retouched flake. Large flat irregular flake in relatively fresh condition. Left lateral edge retains several areas of retouch on dorsal face with a small area on ventral right proximal edge. Platform has been removed; 61×72mm.

Level II

Core fragment. Square and very fresh fractured core fragment.

Tanged butt-trimmed blade. Very fresh and unpatinated tanged butt-trimmed form, made on a relatively broad blade. Distal end has some small portions missing on left edge. Lateral edges appear to show some evidence of use; 87×35mm.

Flake, possibly retouched. Thin large flake possibly struck from the original nodule surface and retaining fresh cortex around much of the edges. Possible area of retouch on cortex on distal edge; 51×63mm.

Flake, possibly retouched. Large fresh square flake with large dihedral platform. Possible slight irregular retouch on the cortex-covered right lateral edge; distal edge has some damage; 52×51mm.

Flake. Large relatively thin flint flake in fresh condition with smooth platform; 51×31mm.

Broken flake. Slightly weathered distal portion of broken flake; 41×35mm.

Base of Level II

Retouched flake. Fresh quite thin flake with large facetted platform, may be the inadvertent byproduct of striking the flake from a multi-platformed core. Distal left edge has an area of invasive retouch that has created a straight edge; 52×49mm.

Retouched flake. Fresh flake with cortex-covered striking platform. Cortex is fresh. Right lateral edge has had several flakes removed from distal portion. These are in one area with slight notches being created with alternate retouch. One modern fracture also exists on distal edge.

Level II: 'Flints, charcoal, pecten shell 21.9.36'

Scraper. Thin slightly curved cortical flake that lacks its striking platform. It retains two flake scars – residues from an earlier series of removals. The extreme distal end has been retouched to form a small rounded scraping edge; 76×43mm.

Flake. Mottled patinated relatively fresh flake with smooth platform; 35×35mm.

Flake. Heavily water-rolled flake.

Level II 1935

Nodule. Water-rolled nodule.

Primary flake. Made from water-rolled nodule of flint. Slightly patinated point platform; 33×38mm.

Retouched flake. Made on an unpatinated but rolled piece of what may have been a flint flake. Steep vertical retouch from both dorsal and ventral faces is across what would have been the distal edge. Probably did not serve as a scraper.

Flake. Fresh unpatinated flake from multi-platformed core with point platform; 33×57mm.

Flake. Small slightly weathered flake possibly struck from older artefact; 27×27mm.

Broken flake. Broken water-rolled flake.

Broken flake. Fresh proximal portion of a flint flake or blade with smooth striking platform; 25×38mm.

'Bone shells and charcoal 1 ft below top of RB' [Raised Beach]

Pebbles. Eight water-rolled pebbles of varying size.

Nodule. Nodule of water-rolled flint with one possible flake removal; 85×53mm.

Nodule fragment. Chunk or portion of flint nodule, possibly a core with several small flakes removed from one edge. Cortex fresh; max. 50mm.

Core. Large portion of a core, probably multi-platformed, made on a nodule of flint with fresh cortex; max. 92mm.

Primary flake. Small fresh primary flake; 40×17mm.

Flake. Small fresh flake; 28×17mm.

Debitage. One piece of debitage.

2. Antrim, Ballintoy Demesne td., Boheeshane Bay Cave 2 (rockshelter east of Boat Cave)

A small flint assemblage of six pieces was retrieved in 1935 during preliminary investigations of this small rockshelter situated close to Boat Cave (Jackson 1936). Aside from the blade, the other material is rather weathered or rolled, and appears to comprise secondary deposits within the rockshelter.

Flint blade. Ventral surface patinated matt white, dorsal surface patinated yellow. Large smooth striking platform; 55×25mm.

Flint piece. Greenish, patinated, crudely flaked on two edges. These edges are differentially patinated suggesting that the retouch is much more recent.

Flint piece. Steeply retouched and heavily weathered.

Flint piece. Patinated deep brown and weathered; small.

Flint pebble. Water-rolled, may have been an artefact.

Flint blade. Water-rolled, patinated brown, broken and damaged.

3. Antrim, Ballintoy Demesne td., Chimney Cave

In total, 86 pieces were available for study from the 1934 excavations in Chimney Cave (Jackson 1936). A group of 19 pieces were documented as coming from below the 'crazy pavement' and at the base levels, and the remainder are presumed to make up the main part of the chipping floor. The most noticeable aspects of the assemblage are the absence of two elements that normally make up chipping floors: small debitage and cores. This would suggest that the material is not at the location where these pieces were struck. However, it is also possible that such elements were not recognised or collected during the excavation. On the other hand, the presence of 12 primary cortical flakes, some of which were quite large, and 16 others that retain smaller but significant remnants of cortex, suggest that this was the product of a knapping event that occurred in the vicinity. As is the case with other assemblages from the Ballintoy area, the knappers made use of fresh flint nodules taken from the nearby cliffs and beach.

With one exception, none of the complete laminar examples could be described as part of a reduction strategy to produce blades. The main part of the assemblage consists of a series of irregular blades of various shapes, sizes and thicknesses. They appear to have been produced with a simple technology – a significant number of flakes were struck directly from the nodule surface thus without the creation of a platform. Only two pieces showed any sign of retouch and in both cases this was quite limited. The evidence of any association with a fire is confined to two burnt flint flakes.

2ft below pavement

Flake. Cortex platform; 41×35mm.

Base

Blade. Irregularly-shaped with cortex-covered platform; 79×35mm.

Flake. Cortex platform; 40×39mm.

Flake. Leaf-shaped, cortex platform; 42×26mm.

Flake. Smooth platform retaining an area of fresh cortex; 37×35mm.

Flake. Smooth platform retaining an area of fresh cortex; 45×49mm.

Flake. Smooth platform; 37×24mm.

Flake. Smooth platform, small area of retouch on left edge; 41×41mm.

Flake. Smooth platform, peripheral retouch on distal end; 45×35mm.

Flake. Smooth platform, peripheral retouch on distal edge; 39×31mm.

Flake. Smooth platform; 31×39mm.

Flake. Smooth platform; 31×57mm.

Flake. Point platform; 34×44mm.

Flake. Point platform; 40×29mm.

Flake. Point platform; 35×31mm.

Flake. Point platform, some fresh cortex; 40×29mm.

Flake. Point platform, some fresh cortex; 47×43mm.

Primary flake. Point platform and beach cortex; 41×31mm.

Primary flake fragment. Fractured piece of primary flake with beach cortex; max. 37mm.

Uncertain location

Core. Irregular core that has been halved and then a few flakes removed; 57×65mm.

Chunk from core. Small chunk from core; ma×. 34mm.

Blade fragment. Slightly weathered medial blade fragment; 43×18mm.

Flake. Burnt, with cortex-covered platform; 27×39mm.

Flake. Cortex-covered platform, slight peripheral retouch on distal end; 36×34mm.

Flake. Portion of a large thick flake with two small areas of retouch, one on the proximal ventral left edge, while a small semi-abrupt area exists on dorsal distal left edge; 47×48mm.

Flake. Cortex-covered platform; 37×48mm.

Flake. Cortex-covered platform; 41×48mm.

Flake. Cortex-covered platform; 37×58mm.

Flake. Cortex-covered platform; 41×44mm.

Flake. Cortex-covered platform; 64×53mm.

Flake. Cortex-covered platform; 45×43mm.

Flake. Cortex-covered platform; 31×25mm.

Flake. Cortex-covered platform; 30×49mm.

Flake. Cortex-covered platform; 35×42mm.

Flake. Cortex-covered platform; 38×30mm.

Flake. Cortex-covered platform; 34×39mm.

Flake. Cortex-covered platform; 33×35mm.

Flake. Cortex-covered platform; 30×47mm.
Flake. Cortex-covered platform; 37×61mm.
Flake. Cortex-covered platform; 40×32mm.
Flake. Facetted platform; 41×43mm.
Flake. Broken, with cortex-covered platform; max. 45mm.
Flake. Broken flake with cortex-covered platform; 41×41mm.
Flake. Small point platform; 44×44mm.
Flake. Small point platform; 41×35mm.
Flake. Small point platform; 34×45mm.
Flake. Small point platform; 25×45mm.
Flake. Small point platform; 44×30mm.
Flake. Small point platform; 43×42mm.
Flake. Small point platform; 36×30mm.
Flake. Smooth platform; 29×46mm.
Flake. Smooth platform; 27×35mm.
Flake. Smooth platform; 43×26mm.
Flake. Smooth platform; 36×33mm.
Flake. Smooth platform; 39×36mm.
Flake. Smooth platform; 45×25mm.
Flake. Smooth platform; 40×26mm.
Flake. Smooth platform; 36×31mm.
Flake. Smooth platform; 30×39mm.
Flake. Smooth platform; 33×39mm.
Flake. Smooth platform; 27×35mm.
Flake. Smooth platform; 60×38mm.
Flake. Smooth platform; 38×44mm.
Flake. Smooth platform; 40×58mm.
Flake. Smooth platform; 30×38mm.
Broken flake. Smooth platform; max. 45mm.
Broken flake. Smooth platform; 32×28mm.
Broken flake. Smooth platform; 34×31mm.
Broken flake. Smooth platform; 27×35mm.
Broken flake. Smooth platform; 40×41mm.
Broken flake. Max. 58mm.
Broken flake. Max. 35mm.
Broken flake. Max. 25mm.
Primary cortical flake. Struck from cortex surface; 45×54mm.
Primary cortical flake. Struck from cortex surface; 60×59mm.
Primary cortical flake. Struck from cortex surface; 51×50mm.
Primary cortical flake. Struck from cortex surface; 39×32mm.
Primary cortical flake. Struck from cortex surface; 39×35mm.
Primary cortical flake. Struck from cortex surface; 35×55mm.
Primary cortical flake. Struck from cortex surface; 26×39mm.
Primary cortical flake. Struck from cortex surface; 56×37mm.
Primary cortical flake. Small point platform; 40×26mm.
Primary cortical flake. Facetted platform; 40×35mm.
Broken primary cortical flake. Facetted platform; 57×45mm.
Broken primary cortical flake. 57×42mm.
Broken primary cortical flake. Burnt with facetted platform; 50×46mm.

4. Antrim, Ballintoy Demesne td., Masked Rockshelter (west of Potter's Cave)

One lithic was recovered in 1934 during a preliminary investigation in this rockshelter situated close to Potter's Cave (Jackson 1934, 108).

Late Mesolithic leaf-shaped 'Bann flake'. Extensive edge damage; heavily weathered and patinated very dark brown. A little sign of butt-trimming remains; 71×49mm.
Possible rough-out for polished flint axe. A naturally fractured elongated piece of flint which has a rhomboid section, in fresh condition. One surface appears to retain much of the original face of the nodule, while a small area of fresh cortex exists at one end. The cortex-covered end is broader than the other, which may have, before being broken, tapered to a narrow rounded edge. Several step flakes have been removed from both edges. May represent an attempt at a rough-out for a polished axe, or an *ad hoc* attempt to make a crude pick or expedient tool that was then discarded; 183×64×39mm. It is presumably of Neolithic date.

5. Antrim, Ballintoy Demesne td., Potter's Cave

Flint assemblages were recovered during Jackson's excavations in 1933, 1934, 1935 and 1936 outside the entrance to Potter's Cave (Jackson 1933a; Jackson 1933b; Jackson 1934; Jackson 1936; Jackson 1938). No excavation took place inside the cave. The combined lithic assemblage – totalling in the region of 110 pieces – remains largely uncatalogued. The material is arranged here according to excavation season and level: the nomenclature varied from year to year.

Given the fact that the lithics from the upper layers in trenches outside the cave entrance were associated with large quantities of Souterrain Ware of early medieval date, much of the lithic material can be presumed to be in a secondary context. Both upper and lower layers contained some water-rolled pieces as well as fresh artefacts. The most distinctive items from the upper layers include a small Late Mesolithic butt-trimmed form (Jackson 1933b), which occurred entirely out of context in an early medieval stratum. Also from the upper layers is a grinding slab of a type that has regularly been found on Mesolithic sites such as Newferry (Movius 1936; Woodman 1977) and Dalkey Island (Liversage 1968) – these may also have been used during the Neolithic. In the Potter's Cave example, the original edges have been removed through a process of bashing and bruising.

The prehistoric levels outside Potter's Cave seem to consist of the '8–10ft +' strata in 1933 and 'Levels C and D' in 1934. From the artefacts listed below, and given the relatively small area that was explored, it seems that the assemblage relates to short-term activities – possibly occupation within the cave. The presence of charcoal and burnt lithics suggests fires; the core fragments as well as by-products and some debitage indicate knapping – activities that may all have taken place outside the cave. While the flint from Potter's Cave is mostly fresh, there is occasional evidence for the use of water-rolled nodules. The degree of what may be natural fracturing is not unusual along the north coast, as even within the bedrock numerous nodules can be seen to contain fracture lines. The flake assemblage is noticeably non-laminar and contains a series of flakes that retain a range of platform types ranging from the large smooth examples, through to cortex-covered platforms. This would seem to be a very typical assemblage – a by-product of a simple *ad hoc* knapping strategy. Evidence of secondary retouch is rare; the clearest example is the greenish flake from Layer D, which may in itself be residual from an earlier phase.

Figure 3.1 Late Mesolithic butt-trimmed flake (772–1934) from outside Potter's Cave (Jackson 1933b, 213).

1933: Level 01

Large blade or flake. Patinated green, proximal end only; 38×45mm.

1933: Floor above 01

Core. Burnt, small, miscellaneous core.
Flake fragment. Irregular.
Flake fragment. Irregular.
Flake fragment. Irregular.
Flake fragment. Irregular.
Flake. Thick, fresh; 27×39mm.
Flake. Small; 22×17mm.
Cortical flake. Fresh; 37×40mm.

1933: Level 02

Nodule fragment. Water-rolled.

1933: Below 02 (under arch)

Butt-trimmed flake (772-1934) (Jackson 1933b) (Fig. 3.1). Found at a depth of 6ft. Small, slightly tanged, slightly weathered, mottled beige patina. Slightly thick, large, smooth platform butt with a large smooth platform. The actual bulb of percussion is absent from the ventral face, the proximal end retouch on the dorsal edges only slightly restricts the butt. There are traces of what may be damage rather than use on both lateral edges; 63×29mm.

Dual-platformed core (02 22/8/1933). Water-rolled, heavily patinated orange-brown, large; 93×77mm.
Flint pebble. Water-rolled.
Flint flake. Small; 26×17mm.
Flint piece. Elongated, triangular-sectioned portion of what may have been a core edge; 76×27mm.
Flint piece. Triangular-sectioned and triangular-shaped piece of relatively fresh flint, with two areas where several small flakes have been removed; 77×42mm.
Flint pieces. Three probably naturally fractured pieces of flint resembling flakes.

1933: Below 02

Retouched piece. Unpatinated, grey, slightly water-rolled tabular piece of flint, steeply retouched around the edges of one half of the artefact with a shallow steeply retouched notch on the other half; 80×62mm.

1933: Deeper below 02

Flint flake fragment. Fragment of blunt flake that retains a concretion containing charcoal fragments; 43×31mm.
Flint flake fragment. 21×30mm.
Flint blade fragment? Possible portion of flint blade; 43×14mm.
Flint pebble fragments. Two portions of water-rolled pebbles.

1933: Level 9ft and 10 ft deep in charcoal, near alcove with flints and young pig Level 9ft

Flake. Patinated brown flake retaining an area of cortex; 50×37mm.
Flake. Very fresh, grey, slightly irregular flake with a small thin platform. It retains a small shallow retouched concavity on the inverse left distal edge.
Flint object. Broken portion of tabular flint object that retains two very flat, smooth surfaces and numerous remnants of flake scars around the edge. Most of the flake scars are rounded and smoothed. The two flat surfaces may have been deliberately created; 36×57×16mm.

Level 10ft

Flake. Thin platform, retains area of fresh cortex; 48×22mm.
Flake. Struck from outer surface of nodule; 30×43mm.
Flake. Struck from outer surface of nodule, with fresh cortex on platform; 37×52mm.
Flake. Irregular point platform; 38×35mm.
Flake. Large smooth platform; 30×30mm.
Flake. Cortex-covered platform; 42×30mm.
Flake. Large smooth platform; 37×31mm.
Flake. Fresh, cortex-covered platform. Very similar to a hollow scraper blank and would not be out of place in a Neolithic assemblage. However, the putative hollow is a creation of flake removal rather than being created afterwards. Also, there is no retouch on lateral edges; 40×45mm.

1933: Level below 9ft, in clay, above charcoal, near alcove

Debitage. Seven pieces of debitage; max. lengths < 20mm.
Burnt flint. Six burnt fragments.
Possible exhausted core fragment.
Possible small core fragment.
Four small flint flakes and fragments.
Flake fragment? Possible large flake fragment or portion of a core.
Step flake. Smooth platform; 18×40mm.
Step flake. Struck from outer surface of nodule; 27×41mm.
Step flake. Large, struck from outer surface of nodule; 35×58mm.
Cortical flake. Slightly weathered, struck from outer surface of nodule; 48×70mm.
Cortical flake. Weathered cortex and smooth platform; 65×37mm.
Cortical flake. Beach cortex, irregular point platform; 31×40mm.

1933: Level deep layer 18/4/1933

Burnt flint. Three burnt flake fragments.

1934: Level OX

Flakes. Four small flint flakes, relatively fresh though patina varies; max. <30mm.
Laminar flake. Fresh, unpatinated; 56×25mm.
Flake. Irregular crude blade-like flake, possibly struck from outer surface of nodule; 48×28mm.
Step flake. Large differentially patinated, yellow on dorsal surface and reddish brown on ventral face; 59×36mm.
Flint pebbles/fragments. Six water-rolled natural fragments or pebbles of flint.

1934: Layer A

Grinding/polishing stone ('with flints marked A'). Grit or sandstone coarse stone object, retaining a smooth flat surface. Has been chipped and bruised along both lateral edges and round one end; this appears to have happened at a later date; 149×64×30mm.
Miscellaneous fragments. Nodule fragments and fractured pieces of flint.
Nodule. Broken, slightly weathered, patinated mottled brown and yellow flaked nodule.
Core or core tool fragment? 51mm.
Flake. Small fresh flake with smooth platform; 27×16mm.
Flake. Relatively thin almost trapezoidal flake, with smooth platform, retaining fresh cortex; 41×37mm.

1934: Deep in Layer B in shaft

Quartz nodule. Pink quartz nodule from which several small flakes have been removed.
Cortical flake. Fresh unpatinated cortical flake, burnt, smooth platform; 47×30mm.
Flake. Fresh unpatinated thin flake with cortex-covered platform; 53×47mm.
Flake. Small thin unpatinated flake with thin platform; 16×30mm.
Flake fragment. Fresh unpatinated; max. 32mm.
Flake fragment. Broken unpatinated fresh flake; max. 52mm.
Flake fragment. Lime green, water-rolled flake fragment; max. 35mm.
Flint pieces. Four fractured pieces of flint and a piece of debitage.

1934: Layer C

Nodule. Small, water-rolled.
Core. Fresh, unpatinated irregular core.
Flake. Fresh, unpatinated with smooth platform; 37×35mm.
Flake. Fresh, unpatinated with large smooth platform; 45×46mm.

Flake. Fresh, unpatinated ventral face, dorsal slightly patinated, probably struck from slightly older artefact; 28×60mm.
Blade or flake fragment. Proximal end of blade or flake with large smooth platform; 35×40mm.
Flake fragment. Fresh, unpatinated; max. 33mm.

1934: Layer D

Nodule fragment. Appears to be part of a core, slight green patina; max. 39mm.
Flake fragment. Burnt, unpatinated and fresh; max. 31mm.
Flake fragment. Slightly weathered and patinated mid portion of flake; max. 31mm.

1934: Layer D deep in shaft

Flake. Fresh, unpatinated thin flake with no platform; 42×40mm.
Flake. Fresh, unpatinated thick flake with large smooth platform; 30×53mm.
Flake. Small, relatively fresh, no platform; 25×33mm.
Flake. Patinated greenish brown; weathered almost lustred surfaces on a large flake with a point platform. May be proximal portion of a much larger flake. Retains several flake scars on right lateral edge distal, while on left edge several flake scars have been truncated by the ventral surface; 37×63×18mm.
Three flint nodules or fragments.

1934: 03

Flake or core fragment. Patinated grey, relatively fresh portion of large flake or core. Retains one possible ventral surface and several elongated laminar flake scars; 55×36×21mm.
Dual-platformed core. Made on a large water-rolled nodule. Removals have been taken from two directions on the one surface which, although unpatinated, is slightly water smoothed. Some slightly older removals also present. Much of the nodule remains – it could not be described as an exhausted core; 61×58×51mm.

1936: Layer OX

Nodule fragment.
Flint piece. Water-rolled, flat, almost discoidal piece of flint. Flake scars around edge are more likely a product of nature rather than retouch
Flake. Fresh, unpatinated, thin flake retaining some areas of fresh cortex on dorsal face. Retains a smooth platform; 64×40mm.
Flake fragment. Fresh, unpatinated flake fragment; max. 26mm.

6. Antrim, Templastragh td., Portbraddan Cave

May (1943) recorded that 72 flint artefacts were recovered during his 1930s excavations in Portbraddan Cave, but comparatively fewer were eventually acquired by the Ulster Museum in the 1970s. It seems likely that much of the material originally recovered was considered natural: 'Many of these were uninteresting and only 18 are worthy of description' (*ibid*., 55). The four items illustrated in May's figure 11 (*ibid*., 55) (Fig. 3.2) can no longer be located and are described here based on the original descriptions and illustration. Nine of the ten pieces illustrated in his figure 12 (*ibid*., 57) (Fig. 3.2), however, were available for analysis.
The Portbraddan Cave lithics are marked *PB* but a number of other pieces are in the same tray in the Ulster Museum. These include two small naturally rolled flint pebbles marked PB, and seven pieces that are usually marked with a single measurement; of these, only three are struck:

- A small, orange-brown blade, with a marked platform; 39mm.
- A thin fresh flint flake, marked '*3' 1/1/36*'; 52mm in diameter. This is likely to be the piece referred to as a discoidal scraper (May 1943, 56).
- Fresh, leaf-shaped flake with part of right lateral edge broken; 57mm.

The same tray also contains five lithics but these are in such good condition that it is unlikely they came from Portbraddan Cave but must have been inadvertently added to the tray. These five items include a water-rolled flake and relatively large blades in varying condition. One has been turned into a narrow end of blade scraper

The lithics from Portbraddan Cave suggest a pre-Bronze Age date, though it is not clear whether this is Neolithic or Late Mesolithic. No other unequivocal evidence, such as diagnostic Neolithic pottery or flint tools, was recovered from the site. While some of the lithics are natural, and others are in a weathered condition, there is a small group of fresh material (May 1943, figs. 12.1, 12.5, 12.8, 12.9 and possibly 12.6 as well as flake *3' 1/1/36*). Of course, they may not all relate to the same period or activity. However, three (May 1943, figs. 12.1, 12.8, 12.9) comprise blades of various sizes. Large blades with large smooth platforms are often assumed to be of Late Mesolithic date but they can also be found in the Neolithic. While 12.8 could be regarded as a Late Mesolithic backed knife, it is also retouched in a manner that would be similar to some pieces found in the Neolithic Tullynahinnion hoard (Woodman *et al*. 2006, 211–215). On balance, it is more likely that the Portbraddan material dates to the Neolithic.

The basal deposit, Layer A, is associated with a beach and must be relatively early. The overlying Layer B and possibly Layer C pre-date the early medieval occupation of the cave. Only the heavily water-rolled core (May 1943, fig. 12.2) that appears to be Late Mesolithic, and one large irregular undiagnostic flake, were found in Layer B. The group of fresh lithics referred to above were recovered from the early medieval strata, Layers D–F. One fresh piece, as with the Boat Cave butt-trimmed form (see above), might suggest an inadvertent inclusion at a later date, or perhaps even a deliberate placement of an ancient object in early historic times, but this is an unlikely explanation for a small assemblage.

Blade (Fig. 3.2.1) ('6636'). Small thin blade, patinated grey-coloured. Possible signs of use or damage on both lateral edges, smooth striking platform (Layer F); 43×22mm.

Single platformed core (Fig. 3.2.2). Heavily water-rolled, patinated brown, flat (Layer B); 68×58mm.

Flint piece (Fig. 3.2.3). Tabular piece of flint, heavily water-rolled, may show traces of having been worked (layer not recorded); 53×16mm.

Laminar flake (Fig. 3.2.4). Patinated brown-coloured, slightly weathered. Through differential patina it shows signs of damage (Layer E); 48×20mm.

Large flint flake (Fig. 3.2.5). Broken, irregular, very fresh (Layer D); 89×63mm.

Flint piece (Fig. 3.2.6). Retouched, triangular, large irregular piece of flint that may originally have been a large flake, patinated and slightly weathered. Thought by May to have been worked to a beaked point, but this may be fortuitous. One face has been extensively retouched from both edges (Layer D); 88×32mm.

Nodule (Fig. 3.2.7). Fractured portion of nodule, mostly retaining a mottled blue and white patina, triangular shape. Probably not a humanly made object; 63×44mm.

Blade (Fig. 3.2.8). Fresh retouched flint blade with a large smooth striking platform and in remarkably good condition. Relatively steep retouch along left lateral edge, retouched to a slight concavity across the distal end (top of Layer D); 70×32mm.

Blade (Fig. 3.2.9). A large parallel-sided blade that removed the distal cortical end of the nodule from which it was struck. Patinated grey and relatively fresh. It retains a large smooth platform and the cortex at the distal end suggests that it was struck from a core based on a beach rolled nodule of flint. Slight traces of a light series of serrations suggesting usage (Layer E); 93×37mm.

Flint piece (Fig. 3.2.10). Missing.

Chopper-like object (Fig. 3.2.11). Relatively fresh condition, may have been an irregular core (Layer C). Missing.

Chopper-like object (Fig. 3.2.12). May have comprised a core, ochreous patina (Layer C). Missing.

Chopper-like object (Fig. 3.2.13). Patinated brown-coloured (Layer C). Missing.

Flake (Fig. 3.2.14). Large, almost triangular-shaped flake of grey flint (Layer B). Missing.

7. Antrim, White Park td., Park Cave

One lithic survives from the 1933 excavations in this cave; it could be Late Mesolithic or Neolithic in date. It was found near the cave entrance at a depth of 4ft (1.22m), in approximately the same level as pottery sherds and animal bone (Jackson 1933a).

Flint blade. Slightly angled blade with remnants of a large striking platform, grey in colour, possibly very slightly weathered. Proximal right lateral edge appears to have snapped off, but distal portion has inverse peripheral retouch; 83×28mm.

8. Clare, Edenvale td., the Catacombs

Four flint scrapers (Fig. 3.3) were recovered during excavations in the Catacombs in 1902 and 1903 (Scharff *et al*. 1906). Three of the scrapers (1907:17, 19, 20) are all in the same condition and more patinated than the fourth (1907:18). It is not clear whether they belong to one event. The smallest (1907:18) is similar to scrapers associated with some Beaker assemblages, but the others could date to the Neolithic, including the Grooved Ware phase of the Late Neolithic. This might be suggested for the relatively large size, but very invasive retouch that has sometimes been associated with parts of the Bronze Age (see Woodman *et al*. 2006, 156–161).

End scraper (1907:17). Small convex end scraper, patinated white, made on a primary cortical flake. It is possibly from a remaniée pebble. Retouched on proximal end of the flake thus removing the striking platform. The retouch is quite invasive and extends from the proximal end down the right lateral edge; 27×22×7mm.

End scraper (1907:20). Convex end scraper, patinated white, made on a primary cortical flake. It was struck from a water smoothed pebble, possibly of remaniée origin. Retouch is more invasive than on the other scrapers in this assemblage. This is especially evident on the distal edge. Retouch also extends down the left lateral edge; 37×27×12mm.

End scraper (1907:18). Convex end scraper, patinated grey, made on a primary cortical flake retaining water-rolled cortex. The convex retouched edge is created by quite invasive retouch on the distal edge extending for a short distance along the left lateral edge; 49×31×11mm.

End scraper (1907:19). Very small, patinated white, convex end scraper. It has extensive, quite invasive, retouch over the dorsal surface. Although it is slightly elongated and heart-shaped, it is very reminiscent of the small domed scrapers often associated with Beaker assemblages; 22×17×9mm.

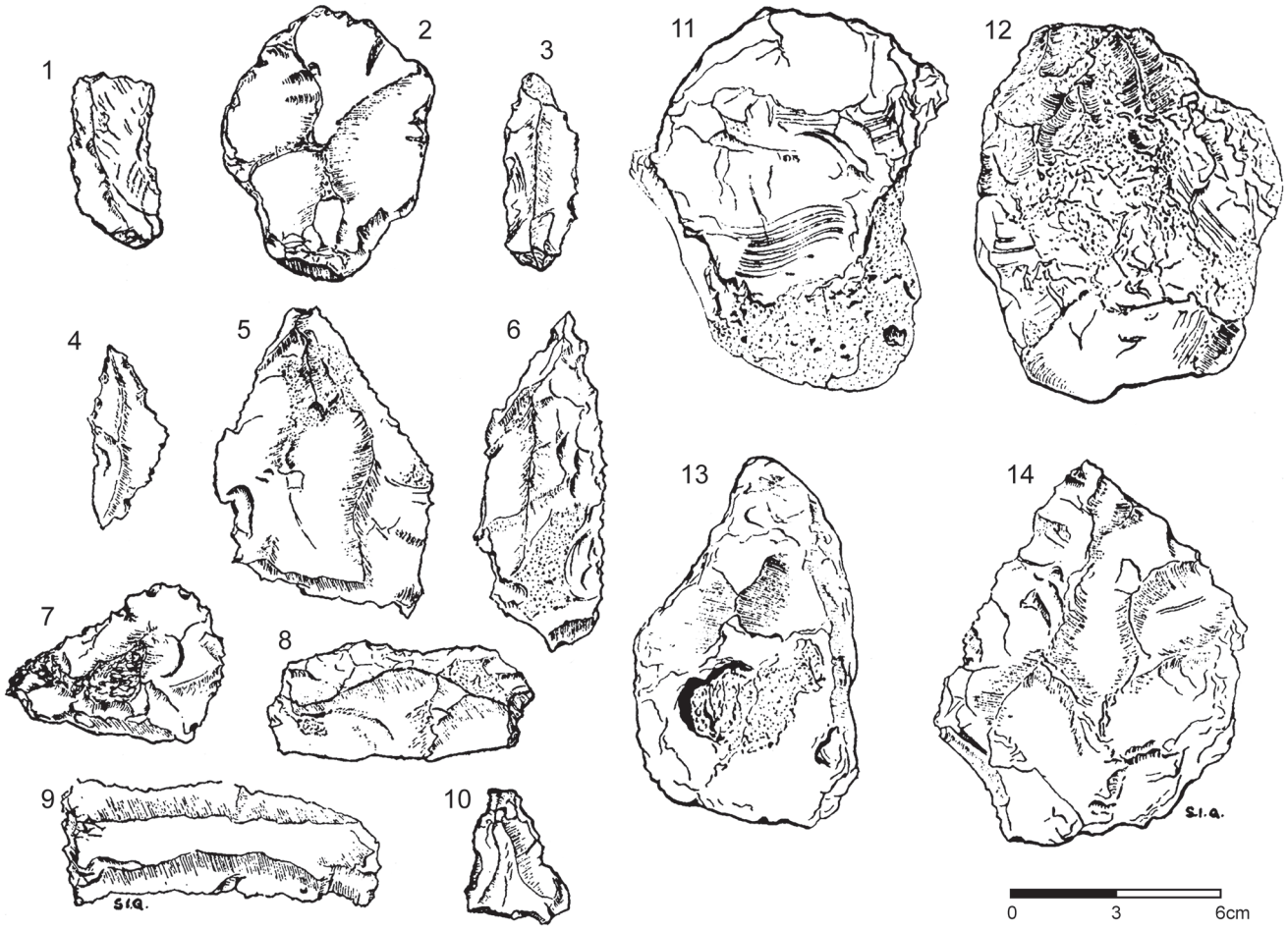

Figure 3.2 Assemblage of 14 lithics from Portbraddan Cave (May 1943, figs. 11 and 12).

9. Cork, Carrigagour td., Carrigagour Cave 1

Six lithics were recovered from Carrigagour Cave 1 during excavations *c*. 1881 (Fig. 3.4) (Ussher 1886, 366–367, pl. I). The material was kept together with Ussher's finds from Carrigmurrish Cave, Co. Waterford. While the six items described here probably all originated from Carrigagour Cave 1, this is not absolutely certain. The assemblage displays a range of conditions and may not necessarily belong to one event. Two blades (1906:342–343) are reminiscent of those associated with the Early Mesolithic. Similarly, blade (1906:341) could be of similar age as it was struck from a good quality blade core.

Blade (1906:341) (Fig. 3.4; Ussher 1886, pl. I.1). Relatively fresh, grey irregular blade with some recent damage on left lateral edge. Retains a small striking platform but shows little signs of platform edge retouch; 64×24mm.

Blade (1906:342) (Fig. 3.4; Ussher 1886, pl. I.2). Small, weathered and almost water-rolled blade with blue grey patina. Traces of light sporadic retouch or damage to lateral edges. Retains a small striking platform showing signs of platform edge preparation; 37×13mm.

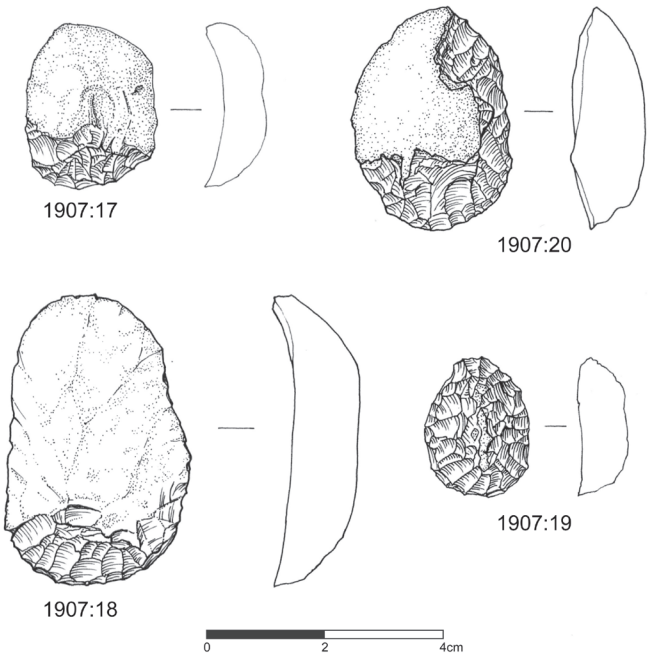

Figure 3.3 Four flint convex scrapers (1907:17, 1907:20, 1907:18, 1907:19) from the Catacombs (Dowd 2015, 109).

Blade (1906:343) (Fig. 3.4; Ussher 1886, pl. I.3). Small slightly patinated grey blade. Small platform and platform edge preparation; 35×16mm.

Flake (1906:344). Retouched flake showing signs of burning. It is of a black glossy flint that seems to have been struck from a large blade nodule and retains some water-rolled cortex. On the dorsal face it has steep irregular retouch along both edges and around the distal end. Some flat irregular retouch on left ventral surface; 54×27×17mm.

Flake (1906:345). Weathered patinated brown, primary flake with water-rolled cortex; 25×33mm.

Flake (1906:346). Portion of a large, flat, patinated but relatively fresh flake retaining some water smoothed cortex. Two small crudely made notches on broken edge; 54×41×14mm.

10. Cork, Connaberry td., Foley Cave

Two flint implements (Pls. 16 and 17) were recovered from 'superficial layers' during excavations in Foley Cave in 1938 and 1940 (Gwynn *et al*. 1942). Given that virtually no flint occurs naturally in this part of the Blackwater valley and Awbeg River, these are remarkably large pieces. One must presume they were brought into the area from elsewhere. As noted below, the cortex is of a character noted on other artefacts from the area. While some individual large flakes have been recovered during excavations in parts of Munster, these would usually be associated with larger lithic assemblages where small pieces were also recovered. While it would be tempting to associate these two pieces with the lower levels containing fauna that mostly dates to before the Last Glacial Maximum, the absence of any artefacts from the lower levels suggests that the two found at a higher level are later in date. In this case, given their size and the fact that they are not associated with any large assemblage, and although they could not be regarded as classic Late Mesolithic artefacts, it would seem on balance of probability that they are Late Mesolithic. As was observed by Woodman (1989), there is an absence of Late Mesolithic material from the Blackwater River valley in general, but to some extent this lacuna may be a by-product of the lack of drainage of the river and the lack of removal of quaternary deposits from the valley floodplain.

Blade-like flake (2011:268). Patinated blue and white, in a weathered condition. Small area of cortex on the distal end, typical of the type found on other flint artefacts from the Blackwater Valley. It retains a tiny striking platform that is at its maximum less than 2mm thick x 8mm wide. It is relatively parallel-sided with a small fracture on the proximal left lateral edge reducing the width at the butt. It shows little sign of water-rolling and the lateral edges remain relatively sharp; 53×27mm.

Distal portion of large blade or flake (2011:269). Modern break that must have occurred during excavation, but left lateral edge was broken in antiquity. It has a blue-white patina and is relatively unweathered. The surviving right lateral edge retains an area of slightly weathered cortex. Seems to be the surviving remains of a quite large blade or flake; 35×30mm.

11. Cork, Park North td. (Imokilly By.), Park North Cave

A flint artefact was recovered during excavations in 1942 (Coleman 1942). It cannot be located at present but was described and illustrated at the time of discovery (Fig. 3.5). It appears to comprise a small domed flint scraper. It is not entirely clear if it has been retouched around most of its circumference, but from the drawing and the fact that it has been described as hemispherical, it appears to be of a type that is usually found in Beaker assemblages (Woodman *et al*. 2006, 159).

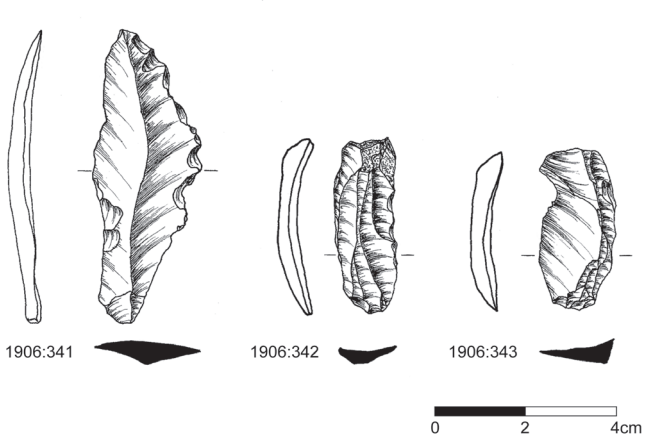

Figure 3.4 Three flint blades (1906:341, 1906:342, 1906:343) from Carrigagour Cave 1 (Dowd 2015, 89).

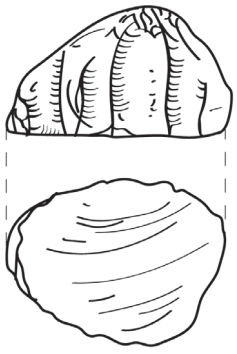

Figure 3.5 Flint scraper from Park North Cave, now lost (Coleman 1942, fig. 4.15).

12. Dublin, Quay td., unidentified cave at Portrane

Four of the five pieces of flint discovered in a cave at Portrane in the 1930s are heavily water-rolled and typical of material found close to beaches on the Leinster coast (Fig. 3.6). They are almost certainly in a secondary context; all the evidence indicates they were picked up by the sea, which heavily abraded and rolled them before redepositing them. It is impossible to date the assemblage but it could be of Neolithic or Bronze Age date, though given that one piece (1946:433) is fresher than the others, they are not all necessarily of the same date

Flake (1946:433). Weathered patinated greenish-brown, lopsided trapezoidal shape, with a water-rolled cortex-covered striking platform; appears to have some sporadic retouch on left lateral edge; 29×36mm.

Undiagnostic flake fragment (1946:434). Patinated heavily water-rolled; 30×29mm.

Flake fragment (1946:435). Heavily water-rolled, patinated white; 26×20mm.

Flake fragment? (1946:436). Possible fragment of water-rolled flake; max. 28mm.

Flake fragment (1946:437). Large flake fragment, heavily water-rolled, battered, patinated white, retaining some possible flake scars on left lateral edge; 59×35mm.

13. Fermanagh, Sheehinny td., Knockninny Cave

Two lithics were recovered from this cave during excavations in 1875. They cannot be located at present but were illustrated in the published report (Fig. 3.7). Plunkett (1876, 332) remarked: 'I found no human or animal remains in the gravel

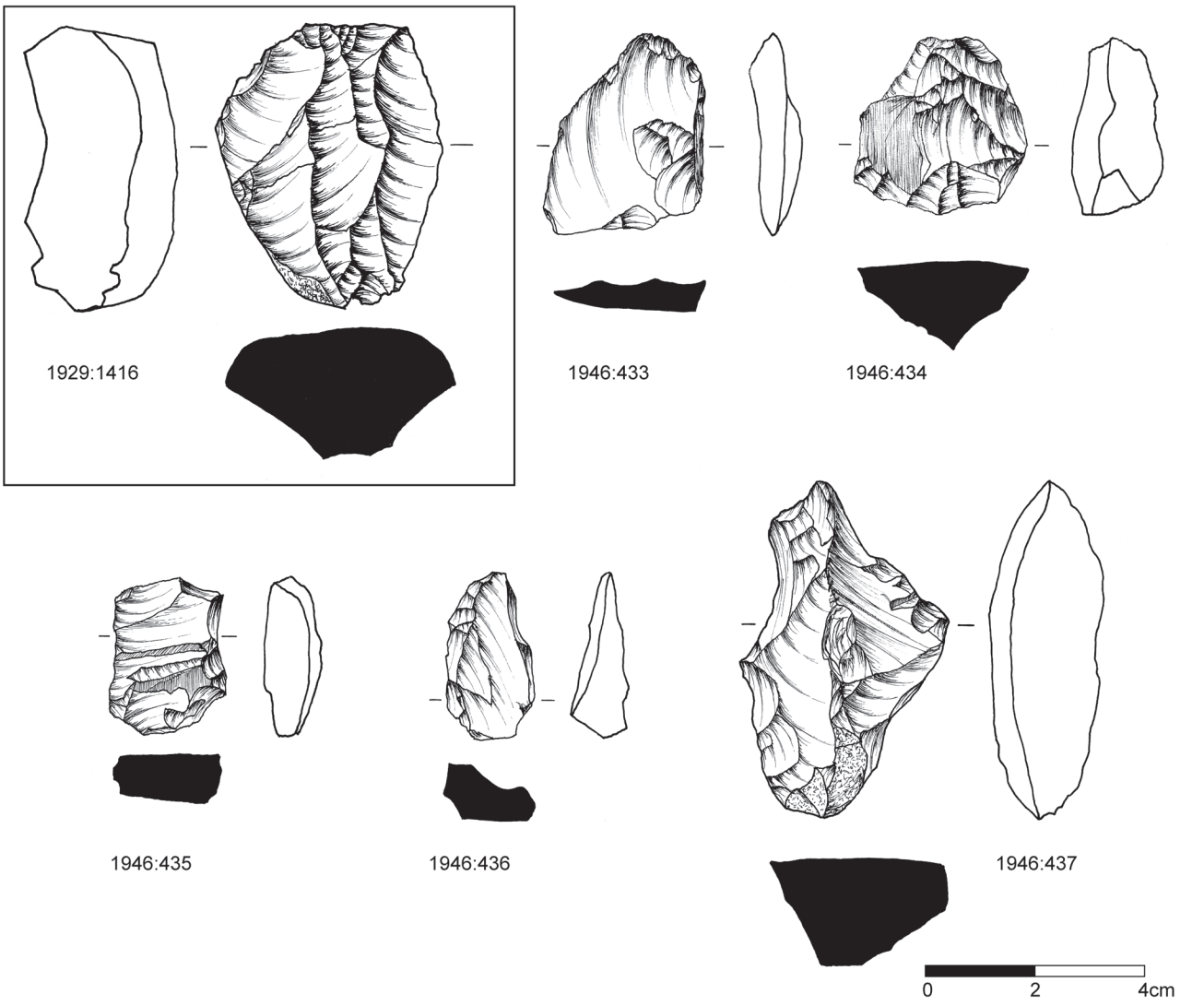

Figure 3.6 Single-platformed core (1929:1416) from Dunbur Rockshelter. Flint flake (1946:433) and four flake fragments (1946:434, 1946:435, 1946:436, 1946:437) from unidentified cave at Portrane (Dowd 2015, 159).

but embedded in the sandy clay on the surface I picked up two rude flint implements of Palaeolithic type, one of them was of a jet black colour, the other a dusky brown. Each measured about 3 inches [7.6cm] in length. I submitted the black flint to the Rev. Dr Haughton who pronounced it Lydian stone'. A later account recorded: 'In the gravel, embedded in the sandy clay, were found the two flint implements about 3 inches long, here delineated from a drawing by Mr Wakeman. None of the material from which the flint flakes were manufactured is found in Fermanagh' (Plunkett 1875/7, 470). The second description suggests that the artefacts were manufactured from either chert or a related material that may have derived from the Carboniferous rocks in the area. The term 'Lydian' was often used in the nineteenth century to describe what was recognised as a black stone that differed from flint, and was not necessarily chert. For example, Evans (1868) uses the term to refer to an axe of black stone. The dusky brown colour of the Knockninny implement leaves open the possibility that it was made from a rock of carboniferous origin rather than cretaceous flint.

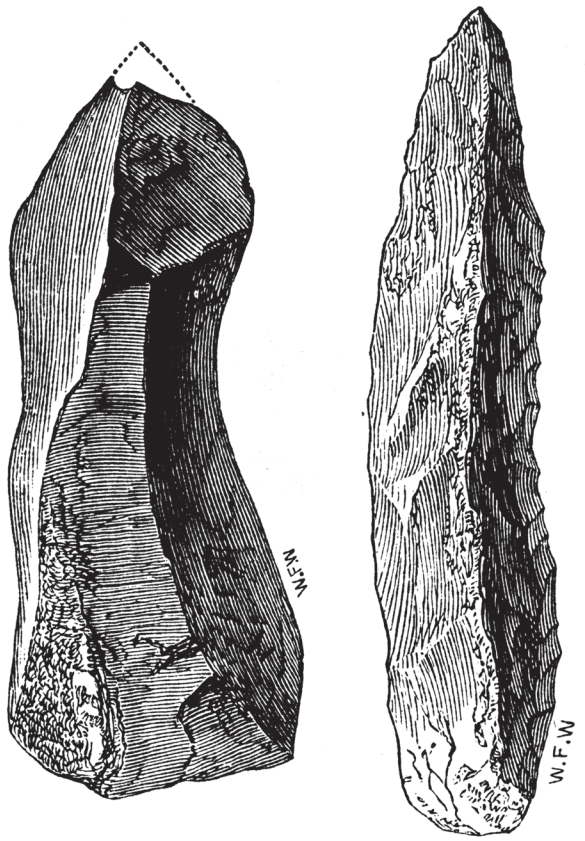

Figure 3.7 Blade and flake from Knockninny Cave, now missing (Plunkett 1875/7, 470).

It is probable that the Knockninny blade and flake date to the Neolithic. Large blades are occasionally found on Neolithic sites, and in particular in court tombs and, therefore, the blade should not necessarily be considered Late Mesolithic. The retouched flake is rather more enigmatic. Although the illustration does not allow it to be assigned to a particular period or to categorise it with certainty, it seems more likely that it dates to the Neolithic. It is difficult to ascribe this object, especially if it is a flake, to the Mesolithic. The retouch, which seems to be semi-invasive, is more typical of the Neolithic. Overall, the two pieces certainly pre-date the Bronze Age. While there is a slight chance that they are Late Mesolithic, on balance they are more likely to be Neolithic. This issue can only be resolved if the two artefacts are rediscovered.

Blade. A broad flint blade, distal tip missing. Breadth/length ratio is almost 3:1, though it is possible from the illustration and the manner in which it has been shaded that the left lateral edge has been broken. There appears to have been a small area of cortex or original surface on the left side near the proximal end.

Flake. A narrower artefact whose breadth/length ratio is more than 4:1, presumably a retouched flake that comes to a point at the distal end. Unfortunately, there is no section drawing but the shading suggests a strong ridge running longitudinally down the middle of the piece. It is also apparent that this had been retouched on the dorsal face – possibly semi-invasive retouch along the right lateral edge, with the original concavities left by bulbs of percussion still evident. It may be that the facets on the left lateral edge have been truncated.

14. Kerry, Cloghermore td., Cloghermore Cave

Cloghermore Cave is best known for its ritual and burial activities of early medieval and Viking date (Connolly *et al*. 2005). However, a range of lithics were also recovered during excavations. Besides the items listed below were several pieces of chert, quartz and rock crystal. These are likely to have occurred locally within the bedrock or till and, especially the rock crystal, may have been brought to the cave with the intention of use. The scrapers both came from soil around the capstones that sealed the entrance shaft, while the chert nodule came from the base of the entrance shaft (*ibid*., 195). It is likely that all three were in secondary contexts and had been dug up in early historic times with material that was used to seal the entrance. Apart from one flake (99E0431:037), the remaining pieces probably belong – at the earliest – to the later part of the Bronze Age; and the strike-a-lights may be later again, probably relating to historic activities. Also significant is the recovery of a stone axe fragment from the cave (*ibid*., 129).

Flint scraper? (99E0431:006). Made on a split pebble; 34×17×7mm.

Chert scraper? (99E0431:012). Triangular piece of chert with a hollow that may have been created; 25×20mm.

Nodule (99E0431:021). Struck chert nodule from which two flakes have been removed; 55×53×20mm.

Flake (99E0431:037). Small rock crystal flake (unlikely to be a microlith); 8×6mm. From fill of posthole outside cave.

Worked chert? (99E0431:211). Possible piece of worked chert; 51×45mm.

Rock crystal fragment (99E0431:065). Possibly worked; 12×9mm.

Strike-a-light? (99E0431:144). Flint flake that may have been used as a strike-a-light. Probably early medieval / Viking-age (Michael Connolly pers. comm.); 32×30mm.

Strike-a-light? (99E0431:192). Piece of flint that may have been used as a strike-a-light. Found outside cave; 38×25mm.

15. Limerick, Annagh td., Annagh Cave

Four lithics were found associated with Neolithic burials in Annagh Cave in 1992 (Fig. 3.8) (Ó Floinn 2011). A leaf-shaped arrowhead and an invasively retouched piece are very typical of assemblages that date to the earlier half of the Neolithic. While invasively retouched pieces are not as instantly recognisable as the more distinctive plano-convex forms, they are a regular occurrence in Neolithic assemblages. One blade (E47:14) appears to be an accidentally created spall that is in a different condition to the rest of the material. A second small blade (E47:13) is rather more enigmatic and cannot be ascribed with absolute certainty to one particular period. While it could occur in the earlier half of the Mesolithic, small blades of similar size also occur in some Neolithic assemblages. However, these blades are less likely to have the platform edge preparation seen here. Although the fact it is in a similar condition to the other items suggests that it could be of Neolithic date, the method of percussion and the Mesolithic date of the single bear bone from Annagh Cave may indicate that there was some residual material in the cave that pre-dated the Neolithic. Thus, this item could belong to the earlier half of the Mesolithic.

Leaf-shaped arrowhead (E47:12). Small patinated white flint leaf-shaped arrowhead in relatively fresh condition. The extreme proximal end has been broken off while the distal tip is slightly rounded rather than coming to an acute point. Both faces have been worked overall with invasive, presumably pressure, flaking. However, both faces also retain small raised areas, which the pressure flaking has been unable to remove; 28×17×3mm.

Invasively retouched piece (E47:11). Made on a patinated white large flat and thin flint flake in relatively fresh

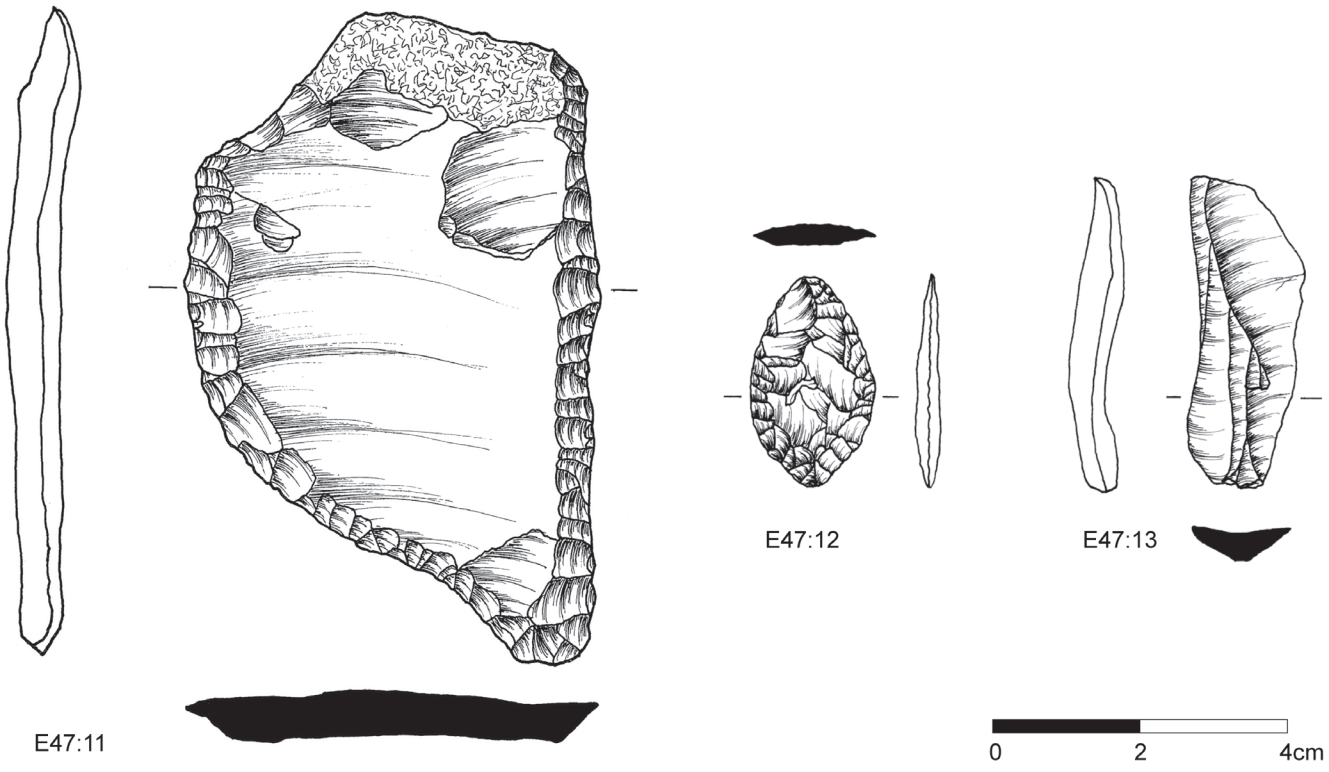

Figure 3.8 Invasively retouched piece of flint (E47:11), leaf-shaped arrowhead (E47:12) and blade (E47:13) from Annagh Cave (Illustration: Malgorzata Kryczka).

condition. Left distal edge has been broken off. Both lateral edges have semi-invasive retouch extending in general only about 5mm from the edge. Right lateral edge is retouched to a straight line, while the left edge is both curved and retouched in a manner that helps create a short tang. Residue of striking platform still present. Possible that some of the striations on the cortex have been deliberately created. The presence of the tang creates a piece that resembles the usually narrower plano-convex forms; 88×52×5mm.

Blade (E47:13). Small flint blade, distal tip missing. Patinated white and quite fresh, though some signs of slight damage on left lateral edge. Small platform shows two signs of attempted removals and has evidence of platform edge preparation; 42×15×4mm.

Blade (E47:14). Small fresh unpatinated rather irregular piece that might have been considered as a blade where the striking platform is missing. It is made from a glossy blue-black flint or chert. The surviving presumed proximal end is a more coarse grained material that may have either been an impurity or the edge of the original nodule or slab. The main broad ventral surface is quite flat and lacks any ripples, suggesting it has been struck off. A more probable explanation for this piece is that it is an accidentally fractured edge with the other narrow flat ventral surface being the remnant of the surface on which the blow that spalled off this piece happened. This would explain the small almost trapezoidal flake scar that originates from the same edge.

16. Limerick, Killuragh td., Killuragh Cave

The lithic assemblage from Killuragh Cave spans the Mesolithic, Neolithic and Bronze Age. Careful examination of many of the deposits, as well as sieving, did not reveal any debitage or evidence for on-site knapping. Given the different years and methods of discovery, it is difficult to be certain where all these artefacts originally occurred. However, the discovery of some pieces in the main entrance fissure leading into the cave, and the variation in condition (i.e. fresh and weathered and patinated pieces), suggest that some material may have been placed outside or close to the entrance (Woodman and Dowd forthcoming).

Aside from the hollow scrapers (Fig. 3.9), the chert scraper and the tip of a large blade-like flake, the rest of the assemblage is likely to be of Early Mesolithic date. The most notable element is the group of eight microliths (Pl. 19). These complete or near complete microliths could be classified as simple oblique forms, which often had retouch on an adjacent lateral edge. They tend to be small and/or quite slender. None could be described as scalene triangles or needle points. Of course it is possible that the microliths represent little more than one or two composite tools. Later periods are represented by a much smaller number of artefacts. It is impossible to attribute a period to the stone axe though it is probably Mesolithic. The large blade-like flake is also likely to be Late Mesolithic. The two hollow scrapers are Neolithic and the chert scraper may belong to the Early Bronze Age.

Microlith. Proximal end of a microlith patinated white and relatively fresh. Retouched on right lateral edge, and is either a portion of a rod or a scalene triangle; 20×6mm.

Microlith. Patinated white, made with oblique retouch on distal end of a small blade; 23×7mm.

Microlith. Patinated white, obliquely retouched microlith made on proximal end of a small blade. Also retouched along one lateral edge; 24×8mm.

Microlith. Lightly patinated and grey in colour. A small obliquely retouched microlith made on the distal end of a blade fragment. Has a small area of retouch to form a point; 29×8mm.

Microlith. Patinated white and made on the medial portion of a blade. Some oblique retouch across surviving proximal end; 30×7mm.

Microlith? Distal portion of a small blade that may have been part of a microlith; 14×6mm.

Microlith. Fresh unpatinated condition, with both extremities missing. Made on a narrow blade with oblique retouch across the proximal end; 28×7mm.

Microlith. Patinated white relatively thick microlith. It is an oblique point created by retouch across distal edge and some possible retouch on proximal right lateral edge; 25×9mm.

Microlith. Slightly weathered and patinated white microlith made on a narrow blade. Has been retouched across proximal edge to form an acute angled point; 29×5mm.

Hollow scraper (Fig. 3.9). Heavily patinated a dark grey black over most of both faces leaving just the left lateral edge with a lighter blue patina. The left lateral edge is broken in places while most of the surviving portion of the edge is covered in relatively fresh cortex. Also retains a large smooth striking platform. The hollow, which lies at the right side of the distal edge, is quite deep and is formed by what appears to be a worn denticulated edge. The hollow is 22mm across × 11mm deep. To the left, on the remaining distal edge, is a small slightly concave serrated edge; 43×36mm.

Hollow scraper (Fig. 3.9). Patinated blue and white, and relatively weathered. Striking platform missing. Surviving portion is trapezoidal in outline. On both lateral edges near the tips of the horns, especially on the right lateral edge, there are areas of steep peripheral retouch. The extreme tip of the right horn is missing. The hollow is quite deep: 23mm across × 11mm deep; 37×38mm.

Convex scraper. Small chert convex end scraper. Almost circular in shape, and made with flat invasive retouch on the right distal and lateral edge. This may have also

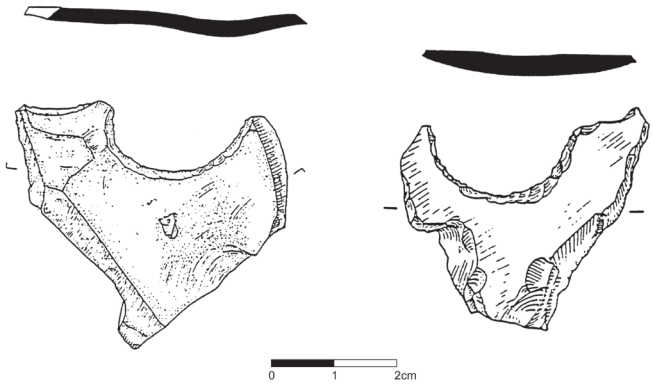

Figure 3.9 Two flint hollow scrapers from Killuragh Cave (Dowd 2015, 109).

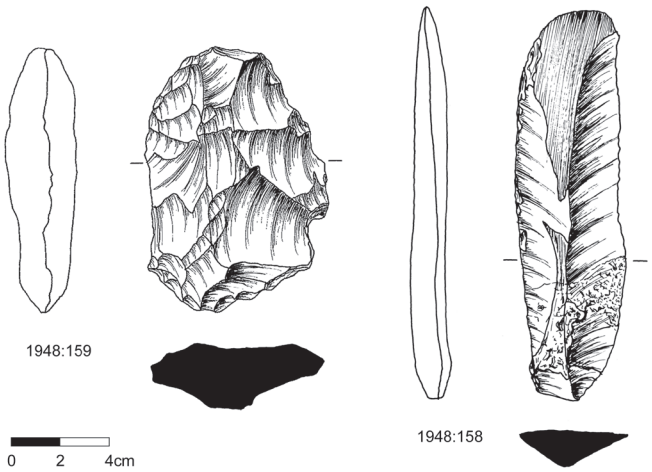

Figure 3.10 Mesolithic flake axe fragment (1948:159) and Neolithic flint blade (1948:158) from Brothers' Cave (Dowd 2015, 91; Illustration: Malgorzata Kryczka).

extended to the left edge but that edge had been damaged. This form would seem to be typical of the earlier half of the Bronze Age; 21×21mm.

Stone axe. A portion of a ground or polished stone axe of coarse stone. Only one half survives. It has been fractured longitudinally and much of the original surface is missing. The area of what would have been the blade retains a damaged original surface. It is impossible to be certain of its age, but as it seems to be dissimilar to those found at Lough Gur it may be of Mesolithic date. The surviving lateral edge is formed by a flat surface; 103×34×19mm.

Distal tip of large blade or flake. A broken specimen patinated blue white and weathered. There are two breaks, one of which is across the middle of the original piece and another along the left lateral edge; also some damage on right edge. It is difficult to establish size of original artefact, but could have had a maximum length of 80mm; 40×29mm.

Blade. Small blade patinated white and weathered. Has an extensively prepared platform edge and limited slight irregular retouch on the right proximal lateral edge; 29×9mm.

Blade. Distal portion of small cream/white blade with small area of light retouch on ventral face; 17×7mm.

Blade. Patinated grey white, quite fresh flint blade. Portion of distal tip missing and some damage on lateral edges. Some platform edge preparation on a small striking platform; 47×13mm.

Blade. Relatively fresh creamy white patinated blade. Retains platform edge preparation on a small platform; 53×16mm.

Flake. Unpatinated small flint flake; max. <20mm.

Flake. Small unpatinated flint flake; max. 7mm.

Flake. Broken small flint flake.

17. Waterford, Ballygambon Lower td., Brothers' Cave

Two lithics (Fig. 3.10; Pl. 18) survive from the antiquarian excavations conducted in Brothers' Cave between 1906 and 1913 (Forsayeth 1931; Dowd and Corlett 2002). The blade (1948:158), with traces of a polished surface illustrating its manufacture from a broken polished stone axe, is highly suggestive of a Neolithic date. It seems more likely that the possible flake axe fragment (1948:159) was introduced into the cave; it has been subjected to extensive rolling typical of a marine or a rough water river environment.

Flake axe fragment (1948:159). A heavily rolled patinated brown portion of a bifacially worked flint flake. The dorsal surface has been flaked from both lateral edges while flaking on the ventral surface is less extensive. The nature of the retouch, the overall shape of the flake (even in its present condition), and the presence of a portion of a distinct flat facet adjacent to the broader edge, suggest that this is a heavily rolled surviving fragment of an Early Mesolithic flake axe which is in a secondary location; 53×36×14mm.

Blade (1948:158). Slightly patinated and weathered elongated flint blade retaining an area of highly polished surface on left distal side. The fact that there appears to be some striations suggests that it was a deliberately polished surface. A tiny area of polishing survives at the proximal end adjacent to a medium-sized smoothed platform. The left distal edge has some flat invasive retouch. There appears to be traces of use along the right lateral edge; 78×21×7mm.

18. Waterford, Bridgequarter td., (Decies without Drum By.), Oonaglour Cave

Seven lithics were recovered during antiquarian excavations in Oonaglour Cave between 1907 and 1913 (Forsayeth 1931; Dowd and Corlett 2002). The four remaniée pebbles were found on the same day and, therefore, may have been found together. The most outstanding object is a core (Fig. 3.11), which could either belong to the earlier half of the Mesolithic or the Neolithic.

Core (1948:111). Small semi-cylindrical single-platformed blade core retaining an area of cortex over approximately 40% of the circumference. The cortex shows extensive chattering suggesting that it was made on a beach pebble. One portion of the core's surface is more weathered and smoothed, suggesting that for a significant time it lay exposed to water or some form of natural erosion; 40×31×22mm.

Chunk (1948:112). Small naturally fractured chunk of cherty flint-like material, which may have, on one corner, been slightly altered to form a small awl-like point; 34×27×15mm.

Chunk (1948:113). Naturally fractured irregular sub-rectangular piece of cherty limestone. Some slight notching on an original edge is likely to be natural; 51×30×14mm.

Remaniée pebble (1948:114). Small rounded remaniée pebble, irregular in shape and highly smoothed; max. 22mm.

Remaniée pebble (1948:115). Small rounded remaniée pebble, flattened disc shape, highly polished surface; max. 19mm.

Remaniée pebble (1948:116). Small rounded remaniée pebble, approaching a spheroid shape, reddish in colour and less polished than the three others; max. 12mm.

Remaniée pebble (1948:117). Small rounded remaniée pebble, slightly globular, highly polished, grey-green colour; max. 15mm.

17/18. Waterford, 'Whitechurch Cave' (either Brothers' Cave or Oonaglour Cave)

Broken flake (1948:275). Unpatinated broken flake, possibly from a remaniée pebble, retaining a highly smoothed dorsal surface. While one edge has been retouched steeply like a scraper, this may have been the fractured half of a D-shaped gun flint, as the surviving straight edge – which is quite thin, as on gun flints – has extensive damage along the surviving length; 22×23×10mm.

19. Waterford, Kilgreany td., Kilgreany Cave

Both the 1928 and 1934 excavations at Kilgreany Cave produced lithics – nine pieces from the earlier excavation and 25 from the subsequent investigations (Figs. 3.12 and 3.13) (Tratman 1929; Movius 1935). Unfortunately (and unusually for one of Movius' excavations), much of lithic assemblage does not come with contextual information, i.e. the layer and the area within the cave from where artefacts were recovered, though some efforts have been made to address this issue (Dowd 2002).

The two most notable artefacts in the assemblage are a hollow scraper (K27) and a possible rock crystal core (K70). The former is a classic example of a hollow scraper (Woodman, Finlay and Anderson 2006, 163–166) made on a broad flat quite thin flake with the hollow created on the distal edge opposed to the striking platform (Fig. 3.12). Its condition – patinated a deep white colour – is not unusual in cave contexts (see the Catacombs above). However, few other artefacts from Kilgreany Cave are patinated this colour. Hollow scrapers in the strict sense are confined to the Neolithic, though it seems unlikely that they were in use during the earliest centuries of that period. Their apparent absence in Munster may have, in the past, reflected an absence of excavations of early Neolithic sites. The quartz crystal (Pl. 20) has a regularity that suggests it may have been created as a personal ornament rather than functioning as a core. While rock crystal items have been recovered

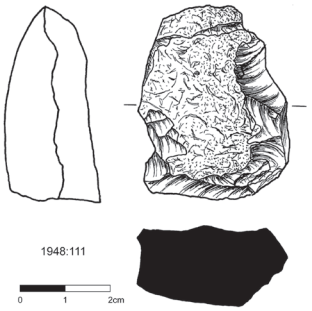

Figure 3.11 Mesolithic or Neolithic core (1948:111) from Oonaglour Cave (Dowd 2015, 91).

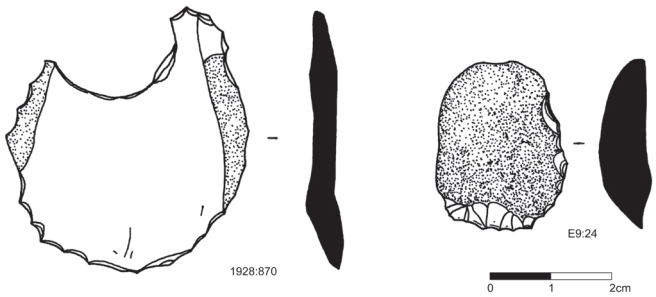

Figure 3.12 Hollow scraper (1928:870) and convex scraper (E9:24) from Kilgreany Cave (Dowd 2002, 84, 86).

from ritual contexts, this particular example is of exceptional size. The other portions of quartz crystal from Kilgreany are rather more fragmentary (Pl. 20).

With few notable exceptions, in particular the hollow scraper (K27) and the broken blade (E9:10), the Kilgreany assemblage consists of artefacts that derive from small pebbles of either remaniée or beach pebble origin. The variation in condition from fresh through to highly patinated or weathered may be a reflection of the degree of disturbance of the stratification rather that an indication of different phases of activity. The absence of a significant blade element would suggest that the assemblage predominantly post-dates the Neolithic. The main characteristic seems to be the small size of the items. Only six of the 25 pieces from the 1934 assemblage exceed 30mm in maximum dimension. However, examples that had a maximum dimension of less than 20mm were even rarer. This could either indicate that in an era that predated systematic attempts at recovery of finer elements, smaller objects were not retrieved. However, Movius was a very meticulous excavator and so it is possible that their absence may be genuine. It might suggest that relatively little flint knapping took place on the site, or that at the very least it was so simple that it did not generate extensive knapping debris.

At one level, the Kilgreany Cave assemblage could be described as a bipolar technology. However, while some possible fractured portions of bipolar cores were recovered, most of the complete examples (e.g. E9:42, E9:43, E9:45) were little more than simple split pebbles from which, on occasions, some small flakes had been removed. In this case, as on E9:45, the flakes were only removed from one end. No classic examples exist where flakes were removed simultaneously from both ends and both faces with an anvil technique.

The few retouched tools include four small peripherally retouched flakes that have been made into small, in some cases quite crude, convex end scrapers. They ranged from 21–27mm in length. E9:23 is a rather enigmatic triangular sectioned piece, while E9:25 seems to be one of the few items that might have been made on a large blade or flake. It is difficult to be certain of its function but it may have been a portion of a fabricator or an unfinished slug knife – both of which are typical of the Bronze Age. This object, as well as the hollow scraper and the rather weathered blade fragment (E9:26), may be the only objects to have been imported in their finished form into the cave.

Most of the assemblage could be part of a limited number of expedient flint working episodes that took place in the cave. The simplicity of the assemblage, including the very simple small scrapers, suggests that the material belongs to the middle or the later parts of the Bronze Age.

Hollow scraper (K27/1928:870) (Fig. 3.12). Patinated and slightly weathered flint hollow scraper. A classic form with a deep well-formed hollow. The cortex along the two lateral edges is only slightly weathered. A curvilinear proximal end made by retouch from both the dorsal and ventral surfaces; this is a common form of retouch with hollow scrapers; 42.9×38.9×11.1mm.

Convex scraper (E9:38) (Fig. 3.13). Portion of a bipolar core that has had a small area of retouch to turn it into a small convex end scraper. In rather weathered condition; 21×15×6mm.

Convex scraper (E9:39) (Fig. 3.13). A small broken fresh flake that may have initially been a primary cortical flake. It has some peripheral retouch to turn it into a small almost keel-shaped convex end scraper; 27×17×10mm.

Convex scraper (E9:24) (Fig. 3.12). Small fresh convex end scraper made on a split pebble with steep peripheral retouch across the distal end and along the left lateral edge; 27×21×8mm.

Convex scraper (E9:30). Small convex end scraper made with steep retouch on a small flake. Retains cortex on its platform and left lateral edge; 27×24×7mm.

Retouched blade fragment (E9:25) (Fig. 3.13). Distal portion of a large blade made with grey flint that has become slightly weathered. It has been worked with steep retouch along the left edge and to some extent on the opposite edge. In both cases the retouch is on the dorsal face and is used to create a robust point; 27×15×7mm.

Retouched fragment flint (E9:40) (Fig. 3.13). Small piece of weathered flint with steep retouch on one edge; 18×12mm.

Rock crystal core (K70) (Fig. 3.13; Pl. 20). Magnificent, almost dual-platformed, but more properly described as globular, core made from rock crystal. Numerous small bladelets have been removed. The final core may be a remnant of a much larger crystal as is shown from the four original flat facets that give an indication of its width. It is of such regularity that the intention may have been to create the existing shape rather than use it as a source of raw material; 31×28×20mm.

Quartz crystal (E9:101) (Pl. 20). Broken end of a quartz crystal with no evidence of human alteration. The original crystal facets are all still intact; 39×27×13mm.

Quartz crystal worked (E9:102) (Pl. 20). Small fragment of a quartz crystal where some of original facets still survive. Several small flakes have been removed from different facets all working across the same fractured surface; 23×19×14mm.

Bipolar core (K10). Patinated white slightly weathered small unifacial bipolar core made on a small remaniée pebble; 29×13×6mm.

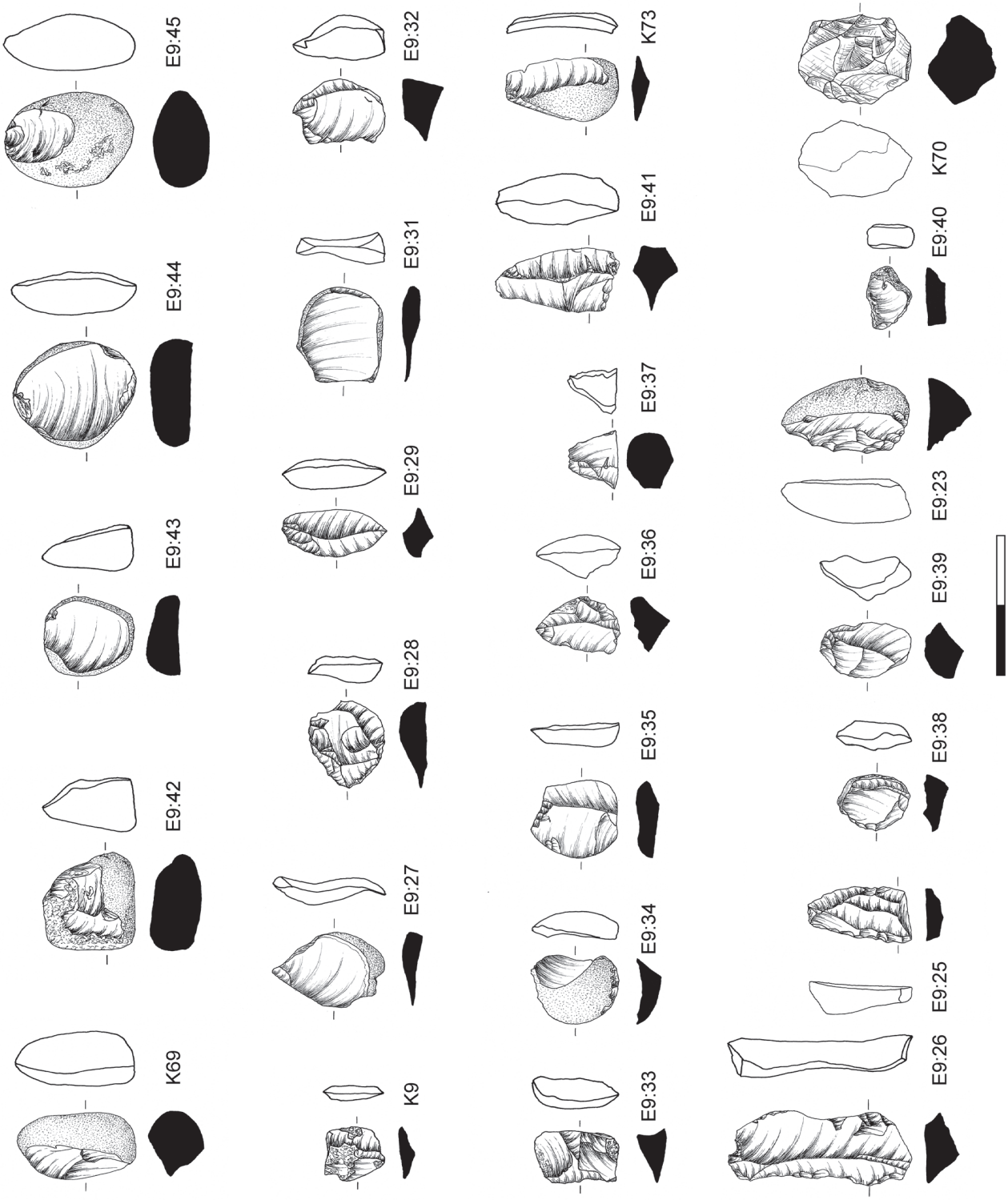

Figure 3.13 Bronze Age lithics and rock crystal of unknown date from Kilgreany Cave (Dowd 2015, 133).

Bipolar core fragment (E9:23) (Fig. 3.13). Triangular sectioned portion of a bipolar core heavily retouched along one edge to create a triangular segment shape; 38×21×12mm.

Bipolar core fragment (E9:29) (Fig. 3.13). A patinated greenish brown and weathered portion of a bipolar core; 30×15mm.

Bipolar core fragment (E9:33) (Fig. 3.13). Slightly weathered patinated light brown flake that is a portion of a bipolar core; 26×18mm.

Bipolar core fragment (E9:36) (Fig. 3.13). Triangular portion of a bipolar core patinated a light brown colour; 25×15mm.

Bipolar core fragment (E9:41) (Fig. 3.13). Patinated brown slightly weathered portion of a bipolar core; 46×18mm.

Bipolar core fragment? (E9:32) (Fig. 3.13). A patinated white flake that would appear to be a portion of a bipolar core.

Split pebble (E9:42) (Fig. 3.13). Small roughly tabular pebble that has been used in an expedient manner to remove several small flakes. The original cortex cover has been used as the striking platform; 27×28mm.

Split pebble (K69) (Fig. 3.13). A small remaniée pebble with flakes removed from one end.

Split pebble (E9:43) (Fig. 3.13). A split remaniée pebble in fresh condition; 37×29mm.

Split pebble (E9:44) (Fig. 3.13). Weathered patinated creamy yellow split pebble where flakes have been removed from both ends on one face; 37×29mm.

Split pebble (E9:45) (Fig. 3.13). A small remaniée pebble with two flakes removed from one end.

Remaniée pebble fragment (E9:37) (Fig. 3.13). Fragment of a remaniée pebble retaining a small area of the original surface. While it looks like a miniature core, the occasional small stepped facets are more likely to be created by chance; 14×16mm.

Primary flake (K21). A fresh primary cortical flake, patinated blue-grey with water-smoothed cortex; 32×25mm.

Primary flake (K73) (Fig. 3.13). Small patinated beige partial cortical flake struck from a water-rolled or remaniée pebble; 32×19mm.

Primary flake (E9:34) (Fig. 3.13). Slightly weathered primary cortical flake struck from a remaniée pebble; 25×17mm.

Flake (E9:31) (Fig. 3.13). Small flake patinated a whitish colour with cortex on its lateral edges and platform; 27×27mm.

Flake (E9:28) (Fig. 3.13). Small grey slightly weathered flake worked in a bipolar manner; 21×21mm.

Flake (E9:35) (Fig. 3.13). A patinated light brown and weathered flake struck from a remaniée pebble that shows some signs of being flaked from both proximal and dorsal ends; 22×22mm.

Flake fragment (K9) (Fig. 3.13). Small unpatinated and fresh portion of a flint flake; 25×14mm.

Broken flake (K28). Proximal end of a patinated blade-like flake. Break may be recent as it is not patinated; 20×31mm.

Broken flake (K43). Broken small flake patinated creamy white; has been struck from water-rolled pebble.

Broken flake (E9:27) (Fig. 3.13). A fresh grey slightly broken flake where part of the distal edge is missing. Retains some cortex on its striking platform and on one lateral edge; 22×26mm.

Broken blade (E9:26) (Fig. 3.13). Fragment of a crude blade that is in a lustred or slightly water-rolled condition. It retains a large smooth striking platform. It would appear that the blade was broken in recent times as the fractured surface is unpatinated and unweathered; 50×21mm.

20. Wicklow, Dunbur Head td., Dunbur Rockshelter

This assemblage of flint artefacts, though a significant portion is slightly patinated, is largely in relatively fresh condition. Several are burnt, most notably a core (1929:1416) (Fig. 3.6). However, this should be taken as evidence that a fire was lit rather than that the site was extensively settled. In essence, this assemblage could be described as a simple flake industry that made use of locally available beach pebbles. Where cortex occurred, it usually showed signs of beach-chattering or water smoothing. In spite of the presence of one good blade core, there were only two blades within the assemblage.

Unusually, for assemblages from the Leinster coast, there was little evidence of either a bipolar core technology or even the presence of significant numbers of split pebbles. Instead, there are a number of simple platformed cores, usually worked in an expedient manner. Among the large number of complete or fragmentary flakes, it is noticeable that in a significant number of instances the platforms retain cortex. Approximately 40% of the flakes are primary cortical flakes, many of which are thick and of almost hemispherical shape, and look as if they were removed from the end of flint nodules to form platforms. No retouched tools were present. In contrast, at Kilgreany Cave a technology relying on limited access to flint concentrated on bipolar and split pebble technologies is evident, and where at least a limited number of retouched tools occurred. In the case of Dunbar Rockshelter, the assemblage has more the appearance of industrial debris discard with the finished products moved elsewhere. From the simplicity of the assemblage and its expedient nature, this assemblage probably dates to the Bronze Age.

Pebble (1929:1414). Small elongated pebble of water-smoothed, beach-chattered, cherty flint. One flake removed from a narrow pointed end; 58×26×18mm.

Pebble (1929:1417). A heavily burnt portion of a beach pebble, which may have been split in two leaving the one flake scar patinated white, with extensive crazing from burning; 42×30×28mm.

Pebble fragment (1929:1423). Burnt fractured portion of a small beach pebble that appears to retain one tiny portion of a flake scar; 28×37×25mm.

Pebble fragment (1929:1424). Fractured portion of a beach pebble retaining part of one flake scar; 49×32×17mm.

Pebble fragment (1929:1425). Patinated grey portion of a beach pebble that appears to have been used in its final phase as an attempted bipolar core. Traces of intense damage on either end; 47×32×30mm.

Pebble fragment (1929:1432). Fractured piece of beach pebble; 40×21×12mm.

Worked pebble (1929:1471). Portion of a beach pebble showing signs of removals; max. 38mm.

Pebble/nodule (1929:1415). A halved pebble, or the cap removal from a nodule of water-rolled beach-chattered flint. The flat ventral surface has had flakes removed from opposing ends. The flaked surface is unpatinated and grey in colour; 42×39×23mm.

Nodule (1929:1411). Flint nodule, globular in shape, mostly covered in water-rolled beach-chattered cortex. One edge showing flake scars struck off alternately; these are all quite weathered and patinated brown; 70×70mm.

Nodule (1929:1412). Small tabular flint nodule with water-rolled cortex and patinated brown, probably unworked; 51×44×29mm.

Nodule (1929:1413). Small ovoid flint nodule covered in water-rolled beach-chattered cortex.

Core (1929:1416) (Fig. 3.6). A burnt pink single-platformed core made on a beach pebble. The core is knapped for about 50% of its circumference; 48×36×24mm.

Core (1929:1418). A flat dual-platformed core that resembles a large bipolar core. It may originally have been a primary cortical flake of reddish pink flint, struck from a beach pebble. It has been flaked from both ends on both surfaces, in each case leaving no trace of a platform but rather a thin edge reminiscent of bipolar working, but in this case on a much larger scale and with no indication of the use of an anvil; 52×42×23mm.

Core (1929:1419). A flat platformed core that may have been made from a thick primary cortical flake struck from a beach pebble. Although at present it appears like a uniplane single-platformed core, there are signs of flakes that have been removed from two other directions.

Core (1929:1422). Small simple flat single-platformed core made on a small beach pebble of flint in a fresh unpatinated condition; 31×37×18mm.

Core (1929:1459). Small irregular core of multi-platformed type, possibly made on a large flake fragment, fresh and unpatinated; 28×33×27mm.

Core fragment? (1929:1448). Patinated grey, possible lateral portion of a bipolar core; 33×17×13mm.

Core fragment (1929:1460). Small relatively fresh multi-platformed core fragment; 31×34×24mm.

Primary flake (1929:1420). Thick primary decortical hemispherical flake struck from a beach pebble. Ventral surface unpatinated; 40×32×19mm.

Primary flake (1929:1421). Thick primary decortical hemispherical flake struck from a beach pebble flake. The ventral surface patinated a light grey colour; 38×30×19mm.

Primary flake? (1929:1426). Flake, patinated light grey; may have been a primary decortical flake from a beach pebble. As it shows intense damage at either end, it seems to have been worked in a bipolar fashion; 41×30×19mm.

Primary flake (1929:1427). Hemispherical unpatinated primary cortical flake that has been used on one face as a bipolar core; 38×26×16mm.

Primary flake (1929:1430). Hemispherical primary cortical flake, grey in colour. Struck from outer surface of nodule; 39×29×18mm.

Primary flake (1929:1431). Primary cortical flake still retaining beach-chattered cortex. The original ventral surface has been worked from both ends removing all platform traces as in the bipolar technique; 42×35×15mm.

Primary flake (1929:1434). Small slightly patinated cortical flake struck from beach pebble surface; 31×30×12mm.

Primary flake (1929:1435). Primary cortical flake struck from a beach pebble with a large irregular platform; 36×36×11mm.

Primary flake (1929:1437). Fractured portion of hemispherical primary cortical flake; 45×26×19mm.

Primary flake (1929:1438). Thin primary cortical flake with brown and reddish patina, struck from beach pebble surface; 39×27×7mm.

Primary flake (1929:1440). Small lightly patinated primary cortical flake struck from a beach pebble; 29×20×8mm.

Primary flake (1929:1441). Small lightly patinated primary cortical flake struck from a beach pebble with collapsed platform; 37×20×9mm.

Primary flake (1929:1450). Small primary decortical flake struck from the surface of a beach pebble; 21×23×9mm.

Primary flake (1929:1455). Fresh unpatinated primary cortical flake; 34×23×8mm.

Primary flake (1929:1461). Small fresh primary cortical flake struck from cortical surface; 26×21×11mm.

Primary flake (1929:1463). Small slightly weathered primary cortical flake; 17×23×6mm.

Primary flake (1929:1491). Heavily burnt primary cortical flake retaining beach cortex, retains large smooth striking platform; 30×26×13mm.

Primary flake (1929:1492). Primary cortical flake in fresh condition; retains beach cortex; 36×23×11mm.

Broken primary flake (1929:1457). Broken primary cortical flake with mottled patina and retaining beach cortex; 29×32×12mm.

Broken primary flake (1929:1467). Broken primary cortical flake struck from beach pebble; 43×23×12mm.

Primary flake fragment (1929:1433). Broken primary cortical flake whose left distal end is missing. Unpatinated and made from a beach pebble; 50×32×16mm.

Primary flake fragment (1929:1449). Fragment from primary cortical flake; 29×18mm.

Primary flake fragment (1929:1469). Small portion of primary cortical flake retaining beach cortex; max. 19mm.

Blade (1929:1439). Slightly weathered and patinated blade of irregular form, retaining small area of cortex on left lateral edge and an irregular point platform; 38×17×6mm.

Blade fragment (1929:1490). Distal portion of a fresh but patinated flint blade; 33×15×7mm.

Flake (1929:1436). Small irregular flake retaining some beach cortex and smooth, relatively large platform; 28×27×15mm.

Flake (1929:1442). Small slightly patinated flake; 30×17×8mm.

Flake (1929:1443). Step flake with striking platform missing; 21×40×9mm.

Flake (1929:1444). Small flake with cortex-covered platform in very fresh condition; 26×31×5mm.

Flake (1929:1445). Small step flake with cortex-covered platform. Left lateral edge broken; 17×26×5mm.

Flake (1929:1446). Small flake in slightly weathered condition, light grey patina with distal end missing. Retains a small point platform; 17×17×4mm.

Flake (1929:1447). Grey relatively fresh step flake with beach-chattered cortex on right lateral edge. No platform evident; 35×35×12mm.

Flake (1929:1451). Slightly weathered and patinated light green flake. Slightly damaged with two attempted points of percussion at the striking platform; 42×31×6mm.

Flake (1929:1452). Heavily burnt white flake with part of distal edge missing. Cortex-covered striking platform; 28×36×8mm.

Flake (1929:1456). Slightly weathered step flake retaining some cortex on platform; 30×29×6mm.

Flake (1929:1462). Small step flake in relatively fresh condition with cortex-covered platform; 17×20×7mm.

Flake (1929:1465). Small relatively fresh flake with collapsed platform; 26×24×10mm.

Flake (1929:1466). Small partial cortical flake struck from beach pebble. It retains a point platform; 27×24×11mm.

Flake (1929:1472). Small relatively fresh flake retaining some beach cortex at distal end with collapsed striking platform; 30×24×9mm.

Flake (1929:1473). Small portion of a weathered and patinated flint flake; max. 30mm.

Flake (1929:1474). Small distal portion of a weathered flake retaining water-smoothed outer surface; max. 27mm.

Flake (1929:1475). Small relatively fresh unpatinated flake with point platform; 21×28×6mm.

Flake (1929:1476). Small portion of a flint flake, slightly patinated; max. 24mm.

Flake (1929:1480). Small relatively fresh unpatinated step flake with a cortex-covered platform; 23×30×6mm.

Flake (1929:1481). Small slightly weathered flake with point platform; 23×18×5mm.

Flake (1929:1486). Small slightly weathered flake with a point striking platform and retaining some corte×; 23×20×6mm.

Flake (1929:1458). Small relatively fresh unpatinated flake struck from the surface of a nodule; 27×29×7mm.

Flake fragment (1929:1478). Broken portion of what was probably a cortical flake; 37mm.

Flake fragment (1929:1453). Fragment of heavily burnt flake; 33mm.

Flake fragment (1929:1464). Small broken flake fragment with cortex-covered platform; max. 27mm.

Flake fragment (1929:1468). Portion of a small flake that has been burnt; max. 31mm.

Flake fragment (1929:1484). Small portion of flint flake; 17mm.

Flake fragment (1929:1485). Small portion of a cortical-covered flake; 18mm.

Flake fragment (1929:1487). Distal portion of a small flint flake; 14mm.

Flake fragment (1929:1488). Broken portion of primary cortical flake in fresh condition; 30mm.

Flake fragment (1929:1489). Weathered and possibly slightly burnt portion of flint flake; 26mm.

Broken flake (1929:1428). Slightly weathered almost triangular-shaped flake retaining an area of water-rolled cortex. Striking platform is missing; 51×32×18mm.

Broken flake (1929:1429). Half an unpatinated flake retaining water-rolled cortex on the right lateral edge; 40×29×14mm.

Broken flake (1929:1454). Broken flake with distal end missing and with large striking platform. In relatively fresh condition with some beach cortex on left lateral edge and retaining a large striking platform; 32×30×10mm.

Flint fragment (1929:1470). Fractured piece of flint possibly struck from beach pebble; max. 46mm.

Flint fragment (1929:1479). Small weathered and fractured piece of flint; 27mm.

Struck flint (1929:1482). Small fresh unpatinated piece of struck flint; 29mm.

Quartz fragment (1929:1477). Small piece of quartz; 26mm.

Quartz fragment (1929:1483). Small piece of quartz; 22mm.

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4

Neolithic and Bronze Age pottery from Irish caves

Helen Roche

Prehistoric pottery assemblages from ten caves were examined consisting of 400 sherds and 63 crumbs, representing an estimated 65 vessels, and including four complete or almost complete vessels. The distribution of sites is diverse with five caves located in the south-east of the country in Co. Waterford, three in the west in counties Limerick and Clare, and two in the north in counties Antrim and Fermanagh (Table 4.1). The results produced an interesting range demonstrating that most of the sites were in episodic use for a considerable length of time during prehistory, ranging from the Early Neolithic to the Late Bronze Age (*c*. 3900–800 BC). Four caves produced Early Neolithic (*c*. 3900–3500 BC) carinated bowl sherds: Annagh Cave, Brothers' Cave, Oonaglour Cave and Kilgreany Cave. Middle Neolithic globular bowls (*c*. 3500–2800 BC) were present at Annagh Cave, Brothers' Cave and Kilgreany Cave. Brothers' Cave and Oonaglour Cave produced sherds of Beaker pottery (*c*. 2450–2300 BC). Four sites – Oweyberne Cave 3, Knockninny Cave, Killuragh Cave and Brothers' Cave – produced Early Bronze Age sherds (*c*. 2200–1600 BC). Just one site, Oweyberne Cave 3, contained Middle Bronze Age sherds (*c*. 1600–1100 BC) and six sites produced Late Bronze Age sherds (*c*. 1100–800 BC): Glencurran Cave, Killuragh Cave, Ballynamintra Cave, Brothers' Cave, Carrigmurrish Cave and Kilgreany Cave (Tables 4.1 and 4.2).

Brothers' Cave had the most varied assemblage containing pottery from all phases of prehistory except for the Middle Bronze Age. Three cave sites had sherds from just one prehistoric phase; Knockninny only contained Early Bronze Age sherds while Glencurran, Ballynamintra and Carrigmurrish only produced Late Bronze Age sherds. Indisputable evidence for burial was found at Knockninny, Kilgreany and Annagh in the form of a cist burial, extended inhumations and crouched burials respectively, and despite the presence of human bone from the majority of these caves, it seems likely not all were funerary in nature. Despite the presence of carbonised residue on many of the vessels, the large number of animal bones found, and the occurrence in some caves of stakeholes and hearths, it is more probable that the pottery vessels were not part of usual domestic activity but reflect ritual events.

1. Early Neolithic carinated bowls (*c*. 3900–3500 BC)

Forty-three sherds representing ten Early Neolithic carinated bowls were identified from Annagh Cave, Brothers' Cave, Kilgreany Cave and Oonaglour Cave. These four caves also produced sherds from later prehistoric periods. Although just one sherd was identified from both Brothers' Cave and Oonaglour Cave, representing two bowls, good examples representing seven bowls were found at Kilgreany Cave and a fine rim sherd from Annagh Cave represented a single bowl (Table 4.2).

The ten carinated round-bottomed bowls represent the earliest form of Neolithic pottery (Case 1961: 'Dunmurry-Ballymarlagh styles'; Sheridan 1995: 'classic' carinated bowls). This vessel type consists of a hemispherical bowl above which there is a distinct shoulder or carination, a generally curved neck and a simple, often slightly out-turned, rounded, pointed or flat rim. The fabric of the ten vessels under discussion here varies in quality but is mainly hard and compact, sometimes with a slightly brittle texture. The fabric is orange-grey to brown-orange in colour and ranges in thickness from 4.4mm to 10.9mm. Many sherds show evidence for weathering with inclusions occasionally protruding; however, smooth surfaces occur and evidence for burnishing is present on all vessels. The inclusions

Table 4.1 Overview of prehistoric pottery from Irish caves.

County, townland and cave name	*No. vessels*	*Early Neolithic c.3500-2800 BC*	*Middle Neolithic c.3500–2800 BC*	*Final Neolithic/ Early Bronze Age c.2450-2300 BC*	*Early Bronze Age c.2200-1600 BC*	*Middle Bronze Age c.1600–1100 BC*	*Late Bronze Age c.1100–800 BC*
Antrim Ballygill South td. Oweyberne Cave 3	5				tripartite vase food vessel vase urn	2 domestic urns	
Clare Tullycommon td. Glencurran Cave	4						4 vessels
Fermanagh Sheehinny td. Knockninny Cave	3				cordoned urn vase urn encrusted urn		
Limerick Annagh td. Annagh Cave	5	carinated bowl	bipartite bowl 3 globular bowls				
Limerick Killuragh td. Killuragh Cave	6				3 vase urns		3 vessels
Waterford Ballygambon Lower td. Brothers' Cave	8	carinated bowl	globular bowl	domestic Beaker	cordoned urn		4 vessels
Waterford Ballynamintra Lower td. Ballynamintra Cave	1						1 vessel
Waterford Ballynamintra Middle td. Carrigmurrish Cave	9						9 vessels
Waterford Bridgequarter td. Oonaglour Cave	3	carinated bowl		2 domestic Beakers			
Waterford Kilgreany td. Kilgreany Cave	21	7 carinated bowls	globular bowl				13 vessels
Total	65	10	6	3	10	2	34

are mainly finely crushed calcite, sandstone and quartzite generally less than 5.6mm long. The rim from Annagh Cave was flat and slightly out-turned and was pinched in with fingernail impressions on both exterior and interior surfaces (Fig. 4.1). The rim sherds from Kilgreany Cave were flat and inward sloping, or rounded and out-turned (Fig. 4.2). The surviving shoulder sherds from Oonaglour Cave and Kilgreany Cave were of simple stepped form. Carbonised residue or fire-blackening was present on sherds from Annagh Cave, Kilgreany Cave and Oonaglour Cave, indicating some form of cooking had taken place either in a domestic or ritual context.

Discussion

Similarly rimmed carinated vessels with simple shoulders are found in ever increasing numbers mainly from settlement sites associated with rectangular houses throughout the country (Grogan 2004a). Smaller quantities have been recovered from funerary contexts, in particular court tombs (Herity 1987, 149–152), including the tomb at Ballynamona Lower, Co. Waterford (Powell 1938). In this study the majority of the Early Neolithic sherds were found in the Waterford caves. This adds to the increasing number of this form of pottery, often associated with rectangular houses now known throughout the region, including the Kilmacthomas

Plate 1 Linda Fibiger examining the human bone assemblage from Kilgreany Cave in 2005 as part of the Human Remains from Irish Caves Project *(Dowd* et al*. 2006, 18).*

Plate 2 Neolithic skulls of 'Kilgreany B' and 'Kilgreany A' (Dowd et al*. 2006, 16).*

Plate 3 Human bones encased in calcite from Killavullen Cave 3 (Dowd et al. *2006, 18).*

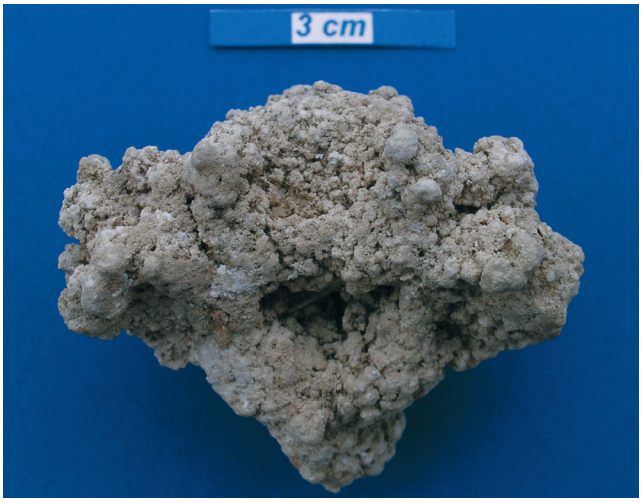

Plate 4 Human cervical vertebra encased in calcite from Killavullen Cave 3 (Linda Fibiger).

Plate 5 Cremated human bones from Kilgreany Cave (Linda Fibiger).

Plate 6 Human vertebra from Kilgreany Cave; the porosity is an indicator of DJD – Degenerative Joint Disease (Linda Fibiger).

Plate 7 Abscess in left maxillary premolar from Kilgreany Cave (Linda Fibiger).

Plate 8 Juvenile or adolescent cranial fragment with peri-mortem sharp force injuries from Kilgreany Cave (Linda Fibiger).

Plate 9 Partially healed injury to left mandibular ramus of 'Kilgreany A' (Linda Fibiger).

Plate 10 Adult 7th cervical vertebrae with spina bifida rachischisis from the Town Hall, Dunmore Cave (Linda G. Lynch).

Plate 11 Dried and cracked human skull fragment with crystalline calcite formation, Dunmore Cave (Linda G. Lynch).

Plate 12 Well-preserved human bones with calcite adhesions from the Crystal Hall, Dunmore Cave (Linda G. Lynch).

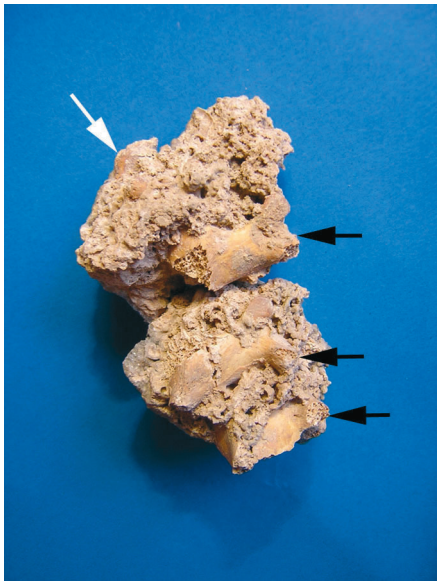

Plate 13 Articulated juvenile vertebra and ribs encased in calcite from 'west side of camel', Dunmore Cave (Linda G. Lynch).

Plate 14 Adult rib articulated and encased in calcite from the Town Hall, Dunmore Cave (Linda G. Lynch).

Plate 15 Juvenile humerus with rodent gnawing from the Town Hall, Dunmore Cave (Linda G. Lynch).

Plate 16 Late Mesolithic? flint flake (2011:268) from Foley Cave (Nigel Monaghan).

Plate 17 Late Mesolithic? flint blade or flake fragment (2011:269) from Foley Cave (Nigel Monaghan).

Plate 18 Neolithic blade (1948:158) and Early Mesolithic flake axe fragment (1948:159) from Brothers' Cave (Marion Dowd).

Plate 19 Early Mesolithic microliths and blade from Killuragh Cave (Dowd 2015, 83; © NMI).

Plate 20 Three quartz crystals (E9:101; K70; E9:102) from Kilgreany Cave (© NMI).

Plate 21 Perforated dog whelk (1948:218), perforated flat periwinkle (1948:219) and six human teeth from Brothers' Cave (© NMI).

Plate 22 Beaker sherd (1948:146+148) from Oonaglour Cave (© NMI).

Plate 23 Early Bronze Age tripartite vase sherd (AE/04/96:07) from Oweyberne Cave 3 (McConkey 2012, 202).

Plate 24 Late Bronze Age rim sherd, vessel 20 (Kp. 24, 95, 96) from Kilgreany Cave (© NMI).

Plate 25 Middle Neolithic globular bowl (92E47:6) from Annagh Cave (© NMI).

Plate 26 Middle Neolithic bipartite bowl (92E47:5) from Annagh Cave (© NMI).

Plate 27 Shale axe (1902:104) from Plunkett Cave and andesite? axe (E969:149) from Ballynamintra Cave (© NMI).

Plate 28 Neolithic porcellanite axe (ISA:013) from Grange Hill Cave (Rhoda Cronin).

Plate 29 Perforated wolf canine (2003:30) from Glencurran Cave (Dowd 2015, 150).

Plate 30 Perforated dog whelk (X2030) from Elderbush Cave (Marion Dowd).

Plate 31 Late Bronze Age/Early Iron Age stone rings (E498:1, 2) from Robber's Den (© National Museums Scotland).

Plate 32 Late Bronze Age hoard (1944:299–303) from Kilmurry Cave (Dowd 2015, 148; © NMI).

Plate 33 Late Bronze Age hoard (K77, K69, K66, E9:71) from Kilgreany Cave (Dowd 2015, 134; © NMI).

Plate 34 Ridge-mount of early medieval house-shaped shrine (E992:15) from Park North Cave (Dara McGrath; © Cork Public Museum).

Plate 35 Early medieval decorative mount (E9:74), possibly from a bell-shrine, from Kilgreany Cave (© NMI).

Plate 36 Viking-age copper alloy annular arm-ring (1907:6) and gold penannular arm-ring (1902:110) from Alice and Gwendoline Cave (Dowd 2015, 193; © NMI).

Plate 37 Viking-age silver hoard (99E0431:61, 66, 72–4) from Cloghermore Cave (Connolly et al. *2005, 135).*

Plate 38 Viking-age coins and ingot fragment (40-49-1983) from Dunmore Cave (Dowd 2015, 203; © NMI).

Plate 39 Six silver woven wire Viking-age buttons (part of 1999:274–289) from Dunmore Cave (Wallace and Ó Floinn 2002, 214; © NMI).

Plate 40 Viking-age glass beads (04E1517:06–11) from Dunmore Cave (Dowd et al. *2007, 13).*

Plate 41 Viking-age glass and bone beads, broken amber ring and iron needle from Dunmore Cave (© NMI).

Plate 42 Viking-age iron axe from Dunmore Cave (© NMI).

Plate 43 Viking-age glass bead necklace from Glencurran Cave (Dowd 2015, 186).

Table 4.2 Vessels and prehistoric pottery groups from Irish caves.

Cave	*Vessel no.*	*Pottery type*	*Rim*	*Base/base angle*	*Shoulder/neck*	*Body*	*Fragments*	*Crumbs*	*Est. rim diam. mm*	*Est. height mm*	*Decoration*	*Weight : grams*	*Total sherds*
Oweyberne 3	1	V/FV	2			1					Yes	48	3
Oweyberne 3	2	?/FV				3	2					35	5
Oweyberne 3	3	VU				1					Yes	17	1
Oweyberne 3	4	MBA	1			3	3				Yes	103	7
Oweyberne 3	5	MBA				5	3					151	8
Glencurran	1	LBA	1	2					250	270		161	3
Glencurran	2	LBA	2			4	24	51				126	30+51 crumbs
Glencurran	3	LBA	1									8	1
Glencurran	4	LBA		1		2	1					72	4
Knockninny	1	CU				9					Yes	1018	10
Knockninny	2	VU				1						55	1
Knockninny	3	EU							372	310	Yes	–	Complete reconstructed
Annagh	1	ENCB	1		1	7	4	12				63	13+12 crumbs
Annagh	2	MN							100	70	Yes	776	Complete
Annagh	3	MNBB									Yes	677	Complete
Annagh	4	MNGB							112	120	Yes	681	Almost complete
Annagh	5	MNGB				1	8					28	9
Killuragh	1	VU	1								Yes	45	1
Killuragh	2	VU		1	1	1	2				Yes	39	5
Killuragh	3	VU	1			2					Yes	11	3
Killuragh	4	LBA	3				8					40	11
Killuragh	5	LBA	1	1			1					40	3
Killuragh	6	LBA	1			5	12					210	18
Brothers'	1	ENCB				1						6	1
Brothers'	2	MNGB	1						236			77	1
Brothers'	3	DB				1						4	1
Brothers'	4	CU				1						34	1
Brothers'	5	LBA	1									34	1
Brothers'	6	LBA	1			1						79	2
Brothers'	7	LBA				1						20	1
Brothers'	8	LBA	1				1					14	2
Ballynamintra	1								226		Yes	57	1
Carrigmurrish	1	LBA	1			29	16		226			1317	46
Carrigmurrish	2	LBA	1	1		4			223			422	6
Carrigmurrish	3	LBA	1						224			78	1
Carrigmurrish	4	LBA		2		3						55	5

(Continued)

Table 4.2 Vessels and prehistoric pottery groups from Irish caves. (Continued)

Cave	*Vessel no.*	*Pottery type*	*Rim*	*Base/base angle*	*Shoulder/neck*	*Body*	*Fragments*	*Crumbs*	*Est. rim diam. mm*	*Est. height mm*	*Decoration*	*Weight : grams*	*Total sherds*
Carrigmurrish	5	LBA	1									86	1
Carrigmurrish	6	LBA	1									23	1
Carrigmurrish	7	LBA	1									27	1
Carrigmurrish	8	LBA	2	1		17			200			577	20
Carrigmurrish	9	LBA	1	2		3					Yes	773	6
Oonaglour	1	ENCB			1							25	1
Oonaglour	2	DB			1						Yes	73	1
Oonaglour	3	DB			1						Yes	9	1
Kilgreany	1	ENCB	1			2						5	3
Kilgreany	2	ENCB			3							46	3
Kilgreany	3	ENCB	1		1							37	2
Kilgreany	4	ENCB			1							4	1
Kilgreany	5	ENCB	1									1	1
Kilgreany	6	ENCB	2		1	1	1					32	5
Kilgreany	7	ENCB	1									8	1
Kilgreany	8	MNGB				1					Yes	10	1
Kilgreany	9	LBA	1						105	74		20	1
Kilgreany	10	LBA		1			3					26	4
Kilgreany	11	LBA	1									46	1
Kilgreany	12	LBA				1						46	1
Kilgreany	13	LBA	3			2						64	5
Kilgreany	14	LBA	1			6						160	7
Kilgreany	15	LBA	1			51	18					883	70
Kilgreany	16	LBA	1									22	1
Kilgreany	17	LBA	1			4	3					66	8
Kilgreany	18	LBA	1									28	1
Kilgreany	19	LBA	3			14	4					468	21
Kilgreany	20	LBA	1						200			264	1
Kilgreany	21	LBA	2			8	9					188	19
Kilgreany	Sherds	LBA				6						22	6
			50	12	11	202	123	63				10,640	400 sherds 63 crumbs 3 complete vessel 1 near complete vessel

ENCB = Early Neolithic carinated bowl; MNBB = Middle Neolithic bipartite bowl; MNGB = Middle Neolithic globular bowl; DB = Domestic Beaker; V/FV = vase food vessel; VU = vase urn; CU = cordoned urn; EU = encrusted urn; MBA = Middle Bronze Age; LBA = Late Bronze Age

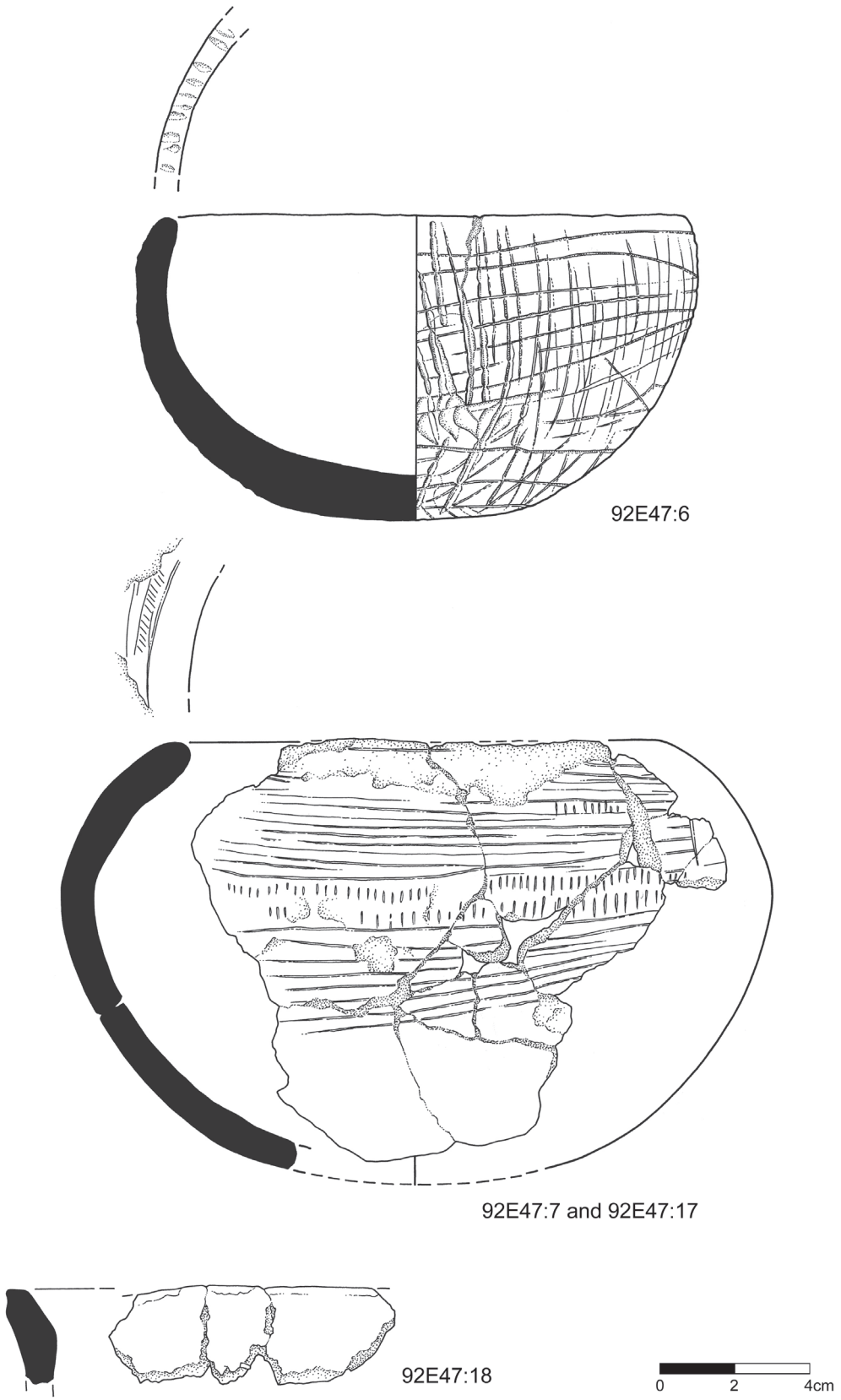

Figure 4.1 Two globular bowls (92E47:6; 92E47:7+17) and carinated bowl rim sherd (92E47:18) from Annagh Cave (Ó Floinn 2011, 28; © NMI).

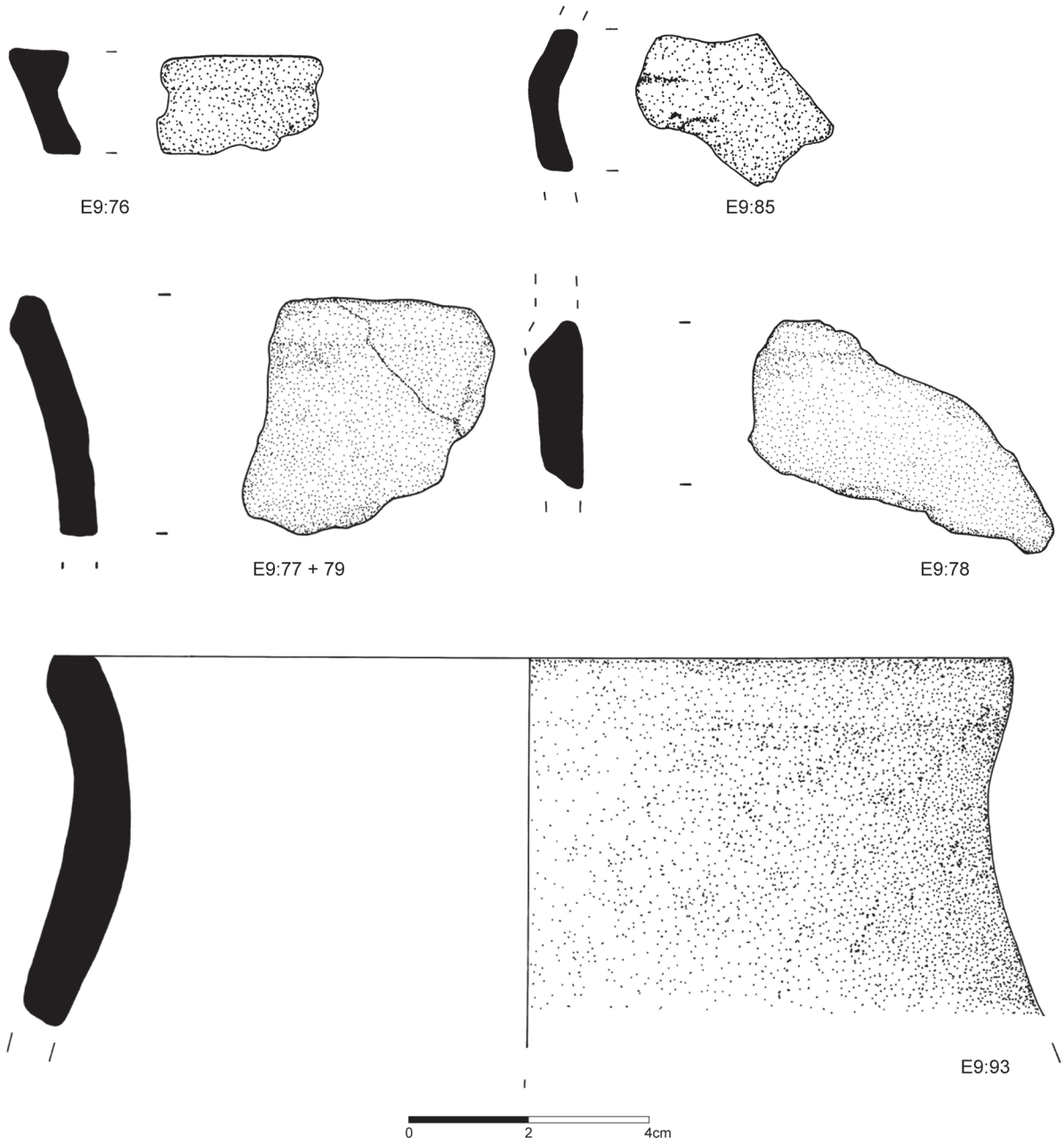

Figure 4.2 Carinated pottery sherds from Kilgreany Cave: vessel 1: E9:76; vessel 6: E9:85; vessel 2: E9:77+79, E9:78; vessel 3: E9:93 (Illustration: Nina Koeberl).

area at Ahanaglogh, Cooltubrid East and Knockhouse Lower all in Co. Waterford; and Kilkeasy, Granny and Newrath 37 in Co. Kilkenny (Johnson *et al*. 2008; McQuade 2006; Brindley 2007a; McKinstry 2007; Grogan and Roche 2008a; Grogan and Roche 2011a). Similar pottery has also been found in pits at Courtlands East and Kerlogue, Co. Wexford (Purcell 2002; Elder 2003; Roche 2004a), indicating a much more extensive settlement pattern in the south-east during the Early Neolithic. The sherds from Annagh Cave also have parallels in Co. Limerick including the well-known assemblages from Lough Gur at Circles J, K, L and Site 10, and the rectangular house at Tankardstown South, Co. Limerick (Grogan and Eogan 1987; Gowen 1988; Gowen and Tarbett 1988). Further afield, comparable bowls have been found at Knowth, Co. Meath (Eogan 1984, figs. 77 and 81; Eogan and Roche 1997) and in the north of the country at Ballyutoag, Ballymarlagh and Ballygalley in Antrim (Herring 1937; Davies 1949; Simpson 1996).

2. Middle Neolithic bowls (*c.* 3500–2800 BC)

Two complete bowls, a large portion of a third, as well as 15 sherds and 12 crumbs representing a total of six Middle Neolithic bowls were identified from Annagh Cave, Brothers' Cave and Kilgreany Cave. A single bipartite bowl (Annagh) was present; the other five were globular bowls. These three caves also produced sherds from other prehistoric periods. Single sherds representing two globular bowls were identified from both Brothers' Cave (broad-rimmed) and Kilgreany Cave; as well as the bipartite bowl, a complete globular bowl, a large portion of a second, and sherds representing a third globular bowl were found at Annagh Cave (Table 4.2).

The Annagh assemblage is especially impressive, not only because complete bowls were present but also in the fine execution of the pots. The bipartite bowl (Fig. 4.3; Pl. 26) represents a modified carinated bowl with a sharply in-turned neck and a simple rounded upright rim (Case 1961: 'Ballyalton bowls'; Herity 1982: 'Necked Vessels'; Sheridan 1995: 'decorated bipartite bowls'). This type of bowl has a particular association with so-called 'single burials', especially those in Linkardstown-type tombs (Brindley and Lanting 1989/90: 'Drimnagh Style bowls'). It is interesting to note that at Linkardstown, Co. Carlow, as at Annagh Cave, a bipartite bowl was also associated with a globular bowl (Raftery 1944; Herity 1987, fig. 18).

The Annagh bowl was well executed with fine well-fired burnished fabric and a high content of mainly quartzite inclusions. The neck and rim were attached as a separate disc onto the upper part of the body. The grey-brown, orange-brown fabric is 10.2mm thick at the neck and 8.2mm at the body. The bowl was elaborately decorated with incised motifs. Oblique scores are present on the outer face of the rim, radial to slightly oblique scores occur on the neck, and there is a shallow scored groove at the junction of the rim and neck. Alternating panels of vertical and horizontal scores are present on the body, forming a type of basket-weave motif. The horizontal panels are triangular in shape, narrowing towards the base, and the lower portion is blank. The base is decorated with panels of shallow horizontal grooves forming a pentangular motif, the centre of which is filled with randomly impressed dots. Four applied, evenly spaced lugs (one now missing) occur on the edge of the shoulder. On the neck the blank zones correspond with the position of the lugs.

The other three bowls from Annagh represent a variety of simple hemispherical bowls with simple rounded in-turned rims (Case 1961: 'Goodland bowls', 'Carrowkeel Ware'; Herity 1982: 'Globular bowls') that dominate the final stages of the Middle Neolithic. The complete vessel (Fig. 4.1; Pl. 25) is a well-executed shallow pot of fine hard dark grey burnished fabric (9mm thick) with a moderate content of mainly quartzite and occasional sandstone inclusions. All-over decoration is present in the form of loose, irregularly fashioned incised lattice motifs. Occasional curved horizontally arranged incised lines are also present. The rim and other sherds from the second globular bowl represent a large portion of the vessel (Fig. 4.1). The rim is folded over on the interior surface and the rim disc was attached separately to the body of the bowl. The hard, slightly friable, burnished fabric has a moderate to high content of quartzite and calcite inclusions and is somewhat abraded. The exterior surface is decorated for a distance of 71.8mm below the rim. The main decorative motif consists of closely spaced fine horizontal incised lines. A horizontal row of oblique fine scores are present just below the rim. A similar horizontal row occurs 28.5mm below the rim and there is a double row of similar motifs 47.08mm below the rim. Panels consisting of a vertical incised line enclosing a blank space and bordered with widely spaced horizontal incised lines appear to have been present at intervals around the pot. There is a possible low attached lug within one of the blank panels. The third globular bowl from Annagh is represented by just a few sherds. The hard friable orange-black fabric has a moderate to high content of calcite inclusions and the exterior surface is weathered and abraded with no evidence for decoration. Carbonised residue is present on the interior surface.

The globular bowl from Kilgreany Cave is represented by a single body sherd with portion of a lug. The good quality, dark orange, hard compact fabric has a moderate content of inclusions and the exterior surface has a smooth, creamy clay and water wash. The interior surface is missing. The lug is decorated with a row of oblique strokes. Another row of oblique strokes is present on the body, just below the lug. The rim sherd from Brothers' Cave represents a broad-rimmed globular bowl. These are generally deep hemispherical bowls with a broad flat or gently curved rim, and a short, frequently constricted (cavetto), neck (Case 1961: 'Dundrum bowls'; Herity 1982: 'Broad-Rimmed Vessels'); the rim top often has a pronounced outward slope that projects over the wall. The Brothers' Cave example has a flat outward projected broad rim. The hard brittle fabric has a high content of calcite inclusion. The exterior surface is smooth but part of the inner face of the rim is missing. There is no surviving evidence for decoration.

Discussion

The Middle Neolithic is characterised by a diversification in pottery forms and by the application of decoration usually pressed into the pot surface using a variety of tools including twisted and whipped cord and bone, leading to the term 'Impressed Ware' (Gibson 2002, 78–82). Although dispersed throughout the country, the main concentration is located in the area of north Leinster continuing northwards into north-east Ulster.

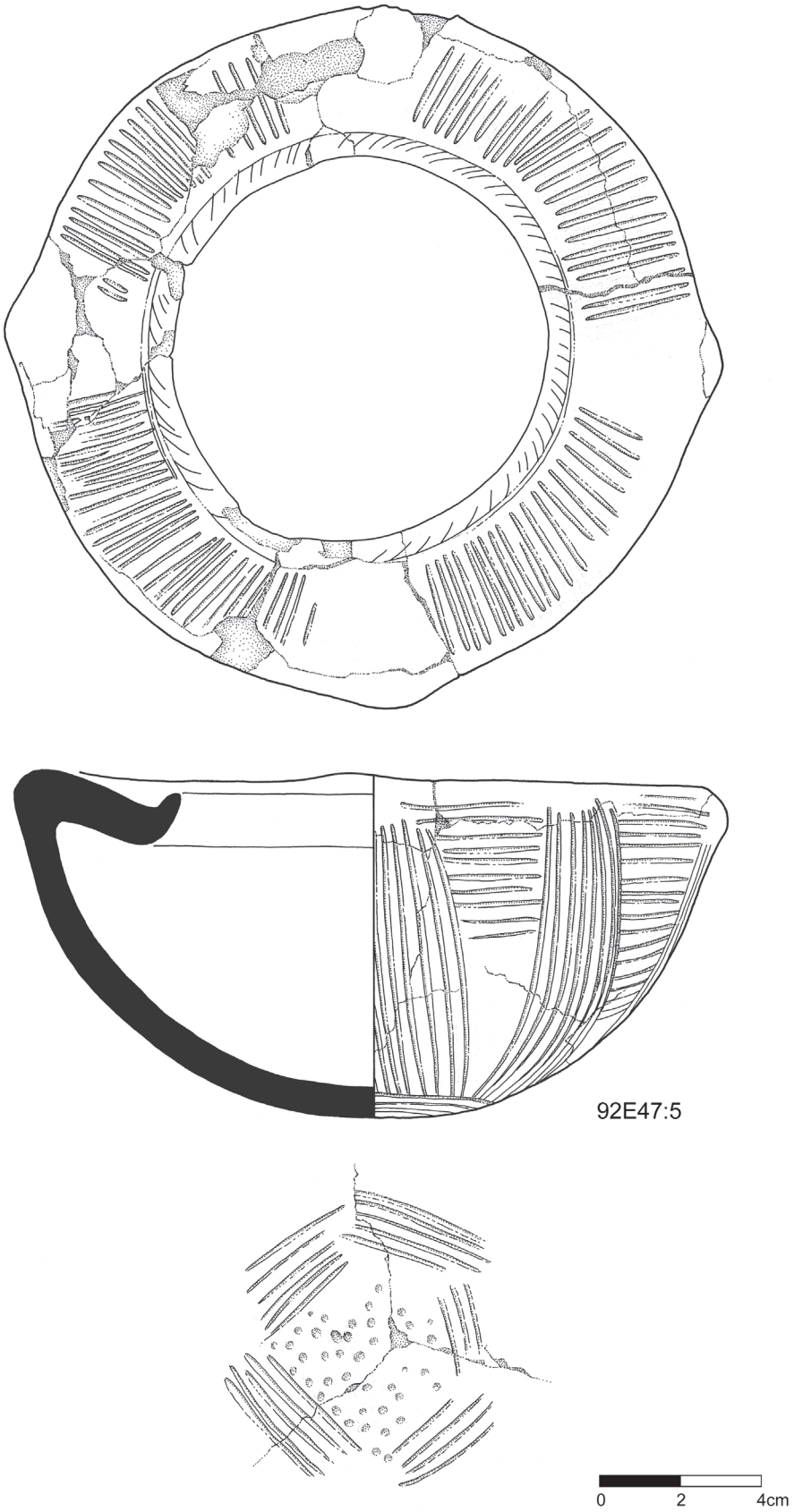

Figure 4.3 Bipartite bowl (92E47:5) from Annagh Cave (Ó Floinn 2011, 27; © NMI).

As already mentioned, bipartite bowls are particularly associated with Linkardstown tombs but have also been found in court tombs at Ballyedmond, Co. Down (Evans 1938), and Annaghmare, Co. Armagh (Waterman 1965), and the portal tomb at Ballykeel, Co. Armagh (Collins 1965) (see Herity 1982, figs. 31:1, 32:2, 47:3, 49:2). The main period for these is firmly dated to *c*. 3525–3350 BC (Brindley and Lanting 1989/90, 4–5, figs. 1 and 2) but wider associations indicate that similar pottery forms may have continued later. The broad-rimmed and globular bowls from the Waterford caves are a rare find in the south-east of the country. Sherds were found in the court tomb excavations at Ballynamona Lower, Co. Waterford, and a small assemblage came from Newrath 35, Co. Kilkenny (Grogan and Roche 2011a). Broad-rimmed bowls are found in a wide variety of contexts but the majority occur in domestic settings, for example Townleyhall 2 (Eogan 1963). The simple globular bowls (Case 1961: 'Goodland bowls'; Herity 1982: 'Globular bowls'), as found at Annagh Cave and Brothers' Cave, dominate the final stages of the Middle Neolithic and are known from pre-tomb domestic contexts at Fourknocks 1 and 2, Townleyhall 2 and Knowth – all in Co. Meath (Hartnett 1957; Hartnett 1971; Liversage 1960; Eogan and Roche 1997).

3. Final Neolithic/Early Bronze Age (*c*. 2450–2300 BC)

Just three sherds representing three Beaker vessels were identified from Brothers' Cave (one sherd) and Oonaglour (two sherds). These caves also produced sherds from other prehistoric periods (Table 4.2). Although the evidence for Beaker pottery from cave sites is meagre, we know from more extensive assemblages that such vessels have generally simple rounded or pointed rims, S-shaped ('Bell') profiles and flat bases. The fabric is fine and fired using techniques that differ from the preceding period and producing a typical 'sandwich' profile with buff to red-buff or red-brown surfaces and grey to dark grey cores. These coil-built, thin-walled vessels frequently contain fine quartzite inclusions. A larger, thicker-walled variant, referred to as domestic, coarse or rusticated Beaker, occurs throughout the tradition: these may be specialist storage or cooking vessels, but all Beaker pottery in Ireland, whether 'fine' or 'coarse', is primarily domestic in function.

It is not possible to positively identify the single body sherd from Brothers' Cave but the fabric is consistent with Beaker pottery (Fig. 4.4). The orange-grey fabric is hard and compact with a moderate to high content of quartzite inclusions and a smooth exterior surface. The interior surface and core of this abraded and leached sherd has a honeycomb appearance; the body is 9.3mm thick. The fabric indicates it is from a domestic Beaker. The sherds from Oonaglour represent two domestic Beakers (Fig. 4.4; Pl. 22). The fabric from both sherds is similar, of good quality hard compact fabric, with a moderate content of fine inclusions. The exterior surfaces are smoothed and well finished and evidence for fire-blackening is present on the interior surface of vessel 2 and the exterior of vessel 3. The sherds range in thickness from 5.7mm to 7.2mm. The sherd representing vessel 2 is from the area of the neck and is decorated with horizontal rows of grooves forming low raised ribs at intervals, creating a ribbed effect. In areas, the grooves are carelessly finished, where the implement used extended beyond the end of the groove forming overlapping oblique incised lines. A somewhat similarly decorated Beaker found at Kilmainham 1C, Co. Meath, has been dated to 2200–2000 BC (Grogan and Roche 2011b). The sherd representing vessel 3 is also from the area of the neck, just below the rim. Two low raised cordons are present on the exterior surface which is a particular feature of the domestic variant of Beakers.

Discussion

The dominant type of Beaker in Ireland classified by its shape and decorative arrangement has been assigned to Clarke's (1970) European Bell Beaker, or his North Rhine or Wessex/Middle Rhine types. Following reviews by, for example, Lanting and van der Waals (1972), there has been a greater recognition of the regional development of Beaker. Case's simpler three-fold scheme, and its specific application to the Irish material, provides a straightforward medium for insular comparison (Case 1993; Case 1995). The formal horizontally zoned decoration on many of the Irish vessels belongs to his style 2 and is widely dated to 2450–2300 BC.

Beaker pottery is not common in the south-eastern part of Ireland but the sherds from the Waterford caves have parallels with sites at Graigueshoneen, Ahanaglogh and Kilmacthomas also in Waterford (Roche 2008); and at Kerlogue, Frankfort and Moneylawn Lower, Co. Wexford (Roche 2004a; Grogan and Roche 2008b; Grogan and Roche 2008c). The vast majority of Beaker associated sites are domestic in nature and over 120 Beaker sites have now been recorded (Grogan and Roche 2010a, 36–38). Typically these are represented by pits, fireplaces, spreads and occasional postholes; many sites produced only small quantities of pottery. Large assemblages have been found at Dalkey Island and Kilgobbin, Co. Dublin; Newgrange and Knowth, Co. Meath; several sites at Lough Gur, Co. Limerick; and Mell, Co. Louth (Liversage 1968; Grogan 2004b; Cleary 1983; Eogan 1984; Ó Ríordáin 1954; Grogan and Eogan 1987; McQuade 2005). Burial associations in wedge tombs include Ballyedmonduff, Co. Dublin and Lough Gur, Co. Limerick (Ó Ríordáin and de Valera 1952; Ó Ríordáin and Ó h-Iceadha 1955). There are a few secondary burials in other tomb types, including eleven court tombs (Herity 1987), and at Knowth (Eogan 1984), but there are no other definite burials. Sherds were also found in association with copper mining activities at Ross Island, Co. Kerry (O'Brien 1995, 41).

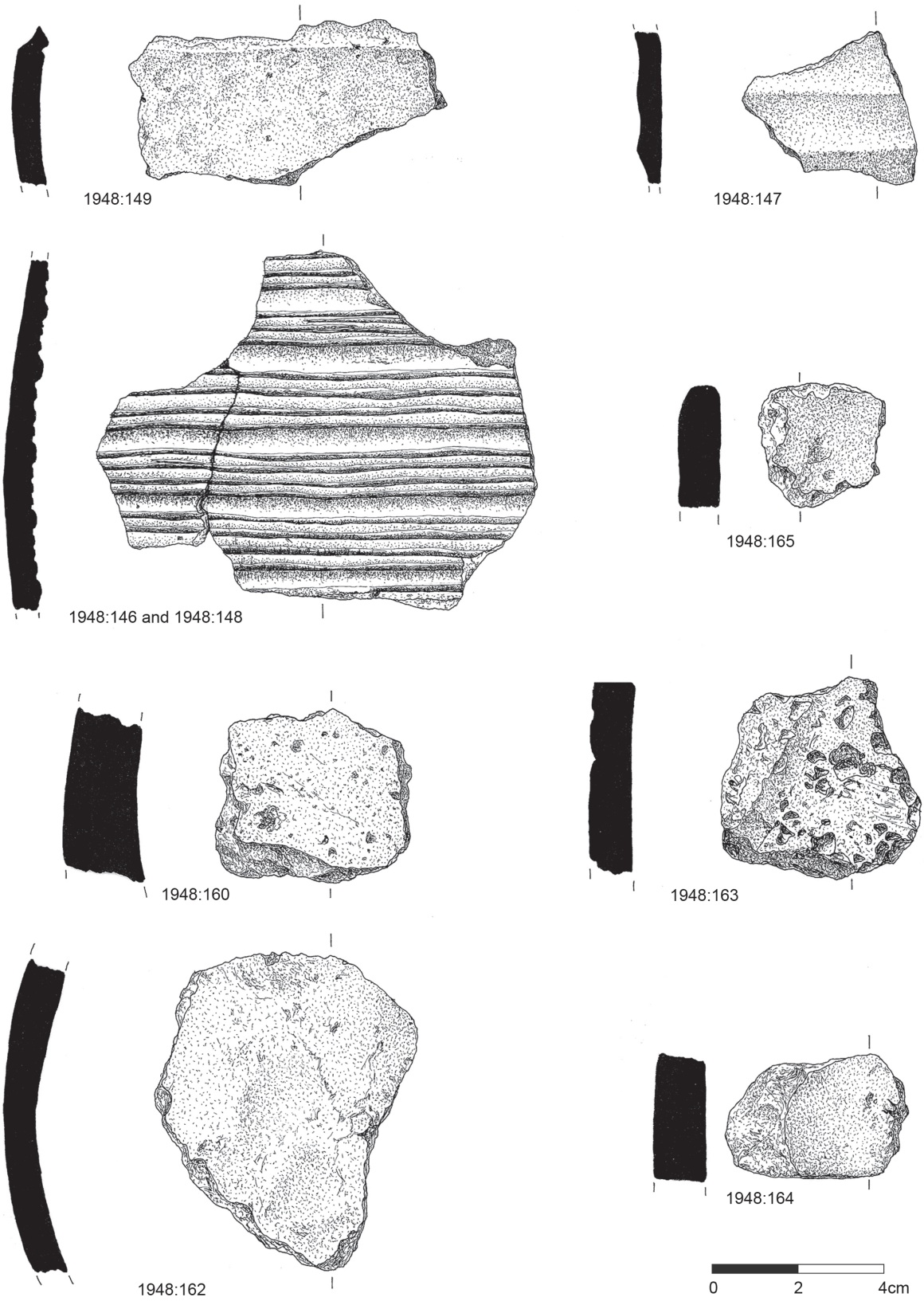

Figure 4.4 Oonaglour Cave: Early Neolithic carinated bowl (1948:149); domestic Beaker (1948:147); domestic Beaker (1948:146+148). Brothers' Cave: probable domestic Beaker (1948:165); probable cordoned urn (1948:160); Late Bronze Age vessel 2 (1948:163; 1948:162); Late Bronze Age vessel 3 (1948:164) (Dowd 2015, 130).

4. Early Bronze Age (*c*. 2200–1600 BC)

Twenty-eight sherds and a reconstructed pot representing a total of ten Early Bronze Age vessels were identified from Oweyberne Cave 3, Knockninny Cave, Killuragh Cave and Brothers' Cave. Sherds from Knockninny Cave represented a cordoned urn, an encrusted urn and a possible vase urn. Two food vessels and a vase urn were identified from Oweyberne Cave 3, three vase urns came from Killuragh Cave, and a cordoned urn occurred in Brothers' Cave (Table 4.2). Sherds from other prehistoric phases were present in the latter three sites.

The assemblage from Oweyberne Cave 3 is small but the decorative motifs, the flat rim with a slight outwardly pointed expansion and almost upright neck indicate that vessel 1 is a tripartite vase (Pl. 23). The thin-walled, slightly brittle fabric is typical of other vessels in the vase tradition. Decoration consisting of criss-crossed filled triangles and horizontal incised lines is also a feature of this vessel type. It was not possible to make a positive identification regarding the second food vessel because of the lack of feature sherds or decorative motifs. However, the hard, gritty, brittle fabric with a high content of inclusions and smooth well finished surfaces is certainly consistent with that of food vessels. The nature of the context from Oweyberne Cave 3 and the presence of carbonised residue on both vessels suggest a domestic function for this small assemblage; however, the occurrence of a vase urn sherd and a human tooth of unknown date may indicate some form of funerary activity. The vase urn was identified on the basis of fabric and decorative motifs. The hard fabric is thick-walled with a loose textured matrix and a high content of inclusions. The smooth exterior surface is decorated with two horizontal rows of oblique, irregularly placed incised lines, above and below a horizontal incised line.

The sherds representing a cordoned urn from Knockninny Cave include a flat outwardly projected rim with a cordon 31.6mm below the rim and a second further down (Fig. 4.5). The thick-walled, hard coarse fabric (13.6–16.0mm thick) has a high content of crushed sandstone inclusions. The exterior surface is somewhat abraded but had originally been smoothed with a clay wash. The rim surface is decorated with oblique slashes. A horizontal row of oblique slashes is also present on the outer lip of the rim. Below the undecorated neck is a raised cordon decorated with oblique slashes. The lower raised cordon is also decorated with oblique slashes. The area between the two cordons is decorated with irregularly placed oblique slashes, sometimes forming V-shapes, possibly forming triangles. The decoration is fashioned with an implement like a split reed that left visible striations on the fabric. Slight traces of carbonised residue and fire-blackening are present on the interior surface, on the exterior surface below the rim, and on the surface of the flat rim. Another sherd represents a probable vase urn (Fig. 4.5). The good quality compact fabric (10.3mm thick) has a moderate content of crushed quartzite. The somewhat abraded exterior surface had originally been smoothed and traces of carbonised residue occur on the interior surface. The heavily reconstructed encrusted urn from Knockninny Cave has a flat inward sloping rim (Figs. 4.5 and 4.6). The good quality, hard, thick-walled fabric (10.7–15.2mm thick) has a moderate to high content of inclusions. The surface is smooth but has an unusual texture, the outer skin appears to have been sheared away or perhaps it had not been completed before firing. Oblique scores are present on the surface of the flat rim and traces of an applied rib and an arc occur near the base. The shape is rather unusual, sloping sharply from the almost bulbous body to a narrow base; it is possible when it was reconstructed sherds were missing from the lower body, thus creating the rather unusual profile. This vessel had been inverted over cremation deposits within a cist-like structure (Plunkett 1875/7).

The sherds representing the three vase urns from Killuragh Cave are fragmentary but the fabric, the rim forms, the presence of cordons and incised decoration are consistent with vase urns throughout the country. The vessels were coil-built with medium- to thick-walled gritty fabric, ranging in thickness between 9.4mm and 15.1mm, and with inclusions ranging from 4.3mm to 5.1mm in length. The colour varies from orange to grey-brown. The abraded surfaces show evidence that they had been smoothed over, probably at the time of manufacture, with a wash or slurry of fine clay applied with the fingers. Carbonised residue and fire-blackening are present on the three vessels. The rim of vessel 1 is flat with a rounded outward expansion, below which are a short upright neck and a raised shoulder. Faint evidence for decoration survives in the form of an oblique incised line below the channel and an oblique incised line is also present on the rim top. The fabric of the second urn has a finer fabric and, although somewhat abraded, had originally been smoothed with a creamy clay and water wash. There is a possible faint incised line on a third sherd, on the area of the neck just above the shoulder. The fragmented remains of the third urn include a flat unexpanded rim. Slight evidence for decoration is present in the form of two oblique incised lines possibly forming a triangular motif.

A single sherd from Brothers' Cave probably represents a cordoned urn (Fig. 4.4). The thick-walled hard gritty fabric (17.1mm thick) has a high content of calcite inclusions. The smooth exterior surface is somewhat weathered and slight traces of carbonised residue is present on the interior surface.

Discussion

The assemblages from these four caves include vase food vessels, vase urns, an encrusted urn and cordoned urns, collectively spanning the entire Early Bronze Age period.

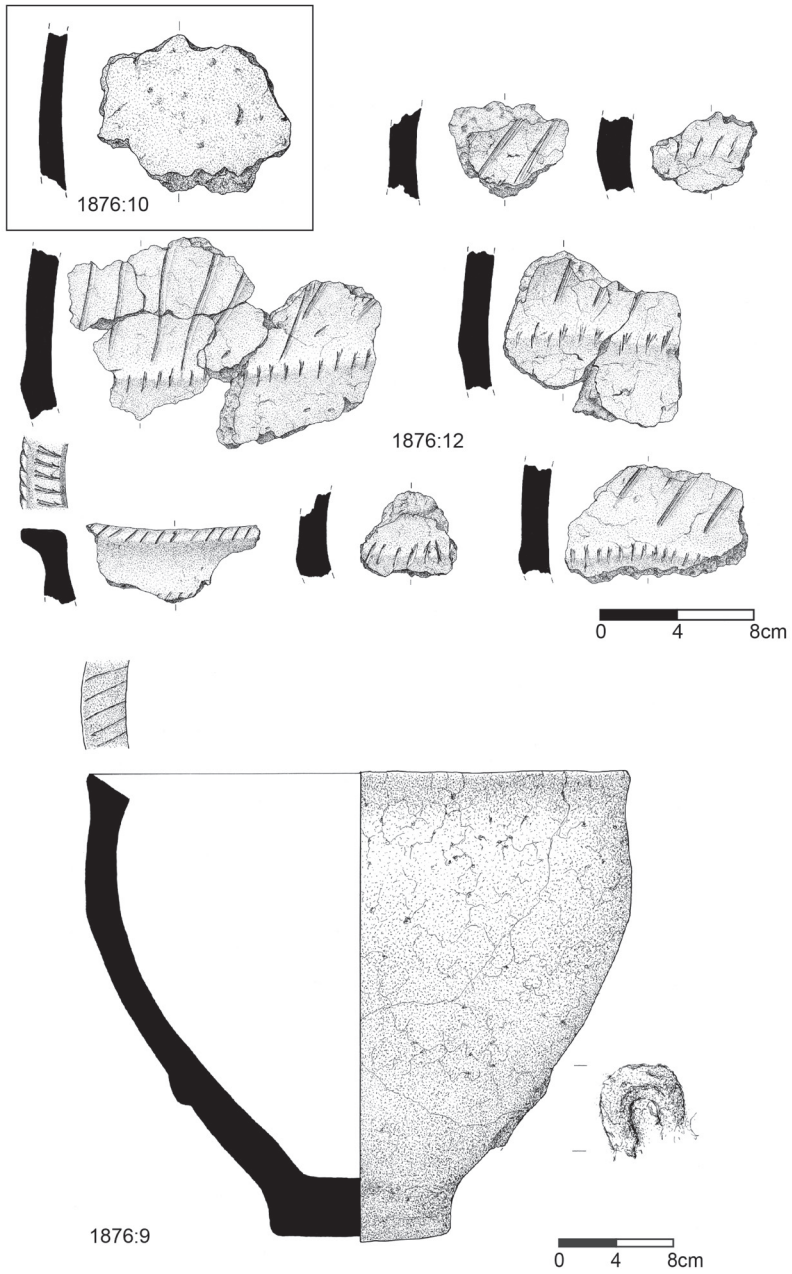

Figure 4.5 Sherd of vase urn (1876:10); sherds of cordoned urn (1876:12); questionable reconstruction of encrusted urn (1876:9) from Knockninny Cave (Dowd 2015, 142).

Comparable material has previously been found in mainly funerary contexts (cist and pits). Vase food vessels have a clear east/south-east and northern distribution and recent research carried out by Brindley (2007b, 328) has produced a comprehensive range of dates for food vessels, which reveals different vessel forms and decorative arrangements were largely in contemporary use spanning the period *c*. 2180–1740 cal. BC. The distribution of vase and encrusted urns broadly coincides with the smaller vase food vessel (Waddell 1998), and research has established a date range of *c*. 2000–1740 BC for this ceramic type (Brindley 2007b, 328). The distribution of funerary cordoned urns is mainly concentrated in Ulster, decreasing in numbers towards north Leinster with scattered examples extending into the Midlands, in areas of Connacht, south Leinster and south Munster (Waddell 1998, fig. 59). A general date range of *c*. 1730–1500 BC is indicated (Brindley 2007b, 328).

5. Middle Bronze Age (*c*. 1600–1100 BC)

Oweyberne Cave 3 was the only cave that produced Middle Bronze Age pottery. The small assemblage consisting

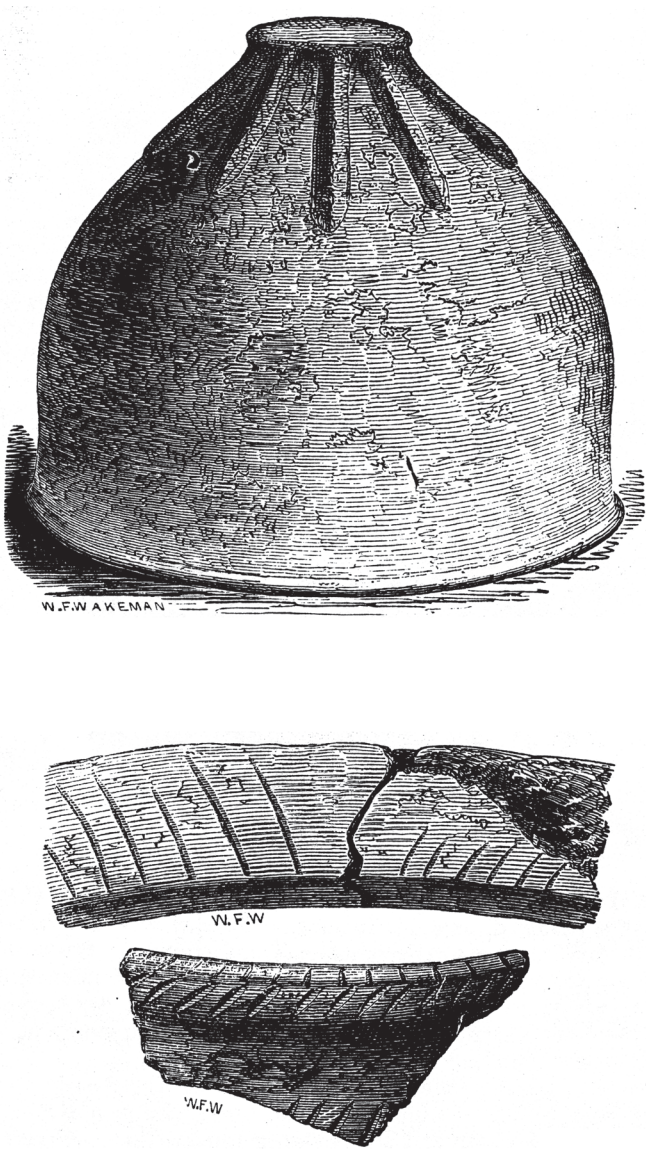

Figure 4.6 William F. Wakeman's 1870s illustration of the encrusted urn (1876:9) and a sherd of the cordoned urn (1876:12) from Knockninny Cave (Plunkett 1875/7, 474).

of 15 undecorated sherds represents two large flat-based domestic vessels. The fabric is hard and gritty, not unlike that of Late Bronze Age pottery, but the form of the sharply in-turned rim of vessel 4 with its curved internal surface with a low bevel, as well as the smoothed external rilled surface treatment, indicates that this small assemblage dates to late in the sequence of Middle Bronze Age pottery (Grogan and Roche 2010b). The presence of carbonised residue on both vessels suggests they were used in a domestic context. The two vessels from Oweyberne Cave 3 were coil-built, tub-shaped with flat bases, generally medium- to thick-walled, well-executed but with a gritty fabric, ranging in thickness between 9.5mm and 16.0mm, and with inclusions ranging from 5.1mm to 7.9mm in length. The colour varies from dark brown/black to orange. The surfaces show evidence that they had been smoothed over, probably at the time of manufacture, with a wash or slurry of fine clay applied with the fingers and vessel 4 appears to have been burnished. Single or double cordons are sometimes present but insufficient sherds survive from Oweyberne Cave 3 to make this identification.

Such vessels are not unlike the shape of the earlier funerary cordoned urn but are generally thinner-walled and if decoration is present, it lacks the typical broad cord decorative motifs found on the funerary variant. As already stated, a general date range of *c*. 1730–1500 BC is indicated for cordoned urns (Brindley 2007b, 328), but the domestic variety had a longer currency and may have continued in use until *c*. 1200 BC.

Discussion

During the Middle Bronze Age, a domestic variant of the cordoned urn developed, having less frequent and less orderly ornament consisting of thick cord-impressed and, increasingly, scored lines; in addition, many examples were completely undecorated (Grogan and Roche 2010b; Waddell 1995, 113, 118). This type of pottery has been identified on an increasing number of settlement sites and has a dispersed distribution throughout the country. A largely undecorated assemblage of vessels similar to the examples from Oweyberne Cave 3 has been identified at Corrstown, Portrush, Co. Derry (Roche and Grogan 2012), while there is a similar assemblage from Downpatrick, Co. Down (Pollock and Waterman 1964). At both sites the vessels were associated with round houses. In north Leinster examples with limited decoration have been found in settlement contexts at Moynagh Lough, Baltrasna and Barronstown, Co. Meath, and Kilshane, Co. Dublin (Bradley 2004; Roche and Grogan 2005a; Roche and Grogan 2005b; Grogan and Roche 2005a). A large assemblage of decorated domestic vessels occurs in the south-west at Lough Gur, Co. Limerick, including Sites C and D (Ó Ríordáin 1954, 333–340, 392–394, figs. 18.7–9, 19.1–6, 34.26, pl. 34), and Circle L and Site 10 (Grogan and Eogan 1987, 405, 449–451, figs. 45.891, 68.893–11). Further south, examples have been found at Ballinaspig More 5, Scartbarry 2 and Ballybrowney Lower 1, all in Co. Cork, and at Knockhouse, Co. Waterford (Grogan and Roche 2004; Grogan and Roche 2005b; Roche and Grogan 2005c; Richardson and Johnston 2007).

6. Late Bronze Age (*c*. 1100–800 BC)

Late Bronze Age flat-based coarse vessels constitute the dominant pottery type found in the caves examined. A total of 291 sherds and 51 crumbs representing 34 vessels were identified from Glencurran Cave, Killuragh Cave, Ballynamintra Cave, Brothers' Cave, Carrigmurrish Cave and Kilgreany Cave. Late Bronze Age pottery was exclusively

found at Glencurran (four vessels), Ballynamintra (one vessel) and Carrigmurrish (nine vessels). Sherds from other prehistoric periods were present at the other three sites with three Late Bronze Age vessels identified at Killuragh Cave, four from Brothers' Cave and thirteen from Kilgreany Cave (Table 4.2).

The Glencurran Cave assemblage contains four coil-built, flat-based, tub-shaped vessels that are similar in shape and form to the other Late Bronze Age pots from the caves examined (Fig. 4.7). The rim forms are rounded and slightly outward sloping, internally bevelled and rounded. The fabric is generally hard, compact and gritty with vessel 2 having a thinner-walled friable matrix. The vessels range in thickness between 5.5mm and 20.6mm and have calcite and quartzite inclusions ranging from 4.1mm to 6.3mm in length. The exterior surfaces, although somewhat weathered, had been smoothed with a clay and water wash. Carbonised residue is present on the interior surface, the exterior surface below the rim, the rim surface of vessel 1 and the interior surface of vessel 4. The colour varies from brown to black to brown-orange.

The rims of the three vessels from Killuragh Cave are flat (vessel 4), flat and slightly in-turned (vessel 5), or flat with a slight outward expansion (vessel 6). The fabric is generally hard and coarse with inclusions ranging between 3.8mm and 7.3mm in length and ranging in thickness from 11.7mm to 16.0mm. The exterior surfaces are weathered and abraded and inclusions protrude, although vessel 5 had been smoothed. Carbonised residue is present on both surfaces of the three vessels. The colour varies from brown to black to orange.

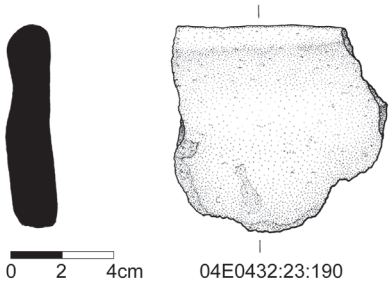

Figure 4.7 Late Bronze Age pottery sherd (04E0432:23:190) from Glencurran Cave (Illustration: Abigail Brewer).

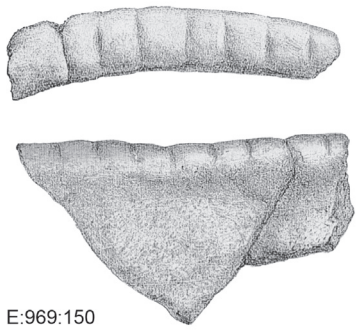

Figure 4.8 Antiquarian illustration of Late Bronze Age pottery sherd (E969:150) from Ballynamintra Cave (Adams et al. 1881, plate xiii).

The single sherd from Ballynamintra Cave is from a well-executed vessel with a hard compact fabric measuring up to 12.2mm thick and with a moderate to high content of inclusions (Fig. 4.8). The rim is decorated with thumb-nail impressions. The brown-black surfaces are somewhat weathered and uneven, and traces of carbonised residue are present on the interior surface and the rim surface.

The Brothers' Cave assemblage consists of four Late Bronze Age vessels (Fig. 4.4). The two surviving rims are flat and slightly out-turned with a constricted neck and flat and slightly in-turned. The fabric is generally hard, compact and gritty, with vessel 8 having a more brittle matrix. The vessels range in thickness between 8.3mm and 14.0mm and with the mainly calcite inclusions ranging from 4.2mm to 8.8mm in length. The exterior surfaces, although somewhat abraded with inclusions protruding, had originally been smoothed with a clay and water wash. Carbonised residue occurs on both surfaces of vessels 5, 6 and 8. The colour varies from brown to black to grey.

The Carrigmurrish Cave assemblage consists exclusively of nine Late Bronze Age vessels of exceptional quality (Fig. 4.9). The surviving rims are flat, rounded and slightly in-turned, flat or rounded with an upright neck, internally bevelled, and flat with an outward expansion. The surface of the rim of vessel 9 is decorated with rounded and oval bone impressions. The fabric is generally hard, compact and gritty with vessel 4 having a poor quality brittle matrix. The vessels range in thickness from 9.6mm to 19.8mm and have mainly calcite and quartzite inclusions ranging between 2.8mm and 15.0mm in length. The exterior surfaces, although somewhat abraded with inclusions protruding, had originally been smoothed with a clay and water wash. Carbonised residue is present on the interior surface and the exterior surface of the rim of vessels 1 and 3, on the interior surface of vessels 2 and 4, on both surfaces and rim of vessel 5, and on the rim of vessels 7 and 8; the exterior surface just below the rim of vessel 6 is fire-blackened. The colour varies from brown-orange to black to grey.

The Kilgreany Cave assemblage contains the largest number of Late Bronze Age vessels – thirteen well-executed examples were identified (Fig. 4.10; Pl. 24). The surviving rims are flat, inward sloping with an upright neck above a curved body; flat unexpanded rims; flat with rounded interior surface; flat with pointed outward expansion; and internally bevelled with a rounded external expansion. Shallow horizontal channels were present below the flat rims of vessels 13, 18 and 20, a feature more common on Middle Bronze Age vessels. However, the fabric was not unlike the other vessels in the assemblage and all probably date to the Late Bronze Age. Three distinct vessel shapes were identified: the majority were the common flat-based tub-shaped pots; vessel 11 had a distinct neck above a curved body

while vessel 9 appears to represent a shallow bowl with an estimated height of 74mm and rim diameter of 105mm. Such bowls are unusual but an example is known from Rathgall, Co. Wicklow. The fabric of the vessels is generally similar, being of good quality, hard, compact and gritty averaging in thickness between 8.8mm and 14.2mm with a moderate to high content of mainly calcite, quartzite and shale inclusions ranging from 3.5mm to 8.1mm in length. The thin-walled fabric (6.7–8.5mm) of vessel 9 was different, having a compact smooth matrix. The exterior surfaces in general were smoothed but most were abraded and somewhat uneven with protruding inclusions. Carbonised residue is present on the interior surface of vessels 10, 12, 14 and 17; on the exterior surface of vessel 16; on both surfaces and the rim of vessels 11, 13 and 18; on both surfaces of vessel 15; and on both surfaces and the rims of vessels 19, 20 and 21. The exterior surface of vessel 9 is fire-blackened. It should be noted that many of the vessels from ritual contexts throughout the country show evidence, in the form of sooting or blackened accretions, for previous use in domestic contexts.

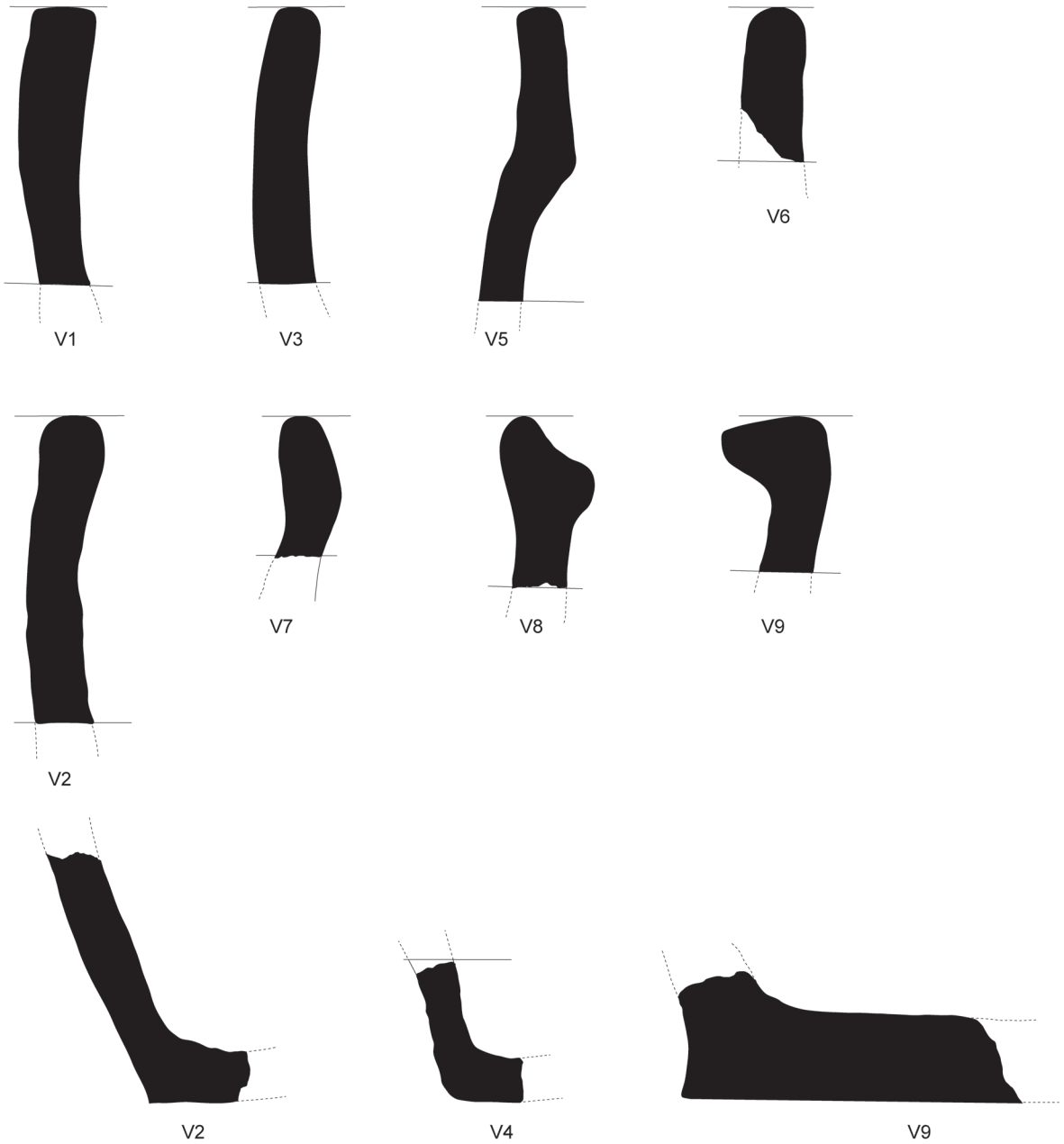

Figure 4.9 Rim and base profiles of the nine Late Bronze Age pottery vessels (E969:145–7) from Carrigmurrish Cave (Illustration: Helen Roche).

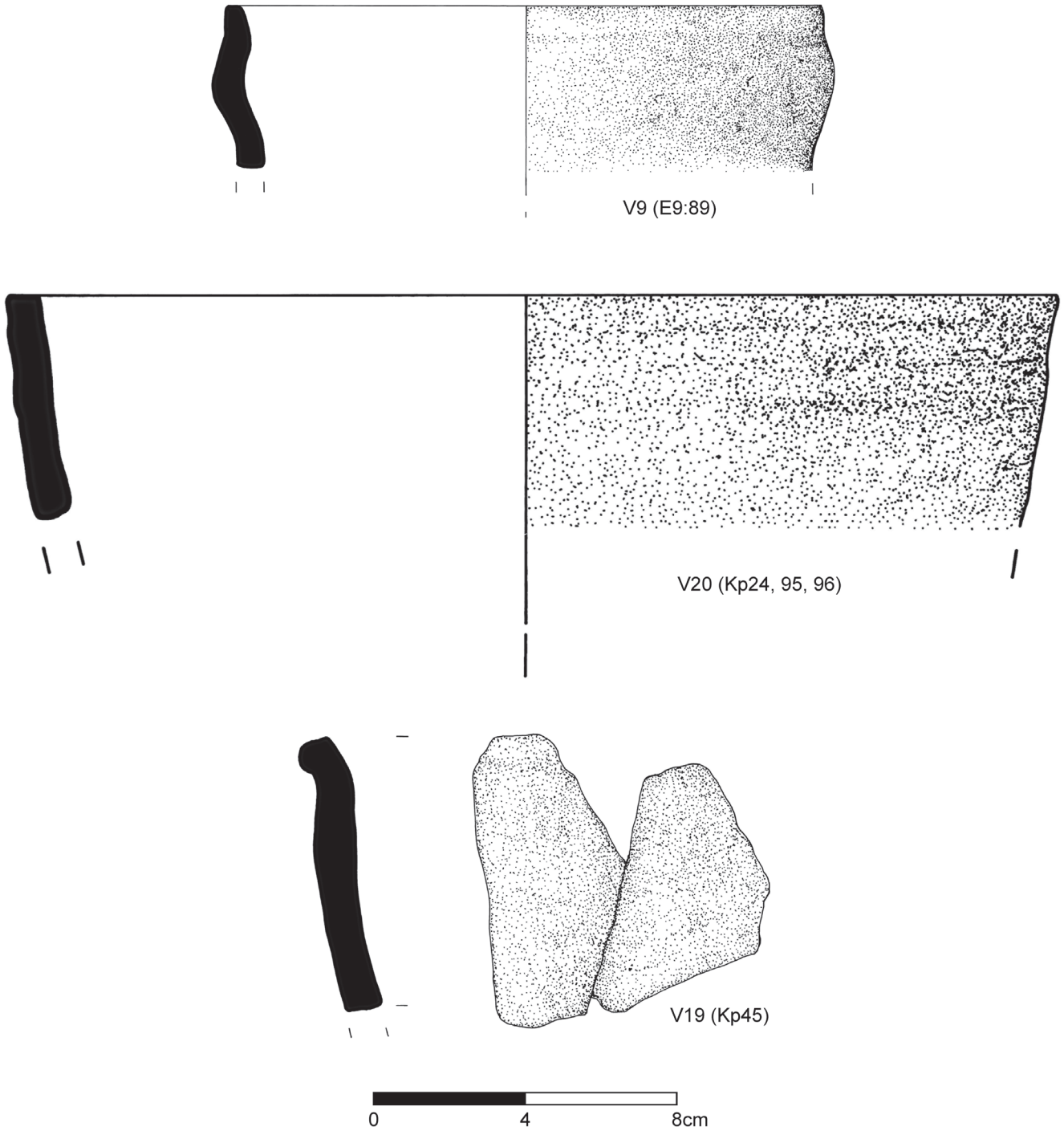

Figure 4.10 Late Bronze Age pottery from Kilgreany Cave: vessel 9 (E9:89); vessel 20 (Kp. 24, 95, 96); vessel 19 (Kp. 45) (Illustration: Nina Koeberl).

Discussion

Late Bronze Age coarse vessels have a wide distribution throughout the country and are found in both funerary and domestic contexts. The examples from the cave sites can be widely paralleled to other known Irish Late Bronze Age pots. However, the large number of vessels from Co. Waterford is of particular interest as such vessels are rare in the south-east. There are examples from Ahanaglogh, Co. Waterford (Roche 2008), Freestone Hill, Co. Kilkenny (Raftery 1969, 86–96), and from older excavations at Harristown, Co. Waterford (Hawkes 1941). The presence of Late Bronze Age pottery in the Waterford caves indicates

a more extensive distribution of this material in the region than had previously been recognised.

Late Bronze Age coarse pots have been found in both domestic and funerary contexts at Curraghatoor, Chancellorsland and Ballynamona 2 – all in Co. Tipperary (Doody 2007; Doody 2008; Roche and Grogan 2009). Assemblages are also known from the nearby archaeologically rich area of Lough Gur, Co. Limerick (Ó Ríordáin 1954; Grogan and Eogan 1987; Cleary 1995; Roche 2004b). Similar pottery has been found at the lakeshore settlement at Knocknalappa and at Mooghaun hillfort, Co. Clare (Raftery 1942; Grogan *et al*. 1999; Grogan 2005). Pottery of this type has been dated at Mooghaun, Co. Clare to between 1100 BC and 800 BC (Grogan 2005, fig. 7.10).

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CATALOGUE

Where the pottery is listed in the catalogue, the context numbers are in bold: e.g. 'body sherd 142:9' (142 = context number; 9 = sherd number).

Sherd numbers incorporating a forward slash indicates joining sherds, e.g. 3/27.

Colour refers to the outer surface/core/inner surface e.g. orange/grey/black.

Thickness refers to an average dimension; where relevant a thickness range is indicated. Vessel numbers have been allocated to pottery where some estimation of the form of the pot is possible, or where the detailed evidence of featured sherds (e.g. rims, shoulders) or the fabric indicates separate vessels.

Antrim, Ballygill South td. (Rathlin Island), Oweyberne Cave 3

Early Bronze Age tripartite vase food vessel

Vessel 1 (Pl. 23). Represented by two rim sherds 119:7, 142:19 and a body sherd 142:14.

Flat rim with slight outward pointed expansion. The almost upright neck is gently curved above a low cordon. Thin-walled hard brittle fabric with a moderate to high content of probable basalt and sandstone inclusions (≤ 3.1mm). The smoothed surfaces are somewhat abraded and traces of carbonised residue are present on both surfaces. The rim top is decorated with oblique rows of fine whipped cord impressions. Surviving decoration on the exterior surface consists of a band of filled triangles positioned between two deeply incised horizontal lines. The triangles are filled with crisscross motifs. Colour: brown/black/black. T: 6.8–9.0mm. Weight: 48g.

Early Bronze Age unclassifiable food vessel

Vessel 2. Represented by three body sherds 142:20a–c and two fragments 142:18d, 23.

Medium thick-walled hard, gritty brittle fabric with a high content of probable basalt inclusions (≤ 6.2mm). There is no evidence for decoration on the slightly abraded but smoothed surfaces. Traces of carbonised residue are present on the interior surface of sherd 18d. Colour: brown/grey/brown. T: 9.1–10.6mm. Weight: 35g.

Early Bronze Age vase urn

Vessel 3. Represented by a body sherd 142:21.

Thick-walled hard fabric with a loose textured matrix and a high content of probable basalt inclusions (≤ 5.8mm). The surviving surfaces are smoothed. Decoration consists of two horizontal rows of oblique, irregularly placed incised lines, above and below a horizontal incised line. Colour: orange/grey/brown. T: 14.2mm. Weight: 17g.

Middle Bronze Age vessels

Vessel 4. Represented by a rim sherd 142:16a, three body sherds 142:9, 16b, 18a and three fragments 142:15, 17a, 17c.

The rounded, sharply in-turned rim has an internal bevel. Medium thick-walled hard fabric with a loose textured matrix and a high content of large probable basalt inclusions (≤ 7.9mm). The slightly abraded exterior surface is burnished. The indication of shallow grooves on sherds 9 and 16b suggest the exterior surface had a rilled finish. Traces of carbonised residue are present on both surfaces. Colour: brown-black/grey/orange-black. T: 9.6–10.9mm. Weight: 103g.

Vessel 5. Represented by five body sherds 119:8, 144:13, 142:10–2 and three fragments 142:17b, 18b/18c, 18e.

Thick-walled hard fabric with a loose textured gritty matrix and a high content of probable basalt and sandstone inclusions (≤ 5.1mm). The somewhat abraded surfaces had been smoothed but inclusions protrude through the surfaces of most sherds. Traces of carbonised residue are present on both surfaces. Colour: brown-black/brown/brown-black. T: 9.5–16mm. Weight: 151g.

Clare, Tullycommon td., Glencurran Cave

Late Bronze Age vessels

Vessel 1. Represented by a rim sherd 23:190 and two probable base fragments 23:141, 25:192 from a flat-based barrel-shaped vessel.

Rounded slightly outward sloping rim. A constriction is present on the exterior surface below the rim. Thick-walled hard compact fabric with a high content of calcite inclusions (≤4.8mm). The slightly abraded exterior surface had been smoothed with a clay and water wash. Carbonised residue is present on the interior surface, the exterior surface below the rim, and the rim surface. Colour: brown-black/black/black. Estimated rim diameter: 250mm. Estimated height: *c*. 270mm. T: 13.7–20.6mm. Weight: 161g.

Vessel 2. Represented by two probable rim fragments 23:143, 145, four body sherds 19:207, 209; 23:138, 154, 24 fragments 15:9; 16:8a, b; 18:82, 218; 19:38, 39, 210–6; 23:140, 142, 144, 147, 155, 198, 208; 25:191, 32:129a,b, 130, and 51 crumbs 15:154, 16:5a–d, 18:156, 19:9, 133a,b, 150a–b, 217; 23:131a–b, 136–7, 139, 152–3, 155–6, 199, 219a–h; 25:193; 34:132.

If sherds 143 and 145 represent rims, the top is missing in both examples and they appear to have been internally bevelled. The thin-walled friable fabric has a high content of quartzite and mica inclusions (≤4.1mm). The sherds are abraded and the exterior surface is often missing; where it survives it shows the exterior had originally been smoothed. Colour: brown-orange/black/brown-black. T: 5.5–13.3mm. Weight: 126g.

Vessel 3. Represented by a rim fragment 16:4.

The rim is rounded. Hard compact fabric with a high content of quartzite inclusions (≤6.3mm). The surviving surfaces are slightly weathered. Colour: brown-black throughout. T: 14.7mm. Weight: 8g.

Vessel 4. Represented by a base sherd 52:10, two body sherds 44:46/49, 48 and a fragment 19:11. Hard compact fabric with a high content of calcite inclusions (≤4.5mm). The exterior surface is smoothed with a clay and water wash. A coil break is present on sherd 19:11. Traces of carbonised residue are present on the interior surface. Colour: buff/grey/buff-orange. T: 11.5–11.8mm. Weight: 72g.

Fermanagh, Sheehinny td., Knockninny Cave

Early Bronze Age cordoned urn

Vessel 1 (Fig. 4.4). Represented by a rim sherd 1876:12a (wk. 2) and nine body sherds 1876:12b (wk. 455/537/13), 1876:12c (wk. 452, 457), 1876:12d (wk. 456), 1876:12e (wk. 21), 1876:12f–j. Flat outwardly projected rim. Two cordons are present, one at a distance of 31.6mm below the rim and a second further down (not possible to estimate distance). Thick-walled, hard coarse fabric with a loose-textured matrix and with a high content of crushed sandstone inclusions (≤6.4mm). The exterior surface is somewhat abraded but had originally been smoothed with a clay wash, although inclusions now protrude. The rim surface is decorated with oblique slashes. A horizontal row of oblique slashes is also present on the outer lip of the rim. Below the undecorated neck is a raised cordon decorated with oblique slashes. The lower raised cordon is also decorated with oblique slashes. The area between the two cordons is decorated with irregularly placed oblique slashes, sometimes forming V-shapes, possibly forming triangles. Decoration is fashioned with an implement like a split reed that left visible striations on the fabric. Slight traces of carbonised residue and fire-blackening are present on the interior surface, on the exterior surface below the rim, and on the surface of the flat rim. Colour: orange/black/black-brown. T: 13.6–16.0mm. Weight: 1,018g.

Early Bronze Age possible vase urn

Vessel 2 (Fig. 4.4). Represented by a body sherd 1876:10 (wk. 538).

Good quality compact fabric with a moderate content of crushed quartzite (≤7.2mm). The somewhat abraded exterior surface had originally been smoothed. Traces of carbonised residue are present on the interior surface. Colour: black/brown-black/black. T: 10.3mm. Weight: 55g.

Early Bronze Age urn

Vessel 3 (Figs. 4.4 and 4.5). Heavily reconstructed complete vessel 1876:9.

Flat inward sloping rim. Good quality hard, thick-walled fabric with a moderate to high content of inclusions (≤7.9mm). The surface is smooth but has a strange texture, the outer skin appears to have been sheared away or perhaps it was never finished. Oblique scores are present on the surface of the flat rim. Traces of an applied rib and an arc are present near the base. Colour: light brown throughout. Rim diameter: 372mm. Base diameter: 120mm. Estimated height: 310mm. T: 10.7–15.2mm.

Limerick, Annagh td., Annagh Cave

Early Neolithic carinated bowl

Vessel 1 (Fig. 4.1). Represented by a rim sherd 18.1 (three joining sherds), a neck sherd 19:1, seven body sherds 18.1, 8:3–5, 7–8, four fragments 8:5, 7–8, and 12 crumbs 8:6, 8.

Flat out-turned rim, pinched in with fingernails on both exterior and interior surface. Good quality hard compact fabric with a moderate to high content of calcite and sandstone inclusions (≤5.6mm). The exterior surface is smooth and burnished; however, some sherds are weathered. The interior surface is fire-blackened. Colour: orange/grey-brown/orange-black. T: 6.9–9.6mm. Weight: 63g.

Middle Neolithic bipartite bowl

Vessel 2 (Fig. 4.3). Represented by a complete bowl (92E0047:5).

Sharply angled shoulder sloping inward and slightly downward to a simple rounded upright rim. The neck and rim were attached as a separate disc onto the upper part of the body. Good quality, fine well-fired fabric with a moderate to high content of mainly quartzite inclusions (≤5.7mm). Evidence in places for burnishing, especially on the neck. Decoration is present in the form of oblique scores on the outer face of the rim. Radial to slightly oblique scores are present on the neck. A shallow scored groove is present at the junction of the rim and neck. Alternating panels of vertical and horizontal scores are present on the body, forming a type of basket-weave motif. The horizontal panels are triangular in shape, narrowing towards the base, and the lower portion is blank. The base is decorated with panels of shallow horizontal grooves forming a pentangular motif; the centre is filled with randomly impressed dots. Four applied, evenly spaced lugs (one now missing) are present on the edge of the shoulder. On the neck the blank zones correspond with the position of the lugs. Colour: grey-brown/grey/orange-brown. Rim diameter: 100mm. Maximum diameter at shoulder: 165mm. Height: 70mm. T: at neck 10.2mm. T: body 8.2mm. Weight: 776g.

Middle Neolithic globular bowls

Vessel 3 (Fig. 4.1). Represented by a complete bowl (92E0047:6).

Slightly in-turned rounded rim. Good quality, hard fabric with a moderate content of mainly quartzite and occasional sandstone inclusions (≤11.1mm). Well finished smooth burnished exterior surface. All-over decoration is present in the form of loose, irregularly fashioned incised lattice motifs. Occasional curved horizontally arranged incised lines are present. Colour: dark grey throughout. Rim diameter: 144mm. Height: 65mm. T: 8.4–9.0mm. Weight: 677g.

Vessel 4 (Fig. 4.1). Rim and sherds representing a large portion of the vessel (92E0047:7, 8:2, 19). Sharply in-turned rounded, thickened rim. The rim is folded over on the interior surface and the rim disc was attached separately to the body of the bowl. Hard slightly friable fabric with a moderate to high content of quartzite and calcite inclusions (≤7.3mm). The surface is weathered and abraded in places but appears to have been originally burnished. The area beneath the rim is decorated for a distance of 71.8mm below the rim. The main decorative motif consists of closely spaced fine horizontal incised lines. A horizontal row of oblique fine scores are present just below the rim. A similar horizontal row is present 28.5mm below the rim and a double row of similar motifs is present at a distance of 47.08mm below the rim. Panels consisting of a vertical incised line enclosing a blank space and bordered with widely spaced horizontal incised lines appear to have been present at intervals around the pot. There is a possible low attached lug within one of the blank panels. Colour: dark grey-red-brown/grey-red-brown/dark grey with buff coloured patches. Estimated rim diameter: 112mm. Estimated height: 120mm. T: 5.8–9.4mm. Weight: 681g.

Vessel 5. Represented by a body sherd 8:1 and eight fragments 8:2, 7, 19:2.

Hard friable fabric with a moderate to high content of calcite inclusions (≤5.7mm). The exterior surface is weathered and abraded. Carbonised residue is present on the interior surface. There is no surviving evidence for decoration. Colour: orange/orange/black. T: 8.6–9.11mm. Weight: 28g.

Limerick, Killuragh td., Killuragh Cave

Early Bronze Age vase urns

Vessel 1. Represented by a rim sherd, no. 1.

Flat rim with rounded outward expansion above a short upright neck and a raised shoulder. Thick-walled hard gritty fabric with a loose textured matrix and a high content of inclusions (≤4.8mm). The exterior surface is weathered and abraded. Faint evidence for decoration survives in the form of an oblique incised line below the channel and an oblique incised line is also present on the rim top. Traces of carbonised residue are present on the interior surface. Colour: orange/orange/black. T: 15.1mm. Weight: 45g.

Vessel 2. Represented by a base-angle fragment no. 2, neck/shoulder sherd no. 3, body sherd no. 51:4 and two fragments nos. 5, 6.

Medium thick-walled coarse fabric with a loose textured matrix and a high content of inclusions (≤4.3mm). The abraded exterior surface had originally been smoothed with a creamy clay and water wash. There is a possible faint incised line on sherd no. 3. Slight traces of carbonised residue are present on the interior surface. Colour: orange-brown throughout. T: 10.4–11.5mm. Weight: 39g.

Vessel 3. Represented by a rim fragment no. 7 and two body sherds nos. 8–9.

Flat unexpanded rim. Hard slightly friable fabric with a loose textured matrix and high content inclusions (≤5.1mm). The exterior surfaces are weathered and abraded. Slight evidence for decoration is present in the form of two oblique incised lines possibly forming a triangular motif. The exterior surface and part of the rim top is fire-blackened. Colour: orange-brown/grey/orange-black. T: 9.4–13.1mm. Weight: 11g.

Late Bronze Age vessels

Vessel 4. Represented by three rim fragments nos. 10–2 and eight fragments nos. 13–20.

Flat unexpanded rim. Thick-walled hard coarse fabric with a high content of inclusions (≤3.8mm). The exterior surface is abraded and uneven. Traces of carbonised residue are present on both surfaces. Colour: brown-black throughout. T: 11.7–13.0mm. Weight: 40g.

Vessel 5. Represented by a rim sherd no. 21, a possible base sherd no. 22, and a fragment no. 23.

Flat, slightly in-turned rim. Good quality hard compact fabric high content of inclusions (≤5.0mm). The slightly abraded exterior surface had been carefully smoothed. Traces of carbonised residue are present on both surfaces. Colour: dark brown-black throughout. T: 12.1–13.8mm. Weight: 40g.

Vessel 6. Represented by a rim sherd no. 24, five body sherds nos. 25–9 and twelve fragments nos. 30–41.

Flat rim with a slight outward expansion. Thick-walled hard coarse fabric with a high content of inclusions (≤7.3mm). The exterior surface is weathered and abraded and inclusions protrude. Traces of carbonised residue are present on both surfaces. Colour: orange/orange-black/orange-black. T: 13.4–16.0mm. Weight: 210g.
There are also two lumps of fired clay.

Waterford, Ballygambon Lower td., Brothers' Cave

Early Neolithic carinated bowl

Vessel 1. Represented by a body sherd 1948:277.

Good quality hard compact fabric with a moderate to high content of calcite and quartzite inclusions (≤3.7mm). The exterior surface is smooth and burnished. Colour: dark brown throughout. T: 7.9mm. Weight: 6g.

Middle Neolithic broad-rimmed globular bowl

Vessel 2. Represented by a rim sherd 1948:255.

Flat outward projected broad rim. Hard brittle fabric with a high content of calcite inclusions (≤7.2mm). The exterior surface is smooth. Part of the inner face of the rim is missing. No evidence for decoration. Colour: orange/grey/orange. Estimated rim diameter: 236mm. T: 9.4mm. Weight: 77g.

Probable domestic Beaker

Vessel 3 (Fig. 4.4). Represented by a body sherd 1948:165.

Hard compact fabric, slightly rough to touch with a moderate to high content of quartzite inclusions (≤3.1mm). The fabric is weathered and leached with the interior surface and core having a honeycomb appearance. Colour: orange/orange/black. T: 9.3mm. Weight: 4g.

Probable cordoned urn

Vessel 4 (Fig. 4.4). Represented by a body sherd 1948:160.

Thick-walled hard gritty fabric with a high content of calcite inclusions (≤4.9mm). The smooth exterior surface is somewhat weathered. Slight traces of carbonised residue are present on the interior surface. Colour: orange/dark grey/brown. T: 17.1mm. Weight: 34g.

Late Bronze Age vessels

Vessel 5. Represented by a rim sherd 1948:161.

Out-turned flat rim with constricted neck. Hard compact fabric with a moderate to high content of inclusions (≤4.2mm). The smooth surface is somewhat uneven. Traces of carbonised residue are present on both surfaces and on the rim. Colour: black-dark brown throughout. T: 12.0mm. Weight: 34g.

Vessel 6 (Fig. 4.4). Represented by a rim sherd 1948:163 and a body sherd 1948:162.

Flat slightly in-turned rim. Hard, compact but gritty fabric with a high content of calcite inclusions (≤8.8 mm). The smooth exterior surface is weathered and leached and cavities are visible on both surfaces. Traces of carbonised residue are present on both surfaces. Colour: grey-black throughout. T: 10.6–11.8mm. Weight: 79g.

Vessel 7 (Fig. 4.4). Represented by a body sherd 1948:164.

Good quality hard compact fabric with a high content of calcite inclusions (≤4.6mm). The surfaces are smooth. Colour: brown/grey/grey. T: 14.0mm. Weight: 20g.

Vessel 8. Represented by a rim fragment 1948:278 and a fragment 1948:276.

Rounded, internally bevelled rim. Hard brittle fabric with a high content of calcite inclusions (≤5.7mm). Inclusions protrude through the smooth exterior surface. Slight traces of carbonised residue are present on both surfaces. Colour: dark brown-black throughout. T: 8.3–11.2mm. Weight: 14g.

Waterford, Ballynamintra Lower td., Ballynamintra Cave

Late Bronze Age vessel

Vessel 1. Represented by a rim sherd E969:150.

Flat rim with a rounded expansion on the exterior surface. Good quality, hard compact fabric with a moderate to high content of inclusions (≤5.6mm). The surfaces are somewhat weathered and uneven. Decoration

is present on the flat rim in the form of thumb-nail impressions. Traces of carbonised residue are present on the interior surface and the rim surface. Colour: dark brown-black throughout. Estimated rim diameter: 226mm. T: 12.2mm. Weight: 57g.

Waterford, Ballynamintra Middle td., Carrigmurrish Cave

Late Bronze Age vessels

Vessel 1. Represented by a rim sherd E969:145, 29 body sherds E969:147 and 16 fragments E969:147.

Barrel-shaped vessel with flat rim. Hard, coarse good quality fabric with a high content of calcite inclusions (≤9.2mm). The sherds are abraded and uneven with inclusions protruding. Carbonised residue is present on the interior surface and traces are present on the rim and on the exterior surface, just below the rim. Colour: grey-brown/grey-brown/black. Estimated rim diameter: 226mm. T: 11.6–14.4mm. Weight: 1317g.

Vessel 2. Represented by a rim sherd E969:145, a base-angle sherd E969:147 and four body sherds E969:147.

Barrel-shaped vessel with rounded slightly in-turned rim. Good quality hard compact fabric with a high content of calcite and quartzite (≤8.3mm). The surfaces are weathered and somewhat uneven but effort had been made to smooth the surface with a clay and water wash. Traces of carbonised residue are present on the interior surface. The surface of the rim and the exterior surface below the rim are fire-blackened. Colour: orange-black/grey-brown/black. Estimated rim diameter: 223mm. Estimated base diameter: 110mm. T: 12.1–14.8mm. Weight: 422g.

Vessel 3. Represented by a rim sherd E969:145.

Barrel-shaped vessel with rounded slightly in-turned rim. Hard, good quality coarse fabric with a high content of stone inclusions (≤4.1mm). The exterior surface is somewhat uneven and inclusions protrude but effort had been made to smooth the surface with a clay and water wash. Traces of carbonised residue are present on the interior surface, the rim and on the exterior surface just below the rim. Colour: orange-black/dark grey/grey-black. Estimated rim diameter: 224mm. T: 12.4mm. Weight: 78g.

Vessel 4. Represented by three body sherds E969:147, a base sherd E969:147 and a base-angle sherd E969:147.

Poor quality brittle fabric with a high content of large angular-shaped shale inclusions (≤15.6mm). The exterior surface is uneven and inclusions protrude but had been smoothed with a thick water and clay wash. Traces of carbonised residue are present on the interior surface. Colour: orange/black/black. T: 9.6–11.2mm. Weight: 55g.

Vessel 5. Represented by a rim/neck sherd E969:145.

Slightly out-turned flat rim, upright neck above the curved body. Hard, good quality coarse fabric with a high content of inclusions (≤5.6mm). The exterior surface is generally smooth but in areas it is uneven with protruding inclusions. Traces of carbonised residue and fire-blackening are present on the interior surface, the rim and the exterior surface just below the rim. Colour: orange-black/grey/black. T: 11.8mm. Weight: 86g.

Vessel 6. Represented by a rim fragment E969:147.

Slightly out-turned rounded rim, upright neck above the curved body. Hard, good quality coarse fabric with a high content of inclusions (≤5.3mm). The exterior surface is smoothed with a clay and water wash. Traces of carbonised residue are present on the interior surface and rim. The exterior surface, just below the rim is fire-blackened. Colour: grey-black/grey-orange/black. T: 14.4mm. Weight: 24g.

Vessel 7. Represented by a rim sherd E969:146.

Slightly out-turned rounded rim, upright neck above the curved body. Good quality hard compact fabric with a moderate content of inclusions (≤2.8mm). The exterior surface is smoothed with a clay and water wash. Traces of carbonised residue are present on the rim. Colour: orange/grey/orange-black. T: 12.1mm. Weight: 27g.

Vessel 8. Represented by two rim sherds E969:146, a base-angle fragment E969:146 and 17 body sherds E969:146.

Rounded internally bevelled rim. Hard compact, somewhat chalky-textured fabric with a high content of quartzite inclusions (≤8.4mm). The smoothed exterior surface is somewhat weathered and inclusions protrude. Coil breaks are present on a few sherds. Traces of carbonised residue are present on the interior surface and on the interior surface of the bevelled rim. Colour: orange/orange-grey/brown-black. Estimated rim diameter: 200mm. T: 9.6–12.7mm. Weight: 577g.

Vessel 9. Represented by a rim sherd E969:146, a base-angle sherd E969:146, a base sherd E969:146 and three body sherds E969:146.

Flat rim with an outward expansion. Thick-walled, hard compact fabric, chalky in texture and with a high content of quartzite inclusions (≤10.2mm). The surfaces are smooth but somewhat weathered. The surface of the rim is decorated with bone impressions. Colour: orange/grey/orange. T: 14.9–19.8mm. Weight: 773g.

Waterford, Bridgequarter td., Oonaglour Cave

Early Neolithic carinated bowl

Vessel 1 (Fig. 4.4). Represented by a simple-angled shoulder sherd (1948:149).

Good quality hard compact fabric with a moderate content of crushed inclusions (≤3.8mm). The slightly weathered exterior surface is smooth and burnished. The interior surface shows the shoulder join to be carelessly executed, shown by an overlapping join. Both surfaces are fire-blackened. Colour: dark brown/black throughout. T: 7.4mm. Weight: 25g.

Domestic Beaker

Vessel 2 (Fig. 4.4; Pl. 22). Represented by a portion from the neck (1948:148/146).

Good quality hard compact fabric with a moderate content of fine inclusions (≤2.2mm). The exterior surface is well finished. The exterior surface is decorated with horizontal rows of grooves forming low raised ribs at intervals, creating a ribbed effect. In areas the grooves are carelessly finished, where the implement used extends beyond the end of the groove, forming overlapping oblique incised lines. A coil join is visible on the interior surface in the form of overlapping clay. Evidence for fire-blackening is present on the interior surface. Colour: orange-brown/black/brown. T: 6.1–7.2mm. Weight: 73g.

Vessel 3 (Fig. 4.4). Represented by a neck sherd 1948:147, from just below the rim.

Good quality hard compact fabric with a moderate content of fine inclusions (≤2.7mm). The surfaces are well finished. Two low raised cordons are present on the exterior surface. Traces of fire-blackening are present on the exterior surface. Colour: orange-brown/dark grey/brown. T: 5.7mm. Weight: 8g.

Waterford, Kilgreany td., Kilgreany Cave

Early Neolithic carinated bowls

Vessel 1. Represented by a rim fragment E9:76.

Flat inward sloping rim. Thin-walled, hard brittle gritty fabric with a high content of inclusions (≤4.1mm). The surfaces are weathered and inclusions protrude. Colour: dark brown throughout. T: 6.2mm. Weight: 5g.

Also possibly from Vessel 1 are two burnished sherds (E9:657, 658) that are embedded in a portion of a stalagmite.

Vessel 2. Represented by two neck sherds E9:78, 84 and a neck/shoulder sherd E9:77.

Gently curving neck and a low stepped shoulder. Good quality, hard compact fabric with a moderate content of fine inclusions (≤1.8mm). The surfaces are smooth and burnished. Colour: dark brown/dark red/dark brown. T: 7.1–7.8mm. Weight: 46g.

Vessel 3. Represented by a rim/neck sherd E9:93 and a shoulder/neck sherd E9:95.

Rounded out-turned rim with a low stepped shoulder. Good quality, hard compact fabric with a moderate content of inclusions (≤2.1mm). The exterior surface is smooth and burnished. A coil join is visible on the interior surface of the rim. Colour: buff-orange/orange/orange. T: 8.7–10.9mm. Weight: 38g.

Vessel 4. Represented by a shoulder sherd E9:94.

Low stepped shoulder. Thin-walled, hard brittle fabric with a low content of quartzite inclusions (≤3.5mm). The surface is smooth, slightly abraded and probably had been burnished. Colour: orange/orange/orange-brown. T: 4.4mm. Weight: 4g.

Vessel 5. Represented by a rim fragment E9:100.

Rounded out-turned rim. Good quality, hard compact fabric with a moderate content of inclusions (≤1.4mm). The smooth exterior surface was possibly burnished. Colour: orange throughout. T: 6.6mm. Weight: 1g.

Vessel 6. Represented by two rim fragments E9:87, 178, a shoulder sherd E9:85 a body sherd E9:86 and a fragment E9:676.

Flat rim with a low stepped shoulder. Hard compact fabric, slightly chalky in texture and with a high content of inclusions (≤5.6mm). The smooth and probably burnished exterior surface is somewhat weathered. Slight traces of carbonised residue is present on the interior surface. Colour: orange/grey-orange/orange-brown. T: 7.8–10.8mm. Weight: 31g.

Vessel 7. Represented by a rim/neck sherd E9:80.

Slightly out-turned rounded rim with a gently curved rim. Good quality, thin-walled hard somewhat brittle fabric with a high content of calcite and quartzite inclusions (≤3.7mm). The exterior surface is somewhat abraded but had been smoothed with a clay and water wash and possibly burnished. Both surfaces are fire-blackened. Colour: dark orange throughout. T: 5.8mm. Weight: 8g.

Middle Neolithic globular bowl

Vessel 8. Represented by a body sherd with portion of a lug E9:345.

Good quality, hard compact fabric with a moderate content of inclusions (≤4.0mm). The exterior surface has a smooth creamy clay and water wash. The interior surface is missing. The lug is decorated with a row of oblique strokes. Another row of oblique strokes is present on the body, just below the lug. Colour: dark orange throughout. Surviving thickness: 12.6mm. Weight: 10g.

Late Bronze Age vessels

Vessel 9. Represented by a rim sherd E9:89. Appears to represent a shallow bowl.

Upright rounded rim with a bulbous expansion 9.9mm below the rim. Good quality, thin-walled hard fabric with a moderate content of inclusions (≤3.5mm). The exterior surface is uneven in places. The exterior surface is fire-blackened. Colour: orange-grey/dark grey/orange. Estimated rim diameter: 105mm. Estimated height: 74mm. T: 6.7–8.5mm. Weight: 20g.

Vessel 10. Represented by a base-angle sherd E9:91 and three fragments E9:88, 96, 99.

Hard brittle gritty fabric with a high content of inclusions (≤4.8mm). The smooth exterior surface is somewhat weathered and inclusions protrude. Traces of carbonised residue are present on the interior surfaces. Colour: orange/grey-black/brown-orange. T: 9.7–10.6mm. Weight: 26g.

Vessel 11. Represented by a rim sherd E9:90.

Flat inward sloping rim, upright neck above the curved body. Good quality hard compact fabric with a moderate to high content of inclusions (≤6.1mm). The smooth exterior surface is somewhat weathered. Traces of carbonised residue are present on both surfaces and the rim. Colour: orange-brown/grey/orange-black. T: 8.8mm. Weight: 46g.

Vessel 12. Represented by a body sherd E9:92.

Thick-walled hard fabric with a loose textured matrix and a high content of inclusions (≤5.1mm). The smooth exterior surface is somewhat weathered. Traces of carbonised residue are present on the interior surface. Colour: orange/grey/orange-brown. T: 14.2mm. Weight: 46g.

Vessel 13. Represented by three rim sherds Kp. 9, 50 and two body sherds Kp. 55, 57.

Flat slightly inward sloping rim with a shallow channel just below the rim on the exterior surface. Good quality, hard compact gritty fabric with a high content of quartzite and calcite inclusions (≤7.6mm). The exterior surface is smooth but inclusions protrude. A coil break is present on sherd Kp. 9. Traces of carbonised residue are present on both surfaces and the rim. Colour: dark brown-black throughout. T: 10.0–11.4mm. Weight: 64g.

Vessel 14. Represented by a rim fragment Kp. 16 and six body sherds Kp. 13, 15, 60, 103, 106a–b.

Flat unexpanded rim. Hard compact fabric with a high content of inclusions (≤3.9mm). The smooth exterior surface is somewhat weathered. Traces of carbonised residue are present on the interior surface. Colour: grey-brown/grey-brown/grey-black. T: 11.5–11.7mm. Weight: 160g.

Vessel 15. Represented by a rim sherd Kp. 93; 51 body sherds Kp. 1, 9, 12, 14, 17–8, 23, 25–8, 31, 33–6, 39, 41, 43, 46, 51, 53, 56, 59, 60, 62, 67, 70, 72, 76–7, 80, 82, 85–7, 94, 102–3, 105–6, 110, 112, 116, 119, 128, 5 unnumbered sherds; and 18 fragments Kp. 10, 19–21, 30, 32, 38, 64–5, 79, 109, 111, 117–8, four unnumbered sherds.

Flat unexpanded rim. Good quality, hard compact fabric with a high content of calcite and quartzite inclusions (≤7.6mm). The sherds are weathered and uneven in places. Coil breaks are present. Traces of carbonised residue are present on both surfaces. Colour: grey/grey-black/grey-black. T: 10.3–12.6mm. Weight: 884g.

Vessel 16. Represented by a rim sherd Kp. 97.

Flat rim with rounded interior surface. Hard compact fabric with a high content of calcite inclusions (≤6.4mm). The exterior surface is smooth. Traces of carbonised residue are present on the exterior surface. Colour: dark grey-black throughout. T: 9.6mm. Weight: 22g.

Vessel 17. Represented by rim fragment Kp. 44; four body sherds Kp. 3, 5–6, 23 and three fragments Kp. 7a–b, 24.

Flat rim with pointed outward expansion. Good quality, hard compact fabric with a high content of calcite inclusions (≤5.6mm). The smooth exterior surface is somewhat weathered. Traces of carbonised residue are present on the interior surface. Colour: grey/grey/grey-black. T: 9.5–10.3mm. Weight: 66g.

Vessel 18. Represented by a rim sherd Kp. 29.

Flat inward sloping rim with a low channel 15.7mm just below the rim on the exterior surface. Hard compact fabric with a moderate to high content inclusions (≤4.5mm). The smooth exterior surface is somewhat weathered and a coil break is present. Traces of carbonised residue are present on both surfaces and the rim. Colour: grey-black throughout. T: 9.7mm. Weight: 28g.

Vessel 19. Represented by three rim sherds Kp. 45, 88, 125; 14 body sherds Kp. 12, 42–3, 52, 74, 89, 90–2, 123, 127–8, 130, one unnumbered sherd; and four fragments Kp. 51, 53–4, 128.

Internally bevelled rim with a rounded external expansion. Hard gritty fabric with a high content of mainly shale inclusions (≤5.5mm). The exterior surface is somewhat abraded and uneven but had been smoothed with a clay and water wash. Traces of carbonised residue are present on areas of both surfaces and the rim. Colour: orange-black/grey-black/grey-black. T: 9.4–10.3mm. Weight: 468g.

Vessel 20 (Pl. 24). Represented by a large portion of the rim Kp. 24, 95–6.

Flat inward sloping rim with a low channel 14.3mm on the exterior surface below the rim. Hard compact fabric with a high content of calcite inclusions (≤6.4mm). The exterior surface is somewhat abraded and uneven but had been

smoothed with a clay and water wash. Traces of carbonised residue and fire blackening are present on both surfaces and the rim. Colour: grey-black/grey/grey-black. Estimated rim diameter: 200mm. T: 9.8mm. Weight: 264g.

Vessel 21. Represented by two rim fragments Kp. 98 and an unnumbered sherd; eight body sherds Kp. 33, 58, 60, 75, 99, 108, 113, 120; nine fragments Kp. 48, 71, and seven unnumbered sherds.

Flat slightly in-turned rim. Good quality, hard fabric with a high content of inclusions (≤8.1mm). The exterior surface is somewhat abraded and uneven but had been smoothed with a clay and water wash. Coil breaks are present. Traces of carbonised residue are present on both surfaces and the rim. Colour: grey-black throughout. T: 11.1–11.7mm. Weight: 188g.

Six Late Bronze Age sherds too small or indistinct to assign to the above vessels.

Kp. 37, 68, 81, 83, 122 and an unnumbered sherd (weight: 22g).

5

Polished stone axeheads from Irish caves

Stephen Mandal, Emmett O'Keeffe and Gabriel Cooney

Over 21,000 stone axeheads are known from Ireland (Sheridan *et al*. 1992, 391; Cooney and Mandal 1998, 4) and are regarded as one of the characteristic objects of the Mesolithic and Neolithic, continuing in use into the Bronze Age (e.g. Woodman 1978; Woodman 1987; Cooney and Grogan 1994). These artefacts were both a symbol of prestige and an ordinary working tool for people over thousands of years. Stone axes served a wide range of functions in prehistoric societies, including use in woodworking, in burial and ceremonial contexts, and as symbols of power. Since 1991 stone axeheads have been the focus of detailed research by the Irish Stone Axe Project (ISAP).

Fourteen stone axeheads, or fragments of axeheads, have been recovered from ten caves in Ireland (Fig. 5.1; Table 5.1). This chapter describes the axeheads in terms of distribution and context, the rock types from which they were manufactured, and the forms that were produced. Of the fourteen axes, eight are known from published or unpublished records only and have not been physically inspected by the ISAP (six of these can no longer be located). Eight axeheads are from Co. Waterford (including four from Oonaglour Cave); two from Co. Limerick; and one each from counties Antrim, Clare, Kerry and Sligo. An equally wide range of rock types and morphologies are represented, from simple functional objects to unusually large and/or well finished axeheads. The significance of the occurrence of stone axeheads in caves was noted by the ISAP (e.g. Cooney and Mandal 1998, 36–37), although by the late 1990s only two axes from cave contexts had been recorded on the ISAP database. Recent research (notably by Dowd: 2004; Dowd 2008; Dowd 2015) has stressed their importance in cave contexts, and the evidence presented here supports that significance.

Distribution and context

The occurrence of eight axeheads from five caves in Co. Waterford is perhaps the most striking aspect of this study, particularly as only 35 axeheads have been recorded by the ISAP from this county (i.e. 57% of axeheads from cave contexts come from a county that only accounts for 0.3% of the total number of axeheads recorded in the country – with provenance known to county level).

Four stone axeheads were found in Oonaglour Cave, none of which can be located at present. Three of these were found together at a place known as the *Reef*, possibly indicating that they represent a hoard that was deposited in the cave, though their propinquity to large quantities of human bones suggests that they may also represent gravegoods (Dowd 2004; Dowd 2015). Unpublished records of the 1907–1913 excavations by Col. Richard W. Forsayeth in this cave note that Axe 1 was 'a much damaged, roughly polished and ground stone celt – usual shape made of a hard green stone'. Axe 2 was a 'very damaged stone axe; one side apparently blackened by fire'. Axe 3 comprised 'a polished greenstone celt in excellent condition ... portion of the tool is blackened as if it had been exposed to the action of fire ... It has a perfect and uninjured edge'. Axe 4 consisted of a 'small greenstone celt' with a finely ground blade but much of the body had been 'merely chipped in a very unfinished style' (Dowd 2004, 163). The fact that two of the axeheads appear to have been exposed to fire (according to the antiquarian accounts) further suggests ritual activity. A number of other prehistoric artefacts were recovered from Oonaglour Cave indicting activity from at least the Neolithic (and possibly earlier) to the Late Bronze Age, including worked flint, Beaker pottery, saddle querns, sherds of Late Bronze Age pottery and several other bronze

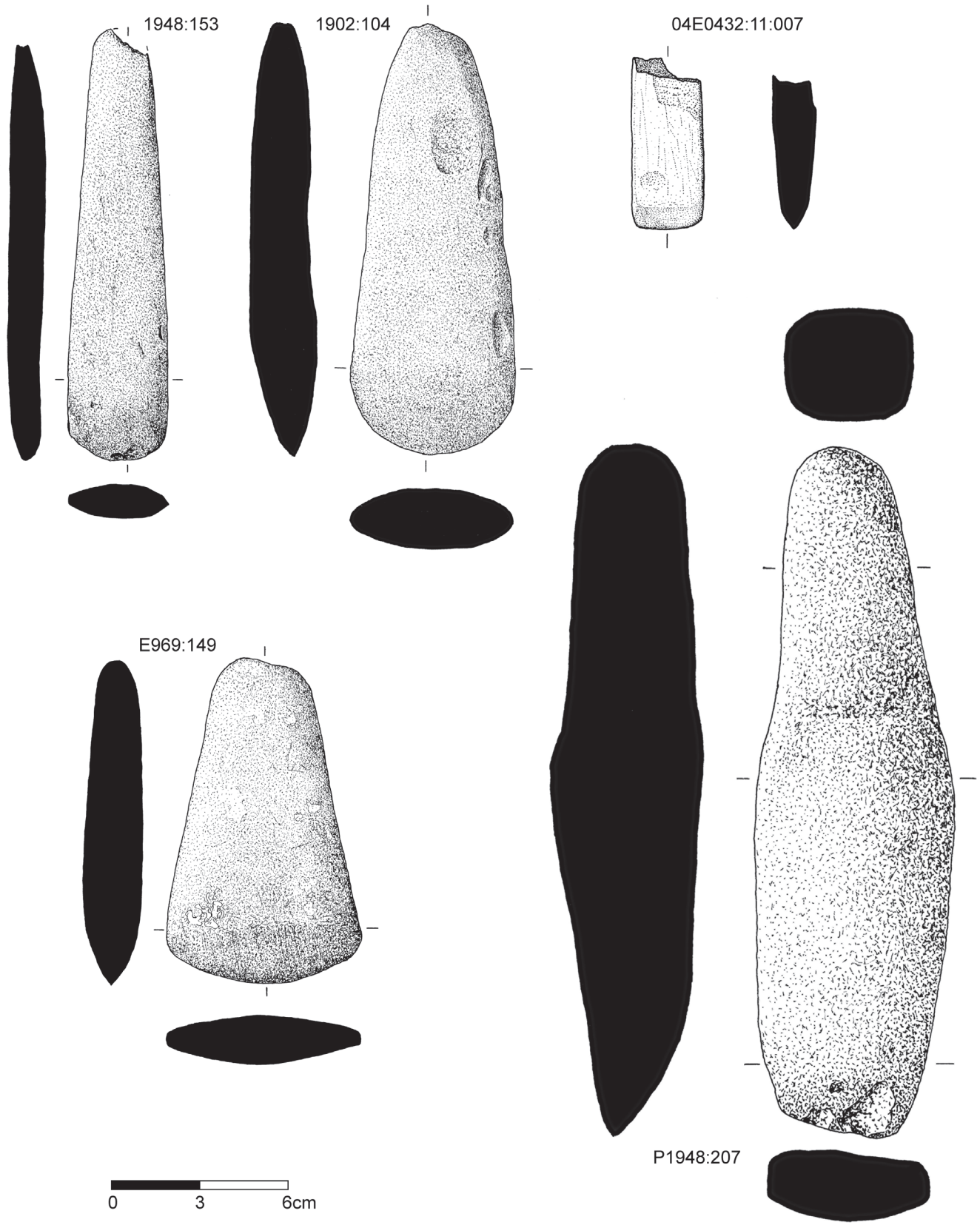

Figure 5.1 Stone axeheads from Brothers' Cave (1948:153); Plunkett Cave, Keash (1902:104); Glencurran Cave (04E0432:11:007); Ballynamintra Cave (E969:149); and Cappagh Cave (P1948:207) (Illustrations: 1, 2, 4, 5: Malgorzata Kryczka; 3: Abigail Brewer).

Table 5.1 Stone axeheads from caves.

County *Townland* *Cave*	*Reg. no.*	*Petrography*	*Type*	*L (cm)*	*W (cm)*	*T (cm)*	*Manufacture*
Antrim Redbay? td. Cushendall Cave	Record only	–	Axe *	–	–	–	–
Clare Tullycommon td. Glencurran Cave	21536 (04E0432:11:007)	Shale Dark grey parallel laminated	Chisel	5.9	2.5	1.5	Flaked and ground
Kerry Cloghermore td. Cloghermore Cave	21579 (99E0431:179)	Shale	Axe/ Adze	5.4	5.2	2.2	Flaked, ground and polished
Limerick Grange td. Grange Hill Cave	4075	Diorite? Green diorite	Axe *	26.7	7.5	5.7	Polished; pecked near butt
Limerick Grange td. Grange Hill Cave	4076 (ISA:013)	Porcellanite Mottled, banded	Axe	7.6	4.5	2.6	Flaked, ground and polished
Sligo Cloonagh td. Plunkett Cave (Keash)	6257 (1902:104)	Shale	Axe	14.3	5.4	2.6	Flaked, ground and polished
Waterford Ballygambon Lower td. Brothers' Cave	4130 (1948:153)	Schist	Axe/ chisel	14.6	3.3	1.1	Pecked, ground and polished
Waterford Ballynamintra Lower td. Ballynamintra Cave	18938 (E969:149)	Andesite?	Axe *	–	–	–	Polished
Waterford Bridgequarter td. Oonaglour Cave	20777	Greenstone	Axe *	–	–	–	Ground and polished
Waterford Bridgequarter td. Oonaglour Cave	20778	–	Axe *	–	–	–	–
Waterford Bridgequarter td. Oonaglour Cave	20779	Greenstone	Axe *	–	–	–	Polished
Waterford Bridgequarter td. Oonaglour Cave	21525	Greenstone	Axe *	9.5	7.1	–	Flaked and ground
Waterford Kilgreany td. Kilgreany Cave	20780	Flint	Axe *	–	–	–	Polished
Waterford Uncertain td. Cappagh Cave	4911 (P1948:207)	Sandstone Grey fine grained dense (meta–) sand	Axe	23.3	6.6	5.2	Pecked, ground and polished; selectively pecked to give grip for haft

(*denotes artefacts not physically examined by the ICAP)

objects of possible prehistoric date (Dowd and Corlett 2002; Dowd 2015; Roche this volume).

The axehead from Ballynamintra Cave was found less than 12m from a scatter of disarticulated human bones radiocarbon dated to the Neolithic and Early Bronze Age (Adams *et al*. 1881; Dowd 2008; Dowd 2015), as well as a series of hammerstones and possible hammerstones of unknown date (Mandal this volume). Brothers' Cave, located in close proximity to Oonaglour Cave, produced a schist axehead as well as another assemblage of Neolithic

and Bronze Age material (Forsayeth 1931; Dowd and Corlett 2002; Dowd 2015). The two remaining axeheads from Waterford were single finds: a flint roughout found at Kilgreany Cave (Tratman 1929, 115), and a sandstone axehead from Cappagh Cave. It should be noted that Dowd (2004, 165) has argued that the latter may in fact be one of the four Oonaglour Cave axes for which records have become confused.

Apart from the Waterford axes, a small stone axehead was found at Glencurran Cave, Co. Clare in association with human and animal remains and artefacts of Bronze Age date (Dowd 2009). O'Kelly (1944/5, 50) reported on several stone axeheads that were discovered in Grange Hill Cave, Co. Limerick *c*. 1917 or 1918; however, by 1940 only two could be located (Dowd 2004, 474). There are a number of factors that suggest the Grange Hill Cave axeheads represented a votive deposit: the presence of a porcellanite axehead, which must have been imported (see below); the large size of the diorite axe (26.7cm in length); and the fact that both axes were ground and polished to a far higher degree than would be necessary for function (Fig. 5.2). The hoard is probably of Neolithic date as there is no evidence that porcellanite was used in Ireland prior to 3800 BC (Sheridan 1986, 25). The exceptionally large and impressive diorite axe can no longer be located but was described in 1940 by Professor M. J. O'Kelly as manufactured from 'green dioritic stone' and O'Kelly's unpublished sketch of the axe indicates it measured 26.7m in length (Dowd 2004, 173). The lower portion of a shale axe/adze was found during archaeological excavations at Cloghermore Cave, Co. Kerry (Connolly *et al*. 2005, 198). The vast majority of material from this site related to early medieval and Viking activities, but a small number of lithics suggest prehistoric activities in the immediate vicinity of the cave, if not inside (Woodman this volume).

Three axeheads were found in caves in the northern half of the country. In 1901 a stone axehead was recovered during archaeological excavations close to the entrance of Plunkett Cave, Keash, Co. Sligo. The archaeological assemblage from this site largely reflected early medieval and Iron Age activities (Scharff *et al*. 1903; Dowd 2009). In the mid-nineteenth century Lloyd (1847/50, 395) reported the discovery of a stone axehead, four bronze axeheads, two human skeletons (later reported as six) and two Anglo-Saxon silver pennies at Cushendall Cave, Co. Antrim in the course of limestone quarrying. Unfortunately, the fate of the skeletal remains and axes is not known.

Petrography

An interesting range of rock types were utilised for the axes found in caves, including igneous, sedimentary and metamorphic, mirroring the range of rock types used in axehead manufacture in Ireland. Information regarding the rock types from which the fourteen axeheads were made is available for all but two axes. However, eight of these were not examined by the ISAP and are only known from published records. The two recorded as being made from flint are probably accurate. The three from Oonaglour Cave identified as being made from greenstone could be igneous (either andesite if fine grained, or dolerite if coarse grained), or sedimentary (mudstone if fine grained, or sandstone if coarse grained).

Igneous rock types

Excluding the Oonaglour 'greenstone' axeheads, which could be igneous, two axes are made from igneous rock types: the Ballynamintra Cave example is andesite, and the large axe from Grange Hill Cave was described as diorite, a medium grained basic igneous rock.

Sedimentary rock types

Six axeheads are made from sedimentary sources (again excluding the 'greenstone' axes from Oonaglour Cave). The medium to fine grained sandstone axehead from Cappagh Cave was cored for thin section analysis by the ISAP and is recorded as grey fine-grained dense (meta-) sand. The three axes from Glencurran Cave, Cloghermore Cave and Plunkett Cave are made from shale – a fine grained, dark grey to black parallel laminated sediment. Finally, the axe from Kilgreany Cave is recorded as being made from flint (Tratman 1929, 115).

Metamorphic rock types

Two of the axeheads are made from metamorphic rock types: the porcellanite example from Grange Hill Cave; and the schist one from Brothers' Cave.

'Greenstones'

The term 'greenstone' typically refers to fine grained igneous rock types, but the possibility remains that in the early 1900s Col. Forsayeth intentionally described a sedimentary rock as such, or mistakenly identified the rock type. As noted above, the three axeheads from Oonaglour Cave, described as 'greenstones', could be either igneous (andesite or similar, or dolerite) or sedimentary (mudstone or sandstone). The fact that one is recorded as having been flaked would indicate that a fine grained rock type (such as mudstone or andesite) is more likely.

Potential raw material sources

Of the eight axeheads from Waterford, one is andesite, three are 'greenstone', one is sandstone, one is flint and

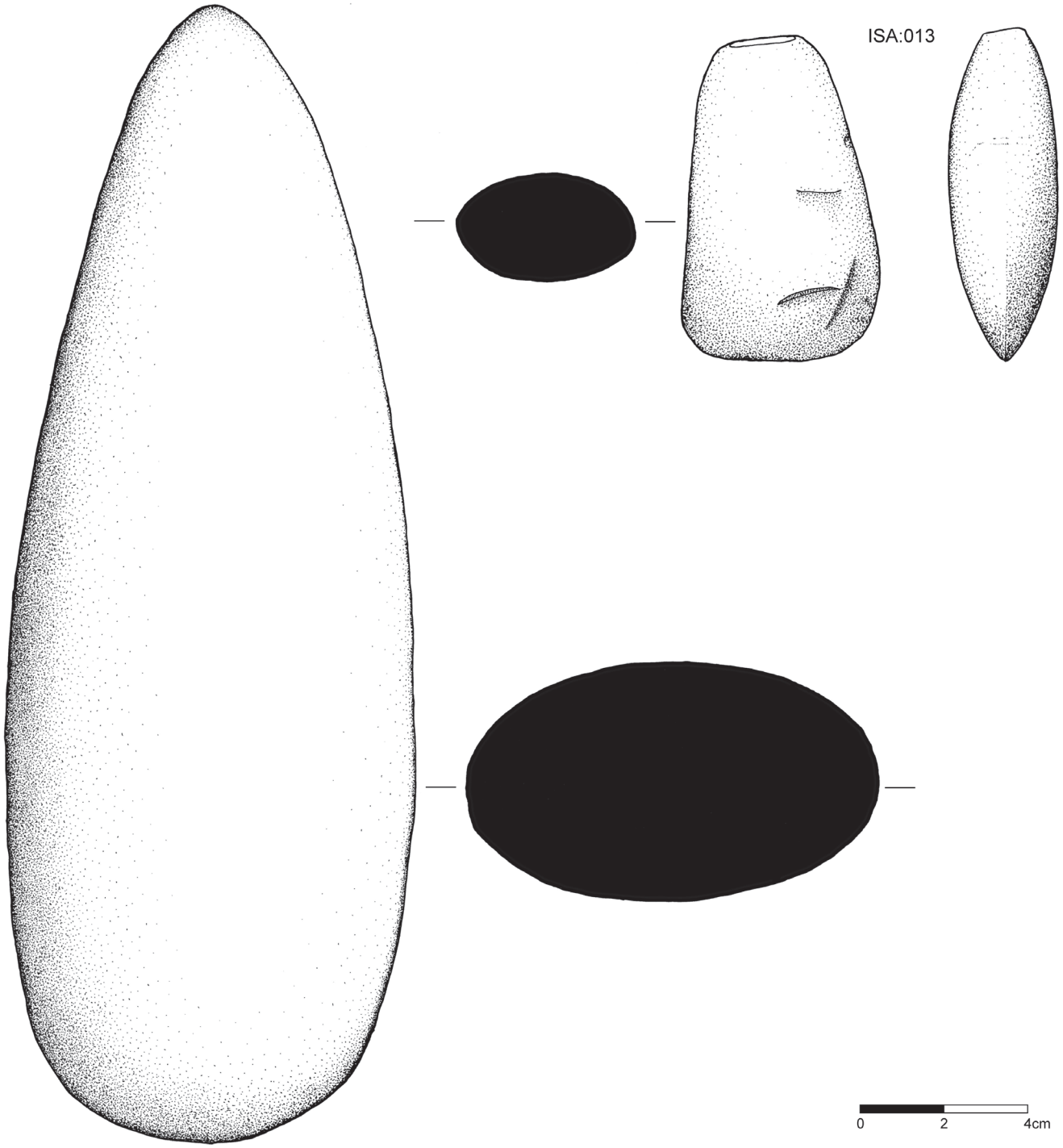

Figure 5.2 Diorite axe (now lost; illustration based on M. J. O'Kelly's 1940s unpublished sketch) and porcellanite axe (ISA:013) from Grange Hill Cave (Illustration: Fiachra Dunne).

one is schist. The geology of Waterford is dominated by sedimentary rocks of Devonian to Carboniferous age, notably Old Red Sandstone. This is interesting given the green colour of four of the axeheads ('greenstones' from Oonaglour and andesite from Ballynamintra), which would have contrasted with the red colour of the majority of rocks in this area – both in outcrops and in the local glacial tills and river or beach cobbles. There are potential sources of green coloured rock for axehead manufacture, notably the green mudstones of the Ardmore Member of the Gyleen Formation and the Kiltoran Formation, and the numerous green volcanic dykes, which occur particularly in coastal

areas (Sleeman and O'Connell 1995). Thus, the utilisation of local primary or secondary sources cannot be ruled out for these Waterford axeheads, but the fact remains that they would have stood out visually from the majority of the stones that would have been readily available in this region.

The most likely primary sources of schist (Brothers' Cave axe) in the Waterford area occur to the south of the county relating to the Ordovician volcanics (Sleeman and O'Connell 1995), but secondary sources such as tills could also have been utilised. Regardless, as above, this material would have stood out visually from the majority of what was available in the area. There are, however, no local sources for flint in the county, though it occurs on most beaches and more rarely in tills along the length of the east coast of Ireland, transported by sea ice from the Antrim coast. A flint core of suitable size to manufacture an axehead such as that from Kilgreany Cave would be an unusual occurrence, but one that cannot be ruled out.

The most striking rock type is the porcellanite from Grange Hill Cave. Porcellanite is known from only two sources in Ireland, namely Tievebulliagh in Co. Antrim and Rathlin Island, off the north coast of Northern Ireland. It is an extremely unusual rock type, resulting from the metamorphism of a lens of lateritic soil incorporated into a dolerite plug, which represented the last phase of volcanoes at Tievebulliagh and at Brockley on Rathlin Island. Both of the above mentioned sources show clear evidence for large scale exploitation of the porcellanite outcrops in the production of stone axeheads (e.g. see Mallory 1990). While porcellanite accounts for almost half of the total number of axeheads identified in Ireland by the ISAP, and porcellanite axeheads have been found throughout the country and further afield, their frequency decreases away from the two known sources (Cooney and Mandal 1998, 64–65). It is highly probable that the porcellanite axehead from Grange Hill Cave came from one or other of the Antrim sources. Porcellanite is a very distinctive rock type and its occurrence in Limerick would certainly have been unusual (porcellanite accounts for only 9% of axeheads from the county where petrographical identification has been undertaken). While it is not possible to differentiate between these sources by macroscopic (hand specimen) examination, or indeed in thin section, x-ray fluorescence geochemical analysis of samples taken from the two sources has identified a difference in the trace element concentrations, particularly of strontium (see Mandal *et al*. 1997). This method can be used to match porcellanite axeheads to a particular source (*ibid*.).

There are outcrop and/or secondary sources relatively close to the caves where the remaining axeheads were recovered. Igneous intrusive and volcanic sources occur throughout the Limerick volcanics, specifically in the Lough Gur area, from which the diorite axehead from Grange Hill Cave could have been sourced. Shale is abundant in Co. Clare (for the Glencurran Cave axehead), and relatively common in Co. Kerry (for the Cloghermore Cave axehead), and Co. Sligo (for the Plunkett Cave axehead).

Manufacture and morphology

In describing the axeheads, it is important to emphasise that only six of the fourteen have been viewed and recorded by the ISAP, and the remaining eight have varying and limited information available in published and unpublished records.

Of the six recorded, four are complete and two are lower portions (i.e. the half of the axehead with the blade). Three are axes, one an axe/chisel (Brothers' Cave), one the lower portion of an axe/adze (Cloghermore Cave), and one the lower portion of a chisel (Glencurran Cave). There is also an axe body fragment (Kilgreany Cave). Six of the axeheads have dimensional information recorded (see Table 5.1). Two of the axeheads are very large (>20cm), and a further two are large (>14cm). The largest is the diorite axehead from Grange Hill Cave at 26.7cm in length (O'Kelly 1944/5). To put this in context, less than 7% of axeheads recorded by the ISAP are longer than 20cm in length.

Details of the method of manufacture and quality of finish are recorded for ten of the axeheads (Table 5.1). The ISAP has identified two distinct methods of manufacture of axehead roughouts, either from outcrop or secondary sources (Cooney and Mandal 1998, 13). Fine grained rock types such as porcellanite that can be fractured in a predictable manner when struck, in a technique similar to that used in flint knapping, are typically flaked to produce the crude axehead form (a roughout). Coarser grained rock types such as sandstone are difficult to break in a predictable manner and are, therefore, often pecked or hammered to reduce to a roughout shape. Five of the axes from caves exhibit flake scars indicative of having been flaked as a primary treatment: the shale examples from Glencurran Cave, Cloghermore Cave and Plunkett Cave; one of the greenstones from Oonaglour Cave; and the porcellanite from Grange Hill Cave. It is important to note that the shale axeheads were manufactured from water rolled cobbles, with minimal flaking required to produce the axehead roughout. Details on the greenstone axes are not known, but the porcellanite and andesite examples are clearly extensively flaked and are likely to have been extracted from outcrop sources. The sandstone from Cappagh Cave and the schist from Brothers' Cave have evidence of having been pecked as a primary treatment. In terms of the quality of finish (secondary working), the ISAP has differentiated between *grinding* where striations are clear and *polishing* where the finish is smooth (Cooney and Mandal 1998, 13–14). Two axes have been ground only, whereas eight have been polished (although it is important to note that this figure includes five that were not examined by the ISAP). Of particular interest

is the sandstone axehead from Cappagh Cave, which has a distinctive hafting band. A band around the central portion of axehead has been deliberately pecked, presumably to provide grip for a haft. Overall, the evidence for their manufacture suggests that axeheads from caves are generally finished to a relatively high degree compared to the average.

Conclusions

The stone axeheads found in caves in Ireland are very interesting for a number of reasons. Axeheads have been found in hoards in two of these caves: four axeheads at Oonaglour Cave and two at Grange Hill Cave (and records indicate there were more). Axeheads have been found in association with other prehistoric material and human bones at Brothers', Ballynamintra, Glencurran and Oonaglour (Dowd 2015). In some if not all of these instances, it is reasonable to assume that the deposits served some form of funerary, ritual or votive role. However, it should also be noted that the assemblages of hammerstones and other working tools from Ballynamintra (Mandal this volume) and Glencurran (Mandal 2009) could also indicate that the axeheads from these caves were part of a working assemblage of finds rather than necessarily serving a higher purpose.

While the range of rocks types used is broad, the occurrence of unusual rock types is marked. The porcellanite axe from Grange Hill Cave is the most obvious example of an axehead that has been imported into the area. Equally interesting is the use of unusual rock types, which may have been sourced locally but were certainly not one of the commonly occurring rock types in these areas. Of note in this regard are the 'greenstones' and andesite from Oonaglour Cave and Ballynamintra Cave respectively. In an area dominated by red coloured rocks, these green axes would have been very distinctive, even if sourced locally. The level of finish in general terms of the axeheads is also interesting. Of those that have been examined by the ISAP, the majority are finished to a relatively high degree, with polishing of at least portions of the axeheads. What is very clear is that these axeheads are an important part of the story of the people who deposited them in caves.

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6

Prehistoric perforated marine shells from Irish caves

Rory Connolly

Perforated marine shells have been recovered from four caves in Ireland, sites that also contained evidence for funerary activities of Neolithic and/or Bronze Age date. In stark contrast is the near complete absence of perforated shells from almost all other prehistoric contexts in Ireland. This chapter presents an overview of the evidence, considers the role of marine shells as personal ornaments, and discusses a range of interpretive possibilities to explain the relationship between perforated shells and caves in prehistoric Ireland.

Overview of sites

Ten perforated marine shells have been recovered from four caves in Ireland (Table 6.1; Fig. 6.1). These were first recognised by Dowd (1997, 2004) as a distinctive category of material found almost exclusively in cave contexts. The group includes a single perforated flat periwinkle (*Littorina obtusata*) from the Catacombs, Co. Clare (Scharff *et al*. 1906, 8); a perforated dog whelk (*Nucella lapillus*) from Elderbush Cave, Co. Clare (*ibid*., 73); a perforated flat periwinkle and dog whelk from Brothers' Cave, Co. Waterford (Dowd and Corlett 2002, 8); and six perforated flat periwinkle shells from Kilgreany Cave, Co. Waterford (Movius 1935, 280; Molleson 1985, 1; Dowd 2002, 2004, 490). Over 40 perforated spotted cowrie (*Trivia monacha*) and flat periwinkle shells have also been recovered in association with Bronze Age activities in Glencurran Cave, Co. Clare (Dowd 2007, 2009) but are the subject of a separate study by Johanna Callaghan.

The Catacombs comprises a small system of interconnecting passages. During excavations in 1902 and 1903 by the *Committee Appointed to Explore Irish Caves* (Scharff *et al*. 1906), a single perforated flat periwinkle shell was recovered from a passage named the *Surprise Gallery* in close proximity to a concentration of human bones of early medieval date and several Neolithic flint convex scrapers. Unperforated marine shells were also found in the Catacombs including two single oyster (*Ostrea edulis*) valves, two limpet (*Patella vulgata*) shells, and two common periwinkle (*Littorina littorea*) shells (*ibid*., 23).

Elderbush Cave is situated *c*. 1km south-east of the Catacombs. It was excavated by the *Committee Appointed to Explore Irish Caves* in 1904; a single perforated dog whelk shell was recovered in close proximity to human remains, 8.5m–9.1m inside the cave entrance (Scharff *et al*. 1906, 17). Two human bones from this site have been radiocarbon dated to the earlier Neolithic and final Neolithic (Dowd 2008, 308; 2015, 97). Unpublished excavation notebooks refer to, 'marine *shells* used as ornament' (Dowd 2004, 434), which implies further examples were recovered, but unfortunately were not adequately recorded and cannot be located. A number of unperforated marine shells were also found including mussel (*Mytilus edulis*), oyster and limpet (Scharff *et al*. 1906, 24).

Table 6.1 Perforated marine shells from Irish caves.

Site	*Species*	*No.*	*NMI reg. no.*
Clare, Edenvale td., the Catacombs	*Littorina obtusata*	1	1907:16
Clare, Newhall td., Elderbush Cave	*Nucella lapillus*	1	X2030
Waterford, Ballygambon Lower td., Brothers' Cave	*Nucella lapillus*	1	1948:218
	Littorina obtusata	1	1948:219
Waterford, Kilgreany td., Kilgreany Cave	*Littorina obtusata*	6	E9:104-6 K:22-4

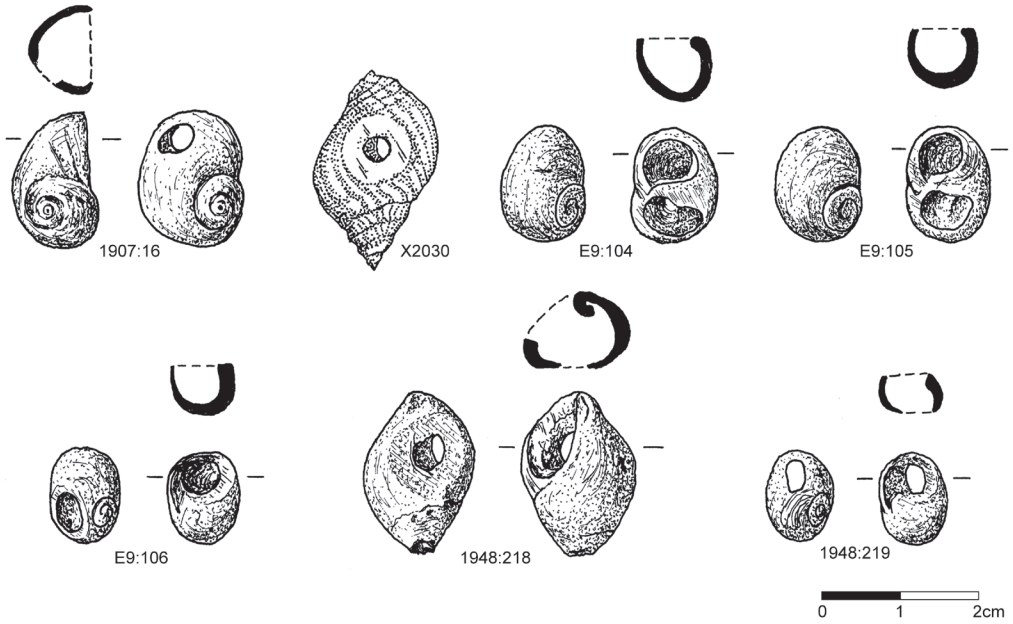

Figure 6.1 Perforated shells. Flat periwinkle from the Catacombs (1907:16); dog whelk from Elderbush Cave (X2030); three flat periwinkles from Kilgreany Cave (E9:104–6); dog whelk (1948:218) and flat periwinkle (1948:219) from Brothers' Cave (Dowd 2015, 118).

Brothers' Cave is a substantial and complex cave system. During excavations carried out by Colonel Richard William Forsayeth between 1906 and 1913 (primarily in 1906 and 1907), a perforated flat periwinkle shell and a perforated dog whelk shell were discovered (Forsayeth 1931; Dowd and Corlett 2002; Dowd 2004, 499, 501, 2015, 115). The precise findspots within the cave are unclear. Forsayeth's unpublished notebooks record that one of the shells was found on the 19th of February 1906 in a wet area known as *The Bog*, and the other on the 29 November 1907 in the Main Chamber, a larger drier part of the cave (Dowd 2004, 508, 510). The artefact assemblage from Brothers' Cave also includes sherds of Early and Middle Neolithic pottery, a polished stone axe, a Neolithic flint blade, a Late Bronze Age hoard, and human bones of Early Bronze Age date. A single unmodified scallop (*Pecten maximus*) shell was also recorded (*ibid*., 507).

Kilgreany Cave is situated 2.2km east-south-east of Brothers' Cave. Excavations undertaken in 1928 (Tratman 1929) and 1934 (Movius 1935) led to the recovery of a wide range of artefacts as well as human and faunal remains, indicating a considerable chronological depth of activities including Neolithic burial; Late Bronze Age votive deposition; early medieval settlement; and late medieval refuge (Dowd 2002, 2015). Six perforated flat periwinkle shells were found in close proximity to a hollow scraper, and seemingly in association with the crouched burials of an adult female (Kilgreany A) and an adult male (Kilgreany B) of Neolithic date (Molleson 1985, 2; Dowd 2002, 83). Unmodified periwinkle, cockle, mussel, oyster and scallop shells were also retrieved (Tratman 1929, 143; Movius 1935, 287), although these may relate to the early medieval phase (Dowd 2002, 87).

It is significant that all four cave sites are situated inland. The Catacombs and Elderbush Cave are both more than 30km from the nearest coastline, while Brothers' Cave and Kilgreany Cave are, respectively, 11km and 9km distant from the sea.

Species, ecology and exploitation

Flat periwinkle and dog whelk are common shellfish species on Irish coasts. Flat periwinkles have a rounded shell, and can range in colour from pale white or yellow to more vibrant red, purple, green or brown. Patterning on the shell can be banded or chequered (McMillan 1968, 31). Dog whelks have a shell that is strong and thick with spiral ridges, and can range in colour from white to yellow, brown or lilac. The patterning on dog whelks is also commonly banded (*ibid*., 50). Both species are characteristic of the intertidal low shore zone. Flat periwinkles are commonly found on the surface of seaweeds, while dog whelks are found in unexposed areas among rocks or in crevices. Flat periwinkles can grow to a maximum height of 1.5cm whereas dog whelks are larger and can grow up to 5cm in height (Philips 1987, 40).

Flat periwinkle and dog whelk are both abundantly available and can be easily collected by hand. Throughout prehistory these species were commonly exploited for subsistence in coastal regions, a fact evidenced by the frequency with which they occur in coastal shell middens. Unless consumed in considerably large quantities, however,

these species are of limited bromatological value. The introduction of agriculture during the Neolithic brought with it a change in the way marine resources were exploited. Human stable isotope data indicates a shift away from marine food sources in favour of a mixed or predominantly terrestrial diet (Schulting 2013). The accumulation of shell middens during the Neolithic and Bronze Age periods does suggest, however, that for some communities at least, shellfish continued to serve at least as a supplementary element in people's diet (Milner and Woodman 2007).

Dating

Perforated shells are not common amongst the corpus of prehistoric material from Ireland. It is of particular note that most of the known examples come specifically from caves. Caves are complex archaeological environments where disturbed stratigraphic and spatial relationships present difficulties in the interpretation of material, and dating by association is difficult. Nevertheless, the *repeated* occurrence of perforated shells in caves containing human remains of Neolithic and/or Bronze Age date strongly supports a Neolithic or Bronze Age date for most, if not all, of these shells (Dowd 2004, 75; 2015, 118). Absolute dates remain elusive, however. The perforated shells from Kilgreany Cave are almost certainly directly associated with some of the Neolithic burials there (Dowd 2002). Neolithic funerary or ritual activities are also evident at Elderbush Cave, the Catacombs and Brothers' Cave, but human bones from the latter two sites have been dated to the Bronze Age. Consequently, the perforated shells from these three caves could be either Neolithic or Bronze Age.

Manufacture

Several studies have identified the main techniques used for producing perforations on shells. These include hammering, gouging, grinding, incising and drilling (Francis 1982; 1989; Bar-Yosef Mayer 2014). A visual examination of the material discussed here suggests that grinding was the preferred technique for perforating both flat periwinkles and dog whelks. The grinding technique is identifiable by linear striations and a smooth flattened surface around the external area of the perforation. Grinding involved rubbing the convex side of the shell on a hard abrasive surface until a hole was produced; this could have been carried out with relative ease on limestone or sandstone. The grinding of shells may even have been performed on quern stones more normally used for grinding cereals (Bar-Yosef Mayer 2014, 95). Only the periwinkle shell from the Catacombs suggested the alternative method of gouging may have been employed. This would have involved the use of a pointed implement pressed against the surface of the shell and twisted while applying pressure (Francis 1982).

Marine shells in prehistoric funerary and ritual contexts

Perforated marine shells have been recovered from at least three Neolithic funerary contexts, other than caves, in Ireland. The most striking example comes from the 1838 excavations at Knockmaree (or Chapelizod), Co. Dublin (Petrie 1838; O'Neill 1852; Wilde 1863). Here, approximately 220 perforated flat periwinkle shells were recovered from beneath the skulls of two crouched inhumations of adult males at a Linkardstown-type tomb (Herity and Eogan 1977, 84). Radiocarbon dating has confirmed a Neolithic date for the burials (Brindley and Lanting 1989, 2). A single perforated flat periwinkle shell was also found associated with the remains of a juvenile in the western recess of Fourknocks I passage tomb, Co. Meath (Hartnett 1957, 241). This is the only example that bears any resemblance to the perforated shells from cave sites.

Elsewhere, four perforated discoid shell beads were retrieved from Cahirguillamore, Co. Limerick (Hunt 1967, 28; McCormick 1985/6, 38). The beads and human remains came from a chamber formed by a large boulder resting against a cliff face to form what has been described as a 'pseudo-cave' (Dowd 2008, 313). This is interesting as it parallels to some extent the ritual deposition of perforated shells in caves. The Cahirguillamore beads differ; their discoidal shape involved a greater degree of modification from their original state – they would no longer have been recognisable as seashells. Discoid shell beads are not known from other Irish prehistoric contexts, but are commonly found throughout the Mediterranean region where they occur in caves as well as other funerary contexts (Álvarez-Fernández 2010, 134). The molluscan species used to manufacture the Cahirguillamore beads were not confidently identified, though common saltwater clam (*Venus striatula* and *Venus verrucosa*) was suggested (Hunt 1967, 28).

Unperforated marine shells have been found with a number of Neolithic burials. At Dalkey Island Site II, off the Dublin coast, the disarticulated remains of a young adult male of Late Neolithic date were recovered from a shell midden. Interestingly, the cranium had been deliberately filled with unmodified periwinkle (*Littorina*) shells, though the surrounding midden was composed primarily of limpet (Liversage 1968, 104; McCormick 1985/6, 42; O'Sullivan and Breen 2011, 42). Shell deposits are recorded from court tombs at Clontygora, Co. Armagh (Davies and Paterson 1937, 41) and Ballinran, Co. Down (Collins 1976, 11); and at several passage tombs including Grave no. 7 and Grave no. 27 at Carrowmore, Co. Sligo (Herity 1974, 68; Burenhult 1980, 32; Bergh 1995, 191), passage tomb H at Carrowkeel, Co. Sligo (McCormick 1985/6, 38), and Cairn H at Loughcrew, Co. Meath (Conwell 1864, 363). Shell fragments were also found at Newgrange passage tomb, Co. Meath (O'Kelly 1982, 215). At Knocklea (Rush), Co. Dublin, excavations of a partially destroyed passage tomb

revealed significant deposits of marine shell (Herity 1974, 255). McCormick (1985/6, 42) has suggested that this monument may have been deliberately constructed on top of a pre-existing shell midden. This resembles evidence from Scotland, which indicates that numerous prehistoric funerary monuments were sited on earlier shell middens, such as Neolithic chambered cairns and Bronze Age cists (Pollard 2000, 153).

Shell deposits recovered during excavations of a passage tomb at Moylehid (Belmore), Co. Fermanagh are likely associated with the reuse of this site during the Bronze Age. A fragment of scallop shell and several dog cockle (*Glycymeris glycymeris*) shells were found in the left chamber, in close proximity to a cist structure, which had been constructed inside the monument (Coffey 1898, 663; McCormick 1985/6, 45). At Bay, Co. Antrim, a small keyhole limpet shell (*Diadora apertura*) was found in a pit burial containing an inverted collared urn with cremated human remains. The shell was recovered from inside the urn and had a natural perforation at its apex, meaning it could have been strung or otherwise employed as personal ornamentation (*ibid*., 44). Excavation of a Bronze Age cist at Carrigeens, Co. Sligo revealed the presence of several cowrie shells in association with a collared urn containing the cremated remains of a 14–16-year-old individual. Deposits of oyster and otter (*Lutraria magna*) shells were also retrieved from a Bronze Age cist containing cremated human remains at Palmerstown Lower, Co. Dublin (Frazer 1886, 338).

Shells are a regular occurrence at prehistoric monuments in Britain although, as in Ireland, these usually tend to be unperforated. However, a single perforated flat periwinkle shell was recovered along with three cowrie shells in a Bronze Age barrow at Langton, North Yorkshire, in association with the crouched burial of an adult female (Kinnes and Longworth 1985). Unperforated shells are known from Neolithic chambered cairns in Scotland and the Orkney Islands where, Pollard (2000, 153) has suggested, they may have been incorporated into the fabric of monuments as a symbolically charged building material. This raises interesting questions about the role of marine shells and the sea in prehistoric worldviews. For instance, an understanding of shell as symbolically charged may have contributed to its use as a tempering agent in the manufacture of Neolithic pottery such as Carrowkeel Ware and Grooved Ware (Thomas 1999, 122). Elsewhere in Scotland, a number of Bronze Age burial cists contain single or multiple shell deposits consisting of mussel, oyster and/or limpet (Pollard 2000). Shells have also been found in the chambers of the Barclodiad y Gawres and Bryn Celli Ddu passage tombs on the Welsh island of Anglesey (Lynch 1969; Lewis-Williams and Pearce 2005, 184–189).

Excavations at several caves in the Liguria region of north-western Italy have uncovered more than one hundred inhumation burials of Middle Neolithic date. Approximately 20% of these were associated with personal ornaments, of which perforated marine shells were the most strongly represented item. Ornaments were predominantly manufactured from common sea snail (*Columbella rustica*) and saltwater clam (*Glycymeris*) shells (Del Lucchese 1997; Maggi 1997; Micheli 2012, 236). Similar perforated shells are found at prehistoric funerary and settlement sites in coastal regions around the Mediterranean, as well as further inland on sites along the Rhone Valley (Álvarez-Fernández 2006; 2010; Lenneis 2007). Discoid shell beads (similar to those from Cahirguillamore, Co. Limerick) made from bivalve shells have been recorded in Early Neolithic funerary contexts from Germignac, France and Navarre, Spain (Álvarez-Fernández 2010, 135). More elaborate ornaments manufactured from *Spondylus* shell were distributed widely throughout Europe during the Neolithic. They are common gravegoods in Linearbandkeramik (LBK) graves and were regarded as prestige items (Chilardi *et al*. 2005; Ifantidis and Nikolaidou 2011; John 2011; Bajnóczi *et al*. 2013).

Beads for the dead and beads for the living

Perforated marine shells are found in a range of prehistoric funerary contexts across Europe. Examples from Ireland, however, exhibit a very clear distributional bias occurring almost exclusively in caves, and specifically caves with evidence for funerary or ritual activities of Neolithic and/or Bronze Age date. Even taking into account the differential preservation of sites and materials, this relationship is notable, particularly when contrasted against their near total absence at contemporaneous settlement sites and funerary monuments (Dowd 2004, 85–89). It is argued here that this association represents a quite deliberate set of behavioural processes or cultural traditions in prehistoric Ireland.

The range of species present in the unperforated shell deposits from funerary monuments is broad and includes oyster, mussel, scallop, cockle, limpet, periwinkle and dog whelk (see above). These deposits are typically assumed to represent offerings or food residues linked to consumption during funerary rituals. In contrast, the species that are perforated are restricted to just periwinkle, dog whelk and cowrie (the latter from Glencurran Cave). These perforated shells represent deliberately curated and manufactured items of personal ornamentation that may have formed part of a necklace, an armlet, a bracelet, earrings, a belt, or may have been sewn onto clothing or attached to an individual's hair (Meisch 1998, 147). Unfortunately, the disturbed stratigraphic environment of caves precludes an understanding of their precise manner of employment.

The distinct association between perforated shells and caves raises a number of interesting questions. Were these personal possessions belonging to the deceased, items of ritual paraphernalia, or votive offerings? What social,

symbolic or religious value did people place on these items? Why do perforated shells not generally occur on settlement sites or megalithic monuments? What, if anything, can these objects tell us about the individuals whose remains were placed in these caves? The evidence presented here provides a basis to speculate on the construction of social identity, and cosmological and religious beliefs in prehistoric Ireland. It also informs us to a certain extent about how people in the past related to their environment and their resources, and how these may have been incorporated into wider symbolic schemes associated with death and mortuary ritual.

Perforated shells may have been worn during life to communicate certain messages about the wearer. Personal ornaments play an important role in all human societies and can express social, political and economic relations between people and negotiate interactions with the supernatural world. The use of beads for personal adornment, including those manufactured from perforated shells, has been the subject of much anthropological and archaeological research (Beck 1928; Biggs 1969; Beck 1976; Cordwell 1979; Roach and Eicher 1979; Sciama and Eicher 1998; Bednarik 2015). Beads can carry multiple levels of meaning and provide non-verbal forms of communication to mediate social interaction They may communicate aspects of social identity such as group membership, ethnicity, marital status, occupation, gender, age, transitional states such as puberty or adolescence, or even emotional states such as grief (Balme and Morse 2006, 801; Micheli 2012, 227; Bednarik 2015, 52). In Zulu society, for instance, particular beads are used to mark transitional periods in a man or woman's life (Kaiser 1997, 186). In many cultures, beads also hold amuletic qualities enabling an individual to garner favour or protection from the gods or supernatural world (Beck 1976).

Colour is often significant (Beck 1976, 33; Stine *et al*. 1996; Claassen 1998, 203; Meisch 1998; Bar-Yosef Mayer and Porat 2008; Micheli 2012, 247). While cultural and individual aesthetic preferences are influential, colour selection may also be dictated by aspects of ideology and cosmology. It is plausible that beads of a certain colour may have been associated with or offered to different deities, or were only collected or worn on particular occasions.

We can only speculate as to whether or not such practices occurred in prehistoric Ireland. It seems reasonable to consider that beads manufactured from marine shells may have been selected for their specific colour or patterning, and/or linked an individual to water and the sea. This is interesting considering the increasing importance of the sea for long distance communication and trade throughout the Neolithic and Bronze Age (Waddell 1993; Cummings and Fowler 2004; Dowd 2009, 93). That marine shells carried a symbolic charge is supported not only by the deposition of perforated shells in caves, but also by the unmodified shell deposits from other funerary contexts. The wearing of shell beads may have been a way of signalling a relationship to the sea or a particular coastal area.

Someone once said, 'it's all about context'

Archaeologists frequently emphasise the importance of context in imbuing meaning on artefacts (Ekengren 2013), which is particularly significant to the present discussion. Caves are often regarded as sacred places charged with spiritual or ideological power, employed for the enactment of ritual practices (Moyes 2012; Dowd 2015). While not all caves were used for funerary or ritual activities in prehistoric Ireland, many caves *were* reserved specifically for such practices (Dowd 2008; 2015). Neolithic cave rituals include the deposition of both extended and crouched inhumations, the placement of token deposits of disarticulated bones, as well as post-mortem processing in the form of excarnation as part of multi-phase funerary rituals. In the Bronze Age, the deposition of disarticulated bones at caves continued, as well as inhumation and cremation burials (Dowd 2004; 2015). To what extent did caves impart, accentuate, alter, or reinforce the symbolic charge attached to perforated shell ornaments? Were these shells linked to a specific form of funerary ritual?

Aside from a simple perforation, no steps appear to have been taken to alter the natural morphology of the shells found in caves. The unelaborate nature of these ornaments and the natural environments from which they were recovered is strikingly juxtaposed to the highly elaborated nature of ornaments recovered from contemporary monuments such as passage tombs (Hensey 2015). It is probable that such ornaments communicated different social and symbolic messages. Perforated shells were considered appropriate offerings *only* in particular contexts, and thus may reflect certain cultural practices or beliefs about caves. By and large they were not deemed suitable for inclusion at megalithic monuments. The question arises whether certain personal ornaments were deliberately selected for mortuary rituals to reflect cultural ideas about the division between natural and built environments?

Ethnographic evidence may also give some indication of how shells were viewed in the past. In many cultures, across a considerably wide geographic and chronological range, perforated shells have been worn to promote fertility and prevent sterility and are strongly linked to concepts of sexual fertility, gestation and birthing (Claassen 1998, 203; 2008; Koerper 2001). It has been suggested that marine gastropods and bivalves are particularly suitable symbols of gestation and fertility as they produce millions of offspring (Claassen 2008, 38). Like shells, caves are also frequently associated with the womb and birthing symbolism, embodying concepts of fertility (Dowd 2004, 10; 2009, 89; 2015, chapter 1). It is tempting to suggest that perforated marine shell ornaments and caves may have been mutually linked in a wider symbolic scheme related to death, rebirth and fertility in prehistoric Ireland.

Social identity and the transition to agriculture

The general absence of perforated shells from other funerary contexts in Ireland raises the question of why individuals wearing perforated shell ornaments were set apart from the rest of society at death and placed in caves. Perforated shell beads are relatively common on Palaeolithic and Mesolithic sites throughout Europe (Stiner 1999; Vanhaeren *et al*. 2004; Lenneis 2007; Álvarez-Fernández 2010). In Ireland, however, this artefact type only first appears in the Neolithic. Though little is known about personal ornamentation during the Irish Mesolithic, it has been shown elsewhere that an increase in the range of personal ornaments is closely associated with the transition to agriculture (Bar-Yosef and Porat 2008; Rigaud *et al*. 2015). It is certainly possible, indeed likely, that perforated shells were worn by Mesolithic people. In later periods the symbolic charge attached to these ornaments may have reflected, or may have been a response to, changes in social organisation and a shift in material culture.

Technological developments and innovations in craft production, which accompanied the introduction of agriculture, would certainly have facilitated new concepts of personhood and social identity. It is plausible, however, that certain individuals continued to identify with older Mesolithic ways of life on the periphery of Neolithic society, perhaps even practicing subsistence strategies rooted in hunting or the exploitation of coastal resources. From this point of view, perforated shells may have played a role in the expression of cultural memory, signalling an association between the wearer and older hunter-gather lifeways. Interestingly, a recent study of personal ornamentation in Europe during the Mesolithic-Neolithic transition revealed a distinct persistence of Mesolithic cultural attributes in Early Neolithic personal ornaments across Northern Europe (Rigaud *et al*. 2015).

With this in mind, it is notable that three of the four caves described here also contained perforated or worked animal teeth, with a prevalence of wild over domesticated species (Beglane this volume). Personal ornaments manufactured from marine shells or parts of wild animals might be interpreted as referencing particular aspects of wildness or the natural world (Dowd 2004; 2015). These link the wearer to the wilderness metonymically, whereby one entity can be used to refer to another that is related to it, or where a single part references the whole (White 1992, 542). In many cultures, the wearing of part of an animal is a means by which the wearer may become imbued with certain qualities or characteristics associated with that animal (to reiterate, for instance, the strong ethnographic link between marine shellfish and fertility). The ornament, therefore, acts as a conduit through which spiritual power or abilities are transferred from the animal domain to the human world (Strathern and Strathern 1971, 176; White 1992, 543; Betts *et al*. 2012, 627; Micheli 2012, 231).

From another perspective, marine ornaments may have carried very negative connotations. Agricultural communities sometimes regard those who subsist on marine resources as uncultured or even subhuman (O'Sullivan and Breen 2011, 68). The shells described here were worn or deposited in societies where, even if certain hunter-gatherer cultural traits persisted, it would have been very much in the shadow of the dominant agricultural paradigm. If such prejudices existed, it may help explain why certain individuals were deposited in caves, away from the rest of society.

Conclusion

Ten perforated marine shells manufactured from just two species, flat periwinkle and dog whelk, have been recovered from four Irish caves containing evidence for Neolithic and/or Bronze Age funerary or ritual activities. These perforated shells may have been used to communicate information about social identity; to link an individual to water and the sea; to evoke concepts of fertility and rebirth; to reference the natural world; or to impart the wearer with certain qualities or characteristics. Whatever their symbolic properties, the repeated deposition of perforated shells in cave contexts suggests that they carried an embedded and shared social, cosmological or religious value, which influenced behavioural processes or cultural traditions. Closer examination of personal ornaments associated with ritual and funerary activity is key to developing our understanding of how prehistoric people viewed themselves and constructed their identities, both in life and in death. It can also inform us about how prehistoric peoples interacted with their resources and environments and incorporated these into wider social and symbolic schemes. The relationship between perforated marine shells and caves is noteworthy, providing a thought-provoking insight into past behaviours and inviting us to consider aspects of religion, cosmology, mortuary tradition and social identity in prehistoric Ireland.

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7

Prehistoric perforated and worked animal teeth

Fiona Beglane

The aim of this chapter is to discuss the various perforated, notched and modified teeth recovered from caves in Ireland. Animal teeth can be perforated or notched to allow them to be secured using a thong, string or thread. They are then suitable for various potential uses including as pendants, necklaces, earrings and hair ornaments, or to be sewn onto clothing. This process of modification has a long history, extending from the modern day and stretching back into the Palaeolithic (e.g. Hahn 1972). Over the course of the last century, fourteen worked and perforated animal teeth have been recovered, identified and catalogued as a result of antiquarian investigations and modern excavations in caves (Scharff *et al*. 1906; Tratman 1929; Movius 1935; Dowd 2009). These artefacts were first discussed and identified as a coherent group of material by Dowd as they are found almost exclusively in cave contexts (Dowd 1997; Dowd 2004; Dowd 2015). Here, the teeth have been re-examined with the benefit of modern zooarchaeological techniques and are discussed in further detail.

Terminology and biology

Regardless of the mammal species, the materials that make up a tooth are fundamentally the same. The crown, or visible part of the tooth, is covered by a hard, shiny layer of enamel, while the root is covered by cementum, which is a softer material. These outer layers surround the dentine, a white, slightly soft material that is prone to staining both during life and on deposition in soil (Hillson 1992, 11). The term 'maxillary' refers to the upper jaw, while 'mandibular' refers to the lower jaw, and directions in this paper are given as per Schmid (1972, fig. 11). Tip-to-tip measurements were in a straight line, and all measurements were taken using electronic callipers to an accuracy of 0.1mm.

Mammals have four types of teeth: incisors, canines, premolars and molars. Incisors are used for holding and tearing food such as meat, in the case of carnivores, and plant matter, in the case of herbivores. With carnivores, the canine teeth are used for gripping prey but in herbivores they are often modified to function as additional incisors. For many species, such as pig, the canines are sexually dimorphic, meaning that they have a different size and shape between the two sexes and can then be used in sexual display. In the case of pigs, the particularly impressive canines of the male are often referred to as 'tusks'. For all species the premolars and molars are sometimes referred to as the 'cheek-teeth' and are used to break up food into small pieces suitable for digestion. In herbivores they are generally high-crowned with folds of dentine and enamel that form *infundibulae* and have flat occlusal or 'biting surfaces' so that they can grind plant material to a pulp. By contrast, carnivores have sharp, pointed premolars and molars that can cut through and break up meat fibres. For omnivores such as humans and pigs, the premolars and molars have a series of cusps and fissures that can be utilised on a variety of food types (Hillson 1992, 11; Reitz and Wing 1999, 49; Hillson 2005, 15, 268, 272).

Measurements and differentiation of dog and wolf canine teeth followed the conventions developed by Morel and Müller (1997) for maxillary canine teeth. These figures were also applied to mandibular canines; however, caution must be expressed here since comparison with two individuals in the author's reference collection shows that the *diamètres labio-lingual* (DLL) or labio-lingual measurement value for mandibular canines is greater than that of the corresponding maxillary canines.

The term 'wild pig' rather than 'wild boar' is preferred here since a boar is a male pig whereas a sow is a female pig, regardless of domestication. This is significant in a discussion

on 'boar's tusks' as it is often thought that the presence of a canine tooth means that wild boars were present, whereas actually it signifies only that a male pig was present. Measurements of pig maxillary canine teeth followed the conventions developed by Mayer and Brisbin (1988).

Catalogue

Ten perforated, one notched, and three worked teeth have been recovered from five Irish caves: the Catacombs, Edenvale td., Co. Clare; Bats' Cave, Newhall td., Co. Clare; Elderbush Cave, Newhall td., Co. Clare; Glencurran Cave, Tullycommon td., Co. Clare; and Kilgreany Cave, Kilgreany td., Co. Waterford (Figs. 7.1, 7.2 and 7.3; Tables 7.1 and 7.2). The perforated and notched assemblage includes one dog, two dog or wolf, two probable wolf, one bear and eight pig teeth. Kilgreany Cave was the most prolific site, yielding five perforated teeth.

Table 7.1 Perforated and notched animal teeth from cave excavations; numbers in brackets are the antiquarian numbers assigned to the artefacts.

Site	*Dog/wolf*	*Pig*	*Bear*
The Catacombs		Maxillary wild male canine 1907:12 (EC55)	
Bats' Cave	Dog/wolf canine 1907:25 (NH1)		
Bats' Cave	Probable wolf canine 1907:26 (NH1)		
Elderbush Cave			Canine 1907:36 (NH98)
Glencurran Cave	Dog/wolf maxillary 3rd incisor 08E265:052:028		
Glencurran Cave	Probable wolf mandibular canine 2003:30		
Kilgreany Cave		Mandibular incisor 1000:134 (K35)	
Kilgreany Cave		Mandibular incisor (K38)	
Kilgreany Cave		Mandibular male canine 1000:131 (K42)	
Kilgreany Cave		Maxillary wild male canine 1000:127 (K65)	
Kilgreany Cave	Dog canine 1000:128 (K81)		

Clare, Edenvale td., the Catacombs

1907:11 is a curved fragment of pig mandibular canine, almost certainly from a male. The fragment measured 59.4mm tip-to-tip, 8.4mm mesio-distally, and 5.6mm labio-lingually. The tooth has been worked to a D-shaped profile with a slightly concave inner surface; the root end is broken and absent.

1907:12 (Fig. 7.3) is a perforated male pig maxillary canine tooth. The tooth itself measures 59.1mm tip-to-tip, with an upper cross-sectional length of 24.4mm and an upper cross-sectional width of 18.5mm, as defined by Meyer and Brisbin (1988, fig.1). The perforation is tear-drop shaped and bevelled so that it measured a maximum of 10×7.9mm, tapering to 7.8×5.2mm. The tooth has been perforated on the convex surface so that if strung using a simple loop it would form a C-shape. Comparison with unpublished data collected by Ola Magnell (pers. comm.) from Mesolithic and Late Iron Age sites in Scania, Sweden, suggests that this was likely from a wild pig.

Clare, Newhall td., Bats' Cave

1907:25 (Fig. 7.1) is a perforated maxillary dog or wolf canine tooth. It measures 44.3mm tip-to-tip, 12.7mm in a mesio-distal direction, and 8.5mm labio-lingually, with the perforation measuring a maximum of 3.8mm in diameter and slightly bevelled on both sides. The perforation was in the labio-lingual direction so that if strung, the tooth would hang in a C-shape. Comparison with data published by Morel and Müller (1997, 68) suggests that this individual was at the wolf end of the overlap in the size range of these two closely-related species.

1907:26 (Fig. 7.1) is a heavily modified animal tooth, probably originally a dog or wolf canine tooth. It measures 35.8mm long, a maximum of 11.7mm at right angles to the

Table 7.2 Worked animal teeth from cave excavations; numbers in brackets are the antiquarian numbers assigned to the artefacts.

Site	*Pig*
The Catacombs	Mandibular canine, probably male. 1907:11 (EC339)
Kilgreany Cave	Male mandibular canine. 1000:132 (K1)
Kilgreany Cave	Male mandibular canine. 1000:278 (K83)

length, and a maximum of 9.4mm in the third dimension. The root end of the tooth has a bevelled notch all the way around. The enamel has been roughly removed from almost the entire surface exposing the dentine and leaving only a small fragment of enamel intact.

Clare, Newhall td., Elderbush Cave

1907:36 (Fig. 7.1) is a canine tooth from a bear. It has been roughly broken off at the root and this end has then been worked to give a smoother finish, especially on the distal side. The tooth measures 45.4mm from tip to broken tip, with a mesio-distal measurement of 26.7mm, and a labiolingual measurement of 18.5mm at that point. The canine is naturally perforated by the longitudinal pulp chamber, and the occlusal surface has been worn through to expose the perforation, dentine and pulp chamber. While the form of the wear suggests that it is highly likely that it was humanly modified to produce a perforation, it is possible that it may be natural. At the root end, the perforation is oval in shape measuring 5.1×4.2mm. From there, the perforation tapers in size to a circular aperture *c*. 1.5mm in diameter at the occlusal end. Neither end is bevelled, instead being sharp-edged at both surfaces. This suggests that if the tooth was strung then it was not used for any considerable length of time prior to deposition.

Clare, Tullycommon td., Glencurran Cave

08E265:052:028 (Fig. 7.2) is a perforated dog or wolf maxillary third incisor. It measures a maximum of 25.5mm tip-to-tip, 6.2mm mesio-distally, and 7.8mm labio-lingually at the point where the crown meets the root. The tooth has a perforation measuring 2.8mm diameter on the mesial side and 2.7mm diameter on the distal side, with both sides bevelled inwards towards the centre of the tooth. In addition, the tip of the root is polished to a smooth surface. This element is not commonly measured, so there is insufficient comparative material available for a distinction between the species; however, this was from a relatively large individual.

2003:30 (Fig. 7.2; Pl. 29) is a perforated probable-wolf mandibular canine tooth. The tooth measures 46.7mm tip-to-tip, 13.8mm mesio-distally, and 8.7mm labio-lingually.

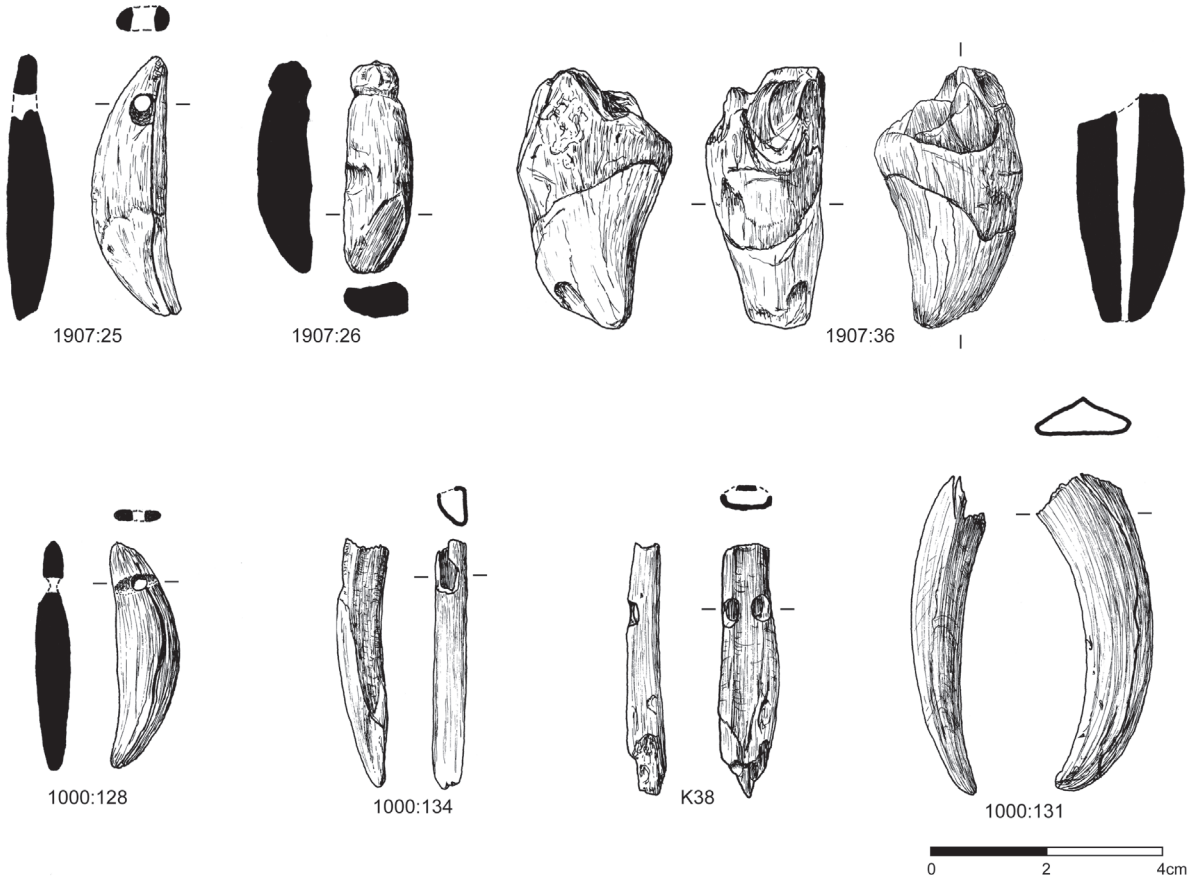

Figure 7.1 Dog/wolf canine (1907:25) and probable wolf canine (1907:26) from Bats' Cave; bear canine from Elderbush Cave (1907:36); dog canine (1000:128), two pig mandibular incisors (1000:134; K38), and a mandibular pig canine (1000:131) from Kilgreany Cave (Dowd 2015, 119).

The perforation is in the labio-lingual direction. It measures 4.5×3.9mm on the lingual side and 4.7×3.7mm on the labial side and is slightly bevelled. In the area close to the perforation the labial surface has been worked to accentuate the natural curve of the root and to form a neck on the tooth at the level of the perforation. This side of the tooth has also been highly polished, while the lingual side is slightly polished. Comparison with data published by Morel and Müller (1997, 68) suggests that this individual was in the size range typical of wolf; however, occasional domestic dog canines were also recorded in this size range. This appeared to be a mandibular tooth so the maxillary teeth on this individual would likely be closer to the wolf end of the spectrum.

Waterford, Kilgreany td., Kilgreany Cave

1000:132 is a polished and worked fragment of male pig mandibular canine tooth. When whole, male pig canines have a triangular cross-section and in this case only the lingual side of the triangle is present. The tooth fragment measures 75.4mm tip-to-tip, with a maximum mesio-distal width of 18.2mm, and a maximum thickness of 4.1mm. The broken edges have been polished smooth but are still visible and there is a flattened, polished, oval area measuring 29×11mm on the lingual surface of the tooth.

1000:134 (Fig. 7.1) is a mandibular pig incisor with a single perforation on the labial surface of the root but suffering from modern breakage. The tooth measures a maximum of 41.7mm tip-to-tip, 7.8mm mesio-distally, and 6.4mm labio-lingually. The perforation measures 6.7mm along the length of the tooth by 4.6mm wide. This tooth was incorrectly identified by Tratman (1929, 124–125) as a maxillary incisor.

K38 (Fig. 7.1) is a mandibular pig incisor with two perforations. It measures a maximum of 42.6mm tip to tip, 6.1mm mesio-distally, and 9.8mm labio-lingually. The perforations lie next to each other and measure 4.4×3.1mm and 4.1×4.2mm at the surface of the tooth and are bevelled inwards. This tooth was incorrectly identified by Tratman (1929, 124–125) as a maxillary incisor.

1000:131 (Fig. 7.1) is a perforated, small mandibular male pig canine. It measures a maximum 52.9mm tip-to-tip, with a lower cross-sectional length of 14.7mm and a lower cross-sectional width of 8.4mm. The perforation currently measures a maximum of 6.8×4.4mm but the tooth has split along its length with the split passing through the perforation so that originally the perforation would have been less than 4.4mm wide. In addition, there is modern damage to the edges of the perforation. The perforation is on the concave, distal surface so that if strung by a simple loop it would hang in a C-shape. It was not possible to accurately measure the tooth due to the split; however, the size shows that it came from a young male since the canines continue to grow through life. Because of this it was not possible to determine whether this was from a wild or domestic animal.

1000:127 (Fig. 7.3) is a perforated maxillary canine tooth of a male pig. The tooth measures 66.2mm tip-to-tip, has an upper cross-sectional length of 22.7mm and an upper cross-sectional width of 17.0mm. There are two perforations, which are both semi-circular in shape, with the wider part at the root end of the tooth. They measure a maximum of 9.0×6.7mm and 9.2×5.9mm and are slightly bevelled, probably due to wear. These perforations are arranged on the mesial and distal sides of the tooth so that if strung,

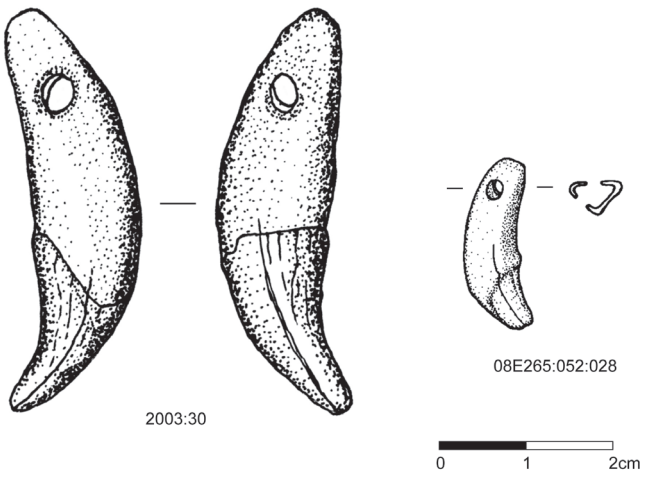

Figure 7.2 Probable wolf mandibular canine (2003:30) and dog or wolf maxillary third incisor (08E265:052:028) from Glencurran Cave (Illustration: Fiachra Dunne).

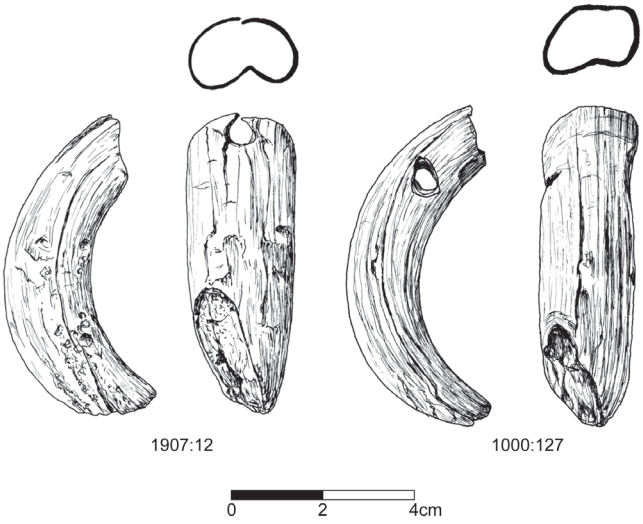

Figure 7.3 Wild pig maxillary canine from the Catacombs (1907:12) and wild pig maxillary canine from Kilgreany Cave (1000:127) (Illustration: Malgorzata Kryczka).

the convex surface would be presented to an observer. Comparison with unpublished data collected by Ola Magnell (pers. comm.) from Mesolithic and Late Iron Age sites in Scania, Sweden, suggests that this tooth was likely from a wild pig.

1000:128 (Fig. 7.1) is a perforated dog canine tooth. It measures 38.9mm tip-to-tip, 11.8mm mesio-distally and 6.9mm labio-lingually. The perforation is in the labio-lingual direction; it measures 2.5mm in diameter and is slightly bevelled on both sides. There is also a slight groove across both faces of the tooth in the area of the perforation, which appears to have been designed to act with the perforation to hold the thong, string or thread in place. Comparison with data published by Morel and Müller (1997, 68) suggests that this individual was a dog.

1000:278 is a worked fragment of a male pig mandibular canine tooth, which measures 67mm long, has a maximum width of 16.3mm, and a thickness of 4.7mm. This fragment comes from the lingual surface. It has been broken off from the rest of the tooth but has evidence of being polished or worn at the occlusal end and along the broken edges of the length.

The cultural significance of worked and perforated teeth

Perforated animal teeth, particularly canines, are common archaeological finds from the Palaeolithic through to the post-medieval period around the world, and are frequently used as decorative pendants even in the modern day. The canine teeth of bear, wolf, fox, deer and pig are the elements most commonly recovered from archaeological contexts, although other species and teeth are occasionally found including dog, horse and cattle incisors. It is generally believed that teeth functioned as amulets, either to protect the individual or to impart the characteristics of the animal – such as ferocity or fertility – to the wearer (Hahn 1972; MacGregor 1985, 109–110; Bednarik 1992; Knol *et al*. 1995/6, 332, 395; Bahn and Vertut 1997, 87; Guthrie 2005, 210; Hillson 2005, 4; Spence 2006 [1920], 23).

Dog and wolf

The domestic dog (*Canis familiaris* or *Canis lupus familiaris*) is believed to be descended from the grey wolf (*Canis lupus* or *Canis lupus lupus*). The date at which this took place is a matter of dispute, but the two are still sufficiently similar that they can crossbreed freely to produce hybrids. This means that their bones and teeth are essentially the same, with size being a major determining factor. Certain skeletal elements have been studied to provide measurements that can be used to separate the two species, but there is a considerable overlap in size and shape, and wolves vary greatly across their geographical range (Clark 1996; Pluskowski 2006). A wolf mandible from the Keash Caves complex, Co. Sligo has been dated to 11,150±90 BP (OxA-3708), demonstrating that they were present in Ireland during the Late Glacial period (Woodman *et al*. 1997, 140), and various wolf and possible wolf bones and teeth have been identified at a range of Irish archaeological sites from early prehistory onwards (McCormick 1999; Hickey 2011, 24–26). Wolves are occasionally mentioned in historical sources and have been a recurring theme in Irish mythology and folklore (*ibid*., 37–59, 60–87). Between the sixteenth and eighteenth centuries wolves were a significant problem, feeding on corpses after battles and preying on domestic animals. As a result, organised wolf-hunts took place and bounties were offered to those prepared to hunt them down. The last wolf was reportedly killed in Co. Carlow in 1786, although both earlier and later dates have also been claimed (Hickey 2000; Hickey 2011, 75–83).

Four perforated and one notched dog or wolf teeth were identified from three Irish caves, with all but one being canine teeth. It is likely that two are wolf canines, and one was a dog canine. The remaining two teeth were from relatively large individuals but it was not possible to determine the species. Only one other partially perforated dog/wolf canine has been identified in Ireland, from an Early Bronze Age cairn at Coolnatullagh, Co. Clare (Eogan 2002).

Wolves are feared predators and the use of their canine teeth as pendants may have been to provide protection for the wearer or to demonstrate his/her ferocity and courage. For example, in Iron Age Scandinavia wolves were seen as symbols of warfare and *ulfheðnar*, or 'wolf skins', were ecstatic warriors similar to the well-known berserkers (Andrén 2007). Wolves have also been associated with evil and in Welsh folktales they were created by the Devil rather than by God (Hickey 2011, 37). One Irish legend connecting wolves and caves is that of Olc Aí. *Olc* means wolf in Old Irish and this individual was a supernatural being who emerged from the Cave of Crúachain or Oweynagat, Co. Roscommon, 'gnashing his teeth, and shaking his beard so fiercely that Erne and her maidens take to flight' (Westropp 1899, 23; Mallory and Adams 1997, 390; Hickey 2011, 40; Dowd 2015, 171–173). Despite these negative connotations, wolves have also been seen as having positive, protective attributes. For example, depending on the version of the tale, either Cormac Mac Airt or his son had a maternal grandfather named Olc Aiche and was brought up by a she-wolf in the Keash Caves before regaining his rightful inheritance as high king at Tara. This tale has obvious connections to the Roman myth of Romulus and Remus, and again highlights the association between wolves and caves (Rolleston 1910; Hickey 2011, 38; Dowd 2015, 226–228).

Of all animals, dogs have the closest relationship with humans, with some evidence suggesting that they were

domesticated as early as the Palaeolithic (e.g. Germonpré *et al*. 2009). They have been kept as companions and have been used for hunting, guarding, herding and transport as well as being a source of food and raw materials, and used in medicine (Gilhus 2006, 109; Morey 2010). Dogs have also had mythical associations with the underworld and death, being perceived at various times as chthonic creatures and as tools of the devil. Archaeologically, across Iron Age Europe their remains have been found in pits, graves and shafts (Green 1992, 111–113, 197–203). In Welsh mythology, Arawn, king of the Underworld, had a pack of white dogs with red ears, and in Classical mythology Cerberus was the three-headed dog who guarded the underworld (Morford and Lenardon 1999, 271; Gilhus 2006, 221). Given the range of symbolism attached to both dogs and wolves, the use of their canine teeth as pendants, amulets or symbols is not unexpected, and the ritual association of these species with the subterranean makes this connection even stronger.

Pig

The domestic pig (*Sus scrofa domesticus* or *Sus domesticus*) is descended from the wild pig (*Sus scrofa*). DNA evidence from both ancient and modern samples has demonstrated that this domestication took place on a number of separate occasions in widely-spaced geographical regions (Larson *et al*. 2005). As with dogs and wolves, wild and domestic pigs can interbreed, and since traditional pig breeding often involved allowing pigs to roam freely in woodland, hybridisation was inevitable. Again, the skeletons are essentially the same with the two groups differentiated by size and shape (Albarella *et al*. 2009). In Ireland there is archaeological evidence for the presence of pigs only from the Mesolithic onwards, which may indicate that they were introduced by people. McCormick (1999) has argued that wild pigs were probably present until the fourteenth century, with later documentary references possibly relating to feral pigs. However, recent genetic evidence may tentatively suggest that the true wild pig became extinct during the Neolithic, with all later examples being feral (van Wijngaarden-Bakker and van Giffen 1978; McCormick 1999; Carden 2012).

Three perforated male pig canine teeth were identified from Irish caves, with the two maxillary examples coming from wild pig. These would have been large, impressive artefacts that could have been strung in a variety of ways. Two perforated mandibular incisors were also identified. However, it was not possible to determine whether the mandibular canine and the incisors were from wild or domestic animals. Perforated and unperforated pig canines are a feature of some Late Bronze Age hoards and also occur in a number of Bronze Age burials where they have been identified with both inhumations and cremations (Eogan 1983, 152, 300; McCormick 1985/6).

Wild pigs were ferocious creatures that could easily kill or maim a huntsman. For example, Xenophon (400 BC) wrote that:

> ‘many hounds are killed in this kind of sport, and the huntsmen themselves run risks, whenever in the course of the pursuit they are forced to approach a boar with their spears in their hands, when he is tired or standing in water or has posted himself by a steep declivity or is unwilling to come out of a thicket; for neither net nor anything else stops him from rushing at anyone coming near him. Nevertheless approach they must in these circumstances, and show the pluck that led them to take up this hobby’.

This ferocity has led to wild pigs being associated with masculinity and warrior status (Green 1992, 89), and has led to representations of boars being commonly used in military or warrior regalia. For example, an Iron Age La Tène boar figurine in the National Museum of Ireland was probably originally mounted on a standard or helmet (Mitchell *et al*. 1977, fig. 18) in much the same way as the helmets shown on the Vendel Period (sixth–eighth century AD) press plate from Torslunda, Öland in Sweden (Lundborg 2007, fig. 3). Pigs’ teeth themselves can be symbolically important and ethnographic evidence shows that they are often incorporated into rituals. For example, in the Baktaman culture of Melanesia, the hunting of wild pigs and the use of their teeth are essential elements of male rituals of initiation and bonding. Novice warriors must first kill a wild male pig while it is in the act of copulation, and then the mandible of this pig is carried into battle as a symbol of ferocity and virility (Whitehouse 1996, 707). Pigs also frequently feature in Irish mythology and are particularly associated with death, rebirth, feasting and the underworld (Green 1992, 171). As with Olc Aí, a supernatural herd of pigs also lived inside the Cave of Crúachain, emerging to ravage the crops of Queen Medb and King Ailill (Westropp 1899, 26; Dowd 2015, 171).

Bear

Brown bear (*Ursus arctos*) was the largest carnivore present in prehistoric Ireland and a formidable predator. They are members of the order Carnivora, although they are omnivorous in their habits and will eat berries and plant material as well as both hunted and scavenged meat (Harris and Yalden 2008, 494–495). Radiocarbon dates show that the species was present in Ireland before the arrival of humans, with the earliest Holocene examples coming from Donore Bog, Co. Laois and Derrykeel Bog, Co. Longford. Bears have been extinct in Ireland for a considerable period but were still present in the Early Bronze Age at Lough Gur Knockadoon Site C and in Beaker period pits at Newgrange (Woodman *et al*. 1997; McCormick 1999;

Harris and Yalden 2008, 494–495). The latest radiocarbon date for bear in Ireland is 2956±33 BP (UB6705), from the cave of Poll na mBéar, Co. Leitrim (Edwards *et al*. 2011, table S2). However, McCormick (1999, 359) has argued that since they were present in Scotland until the early part of the first millennium, it is possible that some survived until a similar period in Ireland.

The perforated bear canine from Elderbush Cave is unique in Ireland, reflecting to an extent the rarity of bear in the Irish archaeological record. Only one other possible bear tooth has been found, which came from the court tomb at Annaghmare, Co. Armagh (McCormick 1985/6). Despite this, bear teeth are well known in other countries, regularly being recovered at sites ranging from the Palaeolithic through to the medieval period (e.g. Wintemberg 1917, 38; MacGregor 1985, 109–110; Newell 1990, 56; Bahn and Vertut 1997, 87; Teschler-Nicola 2006, 64). Bears would have been impressive and daunting creatures. They often hibernate in caves during the winter (Harris and Yalden 2008, 494–495) so that the deposition of the perforated tooth in a cave may reflect an understanding of this association. As described above, wild bears have been extinct in Ireland since at least the early medieval period. They rarely appear in Irish folklore, though are common themes in European tales and Kelly (2000, 190) has shown that Irish early medieval writers associated them with warriors, strength and ferocity.

Conclusions

Ten perforated, one notched, and three worked teeth have been recovered from five Irish caves, with dog, wolf, pig and bear represented. One of the problems with caves is that material is often poorly stratified and all of these artefacts remain undated. They are also very few in number, so that it is difficult to draw firm conclusions about the relative importance of the species represented, the frequency and timespan over which these artefacts were incorporated into caves, and the social contexts at the time. Nevertheless, the artefacts do feed into a larger European body of evidence that shows that perforated and notched teeth have an extremely long history as amulets, found both in caves and in other locations, particularly in funerary contexts. Notable in this regard is the connection between caves and the species found, with dogs, wolves and pigs associated in mythology with the underworld and death. All of these, as well as bears, are noted for their ferocity and strength and have often been used as military or warrior symbols. This suggests that the teeth may have been worn and used as powerful amulets that were subsequently deposited in caves during funerary or other ceremonies. As Dowd (2015) demonstrated, caves in Ireland have been significant places for as long as there have been people in Ireland, and the presence of these teeth in caves undoubtedly reflects their symbolic and ritual importance.

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8

Late Bronze Age and Iron Age metalwork from Irish caves

Katharina Becker

Three caves in Ireland have produced late prehistoric metalwork; two of these are in the south-east, in Co. Waterford while the third site is in the south-west, in Co. Kerry. Kilgreany Cave, Co. Waterford is the only cave to have produced Iron Age metalwork. This stands in strong contrast to the overall large number of Late Bronze Age deposits in particular, and the occasional finds of Iron Age artefacts, in the natural landscape. These finds have, with the exception of the Kilmurry Cave hoard and the Kilgreany Cave razor, not been considered in previous discussions of Late Bronze Age metalwork but have been highlighted as a coherent group of material from cave contexts by Dowd (2002; Dowd 2004, chapter 7; 2015, chapter 6).

1. Kerry, Kilmurry td., Kilmurry Cave

In 1944 a hoard of bronze artefacts was found near Kilmurry Cave during limestone quarrying (Fig. 8.1; Pl. 32). The original unpublished record of the discovery stated:

> 'It is difficult to explain how far exactly from the cave they were found. About 50 years ago it was a large natural cave. Since then the immediate vicinity has been quarried for limestone. The roof of the cave, and probably some of the walls have been quarried away. The location of the find was over either the roof or the side-wall of the cave. When found they were covered with about 2ft. of earth and stones and were resting together on a flat rock. About a year ago 4 or 5ft. of earth was removed from over them' (unpublished records NMI, cited in Dowd 2004, 462).

Bronze spearhead (1944:299)

A small spearhead with a leaf-shaped blade. The socket extends into the blade forming a hollow midrib. A raised band is visible around the circumference of the socket close to its end. The tip of the spearhead is blunt indicating some degree of use pre-deposition. The blades were sharpened post-recovery, as indicated by scratch marks in the patina. Two peg holes or rivet holes are positioned close to the blade on the sides of the socket. The patina is dark green and dense. A fine, clayey or sandy layer is visible adhering to the inside of the socket.

L: 8.0cm; max. width of blade: 1.84cm; narrowest width below blade: 1.26cm; max. diameter of socket: 1.79cm; weight: 23.96g.

With more than 530 recorded examples (Becker 2006), spearheads are one of the most common types of Late Bronze Age artefact in Ireland. The most common forms have a plain blade that can be oval, leaf- or flame-shaped. Leaf-shaped forms had developed by the end of the Middle Bronze Age, and became part of the standard repertoire of the Late Bronze Age. The plain leaf-shaped variety with peg holes appears in hoards of the Wilburton, Blackmoor and Ewart Park/Dowris phase (Burgess 1968). It does not appear in any hoard associations of the Middle Bronze Age in Ireland, but rather in hoards of the Dowris phase such as those from Blackhills, Co. Laois (Eogan 1983, 98–99, no. 95) and Dowris, Co. Offaly (*ibid*., 117, no. 119). Radiocarbon determinations for plain pegged spearheads further demonstrate their mostly late occurrence with dates after 1000 BC (Brindley 2001, 154–155: Faughalstown, Co. Westmeath, 1001–833 cal. BC; Moynagh Lough, Co. Meath, 1001–521 cal. BC); however Middle Bronze Age forms of

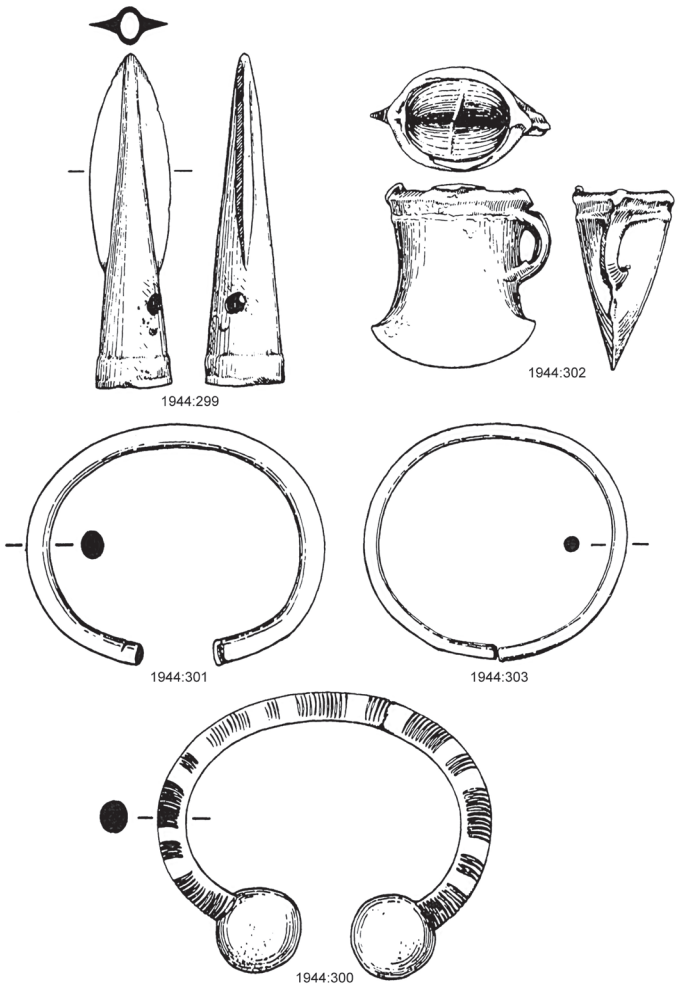

Figure 8.1 Late Bronze Age hoard from Kilmurry Cave: socketed spearhead (1944:299), socketed axe (1944:302), two penannular bracelets (1944:301, 303) and penannular bracelet with globular terminals (1944:300) (Eogan 1983, 262).

spearheads were also fitted with peg holes (Becker 2013a). The latest dates for pegged Dowris type spearheads appear to be around the seventh century BC (*ibid*.).

Bronze bracelet with globular terminals (1944:300)

This penannular bracelet is oval in shape with large globular terminals. In cross-section the body of the bracelet is rounded on the outside and flat on the inside. The outside is decorated with thirteen sets of grooves. Large sets of grooves (13, 12, 11 or 10 grooves) alternate with small sets (two or five grooves). The grooves are mostly deep but in some areas almost unrecognisably flat. Possible traces of wear are visible on the inside of the globular ends on which patina has not built up or has been worn off.

The bracelet is broken into two parts. The break occurred along one of the decorative grooves. No tool marks are visible on the surface or in the break, neither are bending traces recognisable, which might indicate the use of force in order to achieve the break. The broken surface is irregular and reveals a rather porous structure to the metal. This natural weakness in the metal may have contributed to the break occurring. The surface of the terminals also displays small pores, indicating a cast of mediocre quality.

While some green corrosion is visible on the upper part of the break surface, the lower part is blank. The patina on the original surface of the bracelet itself differs strongly from this. While the break surface would, due to its different texture, acquire a different corrosion product than the polished surface, the character of the break surface suggests the break happened post-deposition. The dense, dark green corrosion layer on the outside of the surface is virtually identical on both sides of the break, further suggesting that it developed while the bracelet was still intact. The patina is dark green, dense and fine. It is patchy in some areas and the golden bronze is exposed underneath it.

Diameter: 7.92×*c*. 6.5cm; globular terminal: 2.13×2.0cm; weight: 124.55g.

This bracelet is the only one of its type found in Ireland. It has, in previous research, been considered to be a likely import from the continent (e.g. Eogan 1964, 320; Raftery 1984, 9). No parallels are known from Britain, with the exception of a possibly related gold bracelet with small globular terminals (O'Connor 1980, 259). Comparable bracelets with globular terminals are found in France in Early Iron Age contexts, i.e. dating from 800–450 BC. Eogan (1964, 320) discussed parallels in Alsace, while Raftery pointed to such in eastern France (e.g. 1994, 31). In eastern and south-western France bracelets with globular terminals broadly comparable to that from Kilmurry Cave are found with Hallstatt D associations (e.g. Schaeffer 1930, 239, fig. 175; Mohen and Coffyn 1970, 111, pl. xx; O'Connor 1980, 259). In the Tarn region of south-western France, examples of such bracelets can be dated to the later stage of the Early Iron Age from 675–575 BC (Giraud *et al*. 2003, type C5, 96–97, 167, 180). The majority of these are undecorated. Decoration with lines is found on an example from the site of Gourjade (tomb 202, no. 19b) (*ibid*., pl. 147). Two bundles of parallel lines decorate the end of the body of a bracelet from Causse (tomb 681, no. 19), which dates to between 675–625 BC (*ibid*., 180, pl. 91). As this example is made of iron, it is possible that more decoration was originally present on the rest of its body. Generally, the globular ends are significantly smaller than those on the Kilmurry bracelet and furthermore, its all over decoration has so far not been paralleled in other pieces.

Bracelets with globular terminals have also been found in central France (e.g. Milcent 2004, 158, no. 16, fig. 80) and belong to Milcent's group 2 a and b of annular and penannular torcs, bracelets and pendants. These as a group date to Hallstatt D1–2. This group of ornaments is found primarily in female graves (*ibid*., 160–161, 459). These bracelets, however, have relatively small terminals. In terms of its proportion, a bracelet from Pujaut (Mohen and Coffyn 1970, pl. xx, fig. 6) is closer to the Kilmurry bracelet but according to the published drawing its terminals are hollow and cup-shaped, as opposed to the solid globes of the Kilmurry example.

A better parallel both in proportions of terminals and body, as well as the presence of decoration, is the bracelet from Bouzais, Les Camp, dating to Hallstatt D1–2 (Milcent 2004, 458, pl. 33.2). This not only shows two sets of decoration – though one consists of arrows rather than simple lines as on the Kilmurry piece – but also has relatively large bulbous ends. A bracelet from Caen in Normandy is also closely comparable (Verney 1993, 100, fig. 2.3) with decoration in sets of grooves close to the terminals. However, this one has additional grooves on its terminals, unlike Kilmurry. The Caen bracelet and others with slightly smaller globular terminals (*ibid*., 100, fig. 2.12) are found with inhumation burials of the sixth and fifth century BC in the region.

While no exact parallels for the Kilmurry bracelet can be identified, a close connection to French examples and a date in the Hallstatt C or D period is evident. It is likely that the Kilmurry bracelet is an import, although its isolated position within the Irish corpus may be due to a lack of survival of Bronze Age ornament in the period rather than proof of it being the only bracelet of this type ever in use in Ireland. The lack of comparable material from Britain supports the notion that the Kilmurry bracelet is in fact an import.

Bronze penannular bracelet (1944:301)

This penannular bracelet is oval and slightly irregular in shape. The body is slightly pinched in before the end of each terminal creating a slight expansion, and is oval in cross-section. The surface of the bracelet is covered in a dusty green, fine corrosion product but the golden metal is exposed on one side of the body. The surface is slightly porous in some areas.

Diameter: 7.06c×5.73cm; thickness: 0.53×0.53cm to 0.54×0.60cm; weight: 33.63g.

Bronze penannular bracelet (1944:303)

The bracelet is of sub-circular shape but is slightly bent out of shape. Its cross-section is oval to round and slightly facetted. The ends of the terminals are minimally expanded and have slightly rounded surfaces.

Diameter: 5.8×6.3cm; thickness: 0.33×0.35cm to 0.35×0.39cm; weight: 15.62g.

Bronze penannular bracelets are rare in the Irish Bronze Age. No exact parallels for the Kilmurry bracelets are known. Ring no. 4 in the hoard from Trillick, Co. Tyrone with straight moulded terminals may be a bracelet (Eogan 1983, no. 142, fig. 90). Two other examples from the Brockagh hoard, Co. Westmeath and the Lahardan hoard, Co. Clare have expanded terminals (*ibid*., no. 147, fig. 93; no. 57), a form of bracelet that usually occurs in gold in the Irish record. A bracelet from a hoard from Co. Cork with slightly expanded terminals (*ibid*., no. A.6, fig. 105), has a much larger diameter than the examples from Kilmurry. The bracelets, which in terms of their shape resemble the Kilmurry bracelets most closely, are made of gold and have terminals as, for example, found in a hoard from Co. Limerick (*ibid*., no. 104, fig. 57) or the Mooghaun hoard, Co. Clare.

The examples from Kilmurry with barely expanded and decorated terminals can be paralleled in Hallstatt C contexts elsewhere (*cf*. Eogan 1964, 320), they are, however, a plain and relatively undiagnostic type that cannot be considered

chronologically distinct or informative for the dating of the find.

Plain bronze annular rings that form part of a number of Dowris phase hoards may in fact be bracelets, such as those found at Grange, Co. Kildare (Eogan 1983, no. 92, fig. 48; no. 93, fig. 50). A bracelet from Site D, Lough Gur, Co. Limerick is a plain type with unexpanded terminals and came from the lower terrace wall (Ó Ríordáin 1954, fig. 43.10). While Ó Ríordáin points out that the layer this find came from post-dates the earliest phase of the site (*ibid*., 390), the stratigraphy does not seem clear enough to securely exclude an Early Bronze Age date for the artefact. The ribbed bracelet discovered at Haughey's Fort, Co. Armagh is attributed to the Late Bronze Age phase of the site but, typologically, would have to be placed in the Middle Bronze Age. The radiocarbon dates obtained from the pit wherein the object was found would allow for either date (Mallory 1995, 75–77, 81). Moulds, possibly for the casting of bronze bracelets, found at Corrstown, Co. Derry (Grogan 2012, 190) further add to the evidence that a wider range of bronze artefacts was in use than is apparent in the range of cast objects deposited.

Bronze socketed miniature axe (1944:302)

This small, bag-shaped axe is decorated with a groove around the edge of its bevelled socket. The blade is slightly expanded. The haft rib extends almost to the rim. The patina is dark green to black with the golden bronze exposed in some areas, which may be due to modern handling. The axe is not very well finished with casting seams still visible along the sides of the body; the blade, however, is sharp. There is a thin, sandy deposit inside the socket.

Length: 4.29cm; max. width above blade: 3.0cm; max. diameter of socket: 2.43×3.42cm; weight: 50.86g.

The axe belongs to Eogan's class 11D (2000, 143, no. 1362). The ridge near the socket – or as Eogan calls it, 'base of the neck' – is the distinguishing feature of class 11D. Class D axes are generally characterised by their bag-shape with oval cross-section, concave sides, expanded and crescentic cutting edges, and a loop positioned close to the rim and haft ribs. Class 11 axes are the most common type of axe in Ireland, contributing roughly 1200 to the *c*. 2200 strong corpus (*ibid*., 86). Eogan assigns axes of class 11 to the Dowris phase based on their associations in hoards (*ibid*., 186). They are rare in the south of Ireland and have their main distribution in the northern half of the country (*ibid*., pl. 119).

Discussion of the Kilmurry Cave hoard

The Kilmurry Cave hoard was considered by Eogan in his corpus of Middle and Late Bronze Age hoards (1983), in his synthesis on the Irish Bronze Age (1964), and in Raftery's book on Iron Age Ireland (1994, 26–37). The importance of the Kilmurry hoard is not just the fact that the bracelet with the globular ends is a rare, likely Hallstatt period, import (*cf*. Raftery 1984), but also that it is in fact possibly one of the few remaining pieces of evidence for a transitional Bronze Age/Iron Age horizon in Ireland where early Iron Age forms occur against a local Bronze Age background (*cf*. Eogan 1964, 320; Champion 1971; Raftery 1984, 7–14; Raftery 1994, 26–37). While it is unclear, as yet, how quickly wider technological or cultural changes followed the first – perhaps sporadic – appearance of iron objects in the eighth century BC, it can be suggested that the Dowris metalworking tradition did not continue for much longer after (Becker 2012; Becker 2013a).

2. Waterford, Ballygambon Lower td., Brothers' Cave

A Late Bronze Age hoard was discovered lying on the floor of Brother's Cave in 1906, and subsequent archaeological excavations led to the recovery of a La Tène horse-bit side-link in the cave (Forsayeth 1931; Dowd and Corlett 2002; Dowd 2015, chapter 6). These artefacts have since been lost but the surviving antiquarian illustrations allow for the following observations (Fig. 8.2).

Bronze socketed axehead

According to the illustration, this is a socketed and looped axehead. It is of squat shape with facets and an expanded cutting edge with recurving blade tips. The facets should produce a hexagonal cross-section, but this cannot be verified from the drawing. It resembles most closely Eogan's class 9 axes, particularly those of class 9E. Both class 8 and class 9 axes have facets, but those of class 9 are stouter, similar to that from Brothers' Cave. Besides the faceting, class 9 axes are characterised by an oval mouth, a curved outline, an expanded usually crescentic cutting edge, and broad and rounded bodies (Eogan 2000, 62). Undecorated examples such as that from Brother's Cave find their best parallels in Eogan's class 9E. While many of the axes in this class have bevelled rims, some also resemble the Brothers' example where the rim is plain, with a possible slight projecting of the lip (e.g. *ibid*., pl. 32, 557, 541). They all share a well expanded cutting edge with pronounced re-curving tips (*ibid*., 76). Particularly close parallels with squat, stout bodies are also known (*ibid*., pl. 34, 569, 570).

A number of hoard associations of Class 9 axes are known. A possible Bishopsland phase basal-looped spearhead was found with a Class 9 axe at Kish, Co. Wicklow. All the other ten known associated finds of axes of this type can be assigned to the Dowris phase (Eogan 2000, 80). This is supported by the radiocarbon date for an axe from Ardonan,

Co. Cavan, which was dated to 2720±50 BP, calibrating to 980–790 BC (Brindley 2001, 156). Axes of type 9E are virtually unknown in the very south of Ireland (Eogan 2000, pl. 117), with the example from Brother's Cave representing a rare exception.

Bronze socketed sickle

The characteristically curved blade of this sickle has a wide, rounded tip. No midrib or decoration of the blade is visible. The socket has a rivet hole, which may have been mirrored by a corresponding one on the other side. It is possible that the socket is open at the top, as characteristic for many of the examples of group 1 laterally socketed sickles as defined by Fox (1939, 223). However, the rivet hole is not centrally placed as on these types, but occurs towards the upper third of the socket. The cross-section of the socket cannot be determined from the drawing. Irish examples listed by Fox frequently have an oval rather than cylindrical socket as with the British series. While forms that Fox saw as later in the sequence are characterised by a backward extension of the blade into the socket, and at times even beyond it (*ibid*., 224), the sickle from Brothers' is, like his earliest examples, simple in construction with the blade seemingly simply 'stuck onto' the cylindrical socket. Examples of such early types illustrated by Fox (*ibid*., fig. 2) show a plain form and construction similar to the example from Brothers' Cave. However, the high position of its rivet hole is unusual. Working only from the antiquarian drawing it is not possible to further narrow down the type other than to say it belongs early in the sequence of Fox's group 1 Late Bronze Age sickles.

Socketed sickles are a development of the insular Late Bronze Age; the earliest metal sickles found in Middle Bronze Age contexts are not socketed. In Ireland a buttoned, not socketed, sickle was included in the Bishopsland hoard, Co. Kildare (Eogan 1983, no. 16). Such knobbed unsocketed sickles are also found both on the continent and in Britain and are dated to the Middle Bronze Age Taunton phase – corresponding to Eogan's Bishopsland phase (Eogan 1964, 276). Mould fragments with matrices for sickles of an indistinct type were found in the early Middle Bronze Age hoard from Killymaddy, Co. Antrim (Coghlan and Raftery 1961, 232–233, 239–240, nos. 17–19, 33, 36–37, 39). While the hafting part was broken off on all three fragments, it appears that at least

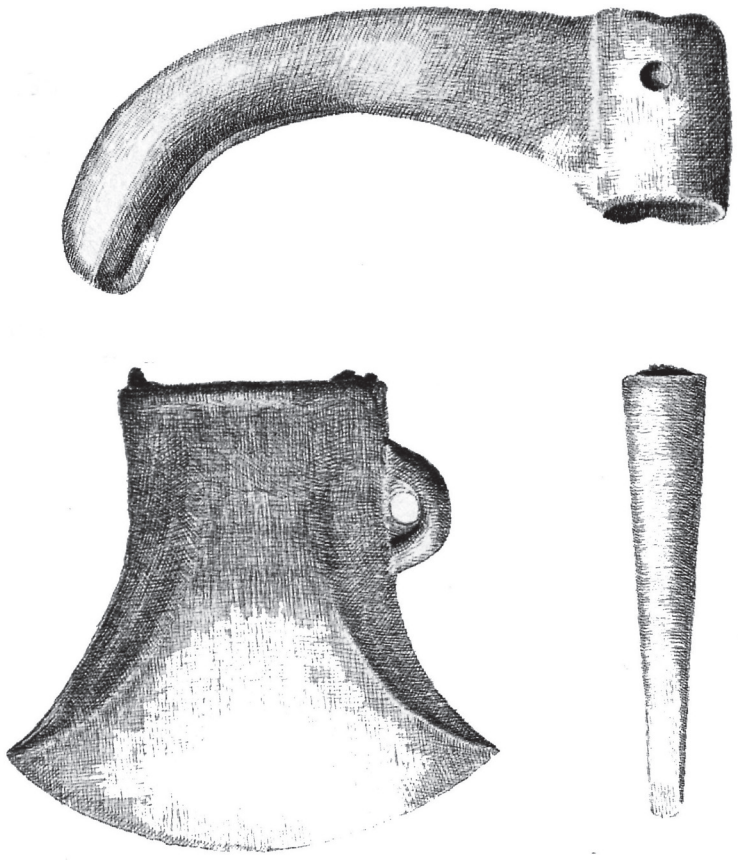

Figure 8.2 Late Bronze Age hoard from Brothers' Cave: socketed sickle, socketed axe and socketed chisel. Illustration by Col. Richard W. Forsayeth c. 1906, artefacts now lost (Dowd and Corlett 2002, 9).

one is not the same type as the sickle from the Bishopsland hoard since it has a midrib, a feature that is not known on contemporary British or European knobbed sickles (Eogan 1964, 276). As Jockenhövel (1980, 55) remarked, this find indicates an early start for the use of bronze sickles in the Kilmaddy phase which, named after this find of moulds, marks the earliest beginnings of the Middle Bronze Age tradition in Ireland. However, in spite of the long time span implied by these two pieces of evidence for the use of sickles at the beginning and end of the Middle Bronze Age, no other examples of these forms have been recorded. The earliest possible evidence for a type 1 sickle of simple form like the one from Brothers' Cave was found in association with a late Middle Bronze Age rapier and palstave at Downham Fen, Norfolk (Fox 1939, 227), which may speak for an earlier beginning of socketed forms. Fox appears to have inspected the objects and identified them as a palstave and rapier. He makes no comment on the original account which refers to a 'short sword', although this could be a product of the difficulties in distinguishing between dirks and rapiers for Middle Bronze Age weapons.

In Ireland, socketed Late Bronze Age sickles have been found in greater numbers with at least 39 recorded examples. Of these, 35 are single finds and four have been found in hoards (Becker 2006; Becker 2013b). The hoard associations securely place them in the Dowris phase. A sickle, which was socketed, probably laterally (*cf*. Eogan 1983, 157), from the Ross hoard, Co. Waterford was associated with other tools of the Dowris phase (socketed axe, two chisels and a gouge). In a hoard from Newgarden North, Co. Limerick a socketed sickle was associated with a socketed axe, a gouge, a chisel and an unidentified item (Limerick City Museum, 2003.0022–0024). An association with Middle Bronze Age kite-shaped and looped spearheads, palstaves, and Dowris phase spearheads in an assemblage from Charleville, Co. Offaly has to be considered insecure and not usable for dating purposes (Eogan 1983, 190). The features found on these sickles suggest that they may be typologically later than the piece from Brothers' Cave – if Fox's sequence, which in its later development stages is not yet sufficiently supported by dating evidence, can be considered chronologically relevant.

Bronze socketed chisel

The chisel from Brothers' Cave appears to have a round socket and a blade with a rectangular cross section. Other socketed chisels from Ireland can have a square socket or a rounded socket and splayed blade (Eogan 1964, 298). The larger socketed chisel from the Ross hoard has a round cross-section and a rectangular sectioned point (Eogan 1983, fig. 85.2), while the smaller one has a consistently sub-rectangular section. Socketed chisels and gouges are part of the Dowris complex (Hodges 1956, 41; Eogan 1964, 296). While it is possible that they already existed in this form in the Middle Bronze Age, they are not found in hoards of that period.

Bronze horse-bit side-link

This is a La Tène side-link of a type B three-link horse-bit (Fig. 8.3). Such side-links are characterised by their slightly bowed shape, the inner terminal being slightly slimmer than the outer. They have a v-moulding on the inner terminal which, as in the Brothers' Cave example, can be simple but is more elaborate on other examples (*cf*. Raftery 1984, 16–18). Type B horse-bits are the most frequent form (*ibid*., 16) and appear early in the typological sequence but this is not confirmed by independent dating evidence. While no imported horse-bits can be identified, parallels are found in Eastern Yorkshire and the Marne region of France and are datable to about the fourth century BC. The date of British parallels is either around the same time or in the second or third centuries BC (*ibid*., 31–32). No secure associations of type B horse-bits are known in Ireland; the association with a bronze spearhead and a trunnion chisel at Toomyvara, Co. Tipperary is suspicious, as is the association with a razor at Ballyblack Moss, Co. Down (*ibid*., 33). Early three-link horse-bits are rare in the south, in line with the general distribution of La Tène material in Ireland (*ibid*., map 1).

3. Waterford, Kilgreany td., Kilgreany Cave

Four Late Bronze Age bronze artefacts were recovered scattered through various strata and in different areas of Kilgreany Cave during excavations in 1928 and 1934 (Fig. 8.4; Pl. 33) (Tratman 1929; Movius 1935; Dowd 2002; Dowd 2015, chapter 6).

Bronze socketed knife (K66)

The blade of this socketed knife is straight on one side for most of its length and more curved on the other side, which also reveals modern damage. It displays a probably slowly developed dense green patina as well as other corrosion products. The junction of socket and blade is straight; the blade is fluted.

Length: 18.9cm; max. width of blade: 3.0cm; max. width of socket: 2.85cm; min. width of socket below blade: 2.39cm; weight: 129.69g.

Socketed double-edged knives are considered a characteristic tool of the Late Bronze Age in Britain; they include the Thorndon, Dungiven and Kells types as well as carving knifes with curved blades (Hodges 1956, 38–39; Eogan 1964, 296, fig. 12.1). The knife from Kilgreany Cave is of Thorndon type, as defined by Hodges, of which at least 18 are known from Ireland (Becker 2006). They also occur

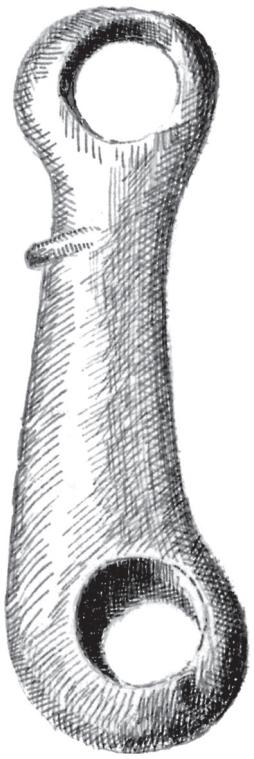

Figure 8.3 La Tène horse-bit side-link from Brothers' Cave. Illustration by Col. Richard W. Forsayeth c. 1906, artefact now lost (Dowd 2015, 168).

in Britain and northern France (Hodges 1956, 38–39, fig. 4; O'Connor 1980, 178; Burgess 1982, 39–40). In Ireland the majority seem to be from northern parts of the country with hardly any recorded from Munster (Hodges 1956, fig. 4).

Thorndon type knifes are characterised by a straight junction between socket and blade and an either straight-sided or leaf-shaped blade with an oval or hexagonal socket (Hodges 1956, 38). There is a great variety of blade cross-sections including plain, bevelled and multiple-arris or fluted forms (*cf*. Burgess 1982, 38–39). The blade of the Kilgreany knife is fluted and most closely comparable in an Irish context with the knives from the Kish hoard, Co. Wicklow and the Crossna hoard, Co. Roscommon. The Kish knife differs: it has a decorated socket whereas the Kilgreany socket is plain. The hexagonal cross-section of the Crossna knife and its constricted socket differ from the Kilgreany piece. Also, the rivet holes are positioned on the sides of the socket rather than on the front and back as with the Kilgreany knife. The Kish example also shares a concave socket outline with the Kilgreany knife, a knife from Oghermong, Co. Kerry and an example from Kilycreen West, Co. Fermanagh (Eogan 1983, no. 91, fig. 4; no. 79, fig. 41). These are not associated with diagnostic types, which would allow us to narrow down their date within the Dowris period.

Apart from two characteristic Late Bronze Age socketed axeheads, the Kish hoard includes a basal looped spearhead and thus is possibly early in the sequence (Eogan 1983, no. 155, fig. 96). The other associated finds from Ireland (*ibid*., nos. 44, 79, 91, 119, 125, 144, 146, 155; O'Carroll and Ryan 1992) indicate a parallel date in the Dowris phase, however, no fine chronological differentiation is possible. In Britain they occur with Ewart Park associations. O'Connor (1980, 178) identified double-edged socketed knifes as primarily belonging to LBA3 (Ewart Park) with only one example known from LBA2.

Bronze pin (K77)

This pin has a slightly irregularly shaped head and a flat top. It is covered in fine, dark green patina with corrosion product build up in some areas.

Length: 8.25cm; width of head: 8.1cm; height of head: 1.14cm.

Bronze pin (K69)

This bulbous headed pin is incomplete; its end is missing. The head has a slightly angular profile. Two grooves around the circumference create a decorative band. The pin was covered with a dense green patina, but now bronze disease has destroyed large portions of it.

Length: 11.41cm; diameter of head: 1.41cm; height of head: 0.84cm; diameter of shaft: 0.44cm; weight: 22.83cm.

The pins from Kilgreany Cave are unusual in the repertoire of Irish Bronze Age metalwork, but are frequently found elsewhere in Europe in an Urnfield context. A comparable pin with a bulbous head was found in Bronze Age or early Iron Age levels at Aughinish, Co. Limerick (Kelly 1974).

Bronze bifid razor (E9:71)

The end of the tang of this bifid razor has broken off. Large patches of surface have been destroyed by bronze disease, including the cutting edge, which makes it difficult to judge the original outline. Decorative ridges are positioned on the midrib.

Length: 7.94cm; max. width of blade: 2.2cm; weight: 10.0g.

Bifid razors are the dominant type of razor in the Later Bronze Age in Western Europe. The Irish examples belong

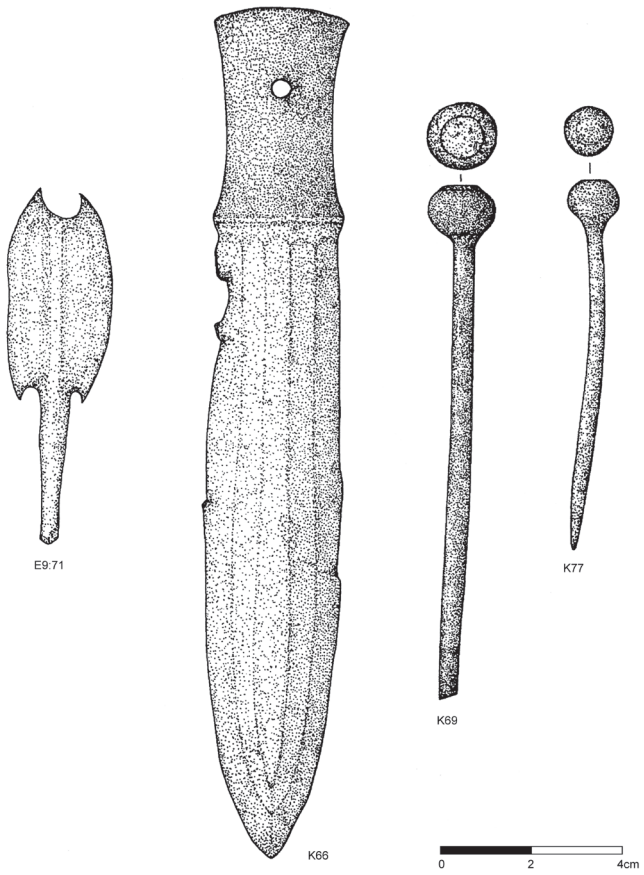

Figure 8.4 Late Bronze Age metalwork from Kilgreany Cave: bifid razor (E9:71), Thorndon type socketed knife (K66) and two bulb-headed pins (K69, K77) (Dowd 2002, 85).

to the tanged form. Only one example of the Feltwell type (Carp's Tongue complex/Dowris phase) has been found in Ireland (no provenance, Jockenhövel 1980, no. 176). This is the typical razor in the British Late Bronze Age (*ibid*., 65, 67) and is characterised by a maple leaf-shaped blade with concave ends. The resulting indentation is almost v-shaped on the top. The contemporary Dowris form, which is a slightly more slender version with butterfly wing-shaped blades and a flat and wide tang, was locally produced (*ibid*., 72-5); it has been found in the Dowris hoard, Co. Offaly, the Cromagh hoard, Co. Antrim, and the Moynalty Lough settlement, Co. Monaghan (Eogan 1983) and can thus be dated to the Dowris A phase (after Eogan 1969).

The Kilgreany Cave artefact is a characteristic example of razors of local Irish Dowris type (Jockenhövel 1980, no. 200). It most closely resembles the example from the Cromagh hoard with a defined midrib (Eogan 1983, no. 38.3), and a closely comparable piece from the Dowris hoard (*ibid*., no. 119.91). All these have a perforated midrib, in contrast to the Kilgreany piece. Other Irish examples, such as from Monalty Lough, one from Toome, Co. Antrim, and two unprovenanced examples, also lack perforations (Jockenhövel 1980, nos. 198, 190, 201 and 202).

Concluding remarks

The three assemblages of late prehistoric metalwork discussed here date to the Late Bronze Age. It is striking that, with the exception of the Iron Age horse-bit from Brothers' Cave, no later or earlier prehistoric metalwork has been recovered from caves in Ireland. This probably reflects to a degree the peak in deposition of bronze and gold artefacts in the Late Bronze Age generally. The special character of these cave deposits must be noted. For example, the Kilmurry Cave decorated bracelet and the pins from Kilgreany Cave represent unique or rare forms of artefacts within the known corpus of Irish late prehistoric metalwork. The Kilmurry bracelet is one of the few genuine Hallstatt C or D imports (*cf*. Raftery 1994) and may represent evidence for an otherwise elusive horizon of transitional Late Bronze Age and Early Iron Age metalwork. Further, the axes from Brother's Cave and Kilmurry Cave are unusual finds; while

the overall density of socketed axes is much lower in the south than elsewhere in the country (Eogan 2000, pl. 112), the types from these caves show an even stronger regional bias, which makes their presence much more striking.

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9

Early medieval and medieval pottery from sea caves along the Antrim coast

Alison Kyle

This chapter presents the analysis of coarsewares from six caves along the north Antrim coast that were excavated during the 1930s (Jackson 1933; Jackson 1934a; Jackson 1936; Jackson 1938). Boat Cave (initially known as Boheeshane Bay Cave 1), Boheeshane Bay Cave 2 (a rockshelter east of Boat Cave), Chimney Cave, Masked Rockshelter (west of Potter's Cave), and Potter's Cave are all located in Ballintoy Demesne townland; the sixth site, Park Cave, is in White Park townland. It should be noted that the material from Portbraddan Cave – another sea cave on the Antrim coast – could not be located at the time of analysis, though pottery was recovered during excavations there (May 1943).

A total of 2583 sherds and 32 fragments of pottery were examined in the Ulster Museum, as well as a clay figurine and several lumps of fired clay. The pottery was found to range in date from the Middle and Late Neolithic through to the medieval period; however, the vast majority was identified as early medieval in date. Overall, 203 vessels were identified of which one was Neolithic, one possibly Bronze Age, 184 were Souterrain Ware vessels, 16 were Everted Rim Ware vessels, and there was a single medieval glazed vessel. The largest assemblage came from Potter's Cave. The material from each site is discussed below before turning to a comparative inter-site discussion.

Methodology

Due to time constraints, detailed parameters such as sherd weight and thickness were not recorded. It was, therefore, not possible to compare the degree of fragmentation across contexts or at an inter-site level. However, given the general absence of small fragments of pottery (i.e. less than *c*. 1cm in size) it seems that the original excavation and collection strategy did not include the retention of smaller fragments, and as such any consideration of fragmentation would be based on an inherently biased dataset.

With regards quantification, the irregular nature of Souterrain Ware vessels contributes to the problem of attribution of individual sherds to vessels. The homogeneous nature of the fabrics further adds to this problem. Those vessels that were felt sufficiently distinctive were given individual vessel numbers in the form of an alphanumerical code, for instance V1, V2 etc. Due to limitations of time and work space, it is possible that more vessels were present but not identified. Vessel identification was largely based on rims as they were more distinctive; it was generally not possible to attribute base sherds to vessels. In the following site discussions, sherds unattributed to vessel are included in the sherd counts, but discussions of decoration, evidence of use etc., are restricted to identified vessels. Finally, the overall discussion focuses on a comparison of the early medieval material recovered from these cave sites.

1. Antrim, Ballintoy Demesne td., Boat Cave

A total of 143 sherds (none small enough to be classified as fragments) and a piece of fired clay were recovered from Boat Cave (Fig. 9.1). The pottery assemblage represents both early medieval and medieval material. A minimum of 15 vessels were identified, including nine of the Souterrain Ware tradition (V5–V13), five of the Everted Rim Ware tradition (V14–V18), and a single sherd of a medieval glazed vessel (V203). During the excavations two occupation layers

were identified within the cave – Levels I and II (Jackson 1936, 36; Jackson 1938, 107–109). The majority of the analysed pottery came from the upper stratum, Level I, including all the identified Everted Rim Ware and all but one of the decorated Souterrain Ware vessels. Only two identified vessels were recovered from the lower stratum, Level II, including one decorated Souterrain Ware pot (V5).

Early medieval Souterrain Ware

Of the nine identified Souterrain Ware vessels, four appear to have overall 'barrel-shaped' profiles (V5, V6, V8, V12) and the remaining five have 'bucket-shaped' profiles (V7, V9, V10, V11, V13). One vessel (V8) displayed a plain, pinched cordon positioned *c*. 29mm beneath the rim. This had been pinched out from the body of the vessel rather than applied as a separate strip. As a result, a single finger groove can be seen running around the vessel immediately above the cordon. Three vessels (V5, V9, V11) had rim top decoration, executed by three different means including incised diagonal lines (V5), diagonal fingernail impressions (V9), and fingertip impressions (V11). All were intermittent and executed in an expedient manner. No surface treatment was observed on any of the identified vessels. Evidence of use was restricted to the presence of sooting on the external walls of V9. Thin, patchy vitrified material was present on both the internal and external surfaces of V6. The vessel does not appear, however, to have been used as a crucible. Rather, this may have occurred accidentally, perhaps indicating that the vessel was in close proximity to a metalworking area.

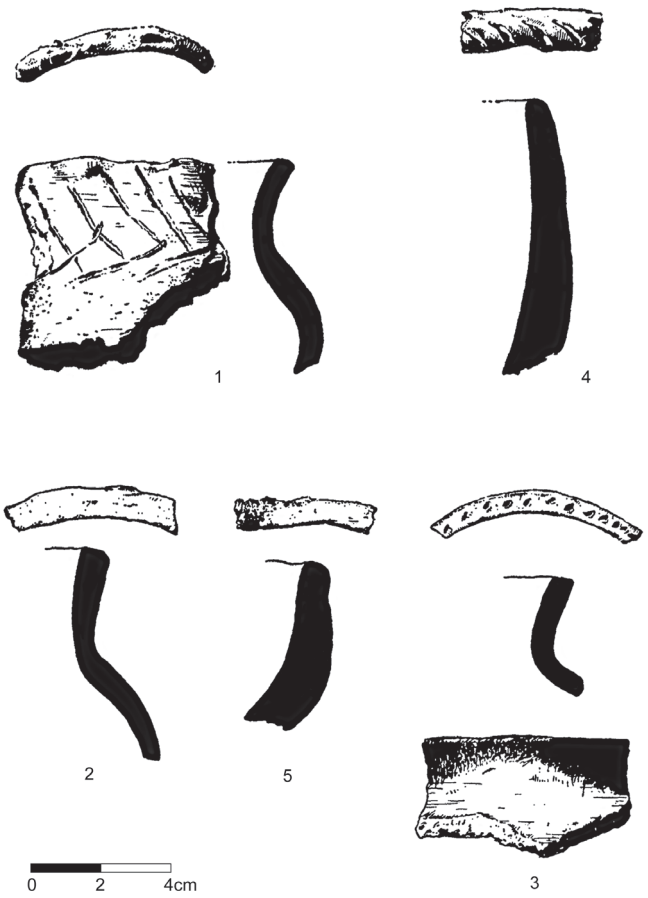


Figure 9.1 Pottery from Boat Cave (Jackson 1936, 39).

Medieval Everted Rim Ware

Each of the five identified Everted Rim Ware vessels had flattened rims, which lead from slightly everted necks (V14–V18). V14 and V16 appeared to possess high shoulders. It was not possible to attribute base sherds to any of these vessels. Decoration was present on V14 and V16. The decoration on the rim top of V16 consisted of impressed dots that may have been executed using a stick, bone or similar implement. The rim top of V14 displayed intermittent fingernail impressions, while incised chevrons were present on the shoulder. No surface treatment or evidence for use was observed on these vessels.

Medieval glazed pottery

A single glazed vessel (V203) was represented by the remains of what appears to be a flat pedestal base of a jug, recovered from 'Surface soil in alcove'. It has a sandy fabric with identifiable inclusions including red iron ore and rounded quartz grains reaching up to a maximum of 2.5mm. The core is grey with buff-coloured margins, and a patchy pale green glaze is present on the external surface, extending over the underside of the base. Parallel striations on the underside of the base may have resulted from cutting the vessel off the wheel.

Production waste?

A single irregular lump of fired clay was recovered from 'Level II (alcove)'. This lump showed evidence of having been handled, in the form of wipe marks, prior to firing. Its amorphous nature suggests it was never intended to be fired as an artefact in itself and represents production waste.

2. Antrim, Ballintoy Demesne td., Boheeshane Bay Cave 2 (rockshelter east of Boat Cave)

A total of 25 sherds were recovered from a charcoal-rich stratum ('Layer I') associated with animal and fish bone in this rockshelter (Jackson 1936, 35). The assemblage includes three diagnostic base sherds and the remainder are all undiagnostic body sherds. These are tentatively suggested to derive from a single vessel (V1) belonging to the Souterrain Ware tradition. This assemblage was the most undiagnostic of all those examined during this project. Three base sherds

were attributed to V1. These indicate the vessel had a flat base with gently splaying vessel walls. The general form fits within the Souterrain Ware bucket-shaped template, but this identification is not entirely certain. The base diameter of the vessel could not be established due to the abraded nature of the sherds. No decoration, surface treatment or evidence of use was observed.

3. Antrim, Ballintoy Demesne td., Chimney Cave

A total of 136 sherds (16 base sherds, 13 basal sherds, 19 rim sherds, 88 body sherds) and three body fragments were retrieved from Chimney Cave. The pottery was all recovered from a single context described as, 'occupation layer above stone paving', which appears to have been the uppermost of four identified occupation layers (Jackson 1936, 32). A minimum of five vessels (V19–V23) are represented in the assemblage, all of which seem to belong to the Souterrain Ware tradition. Four vessels (V20–V23) appear to be of overall bucket-shaped form and one is of barrel-shaped form (V19). Rim top decoration in the form of intermittent fingertip impressions was present on V19 and V22. Observed surface treatment on the vessels from this assemblage was restricted to V19. The underside of the base displayed sparse, fine organic impressions and was slightly pitted. This may suggest the vessel was constructed on a sanded surface. Evidence for use was again restricted to V19; sooting was present on the external vessel wall but did not extend to the underside of the base suggesting the vessel was placed directly on the hearth.

4. Antrim, Ballintoy Demesne td., Masked Rockshelter (west of Potter's Cave)

A total of 48 sherds were recovered from both of the identified occupation layers in Masked Rockshelter – Layer A and Layer B (Jackson 1934a, 108). The decorated vessel was recovered from the upper stratum, Layer A. The assemblage includes four base sherds, four basal sherds, six rim sherds and 34 body sherds. A minimum of three vessels (V2–V4) are represented, all of which seem to belong to the Souterrain Ware tradition. The forms of the vessels are slightly different but they do conform to the overall known Souterrain Ware tradition. V2 fits within the general bucket-shaped form, while the in-turning rim of V3 may have given it a slightly more barrel-shaped profile. The upper section of V4 did not survive, though this vessel had a slightly footed base in comparison to the irregularly-defined basal angles of vessels V2 and V3.

Only V3 exhibited decoration; this was in the form of a plain cordon that had been pinched out from the vessel body rather than being applied as a separate piece of clay. The cordon is poorly defined, protrudes a maximum of 2–3mm and occurs *c*. 21mm beneath the rim. Evidence for surface treatment in this assemblage was restricted to organic impressions on the underside of the base of V3. These were short and fine, and appeared chaff-like in character. Organic impressions were also present on a further three basal sherds, not attributed to any particular vessel.

External sooting was present on V2 and V3, though they displayed different sooting patterns. The sooting on V2 extends over the vessel walls to the underside of the base, while on V3 soot is restricted to the walls and is absent from the base indicating it was placed directly on the hearth. While the sooting pattern on V2 may suggest the vessel was suspended above a fire, an alternative possibility is that it was placed directly on the fire, with soot adhering to the underside of the base as it was placed in, and lifted out of, the fire. Further evidence for use was present in the form of carbonised residue on the internal surface of V3; this was heavily encrusted in places.

5. Antrim, Ballintoy Demesne td., Potter's Cave

Four occupation deposits were identified during the excavations that took place outside Potter's Cave (the cave interior was never excavated). From the stratigraphically latest to the earliest, these levels were named OX, 01, 02 and 03 (Jackson 1933; Jackson 1934a; Jackson 1936; Jackson 1938). Pottery was recovered from the three uppermost layers (OX, 01, and 02). The presence of Everted Rim Ware and decorated Souterrain Ware in all three levels indicates the degree of post-depositional disturbance. However, where the context of the decorated vessels (V126–V128) was recorded, cordoned vessels were present in the early phase only (Layer 02); rim tops with fingertip decoration were present in Layer 02 (V116) and Layer 01 (V91); and rim tops decorated with an implement (V54, V104, V105, V134) occurred only in the most recent phase (Layer OX). However, the low frequency of decorated vessels and the likelihood of cross-context contamination urges caution in the interpretation of these patterns. Furthermore, no cordoned sherds were noted from Layer 01 in this study, despite Gaffikin's (1934, 112) assertion that a 'fair number' were present. This brings into question the problem of post-excavation loss and the retention strategy: the assemblage as it survives today may not be representative of what was recovered in the 1930s. For instance, the reconstructed pot from Park Cave, which appears as a photograph in Gaffikin's report, could not be located at the time of this analysis (*ibid*.) (Fig. 9.2).

A total of 2149 sherds and 11 fragments were recovered from outside Potter's Cave. The incongruous proportion of fragments is suggestive of a deliberate retention policy whereby small fragments were not retained. It is suggested that a minimum of 165 vessels (V38–V202) are present in this assemblage. Of these, one vessel was Neolithic in date (V200), one was Bronze Age (V201), 152 were attributed to the Souterrain Ware tradition (V38, V40–V52, V54, V56–V91, V93–V100, V104–V112, V114–V134, V136–V146,

Figure 9.2 Reconstructed pot from Park Cave, now missing (Gaffikin 1934, 109).

V148–V199, V202) and the remaining 11 vessels were attributed to the Everted Rim Ware tradition (V39, V53, V55, V92, V101–V103, V113, V135, V147).

Middle–Late Neolithic globular bowl?

A single sherd of this vessel survives. It is a thick T-shaped rim sherd, which appears to derive from a Neolithic globular bowl. The fabric is hard and fine with no obvious inclusions. The vessel has a rim diameter of *c*. 16cm. Impressed decoration is located both on the rim top and external wall, and takes the form of two impressed lines running around the rim top and a series of parallel lines impressed around the circumference on the external wall. No surface treatment or evidence of use was observed. This sherd was recovered from Level OX in the 1930s excavations. Given the paucity of prehistoric remains from this context, and the comparative large quantities of early medieval and medieval material, this sherd is likely to have been residual.

Middle/Late Bronze Age flat-based coarseware?

Three body sherds were tentatively identified as deriving from a Middle/Late Bronze Age domestic vessel. The vessel had thick straight walls and a distinctive coarse fabric with angular inclusions and a hackly fracture. The firing also appeared distinctive. No decoration or surface treatment was evident on the surviving sherds. The presence of sooting on the external surface, accompanied by possible traces of carbonised residue on the internal surface, suggest this vessel served a domestic function. These sherds were retrieved from Layer O2. Given the proportion of early medieval material from this context, it is suggested that if these sherds represent a Bronze Age vessel they are intrusive.

Early medieval Souterrain Ware

Of the 152 identified Souterrain Ware vessels, 127 were bucket-shaped (V40, V42–V51, V54, V56–V71, V73, V75–V87, V90, V91, V94–V96, V98–V99, V104–V112, V116–V118, V120–V134, V136–V146, V148, V149, V151–V154, V156–V160, V162–V165, V167–V171, V173, V175–V178, V182–V185, V189–V196, V198, V199, V202), nine were barrel-shaped (V52, V88, V93, V97, V166, V172, V179, V186, V187), seven had flaring profiles (V72, V100, V155, V161, V174, V181, V188), three were of carinated form (V89, V114, V197) and a single vessel was classified as a 'cup' (V41). A final vessel of unusual bipartite construction has been described as a 'bipartite form' (V150). It was not possible to identify the form of four of the identified vessels (V38, V74, V119, V180).

Twenty-seven Souterrain Ware vessels bore decoration. It is of note that there was no combination of decorative motifs in the Potter's Cave assemblage. A single vessel (V141) had incised body decoration. This took the form of a single line positioned immediately beneath the rim. It is uncertain whether this line was intentional and whether it continued for the full circumference of the vessel. Seven vessels had cordons. All were produced through the application of an additional strip of clay rather than being pinched from the body of the pot. Of these, six were plain (V73, V87, V126, V127, V145, V199) while the cordon on the remaining vessel (V128) had been impressed at intervals to produce the typical 'pie-crust' effect.

The majority of the decorated Souterrain Ware vessels, 19 examples, bore decoration along the rim top, which was executed in a number of ways. Nine vessels displayed fingertip impressions that took the form of shallow indentations (V91, V116, V139, V144, V158, V159, V165, V166, V180), while one vessel had fingernail impressions along the rim top (V157). The rim tops of the remaining nine vessels were decorated using some form of implement, perhaps a bone or stick, to impress/incise lines, which generally ran perpendicular to the rim (V54, V90, V104, V105, V134), but occasionally were diagonal (V156, V164), or ranged between the two (V167, V168).

Within the examined assemblage, ten basal sherds were identified that possessed possible decoration on the internal flat basal surface. This took the form of linear grooves, which had been impressed using a fingertip. On two sherds, two lines intersected to form a cruciform motif. It should be noted that these sherds could not be attributed to individual vessels; however, they were of two different fabrics suggesting the presence of at least two vessels decorated in this manner.

Surface treatment was observed on 31 Souterrain Ware vessels. Seven vessels displayed evidence for base treatment (V38, V56, V89, V100, V149, V150, V197) – this low figure is reflective of the general inability to attribute base sherds to individual vessels. On all seven vessels this treatment took the form of organic impressions, which in some instances appeared short and chaff-like. It is of note that while the bases of vessels V89 and V197 did not survive, organic impressions were present on the lower half of the

vessels – below the 'carination' but not above it. These two vessels are of distinctive carinated form and would have had rounded bases. A parallel, both in terms of form and location of organic-impressions, is known from Carnmeen ringfort, Co. Down (Kyle 2009).

The observed surface treatment on the remaining vessels took the form of fine wipe marks on the internal and/or external surfaces of body sherds (V41, V42, V47, V50, V51, V59–V61, V114, V117, V119, V122, V129, V130, V146, V151, V152, V161). Surface abrasion likely removed wipe marks from other vessels. The fine nature of the marks suggests they were the result of wiping the surface using only the fingertips, and in some instances may have been accidental rather than a deliberate attempt to alter the appearance of the vessel. Two further vessels had also been wiped using fingertips, but in these instances more force had been applied resulting in the external surface possessing a slightly faceted appearance (V142, V171). Four other vessels had coarse wipe marks, which appeared to have been executed using a wad of organics – perhaps a handful of grass (V52, V87, V127, V163).

Twenty-eight Souterrain Ware vessels from Potter's Cave showed indications of use in the form of sooting, residue and repairs. External sooting was observed on 22 vessels. Of these, four also bore the remains of carbonised residue on the internal surface (V100, V134, V148, V149). A further two vessels had carbonised residue but no traces of sooting (V38, V41). Of the vessels with external sooting (V50, V52, V59, V60, V72, V100, V109, V116, V117, V119, V122–V125, V127, V129, V130, V134, V146, V148–V150), only six had surviving sections of a base. Two of these six bore no sooting on the underside of the bases suggesting they were placed directly on the hearth (V100, V150); two had sooting on the underside (V148, V149); and it was not possible to be certain about two vessels (V72, V134).

Five vessels had post-firing perforations (V44, V78, V94, V109, V143). The maximum diameter of these perforations ranged from 6-8mm. They were both cylindrical and hourglass-shaped in profile, indicating that at least some were drilled from both sides of the vessel. Where measurable, the distance from the rim to the perforation was 23mm (V44) and 25mm (V94, V143).

Medieval Everted Rim Ware

Eleven Everted Rim Ware vessels were identified but the predominance of body sherds made it difficult to establish overall form. Flattened rims dominated, leading from short everted necks on three vessels (V101–V103) to gently flaring necks on two vessels (V55, V147). It is suggested that the latter two vessels may represent a transitional stage between the development of Souterrain Ware and Everted Rim Ware. However, too little survives of these vessels for this to be more than supposition. One vessel had a rounded rim (V135), and one had an irregular rim (V115). Base sherds were attributed to one vessel only (V113) which took the form of a flat base with a slight foot.

Six of the 11 vessels displayed decoration (V39, V53, V55, V102, V103, V113). One vessel (V55) had decoration on the rim top only, which took the form of intermittent fingertip impressions. Four vessels bore the remains of body decoration only (V39, V53, V103, V113); of these, the rim only survived on V103 and it is uncertain whether the other three also had rim top decoration. Body decoration was executed using a variety of techniques and motifs. The decoration on V113 had been executed by combing. The motif consisted of parallel sets of short vertical combed lines. The body decoration on the remaining three vessels was executed by incision. The motifs consisted of groups of three short parallel lines (V53), incised chevrons/triangles (V103), and an uncertain overall motif, which survived as two incised parallel lines (V39). A single vessel (V102) displayed decoration in a combination of locations – on the rim top, the shoulder, and the internal surface of the vessel immediately beneath the rim (the inner rim zone). The motifs on each region were varied and executed in a number of ways. Incised wavy lines were located on the shoulder, with incised nicks located along the rim edge, and impressed circles on the inner rim – executed using a hollow stick or bone.

Surface treatment was observed on one vessel (V53), which took the form of horizontal wipe marks on the internal surface. It is likely these were executed by hand without the use of, for example, a textile. Evidence for use was observed on a single vessel (V147) in the form of sooting located high up on the external surface of the vessel.

Eleven amorphous fragments of fired clay were present within this assemblage; eight were recorded as 'Potters clay from OX'. These fragments show evidence for having been worked or handled. One small fragment had a single thumb depression. Another appears to have been kneaded or worked with a thumb or fingers showing small peaks of clay, which resulted from surface tension between the clay surface and the potter's hand. Another fragment has an almost faceted appearance with fine striations and similar small peaks, seemingly the result of human handling and working. These fragments have fired to an orange colour with the exception of two greyish fragments. The inclusions present are fine and are similar in appearance to the pottery.

A lump of fired clay was also recovered from Layer 01. However, of particular interest are two fragments recorded as 'Potters clay from OX' and 'From below stones of OX'. These fired lumps are coarser than those discussed above, and are strikingly similar in composition and appearance to the fabric of the figurine discussed below. They appear to represent unintentional byproducts of the pottery production process, and as such are unlikely to have travelled far from the location of the firing. This suggests pottery production

occurred in the immediate vicinity of the cave (perhaps even in the cave) – concurring with the suggested level of organisation of Souterrain Ware production (Kyle 2007, 72). However, given the context of recovery (Layer 01 and OX), these clay fragments are associated with both Souterrain Ware and Everted Rim Ware and it remains uncertain as to which period of pottery production they relate to. Similar production waste was recovered from Boat Cave (see above), Nendrum, Co. Down (Lawlor 1925, 166) and Ballyutoag enclosure I, Co. Antrim (Williams 1984, 45; Comber 2008, 81).

Potter's Cave would have provided the shelter required for both drying and firing vessels. However, Jackson's (1934a) identification of a structure encountered during excavations as a pottery kiln is dubious. Comber (2008, 83–85) listed various early medieval kilns in her discussion of the production of Souterrain Ware in Ireland suggesting they may have been used to fire vessels. However, there is no evidence for the use of kilns and it seems highly unlikely that firing of these vessels entailed investment in a superstructure (Kyle 2007, 77).

Figurine

This clay figurine (Fig. 9.3) has broken at the waist and the lower section is missing; the lower portions of both arms are also missing. Some repair has been carried out with fragments of the left arm and breast re-attached. The figure has an ill-defined neck and a slight hunchback, while the head and neck section appears disproportionately long in comparison to the surviving section of the body. The figurine appears to have been constructed in sections, with the neck/head applied to the body as a separate element. The arms and breasts have also been applied separately. The arms appear to be held against the body and not modelled in an active pose. The left shoulder is better defined than the right, which slopes downwards from the neck. The breasts, which seem to have been applied after the arms, are well-defined and render the figure instantly recognisable as female. The figure does not appear to be veiled (*contra* Jackson 1934a, 105). Height: 99mm; width ear-toear: 30mm, neck: 33mm, shoulders: 66mm, waist: 41mm.

Figure 9.3 Clay female figurine from Potter's Cave (Jackson 1934b, 181).

In contrast to the applied body features, the facial features have been executed by means of impression and possibly incision. The eyes are represented by slightly triangular-shaped impressions, while the mouth seems to have been incised – it is roughly ovate and possibly open. Two impressions at either side of the head seemingly represent ears. The right ear is irregular in outline, while the left ear appears to have been impressed using a D-sectioned tool, perhaps a split stick or bone. Finally, the facial features are dominated by a relatively large circular impression located at the centre of the forehead. Its purpose and meaning are not readily explicable.

This figurine has been produced using clay that is relatively poorly sorted – particularly when compared to the associated pottery assemblage. The fabric has fired red throughout, and is characterised by the presence of occasional sub-angular and sub-rounded grit inclusions. Two of the amorphous fired clay fragments discussed above (Layer OX) are very similar in composition to the fabric of the figurine. This may suggest the object was produced in the immediate vicinity.

The figurine was recovered from Layer 02 with associated finds including both Souterrain Ware and Everted Rim Ware (Jackson 1934a, 105). Its dating, therefore, remains uncertain though the dominance of Souterrain Ware suggests an early medieval date is more likely. At the time of excavation Jackson noted the lack of Irish parallels for this object (*ibid*., 106), and no parallels have emerged since then either in Ireland or Scotland. Given the potential that the figurine was produced at Potter's Cave together with the pottery, it may represent a rare instance of experimentation with clay by the producers of Souterrain Ware. What of the potential symbolism of this object? Given the suggestion that the associated pottery was produced by women (Kyle forthcoming), is it significant that this figurine depicts a woman? What might this object tell us of the agency of women in early medieval Ireland? Certainly the unique nature of this figurine merits further in-depth research.

6. Antrim, White Park td., Park Cave

A total of 82 sherds and 18 fragments were recovered from Park Cave including 31 rim sherds, seven base sherds, five basal sherds, 39 body sherds and 18 body fragments. All the pottery appears to have been recovered from the 'occupation layer below blown sand near R. wall' – the

only occupation layer identified during excavations (Jackson 1933, 231–232). A minimum of 14 vessels (V24–V37) are present in the assemblage, all of which seem to belong to the Souterrain Ware tradition. Thirteen (V24–V32, V34–V37) appear to be of overall bucket-shaped form with the remaining vessel (V33) being of slight barrel-shaped form. Decoration was located on the body section of V32 and took the form of haphazard fingernail impressions on the vessel walls. This is an unusual decorative motif and location for Souterrain Ware. The internal basal surface of V31 had two impressed grooves which intersect to form a cruciform motif. However, it is unclear whether this had a purely decorative function or was more symbolic or indeed functional (see discussion below).

Potential surface treatment was observed on three vessels (V27, V31, V34), though V31 may not represent deliberate treatment. V27 and V34 both displayed coarse wipe marks on the external vessel surface. These were haphazard indicating that the surface had been wiped in various directions, possibly using a wad of organic material. Sparse grass impressions were observed on the basal surface of V31. These were long strands of grass and seem too sparse to have functioned efficiently as a turntable. No evidence of use in the form of sooting or carbonised residue was present on the examined vessels. However, V35 had the partial remains of a post-firing perforation along a sherd break.

Inter-site discussion of the Souterrain Ware assemblages

Fabric

Given the tendency for variation in fabrics, even at an intra-vessel level, fabrics are defined here as broad groups. Refining these broad distinctions might prove fruitless as the inclusions are so fine and the feel and colour of the fabric so similar that differences were most likely not observed by the users/producers of the vessels. Microscopic fabric divisions might, therefore, only create meaningless artificial divisions. The inclusions present all appeared to be locally derived – in keeping with the suggested household level of production (Kyle 2007, 72) and the occurrence of production waste at Potter's Cave and Boat Cave. Three broad fabric distinctions were observed:

(1) Non-tempered
(2) Organic-tempered
(3) Quartz-tempered

The vast majority of vessels were produced using non-tempered fabrics. The inclusions present in these were naturally occurring minerals and rock fragments. Petrological analysis has shown that the producers of Souterrain Ware generally did not deliberately add inclusions to clay (Kyle 2007). However, it does appear that some degree of clay sorting was carried out to remove any overly large naturally occurring inclusions – albeit to varying degrees, not only from site to site but also between clay batches at individual sites.

Deliberately organic-tempered fabrics, referred to as 'flaky' fabrics in the 1930s cave excavation reports, were identified at all the examined cave sites with the exception of Boheeshane Cave 2 (see Table 9.1). At Potter's Cave organic-tempered pottery was recovered from all three main occupation horizons, suggesting the use of organic tempering may not be chronologically significant. However, the problem of the security of these contexts means this remains a research question for future well-stratified assemblages.

There is some confusion between the identification of grass/organic-impressions, which commonly occur on bases, and organic-tempering. Ryan noted the occurrence of organic-tempering at Larrybane, Co. Antrim to be 'exceptional' and dismissed other identifications of organic-tempering as confusion with the organic-impressions located on vessel bases (1973, 621, footnote 15). However, it has become apparent that organic inclusions, both deliberate and accidental, are commonly encountered in Souterrain Ware assemblages (e.g. Kyle 2007, appendix 3). The confusion would seem to have arisen from the lack of specialist input into the study of Souterrain Ware. Care should be taken in future analyses to differentiate between deliberate organic-tempering, organic markings on bases, and accidental organic impressions on vessel bodies.

Quartz-tempered fabrics were identified at Potter's Cave and possibly Chimney Cave (Table 9.1). At Chimney Cave the vessels were of the Souterrain Ware tradition, while at Potter's Cave the vessels with deliberately added quartz were exclusively Everted Rim Ware. Sherds of these vessels were recovered from all three main occupation horizons. It would appear that the deliberate addition of non-organic temper was generally a later occurrence. Such deliberate tempering has been noted in Souterrain Ware assemblages, for instance at Seagoe Road, Co. Armagh (Kyle 2010), but present evidence suggests it to be relatively rare. It is tentatively suggested here that this technological advancement occurred late in the development of the Souterrain Ware tradition and carried over into Everted Rim Ware production. Finally, it should be noted that none of the examined cave fabrics appeared to be fired in a way that is distinctive within the Souterrain Ware tradition (*contra* Ryan 1973, 621).

Form

The overall vessel forms from each examined cave assemblage have been recorded in Table 9.2, highlighting the dominance of the traditional bucket-shaped form. This includes vessels with a flat base and straight (rather than curving) walls, which

Table 9.1 Presence of deliberately tempered fabrics.

	Boat Cave	*Boheeshane Bay Cave 2*	*Chimney Cave*	*Masked Rockshelter*	*Potter's Cave*	*Park Cave*
Organic-tempered	Yes – rare	_	Yes – rare	Yes	Yes	Yes
Quartz-tempered	_	_	Uncertain – all Sou. Ware	_	Yes – all Evert. R. W.	_

range from near-vertical to gently splaying. Because it was not possible to attribute bases to identified vessels, there is some uncertainty regarding the base forms of these vessels; however, the majority of the unattributed base fragments are flat rather than sagging. The second most common vessel form is barrel-shaped – a slight variant of the bucket form, differing only in that in-turning rims create an overall curving upper profile. The rim forms present from the various cave assemblages have been summarised in Table 9.3, showing the dominance of flattened and rounded rims from all sites, and the general simplicity of forms.

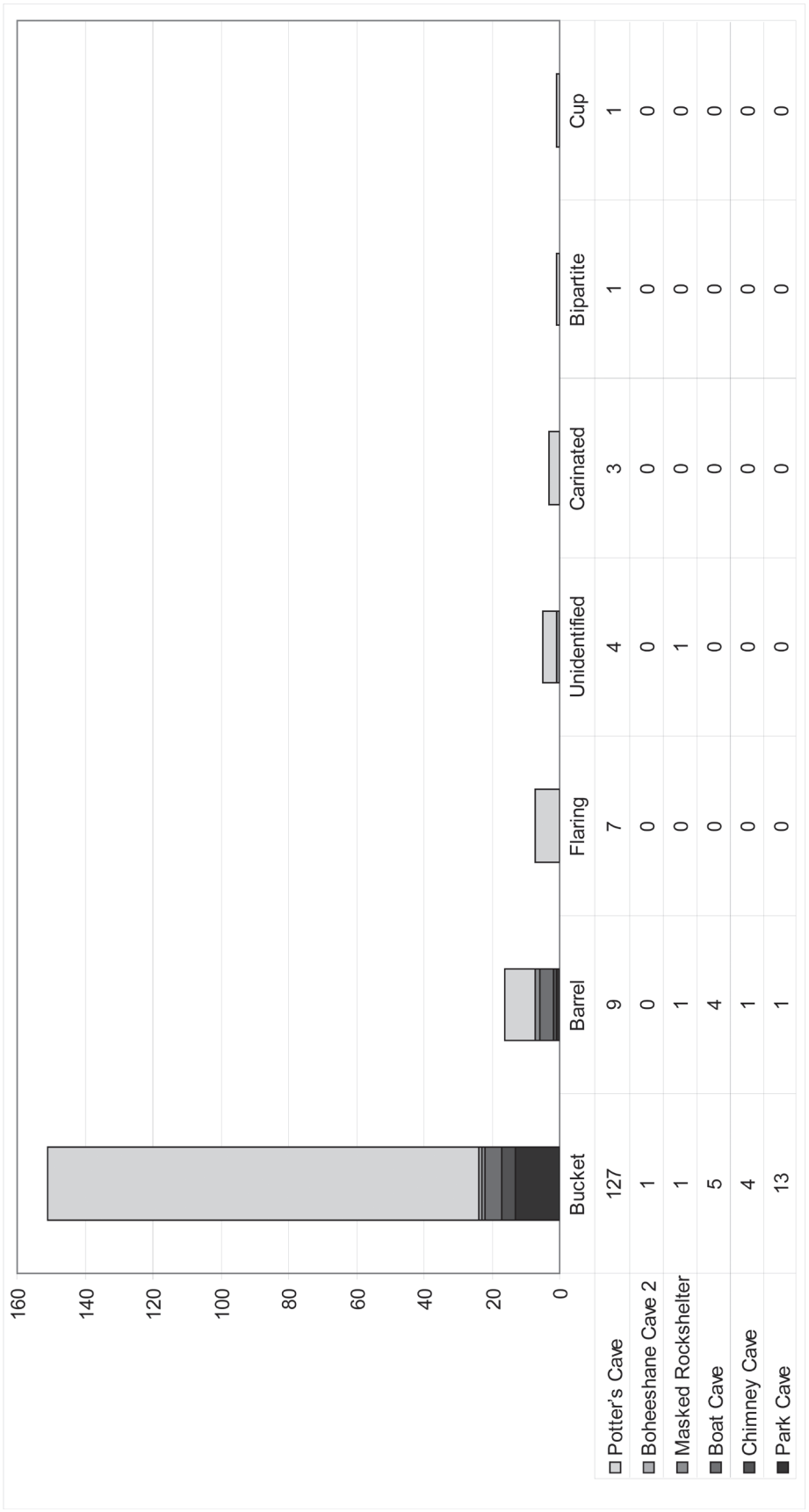
Less common forms were present only at Potter's Cave, including a number of vessels with flaring profiles, which seem to be what Ryan (1969, 26) perceived as a unique 'Ballintoy Style'. While the form of these vessels is distinct, with at least one having an almost S-shaped profile with a rounded base (V100), it seems unlikely and remains to be proven that these represent an 'autonomous local pottery tradition' (*ibid*., 13). A single small 'cup' (V41), measuring 74mm in height with a rim diameter of just 11cm, was also identified from Potter's Cave. Although less common than larger vessels, small cup-type vessels are known from other sites including Doonbought Fort, Co. Antrim (McNeill 1977, 74). Some of these smaller vessels may have served a different function, perhaps relating to serving. However, V41 bore the remains of carbonised residue on the internal surface suggesting it may have been used as a cooking vessel.

Of particular interest are three 'carinated' vessels (V89, V114, V197) and a 'bipartite' vessel (V150) from Potter's Cave. The carinated form consists of a thick upper body giving these vessels a collared appearance thinning out immediately beneath a shoulder or carination and gently curving towards a rounded base. Although an unusual form, similar vessels are found in early medieval Souterrain Ware assemblages including, for example, Larrybane, Co. Antrim (Ryan 1973, 636), Ballyknock, Co. Armagh (*ibid*., 637) and Carnmeen ringfort, Co. Down (Kyle 2009). Two of the Potter's Cave vessels (V89, V197) had organic impressions on the lower parts of the pots extending to immediately beneath the collar. This also occurred on one of the two vessels from Carnmeen ringfort. The form seems to suggest these were constructed in two parts; the organic impressions might indicate that the lower section was formed in a chaff- or grass-lined hollow in the ground before the thick collar was subsequently applied. This distinctive form does not seem to be paralleled elsewhere, but is a recurring form from late Viking to early medieval contexts in the Faroe Islands, including the site of Argisbrekka, dated to between the ninth and eleventh/twelfth centuries (Mahler 2008, 133). These Faroese vessels also displayed a heavy collar and a rounded base thinning considerably immediately beneath the collar, though whether these had grass-impressions is unknown. The vessel of unusual bipartite form (V150) might also have tentative Faroese parallels from Innanfyri Heygargerði in Sandavág (*ibid*., fig. 5). This vessel also appears to have been of bipartite construction but differs in that the two sections have been joined lower down the straight vessel walls at the base angle. The rounded base appears to have been produced first as a shallow saucer-shaped section prior to the addition of the straight vessel walls. The walls were built from the inner edge of the saucer-shaped base, resulting in the base projecting slightly beyond the vessel walls.

Although an understudied topic, contacts between Ireland and the Faroes at this time are evidenced by the distribution of ringed pins (Fanning 1994, fig. 12), which more generally reflects the pattern of Norse movement and settlement in the north Atlantic (*ibid*., 33). Interestingly, one such ringed pin was recovered from Argisbrekka (*ibid*., 34) and a cruciform-headed bone pin from Boat Cave is proposed here as further evidence for maritime links between north Antrim and the north Atlantic. Therefore, the three carinated vessels and single bipartite vessel from Potter's Cave may represent tenuous evidence for wider contacts between north Antrim and the Faroes. The potential relationship of these two ceramic traditions undoubtedly requires further research.

Decoration

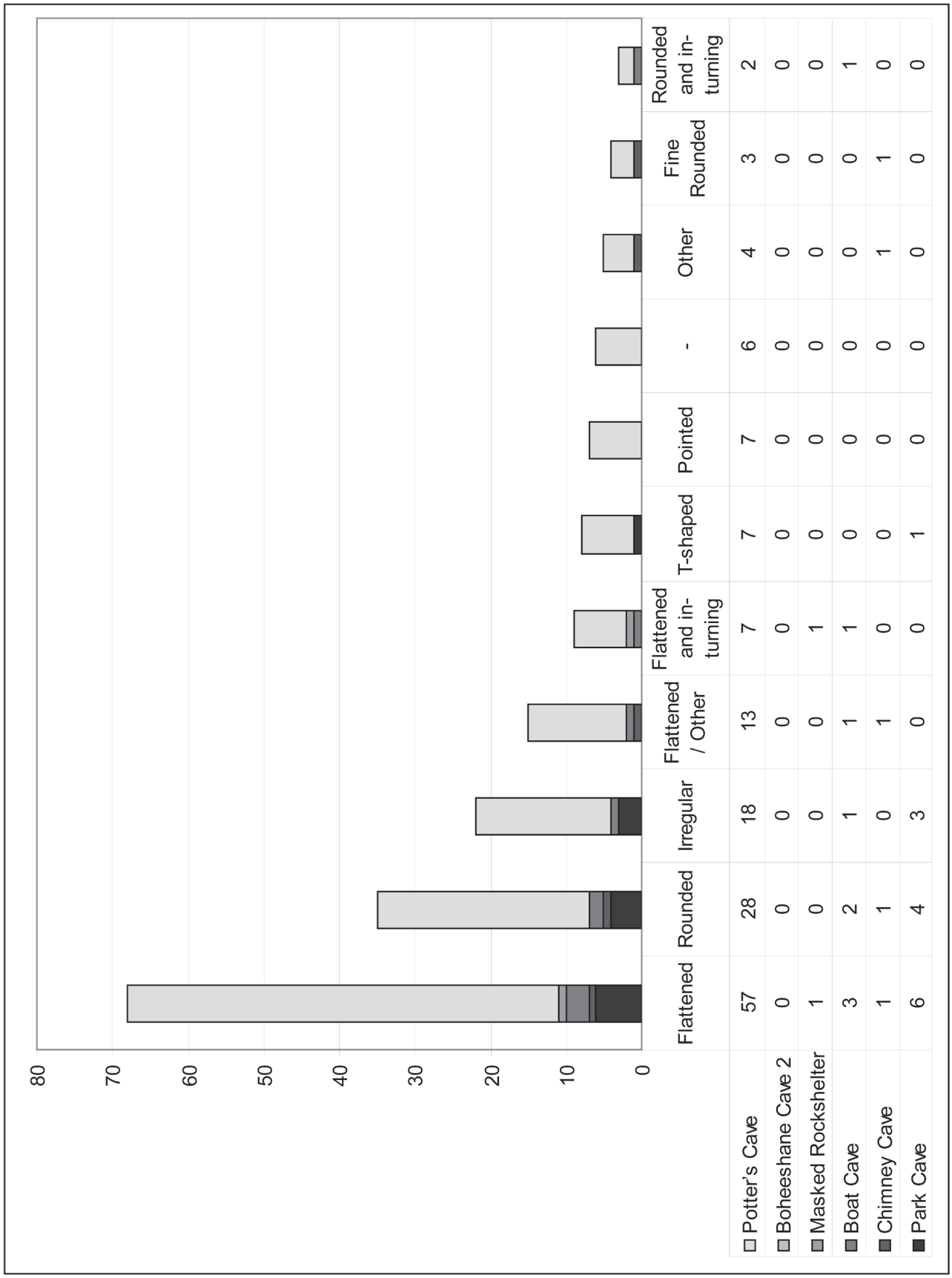
A small number of Souterrain Ware vessels were decorated and where decoration was present, motifs were basic and had been executed in an expedient manner. Table 9.4 highlights the dominance of rim top decoration, with a smaller number of vessels displaying principally plain cordons. Such decoration is typical of the Souterrain Ware tradition, though it has been suggested that it occurs late in the development of the ware, possibly not pre-dating the ninth century (Mallory and McNeill 1991, 201). Ryan (1973, 628) proposed a three-stage sequence of development for this ceramic tradition: 1. undecorated; 2. plain cordons and decorated rim tops; 3. decorated cordons and an increase in the



	Bucket	Barrel	Flaring	Unidentified	Carinated	Bipartite	Cup
Potter's Cave	127	9	7	4	3	1	1
Boheeshane Cave 2	1	0	0	0	0	0	0
Masked Rockshelter	1	1	0	1	0	0	0
Boat Cave	5	4	0	0	0	0	0
Chimney Cave	4	1	0	0	0	0	0
Park Cave	13	1	0	0	0	0	0

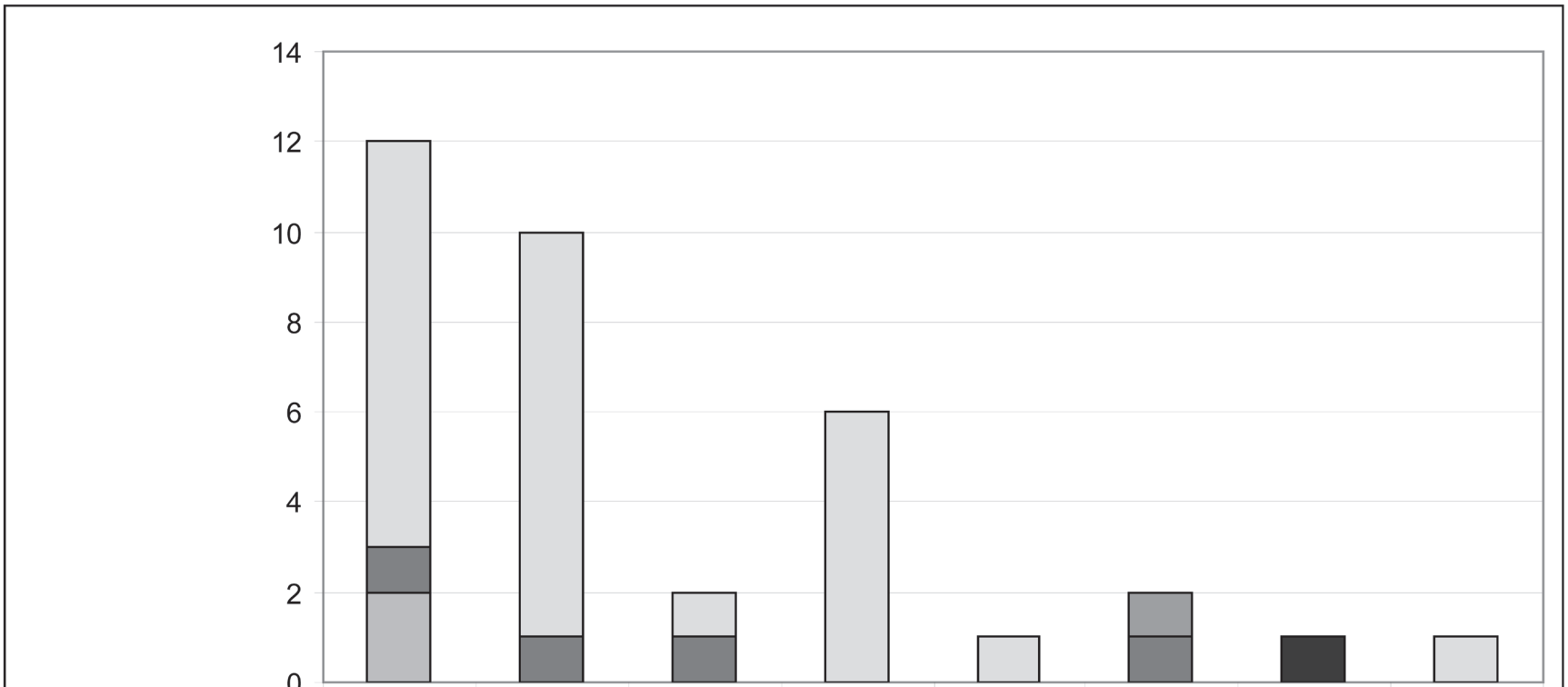
Table 9.2 Vessel forms from analysed cave assemblages.

Table 9.3 Rim forms from analysed cave assemblages.



	Flattened	Rounded	Irregular	Flattened / Other	Flattened and in-turning	T-shaped	Pointed	-	Other	Fine Rounded	Rounded and in-turning
Potter's Cave	57	28	18	13	7	7	7	6	4	3	2
Boheeshane Cave 2	0	0	0	0	0	0	0	0	0	0	0
Masked Rockshelter	1	0	0	0	1	0	0	0	0	0	0
Boat Cave	3	2	1	1	1	0	0	0	0	0	1
Chimney Cave	1	1	0	1	0	0	0	0	1	1	0
Park Cave	6	4	3	0	0	1	0	0	0	0	0

Table 9.4 Location of decoration and method of execution.



	Rim-top, fingertip	Rim-top, implement	Rim-top, fingernail	Cordon, applied plain	Cordon, applied impressed	Cordon, pinched	Body, fingernail impression	Body, incised line
Potter's Cave	9	9	1	6	1	0	0	1
Boheeshane Cave 2	0	0	0	0	0	0	0	0
Masked Rockshelter	0	0	0	0	0	1	0	0
Boat Cave	1	1	1	0	0	1	0	0
Chimney Cave	2	0	0	0	0	0	0	0
Park Cave	0	0	0	0	0	0	1	0

number of decorated vessels. The majority of the analysed Antrim cave assemblages conform to Ryan's second stage of development. However, this proposed developmental sequence remains to be vigorously interrogated in light of more recently excavated and well-stratified assemblages.

The most unusual decoration took the form of simple finger-impressed grooves located on the internal basal surface that were arranged so that two simple lines intersected to form a cruciform motif. This was found on one vessel (V31) from Park Cave, and ten unattributed basal sherds representing a minimum of two vessels from Potter's Cave. Such treatment of Souterrain Ware bases does not appear to have been discussed elsewhere; however, this does not seem to be a local method of treatment. Similarly impressed cruciform motifs were executed on the internal basal surface of Souterrain Ware vessels from Millmount, Co. Down (author's own observation). Research on Iron Age dimpled bases from the Northern Isles may prove relevant to these early medieval Irish vessels. Reassessment of old assemblages is necessary to determine how widespread this phenomenon was and further research is required to establish whether this was purely aesthetic, or served a symbolic or functional purpose.

Base treatment

Ten vessels displayed evidence for base treatment that took the form of organic impressions and sanded or gritted bases. A large quantity of unattributed basal sherds from all sites, with the exception of Boheeshane Bay Cave 2, also displayed evidence of similar treatment. Organic impressions were present on attributed and unattributed vessel bases from Boat Cave, Chimney Cave, Masked Rockshelter, Potter's Cave and Park Cave; in some instances, these were chaff-like in appearance. A smaller number of base sherds from Boat Cave, Chimney Cave and Potter's Cave had gritted or sanded bases.

It has been suggested that the common occurrence of 'grass-marked bases' evidences the use of vegetable matter (such as grass or chopped straw) as a means of preventing vessels from adhering to the surfaces on which they were placed to dry (Ryan 1973, 622). Ivens (1984, 77) suggested that the impressions are more likely to represent a step in the manufacturing process, such as the use of vegetable matter as a means of preventing hand-built vessels from adhering to the 'construction surface', or perhaps as an early form of turntable used to facilitate rotation of coil-built vessels during manufacture. The identification of some of these organic impressions as possibly chaff is of note, and suggests some vessels may have been produced immediately following harvest (see Kyle 2007, 80 for discussion).

Evidence of Souterrain Ware usage

Souterrain Ware vessels were generally believed to have been used as domestic cooking pots, supported by the common presence of sooting and carbonised residues, and may have been used in the preparation of porridges or gruels (Sexton 1998, 76). It is also possible that some vessels had alternative functions. For instance, smaller vessels similar to the 'cup' (V41) from Potter's Cave may have played a role in serving food, perhaps for condiments. A programme of residue analyses might elucidate whether vessels of different sizes or forms held different functions. Evidence for repairs to cracked vessels suggests some were used for dry storage or perhaps serving – even if only as a secondary function. Perforations were present on seventeen sherds: Park Cave (V35 and two unattributed sherds), Potter's Cave (V44, V78, V94, V109, V143 and six unattributed sherds), and Boat Cave (three unattributed sherds). One of the perforations from Boat Cave was executed prior to firing; this was distinctive in that it was of considerably narrower diameter and possessed a slight raised collar of displaced clay. Pre-firing perforations are not common in Souterrain Ware vessels. The two sherds with post-firing perforations from Boat Cave were originally recorded as 'spindle whorls', but there is no evidence for modification of these sherds other than the perforations.

Post-firing perforations occur commonly in Souterrain Ware assemblages. Edwards (1990, 73) has suggested that these vessels were covered when used for cooking with the perforations acting as steam-holes; Ryan (1973, 621) proposed that the perforations were drilled to facilitate suspension. However, in both cases it would have been more expedient for the potter to pierce holes prior to firing when the risk of damaging a vessel would have been greatly reduced. The vessel from Hillsborough fort, Co. Down, where five sets of paired holes occurred on either side of a crack (Edwards 1990, 73), is irrefutable evidence that at least some of these perforations represent repair holes. Repeated repairs may represent either the intrinsic value of a vessel (unlikely given the coarse nature of Souterrain Ware and its ubiquity), or because it was only periodically available (Howard 1981, 25; Kyle 2007, 79). Such restricted availability might indicate that the production of Souterrain Ware occurred at a household level on a seasonal basis (Kyle 2007, 79). Furthermore, the common occurrence of such repairs across the distribution of Souterrain Ware indicates that this was a socially accepted way of using the vessels, and seems to have passed from generation to generation.

Dating Souterrain Ware

The general conservatism of Souterrain Ware styles, mirrored in these cave and rockshelter assemblages, hinders our ability to closely date individual site assemblages. Our knowledge of this pottery style has been further hampered by the lack of modern interpretative research. The tradition was suggested by Ryan to have ranged in date from the sixth/seventh to twelfth centuries (1973, 626). More recently, Armit (2008, 8) has suggested the tradition is likely to have begun between the mid-seventh and mid-eighth century.

There has been a previous reliance upon associated finds for dating (see Ryan 1973, 624), but there remains a need to collate the extant associated radiocarbon data. For instance, recent excavations at Carnmeen ringfort indicated the presence of Souterrain Ware in contexts radiocarbon dated to 460–650 cal AD (SUERC-23958; 2-sigma) and 1210–1380 cal AD (SUERC-23947; 2-sigma) (Kyle 2009), which presents the possibility of a mid-seventh to early thirteenth century range for Souterrain Ware.

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10

Early medieval shrine fragments from Park North Cave, Co. Cork and Kilgreany Cave, Co. Waterford

Griffin Murray

Amongst the corpus of material recovered in the course of archaeological excavations in caves in Ireland are two highly decorative pieces of metalwork made of copper alloy which have been interpreted as fragments of portable shrines of early medieval date. One of these was discovered in 1942 in Park North Cave near Midleton in Co. Cork (Coleman 1942, 74–75, pl. I), while the other was found in Kilgreany Cave in the Cappagh valley near Dungarvan in Co. Waterford (Movius 1935, 277–278, fig. 9). The purpose of this study is to reassess the artefacts, to test whether previous interpretations withstand more rigorous analysis, to see if any new interpretations can be advanced, and to explore the possible context of how these objects came to be deposited in caves. The study also includes more detailed descriptions of the objects than has hitherto been given, as well as the results of X-ray fluorescence (XRF) analysis carried out by Dr Paul Mullarkey of the National Museum of Ireland.[1]

Cork, Park North townland, Park North Cave (Fig. 10.1; Pl. 34)

The mount from Park North Cave, or 'Bronze Bar' as it was referred to in the excavation report, was dated to the eighth century by the excavator on the basis of its decoration and was interpreted as being 'possibly part of the mounting of a shrine' (Coleman 1942, 75).[2] Curiously, the significance of this object seems to have escaped the attention of more recent scholars despite the fact that it has been published for many years and has been on permanent display in Cork Public Museum. The original dating and interpretation of the object as being part of a shrine are largely followed here. However, the mount can be more specifically identified as the ridge-mount of a house-shaped shrine.[3] This is indicated by its general shape: the fact that it is three-sided and has a splayed Π-shaped cross-section. Its open ends may be explained by the likelihood that separately made terminals, now missing, possibly in the form of animal-heads, would have originally been attached to it; as in the case of the insular house-shaped shrine found at Melhus in Norway where the ridge-mount terminals were separately made (Blindheim 1984, 44, fig. 41). If one allows for the fact that it was originally longer when its terminals were in place, the Park North example compares favourably in length with the ridge-mounts on the larger shrine from Lough Erne, Co. Fermanagh, and on the so-called 'Copenhagen' shrine from Norway, as well as with a detached example of unknown locality in the National Museum of Ireland (Mahr 1932, pl. 18:1; Blindheim 1984, 33, 40). In fact, the Park North ridge-mount was probably originally slightly longer than those examples by one or two centimetres, so one might expect that the total length of the original shrine was in the region of the larger surviving shrines, which includes the larger Lough Erne example, as well as that from Clonard, Co. Meath, i.e. around 17.7–19.2cm long (Ó Floinn 1990, 53).

XRF analysis in the NMI revealed that this object is principally made of leaded gunmetal rather than bronze.[4] This follows the latest terminology proposed by Bayley (Bayley and Butcher 2004, 14–15). Although the term is unwieldy, it avoids using the generic but imprecise label 'copper alloy'. Copper/tin alloys are called bronzes, and copper/zinc alloys brasses, depending on the relative proportions of the alloying elements. Gunmetal is defined as

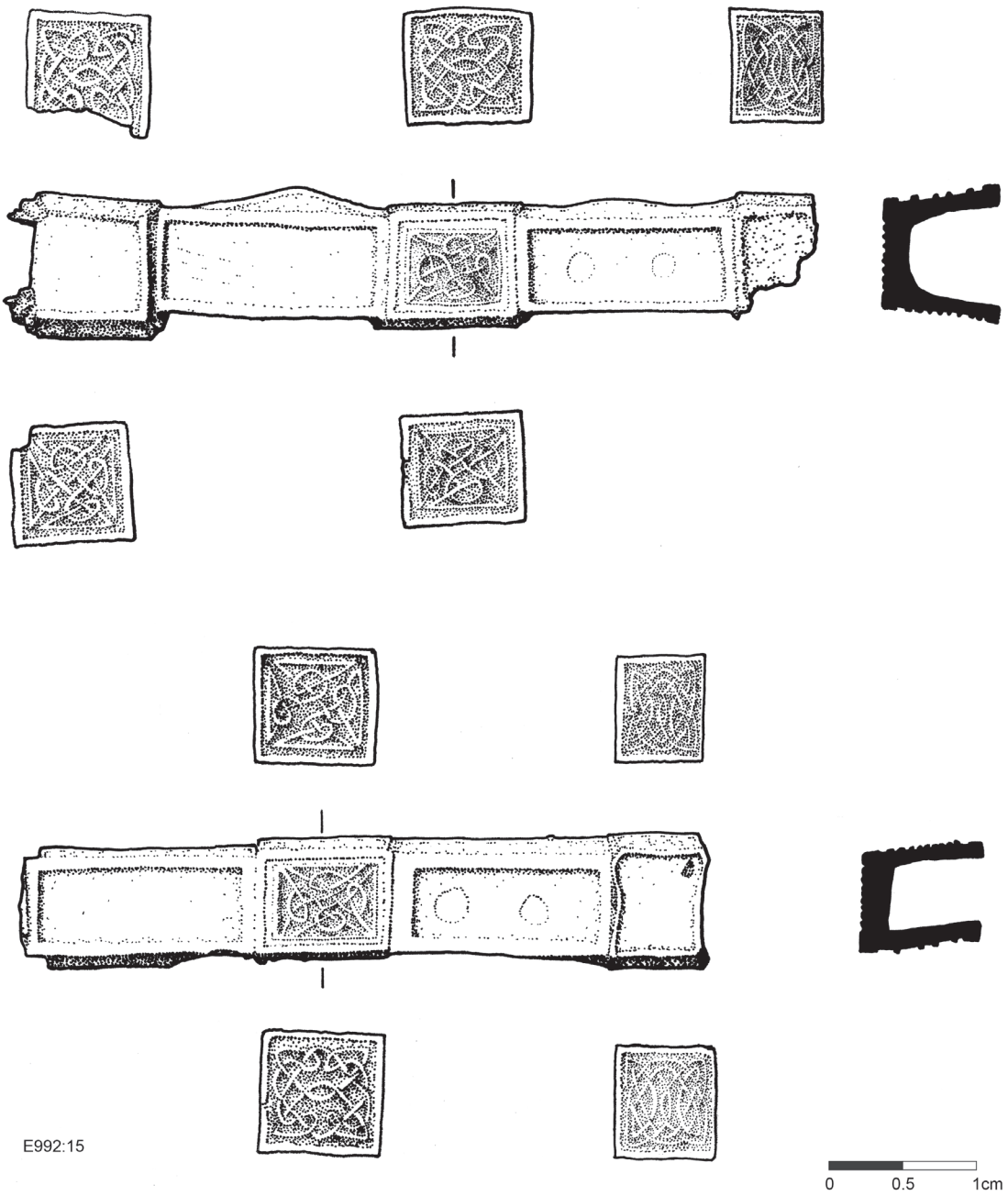

Figure 10.1 Ridge-mount of an early medieval house-shaped shrine from Park North Cave (Dowd 2015, 191).

bronze with a low percentage of zinc. Where other house-shaped shrines have been analysed – the larger Lough Erne, the Monymusk, and the Melhus shrines – they have all been found to be made of bronze, while the 'Copenhagen' shrine was found to be principally made of copper with 'a little lead and a fraction of zinc and iron' and its frame is made of 'copper with some lead and fractions of tin, zinc and iron' (Blindheim 1984, 35, 38, 42, 44). However, recent XRF analysis of the Melhus shrine has shown that one of its circular mounts is made of brass.[5]

The gilded chip-carved ornament on the Park North ridge-mount is particularly fine and similar ornament occurs on the ridge-mounts of the Monymusk, larger Lough Erne, and Bologna shrines (Youngs 1989, 134–137, 139–140, cat. nos. 129, 130b, 132). XRF analysis found the gilding to contain mercury, which means that the fire gilding technique was employed (see Cradock 1989, 173), as it was on the Monymusk shrine (Blindheim 1984, 38). The now empty rectangular panels, which are undercut around their edges and are very shallow, were probably originally filled with

either panels of gold filigree or stamped silver foil and may be compared with similar empty panels on a fragment of a shrine ridge-mount from Shanmullagh, Co. Armagh (Bourke 1993, 28–29; Bourke 2010, 48–49, cat. no. 141, fig. 18: 141). These panels contain patches of a white powdery material on their surfaces, which analysis indicates is lead residue. This may be the remnants of a lead solder used to attach the now missing decorative panels of silver or gold.[6] Of the three more deeply set square-shaped panels on the top of the ridge-mount, one contains the remnants of a green powdery material, which may be degraded enamel. An empty panel for a glass or enamel setting may be seen in a similar position in the centre of the Shanmullagh fragment and on the ridge-mount of the Monymusk shrine (Blindheim 1984, 38, fig. 31). Enamel insets are a feature of many of the surviving house-shaped shrines including the 'Emly', Melhus, Setnes, Monymusk, 'Copenhagen' and Bologna shrines (*ibid*., cat. nos. 2, 3, 5–7 and 9).

It is argued here that the ridge-mount was not the only fragment of the shrine to be recovered in the excavations at Park North. The present author originally speculated that a copper alloy ring (Coleman 1942, 74, fig. 5:5) found during the dig may also have come from the same shrine, but XRF analysis showed this to be made of a modern alloy of copper, zinc and nickel. This object can now be discounted in any future interpretation of the early medieval assemblage from the cave. Most of the artefacts recovered during the excavation were from the 'Black Layer' (layer 2) within the cave, the majority of which came from 'Section 8', a trench approximately 3m long and 1m wide (10×3ft). It is from this trench that the ridge-mount was recovered, from 'near the bottom of the Black Layer' (Coleman 1942, 74). Three angled strip fragments (no. 14)[7] were found together in the same trench and in Coleman's original plan of the site they are marked as having been discovered immediately adjacent to the ridge-mount (no. 13) at the 'bottom [of] Layer 2' (see Dowd 2013, fig. 6). Coleman (1942, 73) further stated that: 'Near 14 a number of very much corroded bronze fragments were found embedded in the clay and charcoal. It was thought that these may be portions of No. 14, but as the material was almost powder, no reconstruction was possible.'

The corroded bronze fragments (no. 16) apparently no longer survive, but their noted presence is important, suggesting that the angled strips were part of a more complex object. The original interpretation of these strips having been possibly part of a brooch is an argument without basis and deserves little notice (*ibid*.). The fragmented angled strips can, however, be closely compared with the grid forming L- and T-shaped cells on the front of the 'Copenhagen' shrine (Youngs 1989, 138, cat. no. 131). The latter, like the Park North fragments, are also decorated with a series of dots. The fragments of bronze (no. 16) mentioned in the report, therefore, may have been the remnants of the sheet metal of the shrine over which the angled strips were fixed. XRF analysis confirmed that the angled strips are made of bronze and are tinned on one side.[8]

On the basis of the surviving fragments, the Park North shrine appears to have been one of the largest and most richly decorated in the series of surviving house-shaped shrines. The ridge-mount is gilded, was seemingly enamelled, and was set with either silver foil or gold filigree, while the angled strips were tinned. By comparing the Park North fragments with some of the complete house-shaped shrines, the 'Copenhagen' shrine in particular, it seems likely that the angled strips came from the principal side of the shrine. The fact that the metal composition of the ridge-mount and the angled strips differs need not be of concern, since it has been shown above that different elements of the 'Copenhagen' shrine were also made of different alloys. The fragments that were excavated in Park North Cave represent a significant portion of a house-shaped shrine that was dismantled and stripped of its precious metal and seemingly some of its decorative mounts, before the remnants were deposited in the cave.

One of the difficulties in recognising the significance of the Park North material has been the fact that the surviving artefacts have been separated. Originally, all of the finds were presented to the University College Cork museum in 1943 by Cork Distilleries Co. Ltd. (Anon. 1943). A select number, including the ridge-mount (E992:1a and b, 6, 7 and 13), were later transferred to Cork Public Museum at an unknown date, possibly when it was established a year later in 1944 (O' Kelly 1944) while the remainder of the finds, including the angled strips (E992:14), remained in University College Cork until they were transferred to the National Museum of Ireland in March 1999.

On the basis of its decoration and the techniques used, the Park North shrine appears to belong to Ó Floinn's group two, which he dates to between the eighth and early ninth centuries (Ó Floinn 1990, 52–53). All of these shrines have a wooden core and it seems that the Park North shrine was similarly constructed, as suggested by the position and size of the fixing holes in the ridge-mount. However, in terms of its large size the shrine would have been more akin to those that form Ó Floinn's third group, which he dates to the ninth century (*ibid*., 53). Nevertheless, the evidence of size alone is not sufficient to argue for a later date for this material and so an eighth or early ninth century date seems most likely.

House-shaped shrine ridge-mount

Park North Cave, Co. Cork
Cork Public Museum E992:15 (1777:1990)
Coleman 1942, 74–75, no. 13, pl. I
Length 100.2mm; width 9.7mm; thickness 8.5mm
This long three-sided object has a splayed Π-shaped cross-section and open ends. The decoration on all three sides

is divided into a series of square- and rectangular-shaped panels. It was originally cast as one piece but since it was discovered has broken into two separate parts. It has broken along the line of a central crack that is visible in photographs of the object reproduced in the original published excavation report (Coleman 1942, pl. I). These two sections measure 47mm and 55.4mm in maximum length respectively. Furthermore, a small section at one end, measuring a maximum of 11mm long and 6mm wide, has been lost since those photographs were taken resulting in the complete loss of one of the decorative panels. However, the ridge-mount was in a damaged state when found with some pieces already missing. On one of its sides it is buckled outward at one point and dented inwards at another, above which is a horizontal crack approximately 20mm long. The ridge-mount has not been conserved but appears to be in a stable condition.

Originally there were nine panels on each of its three sides, five square-shaped panels interrupted by four rectangular-shaped panels. The square-shaped panels are slightly prominent to the rest of the mount with the central square-shaped panel on each of the three sides being the most prominent of all. These central panels are raised approximately 1mm above the rest of the ornament. The square-shaped panels are smallest at the ends of the ridge-mount and increase in size towards the centre. The smallest, an end panel, measures 5.8×6.9mm while the largest, a central panel, measures 8.4×8.5mm. Most of the square-shaped panels consist of gilded chip-carved ornament with the exception of three examples on the top of the mount. The chip-carved panels consist of interlace ornament and are repetitive in that only three different designs were used. On the two sides of the ridge-mount the four end panels were matching. One of these is now lost but it is visible in the photograph in the published excavation report. Two further designs were used for the three middle panels on either side; one design on each of the two sides. The designs of the two chip-carved panels on the top of the mount are a repeat of the middle panels on one of the sides. Of the three square-shaped panels on the top of the mount that do not feature chip-carved ornament, two are empty while the third, which is badly damaged, contains a green powdery material with a dark crust. These are all 2mm deep and are positioned at either end of the mount and at the centre.

The rectangular panels are now all empty and are 1mm deep. Like the square-shaped panels, the rectangular panels vary in size and measure between 12.3×4.9mm and 16.2×5.2mm. They are all slightly undercut around their inner edges in order to retain some material. On one side two of these panels have been severely damaged and only fragments remain. On the top of the ridge-mount the rectangular panels at either end both feature two evenly spaced fixing holes, each of which is approximately 1.5mm in diameter.

Angled strips (x3)

Park North Cave, Co. Cork
National Museum of Ireland E992:14
Coleman 1942, 73, no. 14, fig. 5:14
Length 24.5×21mm; width 3mm; thickness 1mm
Length 30.4×8.3mm; width 3mm; thickness 1mm
Length 25×17.7mm; width 3mm; thickness 1mm
Three slight bronze angled strips decorated on one side with tinning, and a border consisting of an incised line with a single row of neatly punched dots inside it. Each example is merely a fragment, all of them featuring broken ends. There is a single tiny fixing hole in the corner of each piece; the remains of a second fixing hole may be seen close to the end of the longest strip.

Waterford, Kilgreany townland, Kilgreany Cave (Fig. 10.2; Pl. 35)

The mount from Kilgreany Cave was found at a depth of 1m in Trench H in the innermost chamber of the cave and was originally interpreted as being 'possibly part of a shrine' and dated to the eighth century (Movius 1935, 277–278). Like the Park North shrine fragments, this mount has received very little attention from scholars since it was first published, although more recently Raghnall Ó Floinn has suggested that it may have derived from an early medieval bell-shrine (Dowd 2002, 88). Indeed, it is mostly likely from an ecclesiastical object and its arched shape is reminiscent of the curved upper portions, namely the crests, of early medieval shrines for hand-bells. If this mount did derive from the crest of a bell-shrine, on the basis of the angle of its curve and the proportions of the surviving shrines, the shrine in question would have to have been around twice as wide as this mount is long, i.e. about 260mm wide. The largest surviving bell-shrine, the early twelfth century *Bearnán Chúláin* from Glenkeen, Co. Tipperary, is only 190mm wide. Of the surviving early medieval Irish hand-bells, Class 1 bells measure 140–310mm high and 100–240mm wide while Class 2 bells measure 70–310mm high and 60–260mm wide (Bourke 1980, 52). Therefore, it is conceivable that the Kilgreany mount may have originally belonged to the shrine of a very large hand-bell.

While the majority of surviving bell-shrines date from the eleventh or twelfth centuries, the *Corp Naomh* dates from the tenth century (Wallace and Ó Floinn 2002, 272, pl. 7:33). Fragments of an eighth or ninth century bell-shrine also survive in the collections of the National Museum of Ireland (Youngs 1989, 143–144, cat. no. 137a–c). These fragments, consisting of a crest and mounts from one of the side-plates, were originally in the Chapman Collection at Killua Castle, Co. Westmeath. Although their provenance has been unknown since they were acquired by the museum in 1920, they match the description of the supposed missing bell-shrine fragments recovered from the River Brosna at

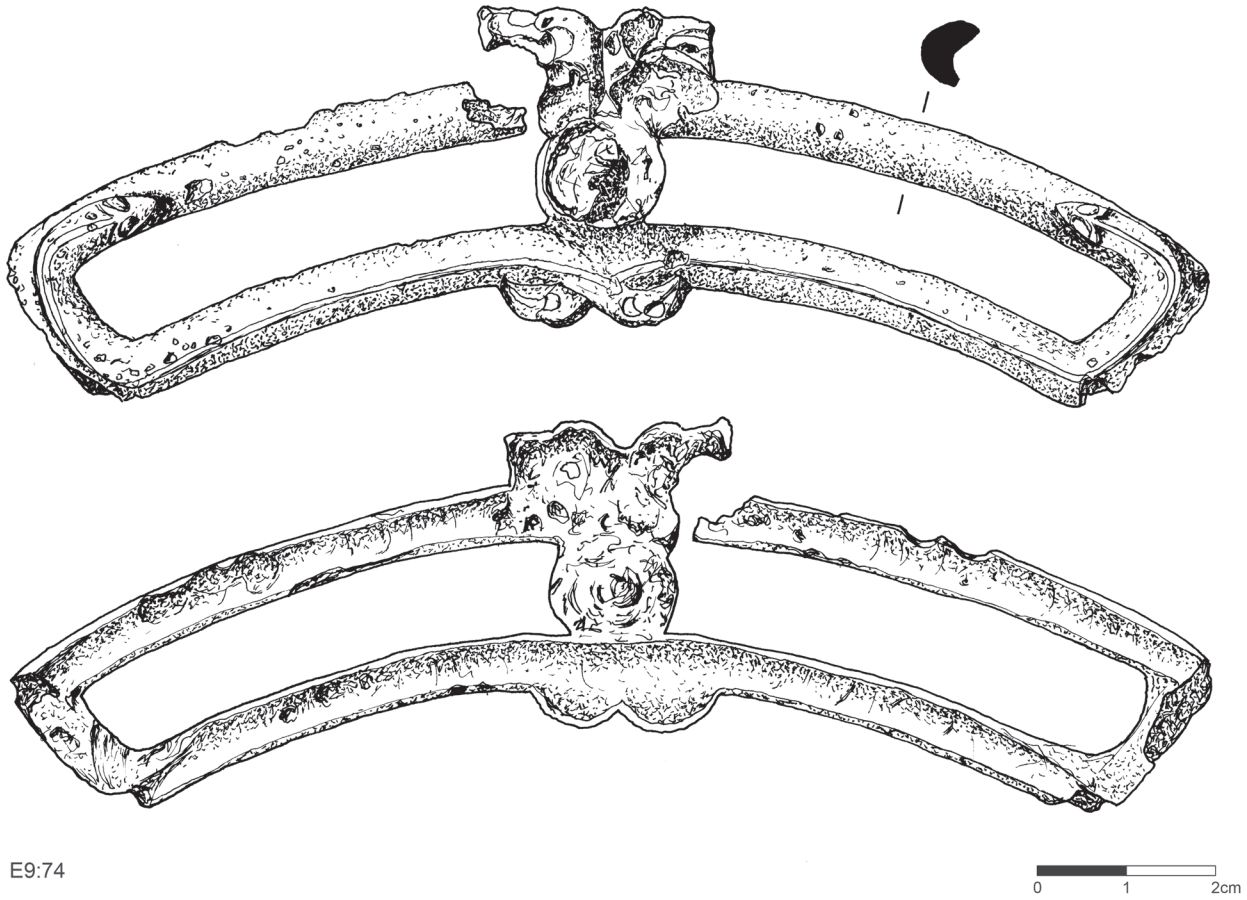

Figure 10.2 Early medieval decorative mount, possibly from a bell-shrine, from Kilgreany Cave (Dowd 2015, 192).

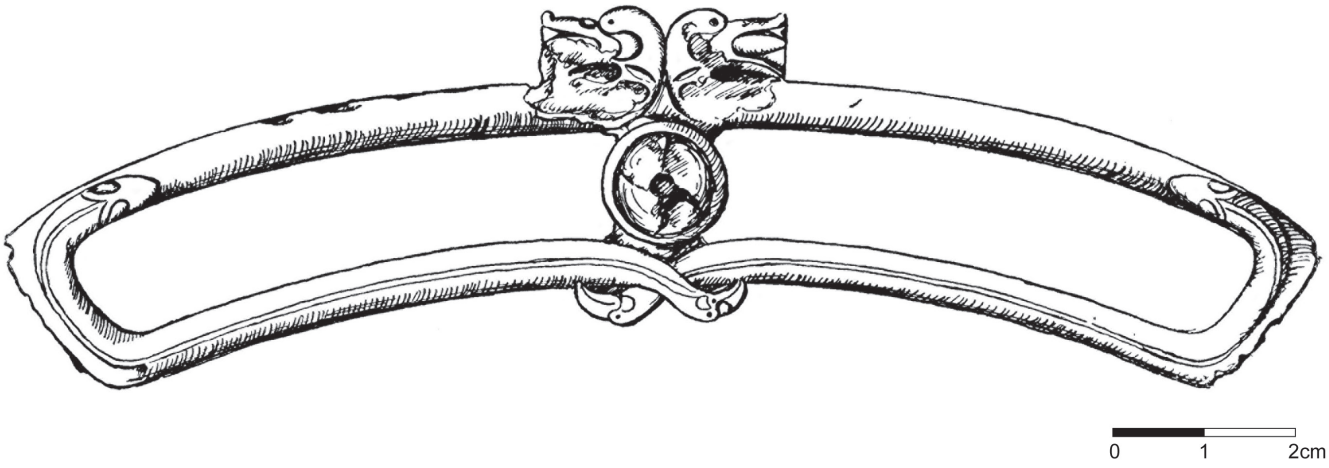

Figure 10.3 Illustration of the early medieval mount from Kilgreany Cave at the time of discovery in 1934 (Movius 1935, 278).

Wheery near Ferbane, Co. Offaly in 1849 (Graves 1869, 347) and may tentatively be identified as them. If one accepts that the Kilgreany mount was also part of a bell-shrine, then it is of some significance in surviving, along with the Chapman fragments, as the earliest evidence for bell enshrinement in Ireland.

XRF analysis has confirmed that the Kilgreany mount is made of bronze.[9] In the published excavation report the mount was described as being silver plated (Movius 1935, 277). This is highly improbable as the technique of silver plating is unknown among surviving eighth and ninth century Irish metalwork. It is far more likely that the object was tinned, like the angled strips from Park North Cave (E992:14), which was a method commonly used in Ireland at this time to give a silvery appearance to copper alloy objects (see Craddock 1989, 173). However, as a result of its chemical treatment (see below) there are now only minute traces of tinning to be seen on the Kilgreany mount. From the drawing in the original report (Fig. 10.3), it appears that there was a rivet hole in the centre of the amber stud and it may be noted that some of the amber studs on the Chapman bell-shrine fragments are similarly attached.

It is further stated in the excavation report that:

> 'Several small fragments of a long piece of gilded bronze with rather fine interlacing ornament were found. This is a plain basket pattern. They came from Trench H, 50 cm. below the silver plated object. The interlacing is of a type likely to be contemporaneous with the object described above; in fact these fragments may well be a part of the decoration of the same shrine' (Movius 1935, 278).

Unfortunately, at the time of writing these fragments could not be located in the National Museum of Ireland's collections.[10] Indeed, as they were not illustrated in the report, no opinion can currently be given.

An eighth century date for the mount was arrived at by the excavators through comparing the snakes on it with those on the Irish shrine finials in the Musée des Antiquités Nationales, St Germain en-Laye (see Youngs 1989, cat. no. 138a, b), and the bird-heads and amber stud with those on the 'Tara' brooch (Movius 1935, 278). The resemblance of the ornament to that seen on both the front and back of the 'Tara' brooch is striking (Wallace and Ó Floinn 2002, pl. 5:16 and 17). Similar crossing bird-heads, although in a more debased form, may be seen on the Westness brooch-pin and the 'Londesborough' brooch (Youngs 1989, cat. nos. 70 and 71). Such comparisons indicate a wider date bracket for the Kilgreany mount to sometime in the eighth or early ninth century.

Bell-shrine? mount

Kilgreany Cave, Co. Waterford
National Museum of Ireland E9:74
Movius *et al*. 1935, 277–278, fig. 9, no. 28.
Length 133mm; width 35mm; thickness 9mm

This arc-shaped bronze object was cast as one piece and was made as a mount to be attached to a larger object. It is an accomplished casting and principally consists of two parallel bands, approximately 6mm wide and generally 4.3mm thick, that meet at both ends and enclose an open area that is divided in two by a centrally placed circular setting. Since the object was found, and sometime after it was published, it was chemically treated. This most likely took place sometime in the late 1960s or 1970s. Unfortunately, this treatment has had a largely negative effect on the object in that its original surface has been all but completely stripped and the metal is now raw looking and heavily pitted.

The object is crowned by two closely set projecting animal-heads, which face in opposite directions. These animal-heads are depicted in profile and face towards the left and right respectively. They are both badly corroded and pitted, particularly their lower portions, so much so that there is now a perforation in that on the right, while part of the left animal-head has been completely lost. To the immediate left of it there is a large break in the upper band of the mount. While their details are now unclear, they both have rounded heads and long straight snouts and appear to have open jaws. Simple dot eyes are depicted on these animal-heads in the drawing of the object in the published excavation report (Fig. 10.3), one of which may still be discerned on the animal-head on the left. A snake is depicted at either end of the upper band, their heads facing towards the projecting animal-heads at the top of the piece. The heads of these snakes are depicted in plan and have pointed snouts slightly raised from the body of the object. It is at these points that the object is thickest, measuring 8mm and 9mm respectively. The snakes' mouths are closed and each has a pair of oval-shaped eyes while a central ridge runs the length of their bodies. Their bodies form the sides and entire lower portion of the object, where they cross each other at the centre before terminating in projecting bird-heads. Like the animal-heads, the bird-heads are depicted in profile and face away from each other towards the right and left respectively. They have closed curving beaks and rounded heads; they also have a little curved feature at the base of their beaks. Simple dot eyes are depicted on the bird-heads in the drawing of the object published in the excavation report, although these are not now visible. The central circular setting, which measures 11mm in diameter and 8.3mm in thickness, features an amber stud secured by a centrally placed rivet. While the stud is depicted as being cracked or damaged in the published drawing, it is

now in a much more damaged state and has the appearance of having been melted, probably as a result of the chemical treatment of the object.

The reverse of the mount has a largely concave hollowed surface, with the exception of the back of the circular amber setting and a flange at either end, which all have flat surfaces. The reverse of the circular amber setting features a rivet hole and the remains of the rivet that holds it in place. The two ends of the mount are C-shaped in cross section and were made to connect with additional elements. One of the terminal flanges has been truncated and only the lower half of it now remains.

Discussion

The presence of mounts in caves in the east Cork/west Waterford region is unusual and deserves further comment. One consideration is that the material may have derived from damaged objects that were destined for recycling by metalworkers. However, this seems unlikely given the definite sacred nature of the Park North material, which seems to represent a substantial portion of one shrine, and the lack of any evidence for the presence of early medieval metalworkers in these caves. A more convincing explanation is that this material derives from objects that were looted and subsequently broken up. Indeed, Dowd (2002, 91) has previously suggested that the Park North and Kilgreany mounts may have been stolen by the Irish or Vikings and notes the closeness of the latter cave to the Viking town of Waterford. The definite sacred nature of the Park North material, and the probable sacred nature of the Kilgreany mount, do not support the theory of Irish involvement. Indeed, most of the Irish metalwork that these pieces have been compared with here is material that was buried with Vikings in Norway and elsewhere, much of it looted Church metalwork. For instance, the Shanmullagh assemblage consists largely of broken up Church metalwork in association with Viking hack-silver, which may have been lost in transit by Vikings in the river Blackwater (see Bourke 1993, 24–38; Bourke 2010).

The Vikings were particularly active in the east Cork/west Waterford region during the ninth century, as evidenced by their raiding of the ecclesiastical sites of Cork, Cloyne, Lismore, and Kilmolash (Etchingham 1996), as well as by their *longphort* settlements at Cork and Youghal (Sheehan *et al*. 2001, 115). The two caves, which are only about 55km apart, are also both just a few kilometres from the coast. Indeed, both caves are located between the Viking towns of Cork and Waterford, which were established in the early tenth century, and there are a number of good harbours along this stretch of coast including those at Cork, Ballycotton, Youghal and Dungarvan. Park North Cave is 8km from Cloyne and only approximately 1.5km from the navigable reaches of the eastern part of Cork harbour. Cloyne was raided by the Vikings numerous times during the ninth century, including on one occasion in AD 888 when it was recorded in the *Annals of the Four Masters* that its abbot and vice-abbot were killed (Gwynn and Hadcock 1970, 65). The finds from the cave have also been generally compared with the Viking material from Cloghermore Cave, Co. Kerry (Connolly *et al*. 2005, 45). Furthermore, it has been argued that the placenames Dunkettle, Fota and 'Longeforde' in Ballincarroonig, which are all within Cork Harbour, were inspired by Scandinavian names and settlement (Sheehan *et al*. 2001, 114–115). Viking activity in the east Cork area probably also explains the find at Ballycotton of a Carolingian cross-brooch set with an Islamic amuletic seal (Porter and Ager 1999).

There is now a growing body of evidence for the use of caves in Ireland by Viking populations (Dowd 2015, chapter 8). Both Cloghermore Cave, Co. Kerry and Dunmore Cave, Co. Kilkenny were used by Vikings, not only as places to hide their valuables but also seemingly as places to bury their dead (Dowd *et al*. 2007; Harrison and Ó Floinn 2014, 618–625, 724–725). John Sheehan has reviewed the evidence for diagnostic Viking or Hiberno-Scandinavian artefacts from Irish caves in this book (Chapter 11), which further supports the view that caves were resorted to by Viking groups in Ireland. Of particular relevance to the discussion here is the quantity of Viking material identified by Sheehan from Carrigmurrish Cave, which is in Ballynamintra Middle – an adjoining townland to the north of Kilgreany. This assemblage is similar in its composition to that excavated from Cloghermore Cave, Co. Kerry (Connolly *et al*. 2005). Amongst the material recovered from Carrigmurrish Cave was a gilded bronze object bearing interlaced ornament (Ussher 1886, 363), which is reminiscent of the description of the fragments of gilded bronze from Kilgreany (see above). Further material of possible Viking-age date was recovered from Brothers' Cave, Oonaglour Cave and Ballynameelagh Cave I, also close to Kilgreany (Dowd 2002, 87; Dowd and Corlett 2002, 8; Dowd 2015, chapter 8). In Kilgreany Cave itself other possible Viking-age material was discovered, including a *Hnefatafal* gaming-piece (Dowd 2002, 87–88).

Only approximately 2km to the south-east of Kilgreany, at Knockmaon, a Viking-age silver hoard was discovered dating from *c*. 1000 (Kenny 1987, 522; Sheehan 1998, 163). This, unusually, consisted of 'Scoto-Scandinavian "ring-money" rather than Hiberno-Scandinavian material, and as such is distinctive in the Irish context' (Sheehan 2008, 243). Approximately 10km to the east, at Shandon and close to Dungarvan itself, a number of Hiberno-Scandinavian objects have been found including a tenth century motif-piece (see Sheehan this volume). Also, a Viking sword pommel made of antler was recovered from 'the estuary near Dungarvan river, above the bridge' in the nineteenth century (Ussher 1886, 367–368). There appears to have been substantial and prolonged evidence for Viking/Hiberno-Scandinavian

activity in the Cappagh valley/Dungarvan area, further indicated by the placenames Helvick Head and Ballynagaul, on the southern side of Dungarvan harbour (Sheehan *et al*. 2001, 115). The identification of diagnostic Viking/Hiberno-Scandinavian material from the adjacent Carrigmurrish Cave strongly indicates that it was as a result of Viking activity that the possible bell-shrine mount came to be deposited in Kilgreany Cave. Indeed, the *Annals of Inisfallen* record that the ecclesiastical site of Kilmolash, which is only approximately 6km east of Kilgreany, was plundered by the Vikings in AD 833.

In conclusion, it is most likely that the house-shaped shrine fragments from Park North, Co. Cork and the possible bell-shrine fragment from Kilgreany, Co. Waterford were deposited in the respective caves by Vikings. It seems probable that this material was looted from church sites before being broken up and the remaining fragments hidden or abandoned in the caves. The early medieval settlement evidence from both of these caves and caves adjacent to Kilgreany (Dowd 2015, chapter 8) suggests that the caves were being used for temporary accommodation or as hideouts by Viking groups during the ninth century. While it is impossible to know where the material was looted from, Cloyne and Kilmolash, which are the closest important early medieval ecclesiastical sites to Park North and Kilgreany respectively, and are both known to have been raided by the Vikings, stand out as distinct possibilities.

Notes

1 I would like to thank Dr Paul Mullarkey, NMI for carrying out this work and for his invaluable contributions to this study. Dr Mullarkey and John Sheehan of University College Cork also read and commented on earlier drafts of the text and I am most grateful to them for their help.

2 I would like to extend my thanks to Stella Cherry and Dan Breen of Cork Public Museum for making this artefact available for study.

3 Also referred to as 'tomb-shaped' shrines.

4 The mount was analysed using a Spectro Midex EDXRF (energy dispersive x-ray fluorescence) spectrometer using a Molybdenum anode. The diameter of the tube collimator and the measurement spot size is 0.7mm, and the distance from the sample surface varies from 2–5mm. The operating conditions for the X-ray tube were 45kV and 0.6mA at normal air pressure. Sample counting time was 180 seconds livetime. The principal elements analysed were copper, tin, zinc, lead, silver, arsenic and antimony. There was no sample preparation, such as polishing or abrasion of the surface, as it would have resulted in unacceptable damage and since the mount was not conserved in the past there are contaminants, surface dirt and corrosion products present. Other factors affecting the results are the surface depletion and enrichment of copper, tin and lead, due to corrosion mechanisms during burial. The calculated percentages were: 64.4 % copper, 18% lead, 7.3% zinc and 6.6% tin.

5 I would like to thank Jon Anders Risvaag, Vitenskapsmuseet, Trondheim, for permission to refer to this analysis which was carried out by Ellen W. Randerz.

6 I am very grateful to Dr. Paul Mullarkey for this suggestion.

7 I would like to thank Éamonn P. Kelly, Maeve Sikora and Margaret Lannin for making these artefacts and the mount from Kilgreany Cave available for analysis.

8 The alloy is 83% copper, 13.4% tin, 1.6% lead and 0.4% zinc. See note 4.

9 The alloy is 83.8% copper, 14.9% tin, 0.4 % silver and 0.1% lead. See note 4.

10 E9:75. These fragments were originally stored with the large mount, E9:74, in C15:1 in the Irish Antiquities Division, NMI in which a label for both may still be found. E9:74 is currently stored in Safe 3:17, while the location of the fragments, E9:75, is unknown at present (June 2010).

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11

Viking-age artefacts from Irish caves

John Sheehan

Terminology and cultural context

In this chapter an attempt is made to identify, describe and discuss Scandinavian or Hiberno-Scandinavian artefacts from nine and possibly ten caves in Ireland (Table 11.1). Throughout the paper the terms 'Scandinavian' and 'Hiberno-Scandinavian', in relation to material culture traditions, are used in preference to other labels such as 'Viking', 'Norse', 'Hiberno-Norse', 'Hiberno-Viking' etc., which are somewhat reductionist and serve to simplify what were complex cultural processes. However, it is almost impossible, and perhaps even impractical, to define terms such as 'Scandinavian' and 'Hiberno-Scandinavian' precisely. Nevertheless, the following definitions are offered as working models for the purposes of this paper: 'Scandinavian' is used to refer to material culture forms that are understood to derive, or ultimately derive, from the Viking-age Scandinavian homelands; and 'Hiberno-Scandinavian' is used to refer to material culture elements from Viking-age Ireland that are understood to be characterised by a fusion of elements derived from both Scandinavia and Ireland.

Table 11.1 Caves that have produced Viking-age material.

County	*Townland*	*Cave*
Antrim	Red Bay?	Cushendall Cave
Clare	Cahircalla Beg	Alice and Gwendoline Cave
Clare	Newhall	Bats' Cave
Clare	Tullycommon	Glencurran Cave
Kerry	Cloghermore	Cloghermore Cave
Kilkenny	Mohil	Dunmore Cave
Sligo	Cloonagh	Coffey Cave (Keash)
Sligo	Cloonagh	Plunkett Cave (Keash)
Waterford	Ballynamintra Middle	Carrigmurrish Cave
Waterford	Shandon	Shandon Cave?

In the Irish context, contact with Viking-age Scandinavia may commonly have been mediated through other regions, such as Britain and the North Atlantic, and may also, therefore, carry influences from these zones. It is understood that material culture cannot automatically be equated with biological heritage, though they can sometimes be correlated (Ó Donnabháin and Halgrímsson 2001, 67–68). Indeed, material culture may also be correlated with a sense of self-identity and, in using the term 'Scandinavian', the author is implying that sites characterised by such material culture traits were the domain of groups of Scandinavian origin or who perceived themselves as such. The term 'Hiberno-Scandinavian', on the other hand, is used to refer to the acculturated descendants of the immigrant Scandinavians and their material culture, the latter reflecting a convergence and reformulation of artefact types that is often focused on urban settings. Wallace, for instance, has identified and discussed the mixed cultural backgrounds of the house types that characterise 'Viking' Dublin (2008, 173). Artefacts with an admixture of Scandinavian and Irish cultural elements are also found in several contexts that lay outside of the Hiberno-Scandinavian milieu in early medieval Ireland, including ringforts, crannógs and the caves that form the subject of this chapter. However, concentrations of such artefacts in urban sites suggest that these may have been populated by individuals, many of whom may have been of Scandinavian background, who had become acculturated through the cumulative effects of processes such as trade, political alliance, intermarriage and, perhaps, changes in self-definition by cohorts of the local population (Ó Donnabháin and Halgrímsson 2001, 66–68, 79). While material culture sets

cannot automatically be equated with specific ethnic groups, and a number of Irish settlements feature notable elements of Hiberno-Scandinavian material culture (Bradley 2009, 45), for instance at Ballinderry crannóg, Co. Westmeath, and the cashel on Feltrim Hill, Co. Dublin, it is also the case that some sites, which are characterised by material culture of blurred cultural affiliation, should perhaps be interpreted as the domains of groups of mixed heritage who consciously privileged and proclaimed their Scandinavian connections to develop and maintain an identity boundary. This model has been proposed in the case of the Hiberno-Scandinavian settlement at Beginish Island, Co. Kerry (Sheehan *et al*. 2001, 111), and may also be applied to the enclosure at Cherrywood, Co. Dublin (O'Néill 2006). Hiberno-Scandinavians were more likely than Scandinavians to be bilingual and of mixed genetic profile and, generally, were of later date than Scandinavians in the Irish context.

Given the difficulties noted above, providing an interpretation for the cultural context of Scandinavian/Hiberno-Scandinavian artefacts from caves in Ireland is a challenging brief. The locations of these caves lie beyond the limits of the rural hinterlands that were controlled and/or settled by Hiberno-Scandinavians, or at least that had an economic and social/political relationship with them, though this merely geographical factor does not, of course, preclude the possibility that any of these finds were deposited or lost by a Scandinavian or Hiberno-Scandinavian individual. The possibility also exists, however, that the finds were in Irish possession before their deposition or loss, as studies have demonstrated that various factors led to a not-insignificant proportion of Ireland's Scandinavian material culture ending up in Irish ownership (Sheehan 1998, 173–176; Bradley 2009, 45). On the other hand, the general cultural context of the archaeological sites from which Hiberno-Scandinavian material is known must also be taken into consideration in ascribing ownership to these finds. In the case of caves, for instance, archaeological and historical evidence respectively, strongly indicates that the finds in Cloghermore Cave, Co. Kerry and Dunmore Cave, Co. Kilkenny were deposited by the Hiberno-Scandinavians rather than the Irish, even though neither cave is located in an area known to have been controlled by Hiberno-Scandinavians.

Only those finds from caves that are considered to be culturally diagnostic and Scandinavian or Hiberno-Scandinavian in background, in as far as it is possible to assign artefacts this distinction, are dealt with below. The broad categories that emerge are silver hoards, beads, pins, bangles of jet and related material, weapons, combs and whetstones. In some cases, the artefacts dealt with are obvious Scandinavian imports, such as the Cloghermore shield boss and certain categories of beads, while in others the artefacts are clearly of Hiberno-Scandinavian manufacture, such as certain types of ringed pins, the Carrigmurrish shield boss, the Alice and Gwendoline arm-rings and many of the objects in the silver hoards. There is also a group of object types, including bangles and combs, where cultural attribution to the Hiberno-Scandinavians is less definitive, though the balance of probability favours this ascription. It should be stressed again that the Scandinavian/Hiberno-Scandinavian background of these objects does not necessarily imply their deposition or loss by Scandinavians in the caves from which they have been recovered. It is only by considering the broader archaeological and historical contexts of these locations, where possible, that an informed view on the possible use of individual caves by Scandinavians may be arrived at.

1. Silver hoards and related material

Four Viking-age silver hoards are on record from three caves: Cushendall Cave, Co. Antrim, Cloghermore Cave, Co. Kerry and Dunmore Cave, Co. Kilkenny, while two single finds of related material, including a gold arm-ring, derive from Alice and Gwendoline Cave, Co. Clare.

Antrim, Red Bay? td., Cushendall Cave

This cave appears to have been destroyed by quarrying in 1849 when, among other material, two Anglo-Saxon silver coins were found. The coins have been regarded as associated finds by Dolley (1966, 19–20) and Blackburn and Pagan (1986, 294, no. 56), and the find is, therefore, interpreted as a small coin hoard deposited *c*. 850.

Coin, Anglo-Saxon issue of Berhtwulf, of Mercia, struck 840–852.

Coin, Anglo-Saxon issue of Ceolnoth, Diocese of Canterbury, struck 833–870.

Clare, Cahircalla td., Alice and Gwendoline Cave

Two arm-rings (Fig. 11.1, Pl. 36), one of gold and one of copper alloy, were discovered in 1902–1904 at Alice and Gwendoline Cave during investigations conducted by an interdisciplinary team (Scharff *et al*. 1906, 67–69; Bøe 1940, 81, 101–102; Dowd 2015, 193). The rings do not appear to have constituted a hoard (*recte* Graham-Campbell 1976, 69), both being found in the Alice passage of the cave as separate finds. The copper alloy arm-ring was found in an apparent midden deposit, while the gold example, apparently deliberately concealed, lay in an earthy stony deposit covered by a stone slab.

Gold penannular arm-ring (1902:110), plain, of broad-band type. Formed of a band of approximately rectangular cross section, tapering slightly towards the terminals, which are square ended and practically touching. One terminal flares slightly. D.: 55mm; T. 2.94mm; Wgt. 59.9g.

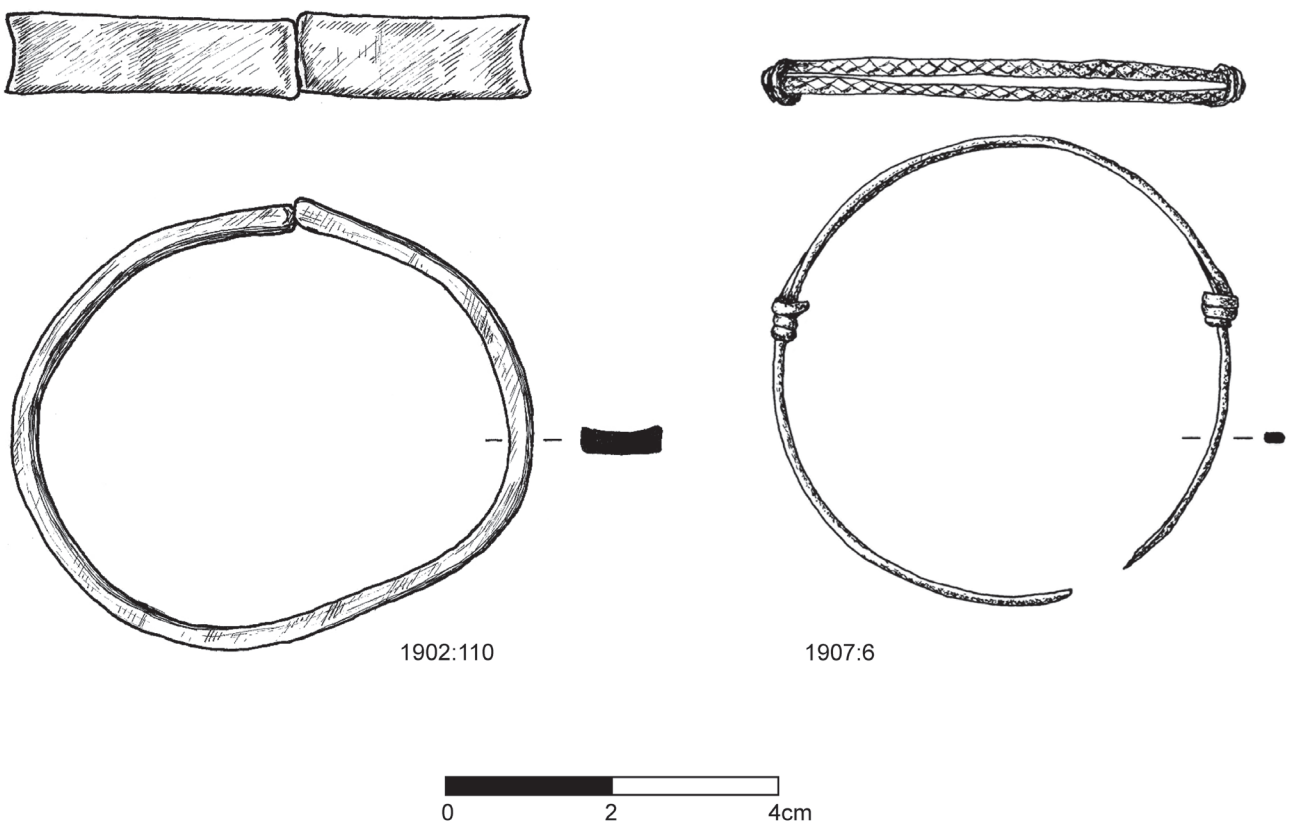

Figure 11.1 Gold arm-ring (1902:110) and copper alloy arm-ring (1907:6) from Alice and Gwendoline Cave (Illustration: Malgorzata Kryczka).

Copper alloy annular arm-ring (1907:6), of coiled arm-ring type. Formed from a rod of sub-oval cross section, 2.4×1.45mm, sharply reduced in thickness at the ends, which are tightly twisted around the hoop. It is coiled one and a half times, so that one side of the ring presents a double aspect. The outer face of the rod is neatly ornamented by stamping, using a punch with minute opposed triangles, leaving a continuous row of lozenges in false relief. D. 57.2mm.

Kerry, Cloghermore td., Cloghermore Cave

This hoard (99E0431:61, 66, 72–74) was found in a small cleft or hollow during archaeological excavation of Quadrant A of the Graveyard Chamber (Sheehan 2005). No other artefacts were recovered from the fill of this cleft. The hoard consists of six items, comprising two ingots and four large hack-silver fragments of arm-rings, two of which were tightly wrapped together (Pl. 37).

Silver ingot (99E0431:61), in the form of an oblong bar, of ovoid cross section, with rounded ends. L. 49mm; W. 10mm; T. 7.0mm; Wgt. 25.4g.

Silver ingot (99E0431:74), in the form of a short oblong bar, of ovoid cross section, with rounded ends. It features a slight protuberance on one face and a single nick (slice). L. 32mm; W. 10.0mm; T. 5.0mm; Wgt. 12.2g.

Silver arm-ring fragment (99E0431:66), of broad-band type. Tapered to severed ends and bent to form a loop. The outer face is ornamented with rows of vertical transverse stamping, the punch having a central row of pellets. H. 21.0mm; T. 4.0mm; Wgt. 27.4g.

Silver arm-ring fragment (99E0431:72:1), of broad-band type. Tapers to severed ends and bent to form a loop interlocked with 99E0431:72:2. The outer face is ornamented with rows of vertical transverse stamping and a diagonal cross, the punch having a plain centre between serrated edges. H. 14mm; T. 3.0mm; Wgt. 14.5g.

Silver arm-ring fragment (99E0431:72:2), of broad-band type. Bent so as to expose the original inner face, and tightly folded to form a loop interlocked with 99E0431:72:1. The outer face is ornamented with rows of vertical transverse stamping and a diagonal cross, the punch having a plain centre between serrated edges. Though both interlocked fragments are ornamented with

the same type of punch, they do not derive from the same ring. H. 13mm; T. 2.0mm; Wgt. 11.8g.

Silver arm-ring fragment (99E0431:73), of broad-band type. Tapered to severed ends and bent to form a loop. The outer face is ornamented with rows of vertical transverse stamping to either side of a central diagonal cross, the punch having a row of lozenge-shaped dots. H. 10.5mm; T. 2.0mm; Wgt. 15.55g.

Kilkenny, Mohil td., Dunmore Cave

Dunmore 1

In 1973 geologists conducted a small excavation in the floor of the Market Cross Chamber in this cave and found a small dispersed silver hoard in a sediment-infilled depression. As the components were scattered through different strata in this hollow, the excavators concluded that the hoard, 'had been lost further up the flowstone slope towards the Market Cross and then washed or rolled down into the depression' (Drew and Huddart 1980, 17).

Ten coins or coin fragments (41-49-1983), comprising three Anglo-Saxon issues of Edward the Elder and Æthelstan, four of the Vikings of East Anglia and Northumbria, one Kufic coin issued by Kaliph Al-Mu'tamid (879–892), one fragmentary Kufic coin, and one unidentifiable coin fragment (Pl. 38).

Silver ingot fragment (40-49-1983), cut at both ends from a bar of sub-triangular section. It features one nick. L. 10.6mm; W. 10.1mm; T. 8.0mm; Wgt 3.26g.

Dunmore 2

This assemblage of objects was discovered in 1999 concealed in a rock crevice in the cave's Town Hall Chamber (Bornholdt Collins 2010, 25–27; Sheehan 2014, 218–219). The find consisted of a hoard comprising both non-numismatic silver and coins along with two copper alloy ingots, and it appears to have been originally wrapped up or contained in a prestigious garment. Fragmentary traces of the garment remained, complete with ornate silver buttons or tassels and a belt. The elements of this garment comprise:

Textile and leather fragments (1999:305), with traces of green pigment on the textile fragments.

Sixteen conical-shaped silver objects (1999:274–289), hollow in form, made of woven silver wire. Represented in three sizes. These possibly functioned as buttons or tassels (Pl. 39).

Fragments of a knitted silver braid (1999:297).

Copper alloy hinged buckle (1999:300), a single solid casting, featuring billeted roundels and boss-capped rivets. It is ornamented with an incised interlaced panel with zoomorphic details.

Strap-end (1999:301), double-sided. Of zoomorphic form and matching 1999:302.

Strap-end (1999:302), double-sided. Of zoomorphic form and matching 1999:301.

Large decorated glass bead (1999:303), see below.

The hoard consists of the following items:

Fourteen or fifteen Anglo-Saxon coins (1999:260–273), including pennies of Athelstan, Eadmund, Eadwig, Eadgar and, possibly, Eadred. Nine are whole or virtually whole, one is a cut halfpenny, and five are small fragments. All but one of the whole coins show signs of bending.

Silver penannular arm-ring (1999:290). Formed from a plain rod of circular cross section, tapering towards straight-cut terminals. D. 69.5mm; Wgt. 59.31g.

Silver rod (1999:291), plain, looped to form a figure-of-eight. It features one nick. L. c. 135mm; Wgt. 10.93g.

Silver ingot terminal fragment (1999:292). Cut and broken from a wide oblong bar of rectangular section, with asymmetrically rounded end. It features eight nicks. L. 25.4mm; W. 13.0mm; T. 4.1mm; Wgt. 10.74g.

Silver ingot terminal fragment (1999:293). Cut and broken from a bar of approximately D-shaped section, with asymmetrically rounded end. It features one nick. L. 25.5mm; W. 9.3mm; T. 7.4mm; Wgt. 11.13gm.

Silver ingot terminal fragment (1999:294). Cut and broken from a bar of sub-rectangular section, with sub-rectangular end. It features four nicks and there is a slight transverse cut on one face. L. 14.0mm; W. 10.3mm; T. 8.2mm; Wgt. 8.02g.

Silver 'droplet' (1999:295). Hammered flat on both faces. D. 8.6mm; T. 4.1mm; Wgt. 1.88g.

Silver brooch pin fragment (1999:296). Consisting of a rod of sub-circular section, cut and broken at both ends and bent into a loop. It is ornamented by an elongated sunken field, narrowing to a point at one end, containing a row of seven irregular squares. It features two nicks. L. c. 48mm; Wgt. 11.69g.

Two long copper alloy ingots, folded (1999:298, 299).

Discussion of silver hoards and related material

A variety of different object types are represented in the finds from Dunmore, Cloghermore, Cushendall and Alice and Gwendoline caves, most of which are ingots or arm-rings. Those of copper alloy or gold occur in complete form, while the majority of the silver examples occur as hack-silver. Frequently hack-silver is a feature of 'mixed hoards' – hoards composed of coins with ingots and/or ornaments – and this is the case with the two Dunmore Cave finds.

Silver ingots, of elongated bar-shaped type, form a significant element of Viking-age hoards throughout the Viking world, and functioned primarily as a simple means

of storing bullion. They occur, in either complete or hack-silver form, in at least half of the ninth and tenth century hoards from Ireland that contain non-numismatic material, including those from Dunmore Cave and Cloghermore Cave. In the latter they occur only as complete finds, whereas they are only found in hack-silver form at Dunmore. All coin-dated hoards containing ingots from Ireland are of tenth-century date, though it is clear that ingots must also have been in circulation during the second half of the ninth century (Sheehan 2014, 196–197). Most of the Dunmore and Cloghermore ingots and ingot-fragments are of the standard Viking-age type – oblong bars, usually of plano-convex, trapezoidal or sub-rectangular cross section, most often with rounded terminals. One example from Dunmore 2, however, is of more unusual form, being a 'droplet' or 'discoidal ingot' as defined by Kruse *et al*. (1988, 90–91). These small globules, which are of uncommon occurrence in Ireland, were formed, apparently unintentionally, by dropping molten silver during the casting process and are thus not ingots in the formal sense. The faces of the Dunmore 2 example are flattened by hammering, in the same manner as an example from Kaupang, Norway (Sheehan 2014, 219). Copper alloy ingots, represented in Dunmore 2, only rarely occur in silver hoards in Ireland.

Since ingots primarily functioned as a means of storing bullion it is probable that they, alongside other objects such as broad-band arm-rings, had a role to play in Ireland's Viking-age metal-weight economy. The fact that many ingots in hoards from Ireland are represented in hack-silver form may be taken as evidence to support this, as may the occurrence of minor nicks on them, as on several of the ingots and ingot fragments from Dunmore and Cloghermore. Silver objects acquired nicks and pecks of this type during commercial transactions, and these represent a characteristic Scandinavian method of assessing silver quality as well as testing for plated forgeries.

In numerical terms Hiberno-Scandinavian broad-band arm-rings form the most important group of ornament types represented in the hoards from Ireland. Examples occur, in hack-silver form in the Cloghermore hoard, while an unusual gold example derives from Alice and Gwendoline Cave as a single find. Such rings are usually made from a thick band and are frequently decorated with rows of stamped grooves though some examples, like the Alice and Gwendoline one, are plain. Over 140 examples are known from Ireland where they occur in 29 hoards, and they also occur quite commonly in hoards from northern England, Scotland and Norway (Sheehan 2011). The type's occurrence in a number of coin-dated mixed hoards indicates that it developed during the later ninth century and continued in general circulation until *c*. 940. Broad-band arm-rings appear to have been made to variations on a specific standard of weight, which suggests that they were intended to perform a role in the Hiberno-Scandinavian bullion or metal-weight economy. Their distributional pattern suggests that they were manufactured within the silver-working tradition centred on Dublin.

Hiberno-Scandinavian broad-band arm-rings most often occur in silver, as indeed do most Viking-age arm-ring types. This is clearly due to the fact that such rings served a dual purpose: they primarily functioned as ornaments but also served as 'currency rings', which could be reduced to hacked pieces when economic necessity required. Given that silver was the principal medium of exchange throughout the Viking world it is not surprising that most Viking-age ornaments were made using this material. In this context, therefore, the rarity of the Alice and Gwendoline gold arm-ring may be appreciated. Indeed, there are only three other locations in Ireland from where examples of this type are on record.

The second Hiberno-Scandinavian arm-ring from Alice and Gwendoline Cave, in copper alloy, may be identified as a coiled arm-ring. These are annular in form and are made by coiling a single rod, usually twice, before winding its ends around the hoop of the arm-ring; the rods are normally decorated with punched opposed-triangle or hour-glass motifs. The Alice and Gwendoline ring is the only such example on record in copper alloy, though copper alloy versions of other forms of Viking-age ornaments occasionally occur in Britain and Scandinavia. Coiled arm-rings are found in association with broad-band arm-rings in a number of silver hoards. Overall, the dating evidence indicates that the development of this type of arm-ring most probably took place during the later ninth century and that its manufacture continued through the early decades of the tenth (Sheehan 1991, 45–48).

The complete rod arm-ring from Dunmore 2 belongs to a type that is of uncommon occurrence in Ireland. It finds a close parallel in the Skaill hoard, Orkney, deposited *c*. 950–970. The brooch pin fragment from Dunmore derives from an Irish brooch type and dates to within the period *c*. 850–950.

2. Beads and related material

Beads of Scandinavian background, of glass, amber or bone, are on record from five caves: Alice and Gwendoline, Glencurran, Cloghermore, Dunmore and Carrigmurrish.

Clare, Cahircalla td., Alice and Gwendoline Cave

An amber bead (1907:5) was discovered during antiquarian excavations, and was found about 1m from the gold arm-ring described above (Scharff *et al*. 1906, 67).

Clare, Tullycommon td., Glencurran Cave

An assemblage of 69 beads, possibly representing a necklace, was discovered during archaeological excavations in 2004/5 (Pl. 43). Dowd suggested that the

beads may have ultimately derived from the nearby high-status settlement of Cahercommaun (2007, 39; 2015, 186), the final phase of occupation of which Kelly has recently proposed is 'strongly Hiberno-Scandinavian in character' (2015, 282).

The beads form two general groups. The first is a segmented type, belonging to Callmer's 'E-group', averaging 5.77mm in diameter, while the second is a larger but more delicate, hollow, blown type, classified by Callmer as 'D-group', averaging 9.44mm in diameter (Callmer 1977; O'Sullivan 2013). 'E-group' beads were imported into Scandinavia from the Near East throughout the Viking period. From there some examples were dispersed throughout the Viking world. In Ireland, for instance, examples have been recovered from the ninth-/early tenth-century cemeteries at Kilmainham/Islandbridge and the tenth-century settlement at Fishamble Street, Dublin. The 'D-group' beads are of less common occurrence in Scandinavia, and are not known from elsewhere in Ireland. They are also likely to be imports, presumably from the Near East (*ibid*., 210–218).

Kerry, Cloghermore td., Cloghermore Cave

A number of beads, both in amber and glass, derive from this cave (Connolly *et al*. 2005, 131–313, 192–194) (Fig. 11.2). Some of the glass examples, not included below, are of Irish type.

Bead, bone (99E0431:79), of disc shape. Found in association with 99E0431:80, 81 and may have functioned as a bead spacer.

Bead, glass (99E0431:80). D. 4.3mm.

Bead, glass (99E0431:81). D. 5.2mm. Similar to 99E0431:80.

Six beads, amber (99E0431:41, 44, 48, 64, 69, 110), of disc-type. Vary between D. 9–11mm and T. 2.5–5.1mm. Found together in a deposit of cremated animal bone in a stone setting.

Kilkenny, Mohil td., Dunmore Cave

In 1973 geologists conducted a small excavation in the floor levels of the Market Cross Chamber of this cave (Drew and Huddart 1980, 18). The finds included an amber ring fragment, three glass beads and a bone bead (Pl. 41). A glass bead (1999:303) also formed part of the 1999 discovery at Dunmore Cave (see above), while another forms part of the National Museum's collections (1949:60) (OPW 1994, 17). In 2004/5 archaeological monitoring led to further discoveries, including beads from the Market Cross Chamber (Pl. 40) (Dowd *et al*. 2007, 9–11).

Ring fragment, amber (Drew and Huddard 1980, 18). Comprising about half of the object, orange in colour. Found in the same stratum (Layer F) as one of the glass beads. Estimated overall diameter *c*. 23mm.

Bead, glass. Of colourless clear glass, decorated with gold foil. Found in the same stratum (Layer F) as the amber ring fragment. D. c. 7mm.

Bead, glass, of segmented form. Of colourless clear glass, decorated with gold foil. L. 10mm; T. 3mm.

Bead, bone, of disc shape. Found in a recess in the chamber. D. c. 8mm; T. c. 2mm

Bead, glass, of sub-annular form. In poor condition, bearing traces of burning. Decorated with white striations in the form of swags or festoons. Found in a recess in the chamber. D. c. 20mm.

Bead, glass (1949:60). Semi-translucent, dark blue. Similar to 04E1517:04. D.18.4mm.

Bead, glass (04E1517:04). Semi-translucent, dark blue. Similar to 1949:60. D. 19mm.

Bead, glass (04E1517:06). Of colourless, semi-translucent, clear glass, decorated with gold foil. D. 5.5mm.

Bead, glass (04E1517:07). Of colourless, semi-translucent, clear glass, decorated with gold foil. Portion of a segmented bead. D. 5.5mm.

Bead, glass (04E1517:08). Of colourless, semi-translucent, clear glass, decorated with gold foil. D. 5.5mm.

Bead, glass (04E1517:09). Of colourless, semi-translucent, clear glass, decorated with gold foil. Portion of a segmented bead. D. 5.5mm.

Bead, glass (04E1517:10). Of colourless, semi-translucent, clear glass, decorated with gold foil. Portion of a segmented bead. D. 5.5mm.

Bead, glass (04E1517:11). Of colourless, semi-translucent, clear glass, decorated with gold foil. Portion of a segmented bead. D. 5.5mm.

Waterford, Ballynamintra Middle td., Carrigmurrish Cave

Bead, amber (1948:217), surviving as two small fragments; dark in colour.

Discussion of beads and related material

Amber occurs quite frequently in late prehistoric contexts in Ireland and consequently some of the amber beads noted above, especially those without association, may well be of prehistoric date (e.g. Carrigmurrish Cave, where Late Bronze Age pottery has also been recovered). However, given that they all derive from caves that also include Viking-age artefacts in their assemblages, it remains possible that these amber beads are of Viking-age date. Amber beads are of common occurrence in Scandinavian contexts in Britain and Ireland, particularly in burial contexts in Scotland (Graham-Campbell and Batey 1998, 149) and in Hiberno-Scandinavian Dublin, where excavations have

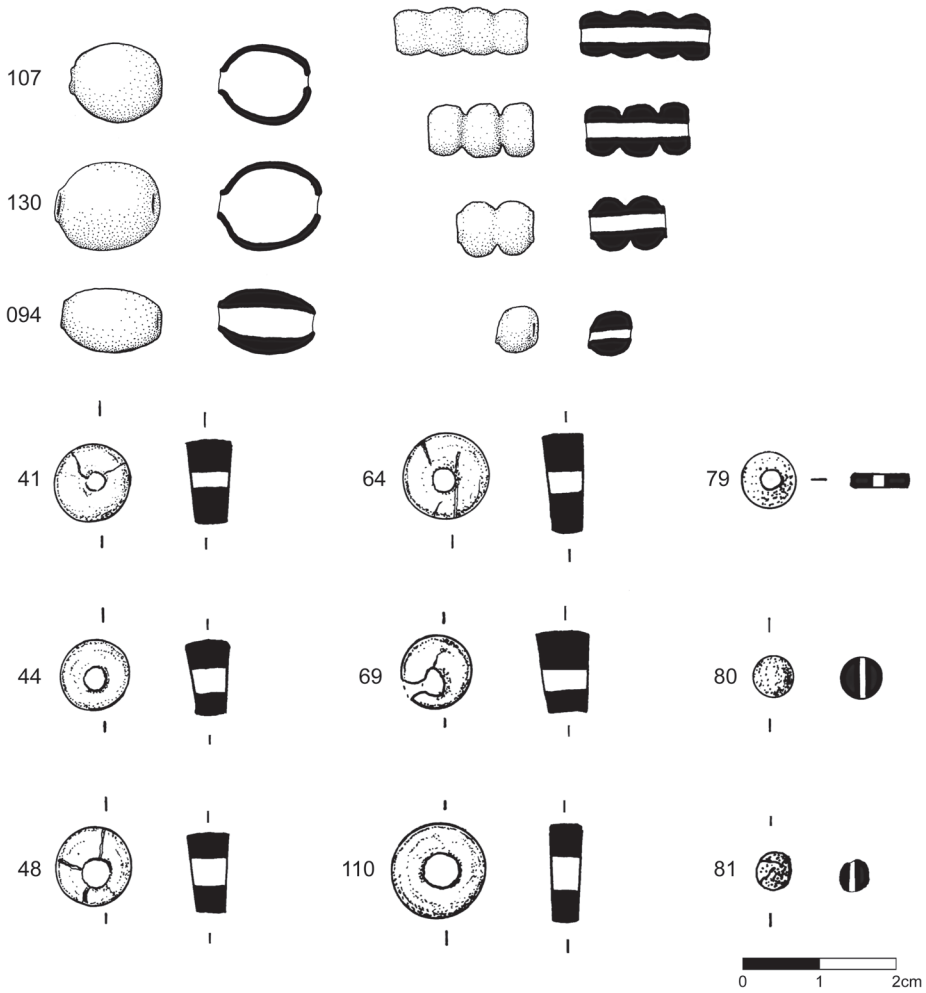

Figure 11.2 Three hollow blown glass beads (04E0432:18:107; 04E0432:23:130; 05E0379:19:094) and four segmented glass beads from Glencurran Cave (Illustration: Abigail Brewer). Bone bead (99E0431:79), two glass beads (99E0431:80, 81) and six amber beads (99E0431:41, 44, 48, 64, 69, 110) from Cloghermore Cave (Connolly et al. 2005, 131, 133).

revealed a number of important amber workshops (Wallace 2016, 291–296).

Glass beads are common finds in caves. In general terms, beads of Irish and Scandinavian backgrounds are often distinguishable from each other, though plain blue glass beads occur in both traditions and, consequently, may prove to be culturally undiagnostic. However, in terms of their form the two glass beads from Cloghermore Cave belong to a type that is well represented in Viking York and in Scandinavian settlement sites and graves, including a tenth-century grave in Scotland (Connolly *et al*. 2005, 131–132). Some of the beads from caves are clearly Scandinavian, having been imported into Ireland through Scandinavia from their place of production in the Near East. This is the case with several of the segmented beads, as well as those decorated with gold foil, from Dunmore Cave and Glencurran Cave (O'Sullivan 2013; O'Sullivan 2015). Similar bead forms are known, for instance, from the ninth-/early tenth-century cemeteries at Kilmainham/Islandbridge and the tenth-century settlement at Fishamble Street, Dublin (Harrison and Ó Floinn 2014, 144–145).

3. Pins

Pins of various types are common finds throughout the Viking Age and the early medieval period. The Hiberno-Scandinavians developed the distinctive ringed pin series, having adapted it from the Irish tradition, and excavations in Dublin have produced evidence for their manufacture there (Fanning 1994, 116). It has recently been described as, 'without doubt, the type of dress pin that most prominently and unequivocally signifies the material culture of the Hiberno-Norse world of the 9th–12th centuries, and its diaspora in Britain and the North Atlantic Viking settlements' (Griffiths 2007, 67). Pins from this and subsequent traditions, most

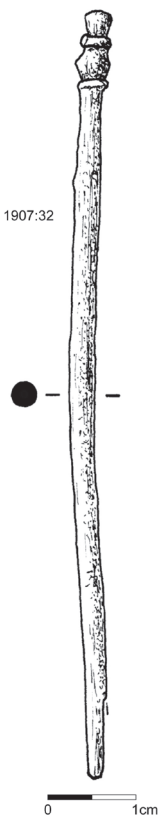

Figure 11.3 Copper alloy stick pin (1907:32) from Bats' Cave (Illustration: Malgorzata Kryczka).

notably the 'stick pin'/lobe-headed-pin types, are on record from six or seven caves: Bats', Glencurran, Cloghermore, Dunmore, Plunkett Cave (Keash), Carrigmurrish and, possibly, Shandon.

Clare, Newhall td., Bats' Cave

Located *c*. 1km from Alice and Gwendoline Cave, Bats' Cave was investigated by Scharff *et al*. in 1904 (1906, 72–73). A hard-trodden floor was revealed at the cave entrance. Amongst the finds here was a copper alloy stick pin (*ibid*., 71; Bøe 1940, 81).

Copper alloy stick pin (1907:32) (Fig. 11.3). The lower portion of the shaft is broken off. The head takes the form of a swelling above and below of which is a raised fillet or collar. The shaft is of circular cross section. L. 88mm; T. of shaft 3mm.

Clare, Tullycommon td., Glencurran Cave

This pin was discovered during archaeological excavations in 2004/5, carefully concealed beneath a large flat slab (Dowd 2015, 183, fig. 8.5).

Copper alloy plain-ringed loop-headed ringed pin.

Kerry, Cloghermore td., Cloghermore Cave

A number of pins and fragments of pins were discovered in Cloghermore Cave, of which only some may be assigned to the Viking Age (Fig. 11.4) (Connolly *et al*. 2005, 103–107, 222–224; Harrison and Ó Floinn 2014, 152–153). One example, an Irish brooch-pin (99E0431:115), and two simple pins (99E0431:96, 122), were apparently directly associated with the only articulated burial from the cave, that of an adult male. However, the two simple pins have recently been shown through X-ray fluorescence analysis to be of post-medieval date (Harrison and Ó Floinn 2014, 619).

Copper alloy plain-ringed loop-headed ringed pin (99E0431:82). The shaft is of rectangular cross section. L. 87mm.

Copper alloy brooch-pin of hinged type (99E0431:115). The shaft is of sub-circular cross section and the ring is damaged. It appears to have featured a recessed field of enamel, now largely missing. L. 92mm.

Kilkenny, Mohil td., Dunmore Cave

Prior to the 1973 excavations at Dunmore Cave some archaeological material, generally without precise find details, was recovered. This includes two separate finds of pins, one of iron and one of copper alloy, both from the Town Hall Chamber (Monks 1948, 57, 60; Fanning 1994, 17). In 2004/5 archaeological monitoring led to further discoveries, including two ringed pins from the Main Chamber (Fig. 11.5) (Dowd *et al*. 2007, 9–11).

Iron plain-ringed loop-headed ringed pin.

Copper alloy plain-ringed loop-headed ringed pin.

Copper alloy plain-ringed baluster-headed ringed pin (04E15117:02), complete. The shaft is of circular cross section, transforming to square section at its lower end.

Copper alloy pin (04E1517:03), incomplete. The shank is of circular cross section and features a looped head. Bent. It is possibly the shank of a plain-ringed loop-headed ringed pin.

Sligo, Cloonagh td. Plunkett Cave (Keash)

Two pins (Fig. 11.6) were discovered in Plunkett Cave, Keash, during the 1901 excavations. One (1902:106) was recorded as having been found near the cave entrance, while the second example was recovered further inside (Scharff *et al*. 1903, 210; Dowd 2013).

Copper alloy ringed pin (1902:106), incomplete. The shank features a plain looped head. L. 82mm. This can

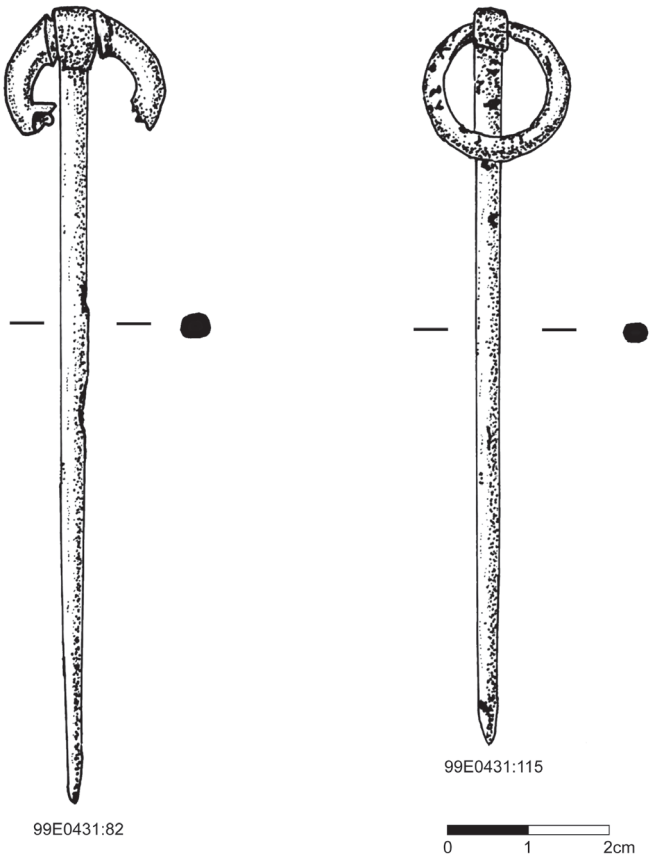

Figure 11.4 Two copper alloy ringed pins (99E0431:82, 115) from Cloghermore Cave (Connolly et al. 2005, 104).

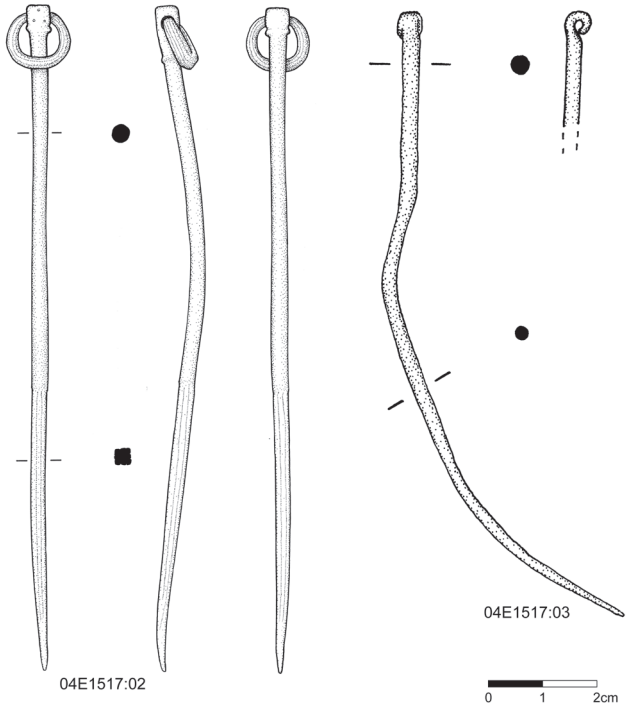

Figure 11.5 Two copper alloy ringed pins (04E1517:02, 03) from Dunmore Cave (Dowd et al. 2007, 11).

be identified as the shank of a plain-ringed loop-headed ringed pin, as the pin is illustrated in this manner (see Scharff *et al*. 1903, fig. 22).

Copper alloy ringed pin (1902:105), cannot be located. Described as being 'of the same class' as 1902:106 (*ibid*., 210), it can, therefore, be identified as a plain-ringed loop-headed ringed pin.

Waterford, Ballynamintra Middle td., Carrigmurrish Cave

A variety of archaeological material was discovered during the investigations of Carrigmurrish Cave in 1881 (Ussher 1886), for the most part deriving from a deposit comprised of occupation debris intermixed with earth and stone. This debris seemingly originated from an enclosure that surrounded the cave opening (Dowd 2015, 195–197).

Copper alloy ringed pin (1906:261), incomplete. The shank is of broad rectangular cross section and features a looped head. L. 86mm. It can be identified as the shank of a plain-ringed loop-headed ringed pin.

Iron plain-ringed loop-headed ringed pin (1906:370), in two pieces. The shank is of broad rectangular cross section and features a looped head and ring (21×19mm). L. 62mm.

Iron ringed pin (1906:371), incomplete. The shank, heavily corroded and missing its lower portion, features a looped head. L. 69mm. It can be identified as the shank of a plain-ringed loop-headed ringed pin.

Iron ringed pin (1906:372), incomplete. The shank is of broad rectangular cross section and features a looped head. L. 70.4mm. It can be identified as the shank of a plain-ringed loop-headed ringed pin.

Iron plain-ringed loop-headed ringed pin (1906:369) (Ussher 1886, pl. iii), complete. The shank, which is bent, is of circular cross section and features a looped head and ring. L. 108mm; T. 3.5mm.

Copper alloy ring (1948:236), plain, derived from a ringed pin. Of oval cross section, 19.8×17.5mm; T 3.9mm.

Copper alloy pin (1948:240), tapering to point, badly corroded in places. May be broken from a ringed pin or stick pin. L. 117mm; T. 3.6mm.

Copper alloy pin (1948:241), tapering to point, with strongly curving shank. T 4.3mm. May be broken from a ringed pin or stick pin.

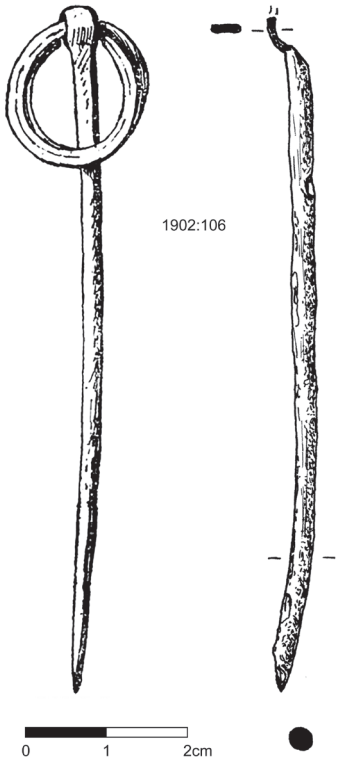

Figure 11.6 Degradation of copper alloy ringed pin (1902:106) from Plunkett Cave between the time of discovery (1901) and present (Scharff et al. 1903, fig. 22; Dowd 2013, 77).

Waterford, Shandon td., Shandon Cave

This pin is provenanced only to 'Shandon, Waterford', and is not necessarily associated with the cave.

Stick pin (1932:7022), of club-headed form. Complete and well preserved. The top, underside and neck of the head, as well as the upper portion of the shank, are decorated with a combination of grooves and dots. On top of the head is a grooved triangle with dots. The upper 9.5mm of the shank features an arrangement of vertical grooves interspersed with horizontal stabs and dots. L. 90.2mm. T. 3.8mm.

Discussion of pins

Most of the pins noted above are of the plain-ringed loop-headed type – the simplest of all the ringed pin classes. Pins of this type are on record from both pre-Viking Age and Hiberno-Scandinavian contexts in Ireland and, consequently, the precise cultural background of unassociated and non-contexted finds is unknown. However, it is the most popular of the ringed pin forms current in the Viking period, having been adapted by the Scandinavians in the later ninth century, and it represents one of the most common types from Hiberno-Scandinavian Dublin where many examples derive from tenth-century contexts (Fanning 1994, 15–23; Wallace 2016, 285–287). The plain-ringed baluster-headed pin, as represented at Dunmore Cave, is mainly of early to mid tenth-century date and forms a relatively small group amongst the corpus of ringed pins.

The 'stick pin' from Bats' Cave represents a type that appears to have evolved from the ringed pin within the Hiberno-Scandinavian context (O'Rahilly 1998, 32–33; Griffiths 2007, 69). Indeed, the form of the head of the Bats' Cave pin, with its raised fillets or collars, may be related to baluster-headed ringed pins. The majority of stick pins were manufactured in Dublin and date from the eleventh and twelfth centuries.

The only pins from caves found with associated material are from Cloghermore and Dunmore. The copper alloy pin from the latter location was recorded by as having been associated with two bobbin-shaped wooden objects (Monks 1948, 57), for which Fanning has noted parallels in the Kilmainham/Islandbridge Scandinavian cemetery and in burial contexts at Birka (1994, 17). This appears to suggest that the Dunmore pin forms part of a Scandinavian deposit, possibly a burial. The Cloghermore brooch-pin, though of Irish background, was directly associated with the burial of an adult male. With the exception of these two cases, it is not possible to make a definitive statement on the cultural background of the deposition of any of the Viking-age pins from the Irish caves.

4. Jet/lignite/shale bangles

Kilkenny, Mohil td. Dunmore Cave

Archaeological monitoring in 2004/5 led to the discovery of a fragment of a ring outside the cave entrance (Fig. 11.7) (Dowd *et al*. 2007, 9).

Bangle (04E1517:01), fragment. Representing approximately one third of a light ring, with an estimated external diameter of 90mm. Of shallow quadric-circular cross section, *c*. 10×*c*. 7mm.

Waterford, Ballynamintra Middle td., Carrigmurrish Cave

Fragments of two bangles were discovered during the investigations of Carrigmurrish Cave in 1881 (Fig. 11.7) (Ussher 1886). They came from a deposit comprised of occupation debris that appears to have fallen into the cave from an enclosure outside and above-ground.

Bangle (1906:331), fragment. Representing approximately half of a large ring with an estimated external diameter of 92mm. Of broad D-shaped cross section, 18.2×14.5mm, with the curvature on the outer surface. The outer surface is ornamented with a thin incised line.

Bangle (1906:332), fragment. Representing approximately one third of a light ring with an estimated external diameter of 74mm. Of shallow D-shaped cross section, 5.7×7.9mm, flat on the under surface.

Discussion of jet/lignite/shale bangles

Terms such as jet, shale and lignite are often used interchangeably given the difficulty involved in identifying these broadly similar materials. In early medieval Ireland there is clear evidence of material of this kind being worked prior to the Viking Age, with bangles being the most common product. Similar bangles, representing a cultural adoption, occur in Scandinavian contexts in both Britain and Ireland. In Britain, their occurrence in Viking burial contexts appears to indicate that these bangles were often associated with women (Hunter 2008, 107).

Many of the finds from Hiberno-Scandinavian Dublin have been identified as manufactured from jet, lignite and cannel coal (Hunter 2008, 112; Wallace 2016, 297–298). Lignite was widely available in Ireland, though it was also imported into Dublin from abroad (Wallace 2008, 175–176), while jet was imported from the north of England. Jet and lignite were both worked in Dublin, where roughouts and unfinished objects have been found. The ornamentation of one of the ring fragments from Carrigmurrish Cave (1906:331) is closely paralleled to a jet bracelet fragment from Fishamble Street, Dublin (E172.13809), indicating that this is probably a bangle of Hiberno-Scandinavian manufacture.

5. Weapons and related material

Kerry, Cloghermore td., Cloghermore Cave

Excavations in this cave produced an iron axehead, an arrowhead, a spearhead and fragments of an iron shield boss (Fig. 11.8). The shield boss was associated directly with the only articulated burial from the cave, that of an adult male (Connolly *et al*. 2005, 60, 85–88, 205–207, 214; Harrison and Ó Floinn 2014, 624).

Shield boss (99E0431:145.1–3), iron, in three poorly preserved curved fragments, of which two fit together. These probably derive from a boss of hemispherical form. Fragments of wood are accreted to the pieces.

Axehead (99E0431:1), of iron. Broken at its butt, which appears to have curved to form a socket. L. 127mm; blade W. 94mm.

Arrowhead (99E0431:53), socketed, of iron. Poorly preserved. The blade is short, flat and of triangular form. L. 97mm.

Spearhead ferrule (99E0431:45–46), of iron. Socketed, with a perforation. Portion of an iron blade is fused to its socket. L. 107mm.

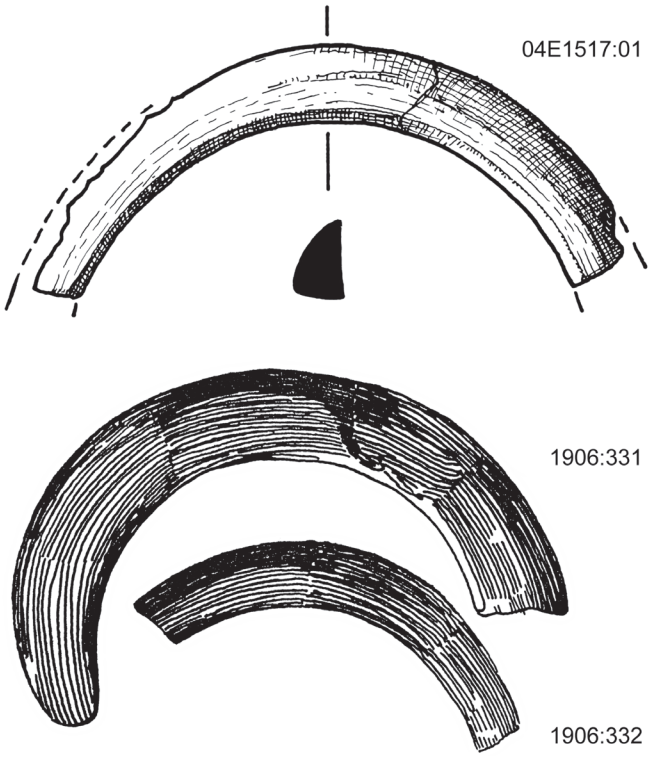

Figure 11.7 Jet/lignite/shale bangle fragments from Dunmore Cave (04E1517:01) and Carrigmurrish Cave (1906:331, 332) (Dowd et al. 2007, 12; Ussher 1886, pl. I).

Waterford, Ballynamintra Middle td., Carrigmurrish Cave

A shield boss (Fig. 11.9) and a spearhead were discovered, not obviously in association with one another, during investigations of Carrigmurrish Cave in 1881. They derived from occupation debris intermixed with earth and stone that originated from outside the cave (Ussher 1886, 365, pl. iii; Halpin 2008, 143).

Shield boss (1906:365), iron, fragmentary and poorly-preserved. Survives in five corroded and accreted pieces. These derive from a boss of conical form, made of iron *c*. 3mm thick, with a strong apex. When intact it probably measured *c*. 11cm in overall diameter and *c*. 8cm in height.

Single-edged spearhead (1906:360), incomplete. The blade is long, at least 131mm in length.

Discussion of weapons and related material

The likely conical form of the Carrigmurrish Cave shield boss allows it to be identified as belonging to the tradition of Scandinavian-type conical shield bosses. It varies in terms of its form from most Viking-age shield bosses from Scandinavia, as well as from several from Britain

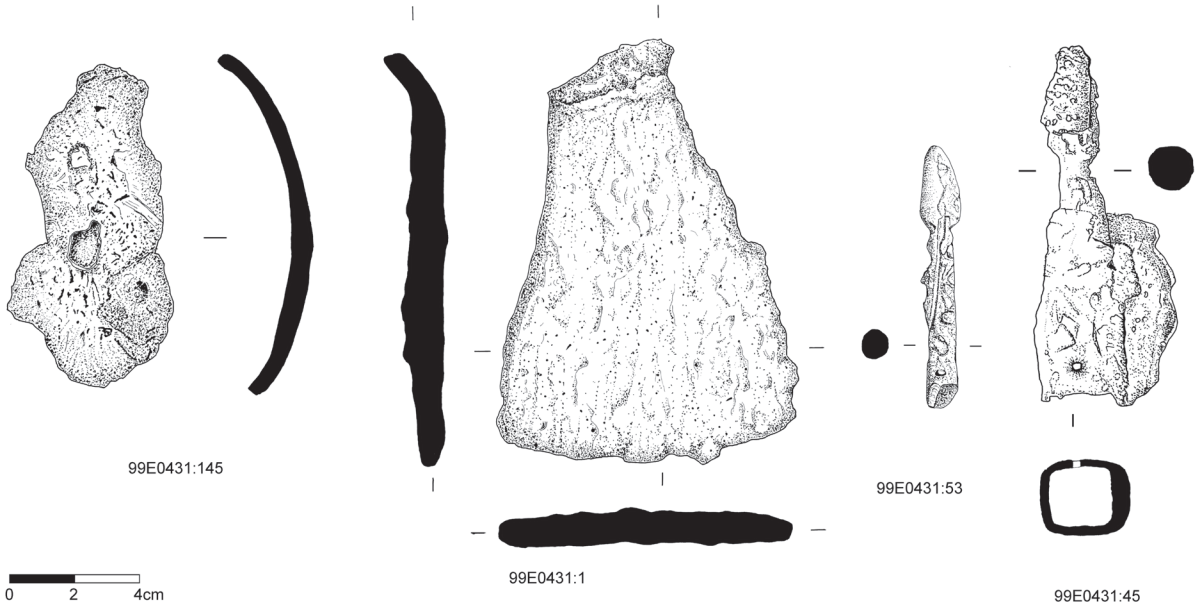

Figure 11.8 Iron weapons from Cloghermore Cave: shield boss (99E0431:145), axehead (99E0431:1), arrowhead (99E0431:53) and spearhead ferrule (99E0431:45) (Connolly et al. 2005, 85, 87).

and Ireland, which typically are of domed hemispherical type (*cf*. Rygh 1885, 562–563, type 562). Bosses of the conical type from Viking-age Ireland are mostly from Dublin (Harrison 2001, 70), with examples including those from College Green and Kilmainham/Islandbridge; these are of ninth- and early tenth-century date. The type should be regarded as an Irish Sea Scandinavian type. The Carrigmurrish boss, and the recently discovered example from a Viking burial at Woodstown (Harrison 2014, 167–168), constitute the only examples of shield bosses of this conical type known from outside Hiberno-Scandinavian Dublin and its hinterlands. The Cloghermore boss appears to be of the standard Scandinavian hemispherical type.

Single-edged spearheads are on record from Hiberno-Scandinavian Dublin, both from the ninth- and early tenth-century cemeteries at Kilmainham/Islandbridge (Bøe 1940, 47) and from a probable eleventh-century context at High Street (Halpin 2008, 143). The incomplete example from Carrigmurrish clearly derives from this background. The Cloghermore arrowhead is of socketed form, like both of the examples on record from the Kilmainham/Islandbridge cemetery.

6. Combs

Kerry, Cloghermore td. Cloghermore Cave

A large number of comb fragments, of different types, were discovered during the excavation of Cloghermore Cave. Those that have been identified by Connolly *et al*. (2005, 225–230) as belonging to Dunlevy's Classes D and F, which are probably of Hiberno-Scandinavian manufacture, are summarised below (Fig. 11.10).

Comb fragments (99E0431:60), probably of Dunlevy Class F, derived from a side-plate and teeth-plate.

Comb fragments (99E0431:67), of Dunlevy Class F, derived from a teeth-plate.

Comb fragments (99E0431:75–76), probably of Dunlevy Class F. Consisting of four fragments of side-plates and a fragmentary teeth-plate.

Comb fragments (99E0431:83), probably of Dunlevy Class F. Five fragments, now refitted.

Comb fragments (99E0431:98), of Dunlevy Class D. Consisting of three fragments of side-plates and two of teeth-plates.

Comb fragments (99E0431:181), probably of Dunlevy Class D. Six fragments, now refitted.

Sligo, Cloonagh td., Coffey Cave (Keash)

This comb fragment derives from the 1901 excavations in Coffey Cave (Fig. 11.11) (Scharff *et al*. 1903, 209; Dunlevy 1988, 395).

Comb fragment (1902:96), representing portion of a winged end-plate of a Dunlevy Class F1. It features three peg-holes. L. 36mm.

Waterford, Ballynamintra Middle td., Carrigmurrish Cave

A number of comb fragments, of different types, were discovered during the investigations of Carrigmurrish Cave in 1881 (Ussher 1886, 363–365; Dunlevy 1988, 398). Those that have been identified as belonging to Dunlevy's Class F,

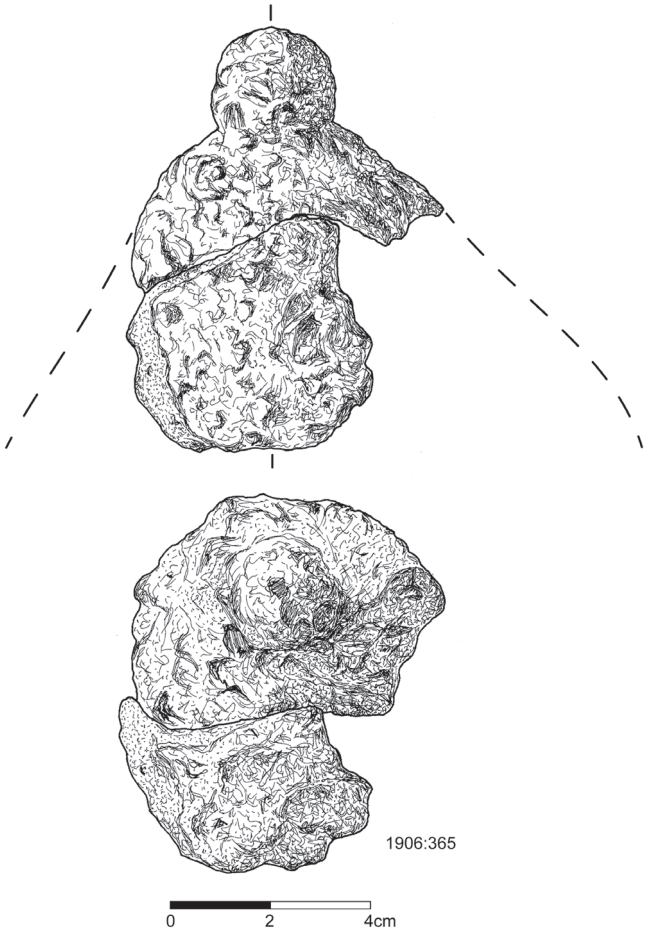

Figure 11.9 Iron shield boss (1906:365) from Carrigmurrish Cave (Illustration: Malgorzata Kryczka).

probably of Hiberno-Scandinavian manufacture, are detailed below (Fig. 11.11).

Comb fragment (1906:291), of Dunlevy Class F2. Consisting of two fragmentary teeth-plates and two side-plates, still attached to one another by three iron rivets. The side-plates are C-shaped in cross section and are ornamented by bands of between two and five parallel lines. Only two teeth survive on one of the teeth plates, with none extant on the other. L. 56mm; H. 16mm; T. 2.5mm.

Comb fragments (1906:292, 300), of Dunlevy Class F2. Two fragments, a teeth-plate and a side-plate. The side-plate, which is C-shaped in cross section and ornamented by simple criss-cross decoration, features an iron rivet and three rivet-holes (two broken). The teeth-plate features six teeth, an iron rivet and a rivet-hole. Side-plate: L. 43mm; H. 14.7mm; T: 5.6mm. Tooth-plate: L. 21mm; H. 34.8mm; T. 3.6mm.

Comb fragment (1906:294), representing a portion of a side-plate of a Dunlevy Class F2. It is C-shaped in cross section and is ornamented by criss-cross decoration and parallel lines. It features the partial remains of an iron rivet. L. 26.7mm; H. 18.4mm; T. 5.7mm.

Discussion of combs

Class D combs, in Dunlevy's view (1988), are developments of an Anglo-Saxon proto-type, which were introduced to Ireland, probably from Scandinavia, as a fully developed type. Class F combs, single-edged composite examples with arched spines, have been subdivided by Dunlevy into three main varieties. Class F1 combs, represented at Coffey Cave (Keash), form a small discrete group with close comparisons within Scandinavia. There, Ambrosiani has dated the type to the mid-ninth and tenth centuries (1981, 23–29), while examples from the Viking burial at Larne, Co. Antrim and Hiberno-Scandinavian Dublin have been dated to the ninth and tenth centuries respectively (Fanning 1970, 77). Dunlevy has proposed that at least some of the Class F1 combs from Ireland are Scandinavian imports (1988, 364).

Class F2 combs, represented at Carrigmurrish Cave, are strong, heavy, well-polished examples with rounded side-plates, usually D- or C-shaped in cross section. The type is well represented among the Hiberno-Scandinavian material from Dublin where they have been recovered from contexts ranging in date from the late ninth to the early twelfth centuries. Combs of this type are of widespread occurrence in Scandinavia, particularly in late ninth- and tenth-century contexts (Ambrosiani 1981, 23–32).

7. Whetstones

Kerry, Cloghermore td., Cloghermore Cave

Excavations in this cave produced at least 11 whetstones. One was associated directly with the only articulated burial from the cave, while another is of the pendant variety. Both of these are made from a fine-grained, mica-bearing red/brown siltstone, which is not of local derivation (Connolly *et al*. 2005, 60, 124–126, 201, pls. 32–33, 38; Harrison and Ó Floinn 2014, 624).

Whetstone (99E0431:116), with convex sides, tapering evenly in width and thickness towards the ends to form a 'boat-shaped' object. Unperforated. L. 82mm; W. 24mm; T. 12mm.

Whetstone (99E0431:141), incomplete. Upper portion of a stone of rectangular cross-section, perforated. It is waisted in form, presumably resulting from use. L. 58mm; W. 17mm; T. 11mm.

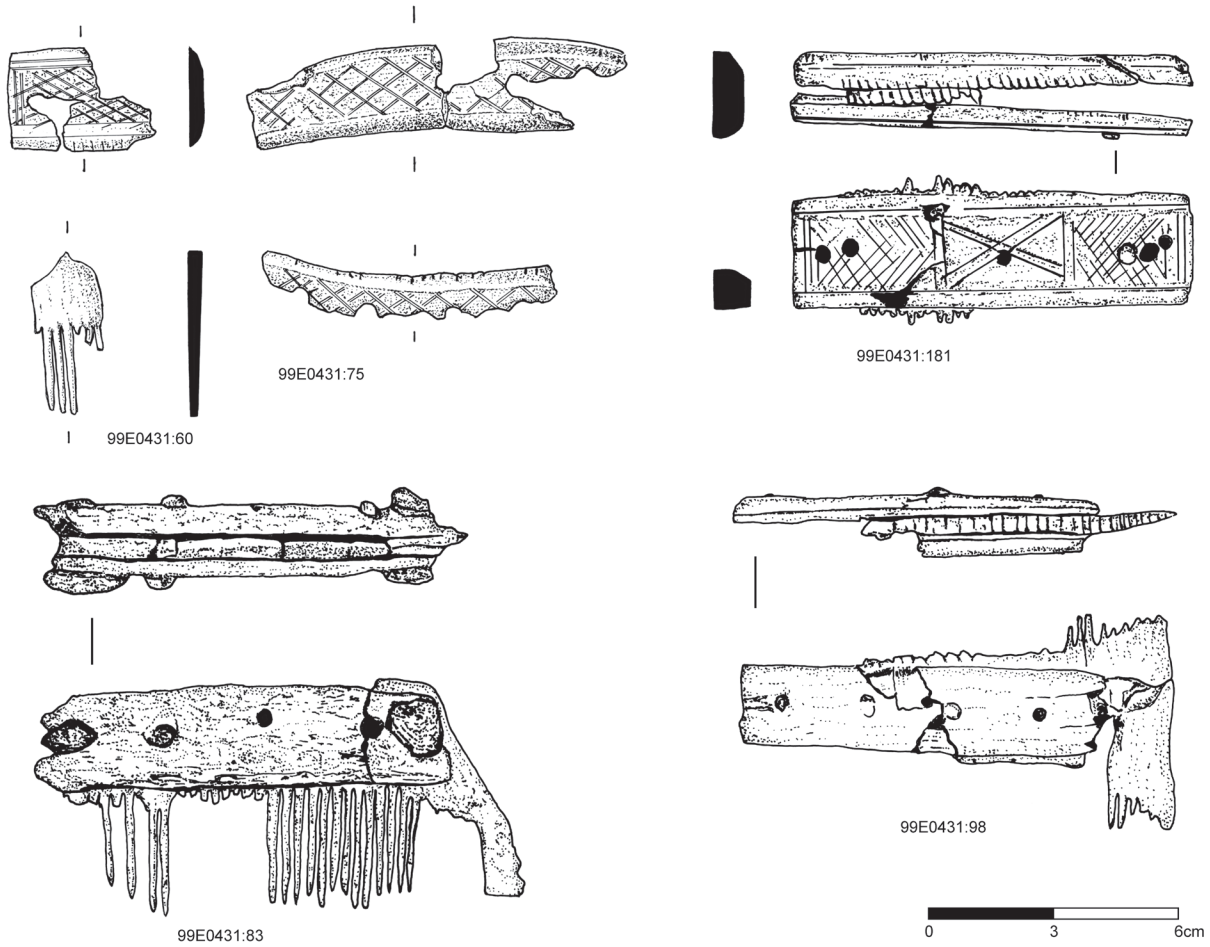

Figure 11.10 Comb fragments (99E0431:60, 75, 181, 83, 98) from Cloghermore Cave (Connolly et al. 2005, 116–7).

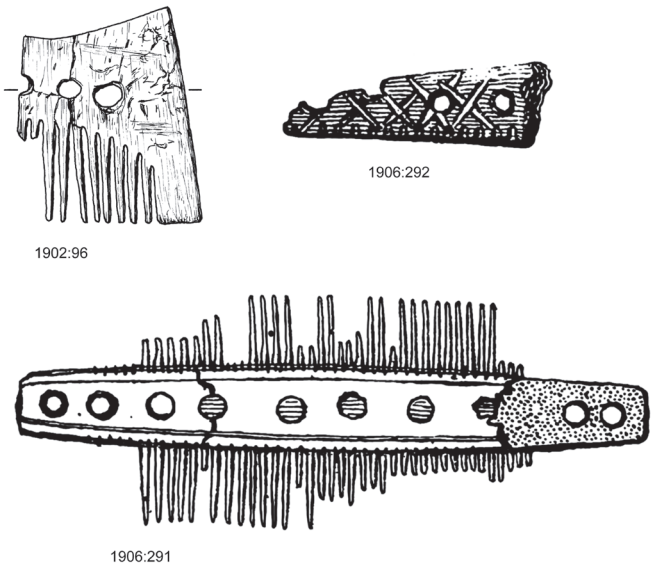

Figure 11.11 Comb fragments from Coffey Cave (Keash) (1902:96) and Carrigmurrish Cave (1906:292, 291) (Dowd 2013, 77; Ussher 1886, pl. II).

Waterford, Ballynamintra Middle td., Carrigmurrish Cave

Pendant whetstone (1906:91), incomplete. Upper portion of a perforated whetstone of angular elongated shape, of broad rectangular cross section. The stone is fine grained, deep olive green in colour, with some mica inclusions. Close to the upper end is a sub-circular perforation, 7.9mm in diameter, of dumb-bell form. The lower portion has been broken off. L. 68.4mm; W 26.8mm; T. 9.2mm (Ussher 1886, pl. i).

Discussion of whetstones

On Viking-age sites in Britain pendant whetstones, like those from Cloghermore and Carrigmurrish, are more commonly found than unperforated examples (Griffiths 2007, 245), and they are a feature of a small number of Scandinavian burials in Ireland. A small, finely made example was recovered from the recently excavated grave at Woodstown, Co. Waterford (Harrison 2014, 169) and the type is also represented in

Scandinavian graves in Scotland (Batey 1993, 153–154, 169–170) and in the Hiberno-Scandinavian settlement at Dublin (E172.7928).

8. Miscellaneous

Kerry, Cloghermore td., Cloghermore Cave

The excavations at Cloghermore produced over 350 items. A small but significant number of these are diagnostically Scandinavian or Hiberno-Scandinavian in character, most of which have been described above. In addition, there is a small number of miscellaneous artefacts of Scandinavian or Hiberno-Scandinavian type, one of which – a copper alloy stud from a buckle – was associated with the only articulated burial from the cave and may have derived from the same object as the buckle-tongue found nearby (Harrison and Ó Floinn 2014, 624).

Perforated sphere (99E0431:91), reportedly of walrus ivory. Ornamented with a series of incised concentric lines. D. 22×35mm (Connolly *et al*. 2005, 115, 189, pl. 36, fig. 35).

Copper alloy tanged stud from a buckle (99E0431:105), with a domed head and a perforated tang. D. 7.1mm (*ibid*., 107–108, 223, fig. 30; Harrison and Ó Floinn 2014, 623–624).

Waterford, Shandon td., Shandon Cave

Shandon Cave, which has now been completely quarried away, is not known to have produced any evidence of human activities. It was investigated periodically between 1859 and 1896 during which faunal remains were recovered. This trial piece (Fig. 11.12), provenanced only to 'Shandon quarry', was discovered in 1917. Although it cannot be demonstrated beyond doubt that this object came from the cave, this is a distinct possibility.

Trial piece (1947:237), formed from section of an animal long bone. It measures 106mm in length and is of almost square section, *c*. 22×21mm in average width. It was prepared by neatly cutting it at the ends, the evidence for which only survives at one end, and by cutting it to form four flat faces. Two of the adjoining surfaces bear deeply cut interlaced and animal-ornament designs, some of which are framed in rectangles, as well as simpler figure-of-eight and triquetra motifs. The animal ornament designs include bipeds and quadrupeds, some with head lappets. The two plain faces were crudely inscribed and decorated by the finders. The object has been fully described by Ó Meadhra (1979, 68–69). Henry briefly discussed it and noted that the high relief animals, which feature on one of its sides, may have been carved in preparation for bronze casting. She identified it as of Viking-age date on the basis of what she termed its Scandinavian-type 'fleur-de-lys' motif between the bodies of animals (1967, 132).

Viking-age artefacts from caves

On the basis of present evidence, it appears that artefacts that originated in a Scandinavian or Hiberno-Scandinavian background are on record from just nine or ten caves in Ireland. In numerical terms, it is beads and pins that form the most commonly occurring types of material. In terms of wealth and commercial significance, it is the silver hoards and related material from Cushendall, Dunmore, Cloghermore and Alice and Gwendoline caves, which represent the most important body of data. From another perspective, however, it could be proposed that it is the Scandinavian/Hiberno-Scandinavian burials at Cloghermore, and possibly at Dunmore, that potentially reveal most about the use of caves in Ireland during the Viking Age. Interestingly, it is also these caves that stand out in terms of the overall quantities and types of Scandinavian/Hiberno-Scandinavian artefacts contained in them, and both have also produced silver hoards. Consequently, this discussion will largely focus on the artefacts from these two sites.

There are well over a hundred Viking-age silver hoards on record from Ireland and they consist of three basic types: coinless, mixed and coin hoards. The form and nature of their composition enables an interpretation of the different types of hoards in terms of the varying degrees of social and economic complexity they represent. The mixed hoards are considered to be 'economically active', reflecting commercial developments, while the coinless ones represent more the social functions of wealth (Sheehan 2004). Both of the Dunmore Cave hoards belong to the former category and, by virtue of their coin and hack-silver elements, have been described by Bornholdt Collins as 'indisputably commercially-inspired' (2010, 22), while the hack-silver nature of the coinless Cloghermore Cave hoard has also caused it to be interpreted as an economic deposit (Sheehan 2005, 150–152).

Dunmore Cave appears to be synonomous with *Derc Ferna*; an entry in the *Annals of the Four Masters*, *sub anno* 928, records a plundering and slaughter carried out by the Hiberno-Scandinavians of Dublin – also recorded in the *Annals of Ulster*, *sub anno* 930. Can the earlier of the two hoards from the cave, Dunmore Cave 1, be related to the historically-attested context of these Hiberno-Scandinavian events? Dolley, in his study of the numismatic element of the find, placed its deposition *c*. 928 (1975, 78), a date subsequently supported by Blackburn and Pagan (1986, 295, no.111). However, Bornholdt Collins has recently pointed out that Dolley's dating was informed by the date of the massacre given in the *Annals of the Four Masters*,

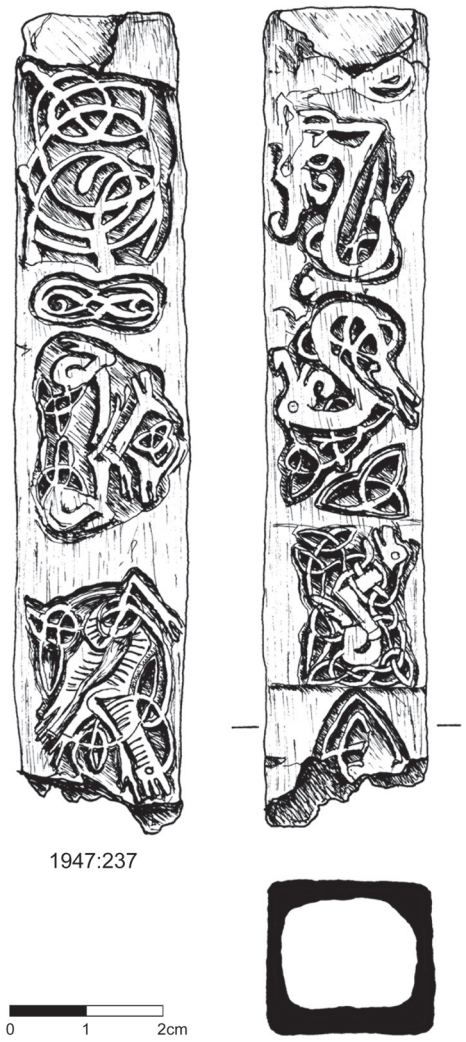

Figure 11.12 Trial piece (1947:237) from Shandon, possibly Shandon Cave (Illustration: Malgorzata Kryczka).

rather than by that given in the *Annals of Ulster*, and has proposed that the hoard's deposition be adjusted to *c*. 930, which in her opinion is equally well supported by the numismatic evidence (2010, 19). The deposition may, therefore, reasonably be associated with the historically-recorded events Downham interprets within the context of the rivalries that existed between Limerick and Dublin (2004, 85). On the basis of its coins, the deposition of the Dunmore 2 hoard has been dated to '*c*. 965 or soon after' (Bornholdt Collins 2010, 31), a period when the cave has no known historically-attested context.

Human remains have been noted in the past as being widely dispersed throughout Dunmore Cave (Dowd *et al*. 2006, 19). A recent programme of radiocarbon dating of human bones found in different areas of the cave resulted in a marked correlation within the date-range 880–970, which may confirm the annalistic record noted above (Dowd *et al*. 2007; Dowd 2015). It is, however, generally unwise to firmly correlate archaeological data with historical events. Nevertheless, the Scandinavian/Hiberno-Scandinavian artefacts from the cave are impressive in their range and quantity, though it should be noted that few of them derive from archaeological excavations and consequently they are often lacking in context. In addition to the two silver hoards, these finds include an impressive garment with ornate attachments, an amber ring fragment, eleven glass beads, three or four ringed pins and a bangle. One of the ringed pins was associated with two bobbin-shaped wooden objects that appear to have Scandinavian parallels from burial contexts (Fanning 1994, 17), suggesting that these particular Dunmore finds may derive from a Scandinavian burial. Dowd (2007, 15; 2015, 204) has noted that the interpretation of the assemblages of human remains from Dunmore Cave, in various respects, does not readily fit in with the view that these represent the Irish victims of the 930 massacre and has noted an alternative proposal, influenced by the results of the excavations at Cloghermore Cave, that Dunmore may have served as a Scandinavian burial ground. It is not possible to substantiate this theory at present, and arguments against it can be articulated, but it would be unwise to dismiss it entirely especially given what has recently been learned about the nature of the Scandinavian presence in areas not normally associated with Scandinavian settlement, such as the Cloghermore area of Kerry. The results of the excavations in Cloghermore Cave (Connolly *et al*. 2005; Connolly 2010) will not be discussed here, though it should be noted that some commentators have expressed caution regarding the cultural background of the site (e.g. Griffiths 2010, 80; Harrison and Ó Floinn 2014, 618–625). In addition to the silver hoard, the finds that may be firmly assigned to a Scandinavian/Hiberno-Scandinavian context include a ringed pin, eight beads of glass and amber, an axehead, an arrowhead, a spearhead, fragments of six combs, and a proposed walrus ivory spherical object. It is possible that many of the other artefacts from the cave also derive from this tradition, but generally they are not culturally diagnostic. More importantly, the Cloghermore Cave burials included at least one of Scandinavian background, which contained various objects including a shield boss. A number of other burials may also derive from this tradition.

It is difficult to provide an interpretation for the cultural contexts of the Cloghermore and Dunmore silver hoards. Their locations lie beyond the limits of the rural hinterlands controlled by the Munster Hiberno-Scandinavians, though this does not preclude the possibility that any of these finds were concealed or lost by a Scandinavian or Hiberno-Scandinavian individual. The possibility also exists that the finds were in Irish possession before their deposition or loss as studies of the distributional patterns of Ireland's

Viking-age silver hoards indicate that various factors, including trade and tribute, led to a very considerable proportion of Ireland's Viking-age silver wealth ending up in Irish ownership (Kenny 1987, 511–512; Sheehan 1998, 173–176). The general context of the archaeological deposits at Cloghermore Cave, however, as well as the possible correlation of the deposition of the Dunmore Cave 1 hoard with the historically-attested presence of the Hiberno-Scandinavians at this cave in 930, as well as the range of other Hiberno-Scandinavian artefacts from the site and the possibility that there may have been Scandinavian-type burials there (Dowd *et al*. 2007, 15), strongly suggests that these hoards were deposited by the Hiberno-Scandinavians rather than the Irish. The overall artefactual evidence, combined with the burial evidence, indicates that an argument can be made for the use of these caves by Scandinavians/Hiberno-Scandinavians.

A third site that is noted for the amount and variety of its Scandinavian/Hiberno-Scandinavian artefactual material is Carrigmurrish Cave. Unfortunately, it has not been the subject of modern archaeological excavation, so the precise contexts of the material remain unknown. The finds include an amber bead, eight pins (all definite or possible ringed pins), two jet-type bangles, one of which finds close parallel in Hiberno-Scandinavian Dublin, fragments of three combs, a pendant whetstone, a shield boss and a spearhead. The presence of the shield boss is of interest given that all other shield bosses of this type known from Britain and Ireland are from Scandinavian-type burials. It is difficult, given this tendency, to satisfactorily explain the presence of this object in the cave.

Connolly has recently summarised the evidence for burial rituals and cult practice at Cloghermore Cave (2010, 34–36). It is also tempting to associate the deposition of a silver hoard in a cave with ritual activity, especially when there are also quantities of human bones present, as is the case at both Cloghermore and Dunmore. There may be some justification for advancing ritual explanations on the basis of the so-called 'Odin's Law', recounted by Snorri Sturluson in *Heimskringla* (Laing and Foote 1961, 12–13), which states that men would enjoy in the afterlife the treasures that they had buried in this life. However, because this belief is recorded only in a thirteenth-century source there is inevitably uncertainty as to whether, where and when it was actually practised in the Viking world. It is possible that it may to an extent simply reflect a religious rationalisation of a previous or contemporary practice, though there are several instances in the Icelandic sagas that may lend some literary support to the notion of ritual hoarding in accordance with Odin's stricture (Graham-Campbell and Sheehan 2009, 89). Either way, Viking-age silver hoards are only very rarely found in demonstrably ritual contexts, such as graves, and there is no example of the demonstrably ritual deposition of a hoard in a cave in the Viking world. It, therefore, seems more likely that the Dunmore Cave and Cloghermore Cave hoards are standard deposits in secure locations, deliberately concealed with the intention of recovery.

There is evidence, literary and archaeological, for the ritual deposition of some hoards in the Viking world. It has been observed, for instance, that Viking-age gold finds in Scandinavia are frequently associated with watery environments and may represent votive depositions (Hårdh 1996, 134). In a recently published paper, the evidence of Viking-age gold and silver hoards from Ireland that derive from watery locations – including crannógs, bogs, rivers, lakes, small islands and shorelines and their environs – is discussed (Graham-Campbell and Sheehan 2009). It is concluded that the phenomenon of ritual hoarding may have been more commonplace than has generally been accepted to date and that some, at least, of the 'watery' finds from Ireland may indeed have been deposited in a ritual context. Interestingly, it is noted that all recorded Viking-age gold hoards from Ireland, with one exception, have an apparent association with water or watery places and thus conform to the patterns noted in Scandinavia. The Alice and Gwendoline Cave gold arm-ring, therefore, though it is a single-find rather than a hoard, should perhaps also be viewed as a ritual deposition. It certainly was not a casual loss, being deposited beneath stones and covered by a slab – a context that led Westropp to interpret it as having been 'manifestly buried for concealment' (Scharff *et al*. 1906, 67).

This review of Scandinavian-type artefacts from caves in Ireland draws attention to the problematic nature of the evidence. Only a small proportion of the overall assemblage derives from archaeological excavations, and in any case many of the caves have minimal soil deposits to provide adequate stratigraphic contexts for the artefacts. It is, therefore, difficult to gain an overview of the significance of the material and its broader meaning within the context of Viking-age Ireland. Given that a significant proportion of Scandinavian-type material ended up in Irish ownership, it is not a straightforward matter to assign the cave finds to a particular cultural context, as is also the case with many finds from non-cave contexts. In a small number of instances, however, as discussed above, enough evidence exists to demonstrate the use of caves by the Scandinavians/Hiberno-Scandinavians in circumstances that appear to have been neither casual nor fortuitous.

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Part III

Site-specific artefact reports

12

Stone rings from Robber's Den, Co. Clare

Alison Sheridan

Introduction

Two rings (Fig. 12.1) were discovered by cavers in 1989 close to the skull of an adult female of Late Bronze Age/Early Iron Age date in the third chamber of Robber's Den, Co. Clare (Anderson and McCarthy 1991; Cremin 1991; Dowd 2015, 143–145). One ring was lying on top of the other. The material used to make both is a fine-grained metasediment, probably a shale/slate/phyllite. The rings are a blackish colour, but before it was worked the stone would have been slightly lighter; it darkens when ground. Unfortunately, the rock type is very widespread and a specific source cannot be pinpointed; it could theoretically have been obtained within a few kilometres of the findspot.

The rings

Ring 1 (E498:1)

Flat ring, roughly circular, external diameter 42.9–43.3mm, internal diameter 25.1–25.3mm, max. thickness 5.7mm. Its upper and lower surfaces are flat, sloping gently inwards to the inner edge to create a slightly lopsided hourglass shape in cross-section. A groove, gently V-shaped and about 1.8mm wide, runs around the outer edge. The ring is decorated on its upper and lower surfaces with shallow, untidily executed radial lines of variable lengths. On one side most of the incised lines run across the width of the ring, while on the other side, many of the lines extend only part way.

The ring's surface has been ground smooth and polished to a low sheen. A few traces of circumferential scoring on the inner edge had been left by the tool used to cut or gouge out a central disc to create the hole. Although the ring is black over much of its surface (with some whitish encrustation, which is likely to represent calcium-rich concretion from the cave environment), there are small patches of a lighter colour, including one where a small spall had evidently become detached during the shaping of the ring; the radial incised decoration continued over the spall scar. There are no signs of any wear (e.g. localised patches of higher polish) to indicate exactly how this ring

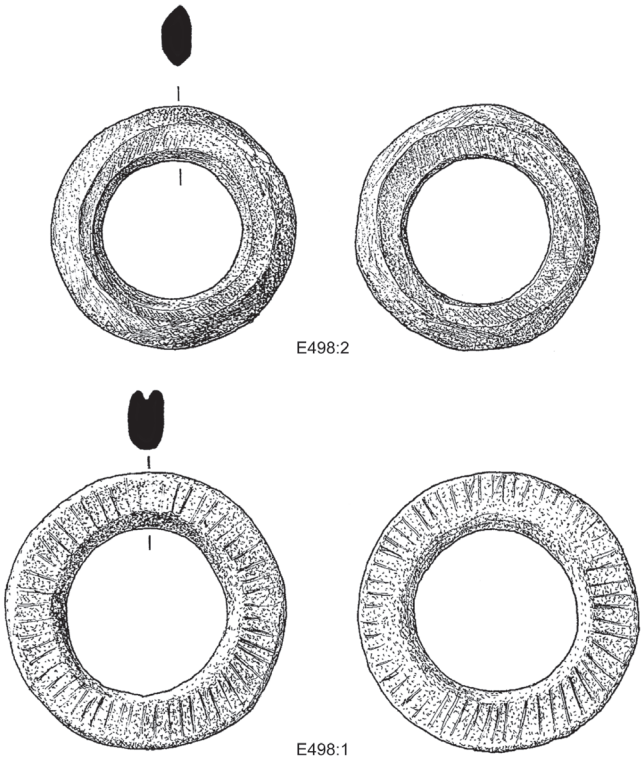

Figure 12.1 Stone rings from Robber's Den (E498:2, 1) (Dowd 2015, 144).

would have been worn, although the circumferential groove might have accommodated a narrow cord (or a lock of hair) for suspending it.

Ring 2 (E498:2)

Flat ring, roughly circular, external diameter 31.2–31.7mm, internal diameter 21.4–21.7mm, max. thickness 4.4mm. Its upper and lower surfaces are flat over the middle part of the hoop, but slope down to its outer and inner edges in unevenly defined facets. The ring is undecorated, but shallow striations relating to its manufacture are visible over much of the upper and lower surfaces, suggesting that these surfaces had been ground into shape. The central hole had been created by cutting and/or gouging around a circle to detach a disc, working mostly from one side; this made the inner edge of the hoop a very lopsided hourglass shape in profile. The creation of the hole, which probably also involved some circumferential grinding, has left striations running around the broader of the two facets that make up this hourglass shape. The ring is fairly smooth but not polished; its surfaces are matte. A patch of whitish encrustation is of the same material as that seen on E498:1. There are no signs of any wear to indicate how this ring would have been worn.

Discussion

The position in which the Robber's Den rings were found, close to the woman's head, suggests that they were some kind of jewellery or dress accessory – perhaps hair ornaments, attachments for headgear, or components of a necklace. For several reasons their use as ear studs seems unlikely, not least because their outer edges are somewhat narrow: Late Bronze Age studs take the form of huge, broad, bobbin- or spool-shaped objects made of gold (Cahill 1994, 2001). Whether the presence of a circumferential groove on one of the rings means that it was deployed in a different way from the other is unclear; the fact that one was found lying on top of the other suggests that they had been used close together.

The radiocarbon date obtained from a sample of the woman's skeleton indicates that the rings date to the Late Bronze Age/Early Iron Age, 2490±60 BP (GrN-27381, 790–430 cal BC at 95.4% probability: Dowd 2015, 127). No obvious parallels from Late Bronze Age Ireland spring to mind, although plain bronze rings of comparable size are known from a jewellery hoard at Tooradoo, Co. Limerick (Eogan 2004, fig. 37). The simplicity of shape, however, means that the similarity may be coincidental.

Simple small rings of black materials – mostly shale and cannel coal – are known from Late Bronze Age and Iron Age contexts in Britain (e.g. Heathery Burn Cave, Durham: Britton and Longworth 1969), and also from Early Bronze Age contexts (as, for example, at Oxsettle Bottom, East Sussex and Winterbourne Stoke G67, Wiltshire, where they are believed to have formed parts of composite necklaces: Woodward and Hunter 2015, figs. 8.3.2, 8.3.4). Some of these Bronze Age and Iron Age examples have the circumferential groove as seen on Ring 1. It is debatable, however, whether the examples that are broadly contemporary with the Robber's Den rings are connected with them as part of a widely-held fashion; once more, it might be a case of coincidental similarity of form. In discussing the British Late Bronze Age and Iron Age examples, Robert Stevenson (1976, 50) suggested that they may have been used as hair ornaments, and argued that the string- (or hair-) groove around the edge of some could have aided their use as such, making the decoration easier to see as the rings dangled.

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13

Medieval pottery from Carrigmurrish Cave, Co. Waterford

Clare McCutcheon

A single sherd of medieval pottery was recovered from Carrigmurrish Cave, either during antiquarian investigations in 1881 or during a second excavation campaign *c*. 1910 (Ussher 1881; Ussher 1886; Power 1928). Substantial quantities of early medieval material were recovered, seemingly from a settlement overhead, and one comb indicated activities as late as the eleventh to thirteenth centuries (Dowd 2015, 195–197). Apart from the pottery sherd described here, and the comb fragment of possible medieval date, no other medieval finds have been identified as yet from the Carrigmurrish assemblage.

This single medieval sherd (1906:337) measures approximately 45×25mm. It is in a pink-firing clay with a pale, muddy, patchy brown/green glaze on the exterior. The sherd is low-fired and the vessel was wheel-thrown. There is a hole visible in section, possibly a fragment of organic material that fired out leaving a void. The pottery is most likely local to the west Waterford area, as similar material has been recovered from Dungarvan Castle and town (McCutcheon forthcoming). The vessel represented is probably a jug, the most typical glazed vessel form in Anglo-Norman Ireland. The locally-made pottery in this area only dates to the mid-thirteenth to early fourteenth century, as French and English wares from the Saintonge and Bristol areas were widely imported into the south coast from the twelfth century onwards.

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14

Late seventeenth century material from Kilgreany Cave, Co. Waterford

Clare McCutcheon

A total of 268 sherds of post-medieval pottery were recovered during the 1928 and 1934 excavations at Kilgreany Cave (Tratman 1929; Movius 1935). Following some reassembly, this was reduced to 211 sherds. Apart from eleven sherds found in the Rear Chamber, the assemblage was recovered from C.5 in Grid H of the Inner Chamber (after Dowd 2002). While this stratum was heavily disturbed, the post-medieval pottery assemblage has an integrity suggesting a specific use by an individual or individuals during a period of unrest in Ireland in the later seventeenth century. In addition to the pottery, two tokens and clay pipe fragments were examined. Both tokens also came from Grid H, and date to between 1660 and 1680 (Michael Kenny pers. comm.). The first of these (E9:646) is a token of 'John Merrick of Youghall' which is in good condition, while the second (E9:655) is a very worn St. Patrick's farthing dating to *c*. 1660–1680 (Fig. 14.1). The clay pipe assemblage consists of four bowls and twenty unmarked stem fragments. Two of the bowls (E9:632, 641) have flat oval heels. One of these (E9:632) has a fragment of a possible cartouche on one side while the second (E9:641) has some rilling around the top. The third bowl (E9:628) is very similar but the identifying heel is not present. The fourth bowl fragment (E9:631) has a spur with no other marking. All of these date to *c*. 1660–1680 (Ayto 2002, 8).

Pottery assemblage

The pottery identification is presented in Table 14.1, showing the quantity of sherds in each fabric type and the minimum number of vessels (MNV), an objective number based on the presence of rim/handle sherds in the assemblage. The more subjective minimum number of vessels represented (MVR) is also listed and is based on the numbers of diagnostic pieces such as differently shaped rims, quantity of handle etc. The most likely form of the vessels represented by the sherds and the known date of distribution of the fabric types are also included.

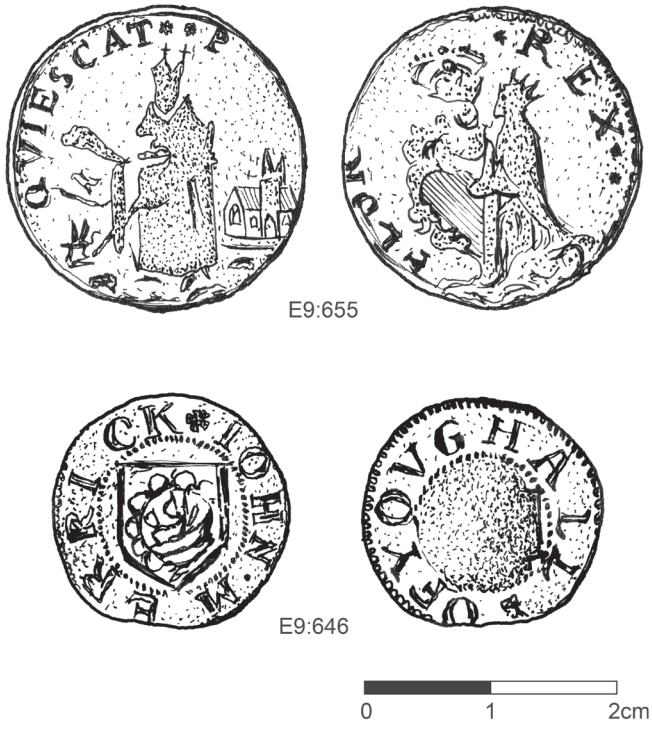

Figure 14.1 Seventeenth century St. Patrick's farthing (E9:655) and token of 'John Merrick of Youghall' (E9:646) from Kilgreany Cave (Dowd 2015, 236).

Table 14.1 Post-medieval pottery from Kilgreany Cave.

Fabric type	*Sherds*	*MNV*	*MVR*	*Form*	*Date*
North Devon gravel free	95	2	4	2 jugs, 2 flared rim pots	17th century
North Devon gravel tempered	17	–	3	Chafing dish, 2 tripod pots	17th century
North Devon sgraffito	3	1	1	Jug	17th century
Donyatt ware?	1	–	1	Plate	17th century
Glazed red earthenware	78	–	5	Chafing dish, 2 pancheons, large bowl, ointment pot?	Late-17th-early 18th century
Unglazed red earthenware	11	–	1	Jug?	18th-19th century
Black glazed ware	2	–	2	Jar, bowl	Late 17th-early 18th century
Mottled ware	2	–	1	Tankard	18th century
Stoneware	2	–	1	Bottle	19th century
Total	211	3	19		

North Devon wares

These wares were produced in the North Devon towns of Bideford and Barnstaple with a large-scale export trade throughout the seventeenth century. Large quantities were exported to Ireland to service the provisions trade to the Americas, particularly to the West Indies (Nash 1985). The pottery trade with Ireland developed from 1620 with peaks in the early 1680s and again in 1699 (Grant 1983, 2005).

The fabric fires to a pink and grey in section and the vessels are glazed internally with a clear lead glaze. The addition of gravel allowed for slower drying of thicker vessels to be used in the dairy and kitchen; vessels such as large jugs, pans, tripod cooking jars, chafing dishes, chamber pots, cisterns and ovens were produced. Jugs and bowls were more often produced in gravel-free ware; the jugs generally with handles in gravel tempered ware, giving the handle a greater strength. The Kilgreany jug in sgraffito ware is based on gravel-free fabric with a white slip. Designs are scratched through the slip giving a brown design on yellow. There is a small amount of rilling on the exterior neck of the jug. The principal vessels in North Devon sgraffito ware are plates with a variety of floral patterns.

Donyatt ware

A single sherd of this glazed red earthenware from South Somerset was found in the assemblage, probably representing a plate. This is distinguished with yellow slip in a grid pattern, more typical of the Donyatt potteries than the dashes and spots of the common glazed red earthenware slip trailed wares.

Glazed red earthenware

Glazed red earthenware or 'brownwares' were made widely in Britain and Ireland from the later seventeenth century through to the nineteenth century (Dunlevy 1988, 24–25). Because of the standardisation of the clay and vessel form, it is always difficult to specify a particular production site but a typical kiln was excavated at Tuam, Co. Galway with milk pans and dishes comprising a majority of the vessels (Carey and Meenan 2004). The fabric is generally sandy earthenware, usually oxidised buff to light orange through to brown. The clear lead glaze takes its colour from the fabric with variations due to firing conditions (Jennings 1981, 157). A small bowl from Kilgreany was glazed internally with the exterior encrusted with chips of clay.

Black glazed ware

These wares were made in North Wales and Lancashire in the seventeenth and eighteenth centuries and imported into Ireland in large quantities (Davey 1975), but were also manufactured in smaller quantities in parts of Ireland (Meenan 1997). Along with glazed red earthenwares or 'brownwares', these comprised the main dairy and kitchen wares, particularly in eighteenth and nineteenth century Ireland. The black colour resulted from the addition of iron to the lead glaze applied to the earthenware vessels. These are the working vessels in a period when Staffordshire tablewares dominated the markets of both Britain and Ireland. The two vessels recovered from Kilgreany Cave may have formed part of the main assemblage. Black glazed ware is found in small quantities in the south of the country where glazed red earthenware predominates.

Mottled/Treacle ware

The fabric of the mottled wares varied from fine buff to orange/red with the vessels covered in a rich dark brown slip (Jennings 1981, 104). The tankard represented in this assemblage is the most typical vessel form recovered from excavations in Ireland.

Stoneware

The term is used here to cover all English stoneware made of a clay and fusible stone, which can be fired to partial vitrification, not then requiring a glaze to make it impervious to liquids (Savage and Newman 2000, 275). It is probable that the Kilgreany bottle was discarded during a casual visit to the cave in the nineteenth or early twentieth century.

Discussion

It appears that whoever was living in or using Kilgreany Cave as a refuge was well provided for in terms of cooking and other utensils. At least three jugs, one in the bright yellow of North Devon sgraffito, were present for serving ale, water or wine. At least four large pots and two chafing dishes would have made cooking a simple task. Two of the pots had three small legs in the manner of metal cauldrons – these would have steadied the pots when set onto a fire. The chafing dishes, one each from North Devon and a possible local product, would have been used to contain embers from the fire with a pot set on top to cook a further dish. These chafing dishes were particularly well represented in the city centre excavations in Waterford and Cork, and both cities also had a long tradition of sixteenth century chafing dishes from the Saintonge area in south-west France (Meenan 1997, 350; McCutcheon forthcoming). Two pancheons were large, shallow utility basins for mixing food, washing clothes or utensils, as well as the person. Finally, the small ointment pot could have contained either a salve for the body or a sauce for the dinner, with a cover of cloth or parchment tied around the top. The assemblage indicates a planned if sporadic use of the cave over a period of time. All of the fabric and vessel types are typical of the period in both urban and rural sites around Ireland.

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15

Coarse stone objects from Ballynamintra Cave, Co. Waterford

Stephen Mandal

Excavations in Ballynamintra Cave, Ballynamintra Lower townland, Co. Waterford in 1879 led to the recovery of twenty-nine hammerstones, three 'grinding or rubbing' stones, three burnt stones and two whetstones (Adams *et al*. 1881; Dowd 2004, 488). Some of these 37 coarse stone objects appear not to have been retained, as by 2010 just 28 coarse stones from the site could be located. These ten hammerstones and possible hammerstones, one worked stone, and seventeen natural unworked stones were subject to macroscopic examination. The purpose of the study was to identify the rock types from which the stone objects were made, to highlight their potential sources, and to comment on their possible function. It is important to note that macroscopic petrographical studies have been considered of limited value in comparison to microscopic (thin section and geochemical analysis) studies. On the other hand, macroscopic studies provide an excellent preliminary assessment tool and have proven to be of considerable value in petrographical studies (e.g. Mandal 1997; Cooney and Mandal 1998).

Solid geology and soils

Ballynamintra Cave is situated within an area of Carboniferous Limestone known as the Waulsortian Limestone Formation (massive unbedded lime-mudstone). These rocks form the axis of an east–west trending syncline, faulted on its southern side. The older rock forms occur to the north and south, comprising a wide range of sedimentary rocks from muddy limestone, to sandstones of varying colours and grain size, to conglomerates (Sleeman and O'Connell 1995). The tills in the area of the site are predominantly Sandstone (Devonian). The soils are predominantly deep well-drained Acid Brown Earths/ Brown Podzolics, derived mainly from non-calcareous parent materials. Interspersed with these are pockets of shallow well-drained Renzinas and Lithosols derived from mainly calcareous parent materials. Alluvium occurs to the north of Ballynamintra Lower, with bedrock exposed at or close to the surface to the east and south of the townland.

Coarse stone objects

Hammerstones

The assemblage includes four hammerstones and six possible hammerstones (Table 15.1) (Fig. 15.1). All are modified water-rolled red sandstone cobbles; two (XXXIII and L) are red quartzite, a form of quartz-rich sandstone. Five are meta-sandstones as they contain garnets. Those listed as possible hammerstones exhibit marks on one or more ends or sides that are consistent with being hammered or being used as a hammer. It is, however, possible that these marks are natural; even if the cobbles were used, it was not extensively as they do not exhibit the characteristic dense pecking associated with long term or repeated usage. The four confirmed hammerstones are extensively damaged or pecked, consistent with use as hammerstones.

Worked stone

The function of one unclassified worked stone is not clear. It is made from a water-rolled cobble of red meta-sandstone.

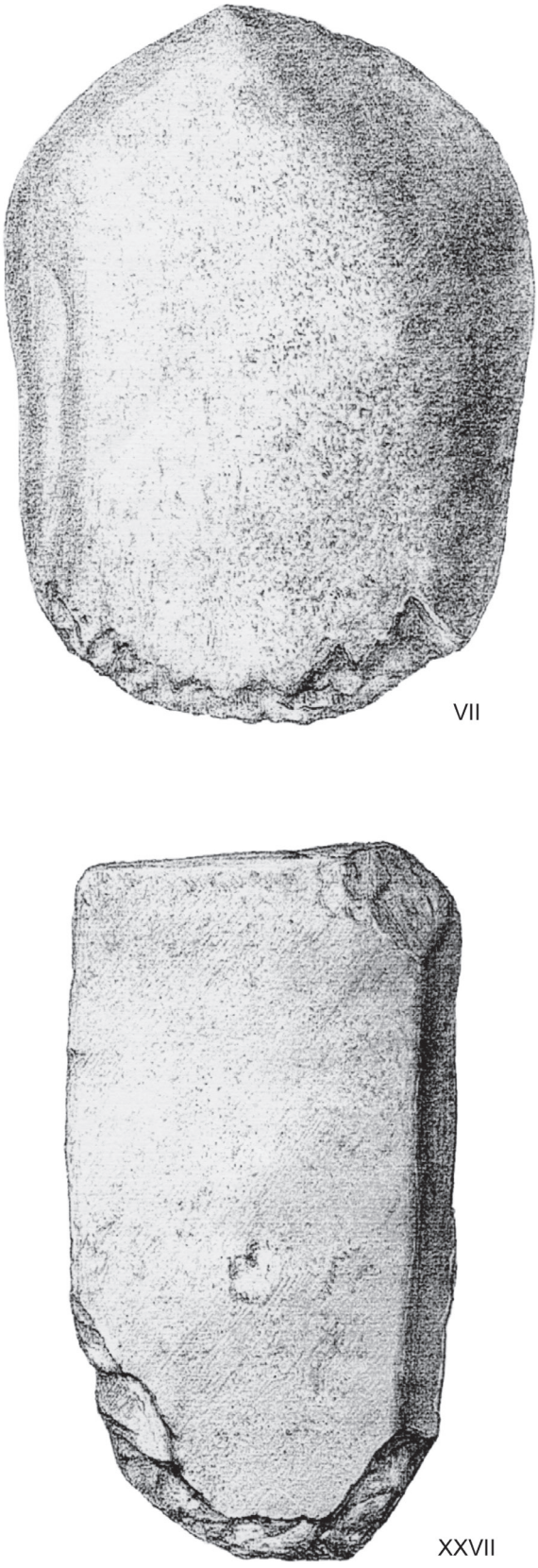

Figure 15.1 Antiquarian illustration of sandstone hammerstone (VII) and possible sandstone hammerstone (XXVII) from Ballynamintra Cave (Adams et al. 1881, pl. i).

It has been fractured (perhaps deliberately), and has clear retouch on its lower face. Its circumference is also possibly worked.

Natural unworked stones

Finally, the assemblage includes seventeen natural unworked water-rolled cobbles (Table 15.1). Ten are made from red sandstone, four from quartzite, and one each from schist, tuff and limestone. Six appear to have been burnt (XIX, XX, XIV, XXXIX, XLVI and LIV). Interestingly, fourteen of the stones have been damaged or broken and/or have had flakes removed. All appear to be natural and there is no evidence of secondary working. The hollows or striations visible on III, XXIX, XLIV and XLVII are natural.

Potential sources and conclusions

It is highly likely that the sources for all of the stones collected during excavations in Ballynamintra Cave are local. It is, however, important to note that these objects were not sourced from bedrock but from secondary sources, such as from riverine deposits or the glacial tills or sub-soils at the site. There are tills in the area but it is reasonable to assume that the stones, including the unworked examples, were brought into the cave by humans. The artefact assemblage and human remains indicate that Ballynamintra Cave was utilised during the Neolithic, Bronze Age and early medieval period (Dowd 2015). However, it is not possible to say which period/s of activity the hammerstones and unworked stones relate to, nor their specific functions. The antiquarian team did not record where exactly in the cave the stones were found but it seems that all were recovered from the first and second strata, with the majority originating from the second stratum, including three burnt stones. One 'whetstone' was found in a crevice 10.4m inside the entrance, and a second 'whetstone' was recorded in the upper stratum 1.2m inside the cave mouth (Adams *et al*. 1881; Dowd 2004, 488).

The choice of stone type for the manufacture of objects/tools is typical: quartz-rich rock types (sandstone and quartzite), which are relatively hard and have good erosive qualities, are frequently used in the manufacture of hammerstones, anvils and grinding stones. These rock types are idea for actions such as hammering.

In conclusion, it is not possible to determine a definitive source for these objects from Ballynamintra Cave based on macroscopic examination alone, and detailed microscopic analysis is also unlikely to identify exact sources. On the other hand, it can be stated that the materials from which these objects were manufactured are available within the glacial tills of the wider area. Thus it is highly probable that these objects were locally sourced.

Table 15.1 Coarse stone objects from Ballynamintra Cave.

Reg. no.	*Type*	*Description*	*Lithology*	*Petrographical description*	*L (cm)*	*W (cm)*	*T (cm)*	*Wt (g)*
II	Hammerstone	made from water-rolled cobble; both ends extensively damaged, consistent with use as hammer	Sandstone	red; fine grained	10.9	7.9	7.6	869
VI	Hammerstone	made from water-rolled cobble; both ends extensively damaged, consistent with use as hammer; burnt	Sandstone	red; medium grained; quartz rich	10.6	9.6	3.9	494
VII	Hammerstone	made from water-rolled cobble; both ends extensively pecked, consistent with use as hammer	Sandstone	red; medium grained; quartz rich; speckled with garnets (meta-sandstone)	10.0	7.5	3.5	405
XXXIV	Hammerstone	pear-shaped water-rolled cobble; pointed end pecked consistent with use as fine hammer	Sandstone	red; fine grained; quartz rich; speckled with garnets (meta-sandstone)	9.7	6.7	4.8	366
IX	Hammerstone?	possible; made from water-rolled cobble; one end may have been used as hammer; groove at opposite end appears natural; possibly burnt	Sandstone	red; fine grained; quartz rich; speckled with garnets (meta-sandstone)	11.4	9.8	4.7	712
Xa	Hammerstone?	possible; both ends damaged, consistent with use as hammer	Sandstone	red; medium grained; quartz rich; speckled with garnets (meta-sandstone)	14.9	9.6	2.0	402
XXVII	Hammerstone?	possible; made from water-rolled cobble; one end may have been pecked; flat faces are result of natural bedding planes	Sandstone	red-brown; medium grained	10.1	5.4	2.0	193
XXXIII	Hammerstone?	possible; water-rolled cobble; one end possibly pecked	Quartzite	red; medium grained	8.6	6.2	5.7	346
L	Hammerstone?	possible; weathered/ damaged water-rolled cobble; may have been used as hammer; possibly burnt	Quartzite	red; very coarse grained (conglomerate)	9.8	9.4	8.1	970
LII	Hammerstone?	possible; elongate water-rolled cobble; flake removed from one end, no secondary working; opposite end pecked flat, consistent with use as a hammer	Sandstone	red; medium grained; quartz rich; speckled with garnets (meta-sandstone)	16.7	6.0	2.9	363
XXV	Worked stone	large water-rolled cobble; fractured with retouch on lower face; circumference also possibly worked; function unclear	Sandstone	red; medium grained; quartz rich; speckled with garnets (meta-sandstone)	14.5	10.7	4.5	736

(Continued)

Table 15.1 Coarse stone objects from Ballynamintra Cave. (Continued)

Reg. no.	*Type*	*Description*	*Lithology*	*Petrographical description*	*L (cm)*	*W (cm)*	*T (cm)*	*Wt (g)*
III	Natural	water-rolled cobble; number of hollows appear natural	Limestone	black	8.3	7.3	4.2	308
VIII	Natural	water-rolled cobble; fractured (possibly struck); no evidence of secondary working	Quartzite	medium grained	11.4	10.7	4.5	640
XVI	Natural	large water-rolled cobble; fractured (possibly struck); no evidence of secondary working	Sandstone	red; medium grained; quartz rich; speckled with garnets (meta-sandstone)	15.8	8.9	4.0	576
XVII	Natural	water-rolled cobble; may have been struck	Schist	red; low grade, micaceous	14.9	7.8	3.5	553
XIX	Natural	water-rolled cobble; fractured, possibly due to burning	Quartzite	red; fine grained	9.7	6.1	3.0	183
XX	Natural	large water-rolled cobble; broken but no evidence of secondary working; burnt	Quartzite	red; medium grained	14.4	11.3	7.7	1250
XXII	Natural	water-rolled cobble; broken both ends (possibly deliberate); no evidence of secondary working	Sandstone	red; fine grained; quartz rich; speckled with garnets (meta-sandstone)	7.7	6.1	2.7	158
XIV	Natural	water-rolled cobble; broken one end (natural); burnt	Sandstone	red; fine grained; quartz rich; speckled with garnets (meta-sandstone)	12.0	7.0	4.0	428
XXIX	Natural	water-rolled cobble; perforations are natural water formed features	Sandstone	red; medium grained; speckled with garnets (meta-sandstone)	12.0	9.4	3.4	430
XXXVIII	Natural	water-rolled cobble; some flakes removed, appears natural; no evidence of secondary working	Sandstone	red; medium grained; quartz rich; speckled with garnets (meta-sandstone)	10.4	7.0	2.3	243
XXXIX	Natural	water-rolled cobble; possibly burnt	Tuff?	light grey; agglomerate	9.3	6.3	2.0	166
XLII	Natural	water-rolled cobble; damage appears natural	Sandstone	red; very fine grained	11.7	7.8	1.6	172
XLIV	Natural	water-rolled cobble; striations/flakes are natural	Sandstone	red; fine grained	12.3	7.1	2.5	367
XLVI	Natural	water-rolled cobble; flat faces due to bedding; circumference damage probably natural; appears burnt	Sandstone	red; fine grained; quartz rich; speckled with garnets (meta-sandstone)	10.8	8.4	2.4	288

(Continued)

Table 15.1 Coarse stone objects from Ballynamintra Cave. (Continued)

Reg. no.	*Type*	*Description*	*Lithology*	*Petrographical description*	*L (cm)*	*W (cm)*	*T (cm)*	*Wt (g)*
XLVII	Natural	water-rolled cobble; striations on lower face appear natural; large flake removed one end is probably natural; no secondary working evident	Sandstone	red-green; fine grained; quartz rich; speckled with garnets (meta-sandstone)	15.0	9.4	4.3	739
XLVIII	Natural	water-rolled cobble; flake removed from one side, appears natural	Sandstone	red; fine grained; quartz rich; speckled with garnets (meta-sandstone)	10.2	9.5	3.7	515
LIV	Natural	fractured water-rolled cobble; burnt/heat fractured	Quartzite	very coarse grained (conglomerate)	8.3	8.0	6.0	461

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