

# A century of archaeology—historical excavation and modern research at the Carrowkeel passage tombs, County Sligo

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## Abstract

The Carrowkeel complex represents one of the four main groups of passage tombs in Ireland. Although less well known than its counterpart in the Boyne Valley, new discoveries in recent years have renewed interest in this internationally significant yet under-investigated site. This paper reviews the 1911 excavation of passage tombs at Carrowkeel and presents new research and discoveries that have been made since. New dates (from a radiocarbon dating project undertaken by the authors) which demonstrate activity within the complex towards the end of the fourth millennium BC are discussed. The authors consider the significance of the recently discovered passage tomb art within the complex, and outline the prospects for future research there, particularly with regard to human bone assemblage from the 1911 excavations.

## Introduction

On the very first day we discovered the hidden entrances to two of the intact cairns, which proved to contain not simple cists as we had expected but beautiful cruciform chambers...like that of Newgrange but smaller...I had the privilege of being first to crawl down the entrance-passage and did so with no little awe. I lit three candles and stood awhile, to let my eyes accustom themselves to the dim light. There was everything, just as the last Bronze Age man had left it, three to four thousand years before. A light brownish dust covered all (Praeger 1937, 137–8).

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Cairn G, Carrowkeel, Co. Sligo was first opened and entered in April 1911. That year saw the excavation of eight passage tombs on the eastern side of the Bricklieve Mountains, the only large-scale investigation of the passage tomb complex there to date (Macalister *et al.* 1912). With the passing of over a century, weaknesses in the original excavation techniques and interpretations have become evident. For example, we now know that passage tombs are Neolithic and not Bronze Age in date as Macalister and his team surmised. A recent radiocarbon dating project by the present authors, discussed below, has demonstrated deposition within one of the cairns and a possible horizon of activity within the wider complex in the late fourth and early third millennia BC.

The history of investigation at Carrowkeel parallels, in microcosm, that of Irish archaeology, from the birth of the discipline to the present; the catalogue of work carried out at the site shows a transition from largely destructive archaeological techniques to a variety of non-invasive methods. Though we are still dependent on the 1911 excavation report for information about the monuments and finds, a number of significant discoveries have progressed research there in the last 20 years. That work is brought together for the first time here. Discoveries include two pieces of passage tomb art recently found within cairn B, which will be discussed together with megalithic art from the wider complex at Heapstown cairn and from the Carrowmore complex to the north.

It is suggested that a number of less recognised passage tombs away from the main group should also be considered part of the complex, and consequently that the name Lough Arrow passage tomb complex may be more useful than current nomenclature. We discuss bones that were removed from the monuments in 1911 and brought to the Duckworth Laboratory in Cambridge after an initial examination by two of the authors (Hensey and Moore). The research methods employed in the course of this project—vis à vis re-examining older excavations; revisiting the artefacts and human bone assemblages from the site; dating materials held in museums; and gathering diverse modern research in the immediate landscape, such as modern survey and palaeoenvironmental data—is a programme of activities that could, cost effectively, be applied to a number of important but largely forgotten Irish sites and landscapes.

Like the other passage tomb clusters in Ireland, the Carrowkeel complex has a distinctive atmosphere and environmental setting. The landscape which the monuments appear to celebrate is not only unique in Ireland for its geology, but for the outstanding drama of its cliffs and glacial valleys. The complex is distinguished by its degree of preservation, which is remarkable in a European context. Significantly, no modern reconstruction work has been carried out there, as occurred at other megalithic complexes such as Locmariaquer in Brittany, or in the Boyne Valley.

## The 1911 excavation

The 1911 excavation party consisted of Robert Alexander Stewart Macalister (Plate I), his father Alexander Macalister, Robert Lloyd Praeger and Edmund Clarence Richard Armstrong. R.A.S. Macalister (41) had recently been appointed Professor of Celtic Archaeology at University College Dublin. In

1911 he was elected a member of the Royal Irish Academy; fifteen years later he would become president (1926–31). Macalister's copious literary output encompassed anthropology, history and epigraphy as well as archaeology. Having trained as a surveyor and draftsman, his first real excavation experience was a two-year post as assistant to the director of excavations for the Palestine Excavation Fund. He was then appointed director and immediately undertook the largest excavation up to that time in Palestine, excavating three-fifths of the twelve-hectare site of Tel Gezer in just seven years (Dever 1967, 48; Thomas 1984, 34; Hallote 2006, 139–40). Carrowkeel was Macalister's first major excavation on his return from the Middle East in 1909. Professor Alexander Macalister (father of R.A.S. Macalister) undertook the identification and analysis of human and animal remains from Carrowkeel and penned the osteological section of the excavation report. On arrival at Carrowkeel, aged 67, he had an international reputation in his field.

At the age of 46, R.L. Praeger had overseen several historic research projects as a botanist and naturalist, including the ground-breaking Lambay Survey in 1905 (Praeger 1907). His book *Irish topographical botany* (1901) was the fruit of country-wide fieldwork that in 1896 led him to Carrowkeel and Kesh Corran and what could be considered the rediscovery of the cairns (Lysaght 1998, 138). In 1901 he took part in a preliminary survey of the caves of Kesh on the west side of Kesh Corran (Scharff *et al.* 1903). Praeger's awards and honours are too many to enumerate here (see McGuire and Quinn 2009), but his positions included president of the Royal Irish Academy (1931–34), president of the British Ecological Society and president of the Royal Zoological Society of Ireland and the Geographical Society of Ireland. His ambitious survey of Clare Island was on-going when he joined the Carrowkeel excavation. The final member of the team was E.C.R. Armstrong. At 32 he was assistant keeper of Antiquities for the Royal Irish Academy Collection in the National Museum of Ireland; three years later he succeeded George Coffey as keeper.

## Methods and finds

The excavations took place in three distinct phases in 1911. From 13 to 20 April the excavation party and two labourers excavated five cairns: G, K, H, O and P; all, except cairn H, had previously been sealed. They also made an initial assessment of cairns E and F and identified 47 possible hutsites in the townland of Mullaghfarna. Fourteen cairns were ascribed letters running from A to P (the letters I and J were excluded to avoid typographic confusion). On their second visit between June 20 and 24, the team excavated cairn B and commenced the excavation of cairn F. The final visit, 10 to 14 October, was spent investigating cairns E and F (Plate II).

Much of the work entailed opening trenches around the circumference of the cairns to locate entrances and removing stones to gain access to, or clear, collapsed chambers (Macalister *et al.* 1912, 317). Cairn P appeared to have no chamber. Six other cairns in the complex (A, C, D, L, M and N) were not deemed worthy of excavation. Hence the primary foci were cairns B, E, F, G, H,



Pl. I—R.A.S. Macalister (Dublin 1916). Courtesy of the Palestine Excavation Fund.

K, O and P. The recovery of bones and artefacts and the creation of plans and sections of the monuments were the primary objectives of the team.

The finds from the investigated monuments are largely typical of those from other passage tombs: beads and pendants, bone pins, stone balls, pottery and human remains (Fig. 2) (Macalister *et al.* 1912; Herity 1974; Eogan 1986). More unusually, a shale point, a boar's tusk, burnt quartz, water rolled pebbles,





Pl. II—Cairn E (with R.A.S. Macalister). Courtesy of the Ulster Folk and Transport Museum, Green Collection.

a sea shell, pieces of calcite (some reported as *c.* 30cm in diameter), and twenty flat stones were found in cairns G, K, E and O. The latter objects were referred to as ‘trays’ by Macalister as he speculated they had been used to carry cremated bones into the monuments (1912, 334–5). The principal pottery type recovered has been referred to as Carrowkeel ware since the 1950s (Ó Ríordáin 1953; Case 1961)—replacing the name Loughcrew ware (Piggott 1954, 202–4). During the 1911 excavation a ribbed bowl was also found in the chamber of cairn K and a tripartite bowl came from cairn O, both of which contributed to the team’s interpretation of the complex as Bronze Age in date.

In the osteological section of the excavation report, Alexander Macalister estimated the presence of *c.* 31 individuals, including at least twelve females and eighteen males. The majority of these, he suggested, were less than 25 years old at the time of death (Macalister *et al.* 1912, 342–3). Juvenile remains were recorded in all seven excavated monuments where bones occurred. Macalister observed that the minimum number of individuals would probably be doubled if the remains had been more suitable for analysis (much of the material was cremated and he probably considered it less informative than the unburnt remains). A provisional re-examination of the human bone from Carrowkeel in the Duckworth Laboratory in Cambridge has revealed that a significant bone assemblage is extant (see Plate VI below).

#### A brief evaluation of the excavations

Writing in 1937, Adolf Mahr, the director of the National Museum of Ireland, described the Carrowkeel project as ‘almost the only really successful excavation’ in Ireland prior to 1930 (1937, 267). The 1911 investigators swiftly reported their excavation results; they completed plans and descriptions for seven monuments and catalogued and illustrated most of the artefacts. In their

report they attempted an interpretation of the discoveries by comparison with sites and artefacts further afield. They recorded place names and completed a superficial survey of the wider environs of Carrowkeel. As cairns H and F are now in a collapsed state, the plans drawn during the 1911 excavation are particularly important for understanding these monuments.

Even by the standards of the time, however, there can be little doubt that the Carrowkeel excavations were rushed, possibly in part the result of Macalister's experience in Palestine and the methods employed for dealing with the enormous scale of the archaeological remains encountered there. He may have insufficiently amended his approach in tackling the relatively smaller monuments at Carrowkeel. Effectively, the team excavated eight cairns in approximately sixteen days. There must have been an incalculable and irreversible loss of important contextual information. It is likely that working at such a pace, many small artefacts and ecofacts were overlooked. A story that has persistently circulated in the locality, and in the archaeological profession, is that dynamite was used during the 1911 excavations. We have found no reliable evidence for the use of explosives, though it was not an uncommon practice in early twentieth-century excavations (e.g. Plunkett 1877, 76; Scharff *et al.* 1906, 8, 17). Macalister did order the sledging of an obstructive capstone of the already partly collapsed cairn F to provide access to the interior (Macalister *et al.* 1912, 316; Timoney and Heraughty 2002, 293).

Sean Lysaght has remarked on Praeger's involvement in the rushed Carrowkeel excavations as a 'rather curious episode in a life of a man otherwise scrupulous about scientific accuracy' (1998, 139). Praeger had been involved in the excavations at the Kesh caves on the western slopes of Kesh Corran led by R.F. Scharff ten years before the work at Carrowkeel (Scharff *et al.* 1903). In the course of these excavations various strata were identified and each stratum was excavated in 0.6m grids. Barrows of earth were 'sifted' outside the caves. Artefacts and bones were labelled according to the layer and grid in which they were found. This information is preserved in detailed field notebooks that survive from the time. Excavation codes were inked onto bones and artefacts and the spatial locations of human bones at Plunkett Cave were plotted. The completeness of the original recording means that it is still possible to establish the distribution of archaeological and palaeontological material within all the excavated caves (Dowd 2004), while this cannot be known at Carrowkeel.

Another difference between the Carrowkeel excavations and those at Kesh is that the entire assemblage from the latter site survives and is housed in the National Museum, whereas the skeletal material from Carrowkeel was never returned to Ireland following A. Macalister's analysis at the Duckworth Laboratory in Cambridge. The lack of effort to collate the primary excavation data (part of the record is probably lost or destroyed forever and no excavation notebooks can be located) could be read as somewhat careless, given the long-term integrity of the Carrowkeel assemblage.

Although the team documented their finds, they neglected, in many instances, to record the precise spatial location of artefacts. More than a decade after the Carrowkeel excavations, Macalister advocated that the archaeologist

must approach a site with an open mind, his one intention ‘to find out what it contains’ (1925, 32). His philosophy and his *modus operandi* raises the question of whether the team systematically excavated inside the monuments or simply removed the contents without recourse to methodical digging. The information in the report—or rather the lack of it—and the pace of the work suggests it was the latter. Though the team appears to have examined beneath floor-slabs in cairns H and G, it is not clear if they actually dug into the chamber floors. This has important implications for any future excavation, as undisturbed strata would greatly increase the chances of discovering significant finds and datable material from secure contexts.

Macalister commented that: ‘The finds in the Carrowkeel cairns [sic] were interesting but scanty. No metal was deposited with the dead’ (1935, 63). As the monuments were perceived to be of Bronze Age date, the absence of ‘golden torcs or lunulae or other contemporary treasure’ was disappointing; the pins, stone artefacts and beads from the chambers were considered meagre and referred to as ‘trinkets’ by Praeger (1937, 140). Macalister sought answers not only in the material assemblage but in the eleventh century *Lebor Gabála Erenn* (the *Book of Invasions*), which he believed contained ‘grains of history’ (1935, 57; Waddell 2005, 193). He described Carrowkeel as indicative of a cultural overlap between the Firbolg/Halberd Folk and the ‘widespread and centralised tyranny’ of the Tuatha De Danann/Men of the Sword (Macalister 1935, 63).

Macalister would eventually re-evaluate his own work. He wrote ‘a pioneer piece of work like this must be subjected to revision...this excavation and the deductions founded upon it are already antiquated...’ (1949, 71). Towards the end of his career he conceded that the cairns were ‘protomegalithic’, from a time period ‘that would elsewhere (i.e., outside Ireland) be called the Stone Age’ (Macalister 1949, 65). Yet he maintained that the entire assemblage from inside the chambers were ‘later intrusions, taking the place of the primary deposits for which the mounds had been primarily erected’ (Macalister 1949, 72).

## Encompassing the complex

Since the eighteenth century the clustering of the Irish passage tombs has been observed, leading to descriptions such as ‘graveyards’, ‘gravefields’ or ‘battlefields’, but more often, ‘cemeteries’ (e.g. Fergusson 1872, 199; Wilde 1880; Ó Nualláin 1968; Eogan 1986; Sheridan 1985/6; Cooney 1990; Bradley 2007; Scarre 2007). The term ‘passage tomb complex’, introduced by Bergh (1995), is now the primary designation. Additionally, Bergh noted an internal order or patterning within the four main passage tomb complexes, focused on a triadic arrangement around distinctive focal passage tombs (Bergh 1995, 157–8).

The passage tombs that form part of the wider megalithic complex around Lough Arrow could be described as having three primary landscape foci; the eastern part of the Bricklieve Mountains which includes Carrowkeel townland; Kesh Corran and notable hills immediately to its east; and Moytirra to the north and east of Lough Arrow (Fig. 1). In the latter area the greatest quantity of cairns are found (sixteen of 26). Given the density of monuments

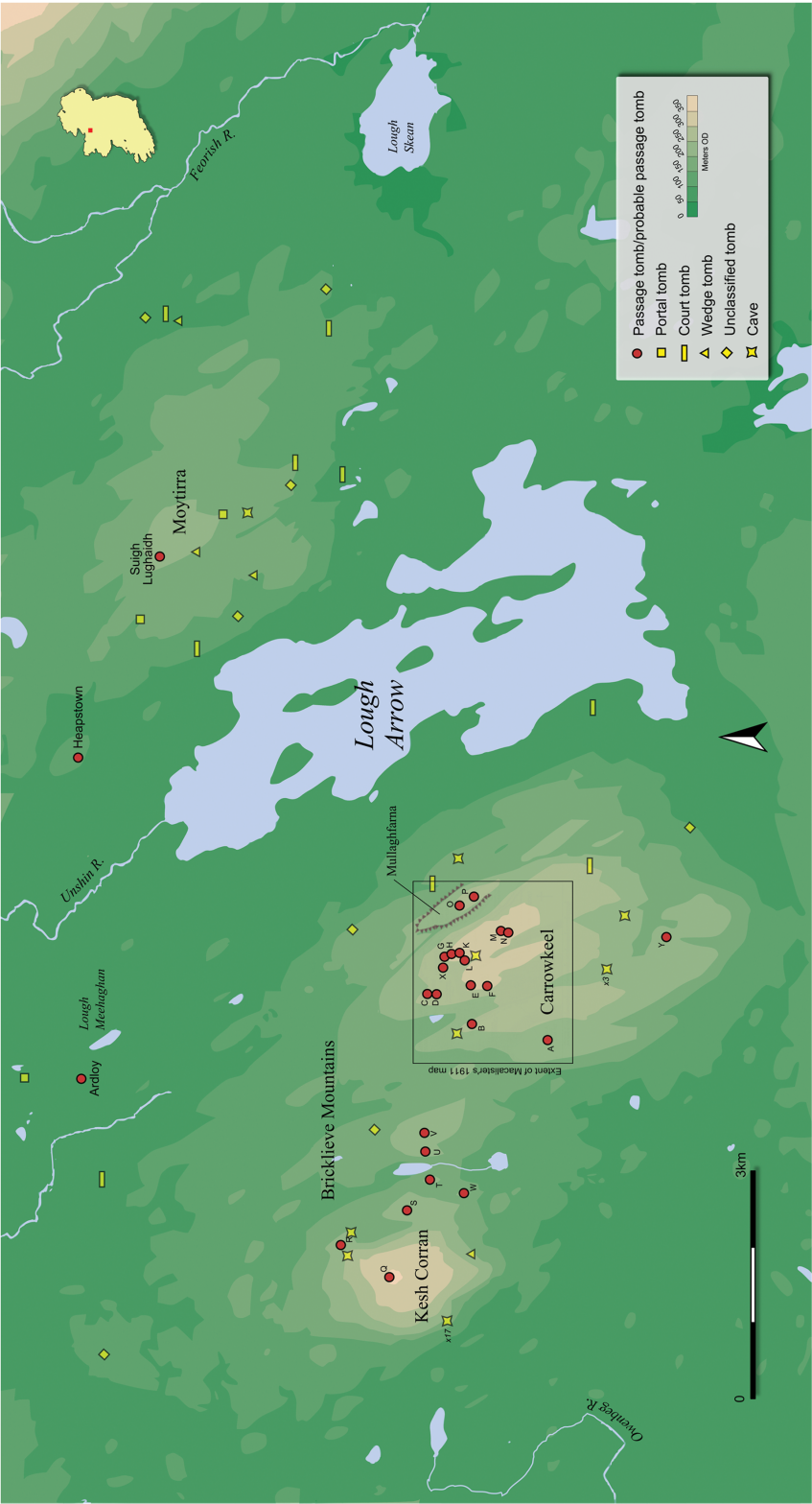


FIG. 1—The Carrowkeel complex. Map by P. Meehan, S. Moore and R. Hensey.



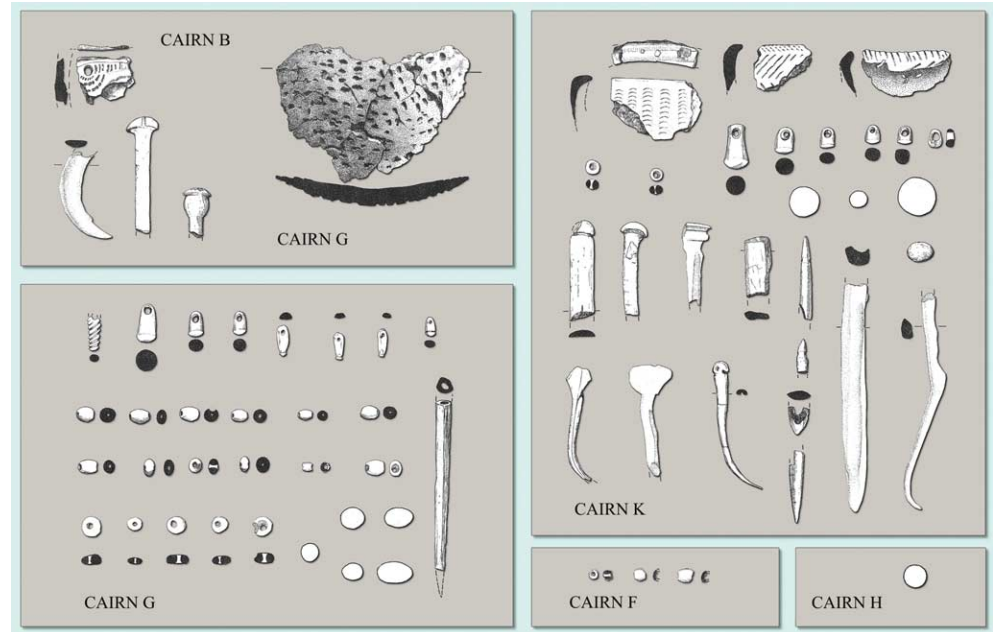


FIG. 2—Finds from the 1911 excavations. Composite image by P. Meehan after Herity 1974, figs 146 and 147.

present in this area its apparent omission from medieval texts and local folklore is noteworthy (Moore 2008). It remains something of a mystery that the team—given it included an experienced field researcher like Praeger—failed to draw connections to the cluster of cairns on the Kesh Corran side of the complex, particularly as cairn Q stands at the highest point on Kesh Corran (346m) only 900m from the 1901 excavations in the Kesh caves.

Since 1911 various scholars have approached different aspects of this remarkable site but mostly only in a piecemeal fashion; one consequence of that research has been a gradual expansion of the boundaries of the passage tomb complex. For instance, though his inventory relied heavily on the 1912 excavation report, Herity observed that Carrowkeel was only ‘one focus of an extended cemetery dominated by the cairn on the summit of Kesh Corran, and which spreads its limits as far as Seelewey’ (1974, 272). Seelewey, or more correctly Suigh Lughaidh, is a monument often overlooked in discussions of the complex. This probable passage tomb is located on the highest point (226m) at the north end of the Moytirra ridge and defines the eastern limit of the passage tomb complex (Fig. 1). It consists of a grass-covered circular cairn with a 2m-wide trench running through it from the south-eastern edge to the centre (Egan *et al.* 2005). The trench resulted from the endeavours of Lady Louisa Tennison whose party ‘camped at the great cairn’ and dug into the mound (Wood-Martin 1884, 462). Though there are no records of a chamber, it is reported that bones were found in the course of her investigations (Wood-Martin 1884). Suigh Lughaidh might be compared with cairn D at Loughcrew

and several other passage tomb tradition sites (including cairn P, Carrowkeel) that appear to be chamberless (Conwell 1866).

Sheridan's (1985/6, 17–29) study of Irish passage tombs includes twelve of the sites in the Carrowkeel complex, primarily monuments on the eastern side of the Bricklieve Mountains. Significantly, she incorporated Heapstown cairn, the huge unopened mound at the north end of Lough Arrow (see Fig. 1). At *c.* 60m in diameter, it is by far the largest monument in the complex and the fifth largest kerbed cairn in the country (only superseded by Newgrange, Knowth and Dowth in the Boyne Valley and Miosgán Meadhbha on the summit of Knocknarea, Co. Sligo). The presence of passage tomb art on one of the Heapstown kerbstones and its proximity to so many other passage tombs suggests that it is also a passage tomb (Hensey and Robin 2011). This largely uninvestigated site may have been a focal point for the whole complex, perhaps a late culmination of earlier construction activities on higher ground (Bergh 1995, 47–8; Hensey 2010, chapter 9). Like Suigh Lughaidh and Heapstown, another monument that is rarely discussed is the passage tomb of Ardloy just north of the central group. There the remains of a cruciform chamber lie within a poorly-preserved kerbed cairn of approximately 13m diameter. It is situated in a commanding position with views in all directions, dominated by views of cairn Q on the top of Kesh Corran.

Bergh (1995, 22) introduced the name 'Carrowkeel-Keashcorran complex', thereby highlighting that the cairns at Carrowkeel should be considered as part of the same complex as those on Kesh Corran (as should the monuments on less elevated hilltops between those two locations). He also applied letters to the passage tombs on Kesh Corran—Q, R, S, T, U and V. Moore (2004) has proposed adding the letters W to the cairn on Kelly's Hill, X for the possible monument north-west of cairn G on Carrowkeel, and Y for the isolated cairn in Carricknahorna West (Fig. 1), creating a total of 26 potential passage tomb tradition sites within the complex. An additional site on the south-west spur of Kesh Corran Mountain (SL040-062), which has morphological affinities with cairn Y, has not been included in this total or in Fig. 1 or Table A.1 as it is considerably disturbed and insufficiently studied.

Eleven of the cairns remain unopened. Those that have been excavated exhibit a rich diversity in scale, in siting and in their basic morphology. Twelve have identifiable chamber plans of which seven (C, E, G, K, M, N and Ardloy) have a cruciform arrangement. Cairn F has a five recess arrangement. Four monuments have a single undifferentiated chamber (B, H, O and R). Cairn E is noteworthy for having a cruciform chamber at the northern end of a 40m long cairn and a court-like arrangement at its southern end (De Valera 1960; Egan *et al.* 2005). As noted, the 1911 team concluded that cairn P was a cenotaph.

## Complex orbits

In the arrangement of the Carrowmore and Carrowkeel passage tomb complexes (and also Kilmonaster complex in Donegal), it is evident that an immediate centre or node, formed of a tightly clustered group of passage tombs, is present. In the foregoing examples this area could be encompassed by a circle of *c.* 1km radius. But this nucleus has outliers, positioned in these cases within a



zone of approximately 6km from the centre (Fig. 3). The apparent outer circle that delineates the zone of influence can be emphasised by outlier monuments sited on high-profile hills, and/or by landscape features such as rivers or other bodies of water. (This is evident from Bergh's (1995) study of the connections between the Carrowmore passage tombs and related monuments in the Cúil Irra peninsula.)

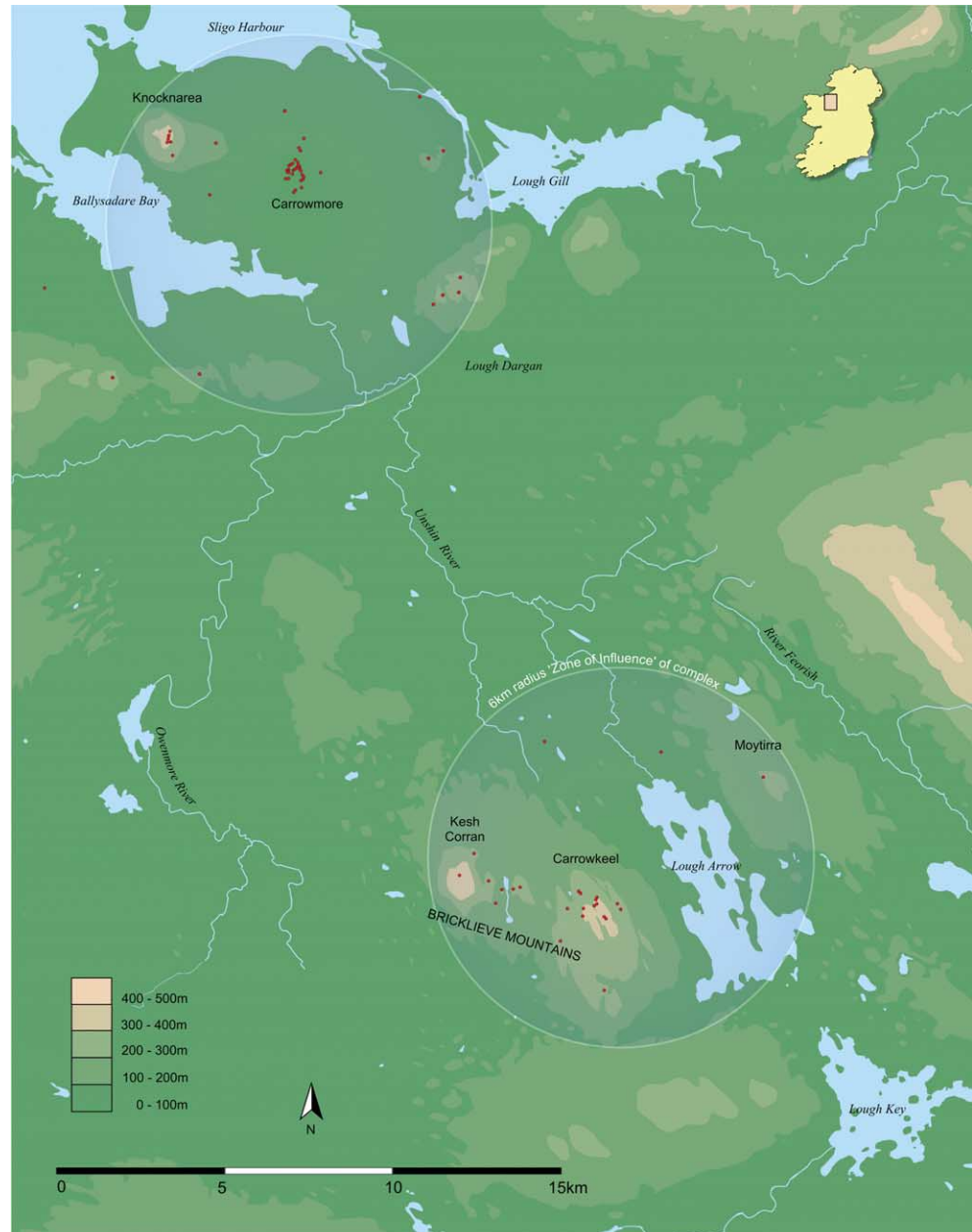


FIG. 3—The wider Carrowmore and Carrowkeel complexes with zones of influence highlighted. Map by P. Meehan, S. Moore and R. Hensey.



Additionally, the node or nucleus tends to attract further construction, often monumental, within its zone of influence (see Fredengren 2002, 199–200 for discussion of nodes). This appears to be particularly true of Lough Arrow, where a remarkable megalithic complex has developed in which all the four main megalithic traditions in Ireland are found in close proximity. The Lough Arrow landscape is best characterised as a passage tomb node which is holding in its orbit a range of other site types, especially megalithic monuments (see Fig. 1 and Table A.2). One of the exceptional features of the complex is that it provides an excellent platform for close consideration of the relationships between the various categories of megalithic monument and natural features.

In summary, research conducted since the 1911 excavation has helped to increase and refine the extent of this prehistoric complex. In this context it can be argued that the most apt name for this cluster of monuments is the Lough Arrow passage tomb complex. The Lough Arrow appellation might be considered preferable because it succeeds in uniting (or reuniting) Suigh Lughaidh, Ardloy and Heapstown with the passage tombs at Carrowkeel and Kesh Corran; and thus better reflects the complex in its entirety.

#### Research in the wider complex

In 1911 Macalister, Armstrong and Praeger identified 47 potential hutsites at Mullaghfarna to the east of the Bricklieves (Plate III), which they suggested may have been used by the people who constructed the passage tombs (Macalister *et al.* 1912, 331–2) (Fig. 1). Grogan's (1980; 1996; 2002) survey expanded that figure to 82 sites. More recently, through a digital photogram-



Pl. III—Mullaghfarna enclosures/hutsites from the air. Reproduced by kind permission of Stefan Bergh after Corns and Shaw (2009, Pl. 74).

metry-based survey, Bergh has increased the total to 153 (Bergh 2004; 2006). The enclosures vary in diameter from *c.* 6m to 20m. Test excavations of three sites indicate Bronze Age and to a lesser extent Neolithic use (see below).

Mount's (1996) analysis of the siting of early prehistoric monuments in the Bricklieve Mountains and Moytirra uplands focused on the soils and geomorphology of the complex and, like the present study, treated Carrowkeel, Kesh Corran and Moytirra as a unified landscape. Further information was provided by Mitchell (1951), McAulay and Watts (1961) and Göransson (1984; 2002) in palaeoenvironmental studies on raised bog at Treanscrabbagh at the centre of the complex. More recently Susann Stolze has undertaken a palaeoenvironmental study on cores from three lakes and a wetland site surrounding the complex: Loughmeenaghan, Templevanny Lough, Lough Arrow and Lough Availe (Stolze 2012; Stolze *et al.* 2012; Stolze *et al.* 2013a, b). The results from Lough Arrow are yet to be published, but cumulative palaeoenvironmental information from the other cores indicate ameliorated climatic conditions, landscape openness and most pronounced human activity during the Early Neolithic period.

The study of Loughmeenaghan is notable for providing direct evidence of wheat cultivation for approximately 140 years, from *c.* 3770–3630 cal. BC, followed by a phase dominated by pastoral farming (Stolze *et al.* 2012). The agricultural activities evinced by the record from Loughmeenaghan took place several hundred years before the earliest dates we have from the passage tomb complex (see below). Stolze concludes that the climate in the region became progressively wetter after 3600 cal. BC; the Lough Availe core reveals that this downturn intensified sometime before 3260 cal. BC (Stolze *et al.* 2013b). It may be significant that the Neolithic dates that have been returned from the complex occur in that difficult period; characterised by Stolze as one of declining human impact on the environment. Stolze's data is corroborated by a palynological study at Lough Dargan, *c.* 15 km north of Carrowkeel (near the Carrowmore passage tomb complex). There, cereal-type pollen is recorded in the sample at *c.* 3730 cal. BC, and deteriorating climatic conditions are indicated from 3400 cal. BC. This period culminates in the regeneration of forest to pre-elm decline levels and a decline or even a cessation of farming after 3000 cal. BC (Ghilardi and O'Connell 2012).

## Dating the cairns

As illustrated by the introductory quote from Praeger, upon entering cairn G the 1911 team immediately drew comparisons with Newgrange. The similarities must have played an important role in the team's subsequent ruminations about the date of the cairns. It should be remembered that at this time George Coffey was in the process of reinterpreting Newgrange as a Bronze Age monument; until this point he thought it dated to approximately 400 BC (Coffey 1912; Macalister 1912).

The excavation team concluded that the passage tombs were Bronze Age in date, and emphasised this in the title of their account of the excavations: 'Report on the exploration of Bronze Age cairns on Carrowkeel Mountain, County Sligo' (Macalister *et al.* 1912). Their conclusions were primarily based

on the relative dating of the Bronze Age ribbed bowl and tripartite bowl found in cairns K and O respectively, and comparisons with Bronze Age pottery found in earlier passage tomb excavations such as at Belmore, Co. Fermanagh (Coffey 1896–8; Macalister *et al.* 1912, 399). Macalister wrote that ‘no Neolithic types of pottery appear to be present, and the cairns [sic] so far examined may all be placed in the Bronze Age’ (1912, 340). Of interest in this regard is Macalister’s reconstruction of a pottery vessel from the right recess of cairn G based on fragments of Carrowkeel ware (Herity 1974, 275). The fragment is depicted in a reconstruction sketch with a flat base in the style of a Bronze Age food vessel, the (probably Neolithic) sherd apparently being coerced to fit a preconceived Bronze Age form (see Fig. 4). A difficulty for the team was the sheer lack of prehistoric pottery available in Ireland at the time, as this precluded one of the main avenues of chronological assessment (Macalister 1928, 87; Mahr 1937, 338; O’Sullivan 2009, 524).

To their credit, however, there are hints in the 1912 report that the team considered possible Neolithic origins for the monuments. Macalister concedes his uncertainty regarding the chronology of several sites: ‘Had the monuments been found rifled, we would have felt inevitably drawn to the conclusion that they represented widely different culture-strata; and indeed we long laboured under the impression that cairn F was Neolithic’ (Macalister *et al.* 1912, 345). The elements of court tomb morphology present at cairn E were a further cause of confusion. Macalister was aware that similar monuments on the Isle of Arran, Scotland had recently ‘been shown’ to date to the Neolithic period (Macalister *et al.* 1912, 333). That the excavation team debated a Neolithic horizon at all was quite remarkable given that the ‘radiocarbon revolution’, which finally resolved these chronological questions, did not take place until the 1950s.

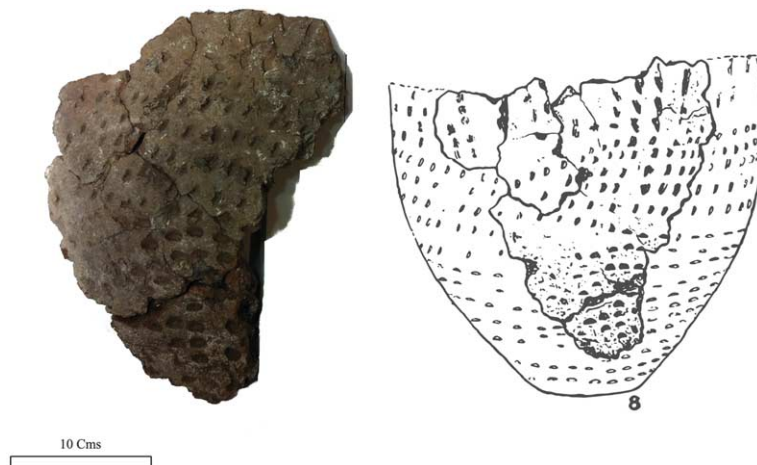


FIG. 4—Carrowkeel ware from cairn G reconstructed in the fashion of a Bronze Age vessel. Image by Pdraig Meehan after illustrations by Macalister *et al.* 1912, Plate XXV.

## Pilot dating project

In more recent decades the Neolithic origins of the Carrowkeel passage tombs have been assumed, but except for a single Neolithic radiocarbon date recovered by Bergh from cairn M (Table 1), this was based on typological comparison rather than scientific measurement. To redress this, the present authors undertook a pilot project to obtain new radiocarbon dates. The National Museum held a number of acquisitions of human bone that had been found by visitors to Carrowkeel in the 1960s and 1970s. Two cremated human skull fragments from cairn G were selected by osteoarchaeologist Jonny Geber as suitable for dating: an adult occipital fragment, and the parietal bone of a 6- to 12-year old child (Table 1). These were part of an assemblage of *c.* 200 fragments of cremated bone that had been found on a ledge approximately 1.6m high in the back recess of cairn G (Lucas 1963, 124). A note in the Antiquities Register (1961, 168) states that the bone had originally been recovered from the floor of the chamber and then placed on the ledge, presumably in the 1960s. Though the samples were from insecure contexts, given the excavation methods and recording at the 1911 excavation outlined above, there are no available samples in either the National Museum or the Duckworth Laboratory in Cambridge that are with certainty from secure contexts.

The five dates from Carrowkeel below (and all other dates in this paper) were calibrated using OxCal ver. 4.2 (Bronk Ramsey 2009; Bronk Ramsey *et al.* 2010) and the IntCal09 calibration curve (Reimer *et al.* 2009). Age ranges are given at the 95 per cent confidence interval and reported in cal. BC. Though the lack of secure contexts is problematic, it was encouraging that both samples returned radiocarbon determinations equivalent to Neolithic calendrical dates (Table 1). The period from which the dates range, 3200–2900 cal. BC, represents a pivotal time in passage tomb construction and use, during which mega-monuments such as Newgrange and Knowth Site 1 were built.

TABLE 1—Five Neolithic dates from the Carrowkeel complex. Dates processed using OxCal ver. 4.2 (Bronk Ramsey 2009; Bronk Ramsey *et al.* 2010) with the IntCal 09 calibration curve (Reimer *et al.* 2009).

<i>Sample</i>	<i>Location</i>	<i>Lab ID</i>	<i>Radiocarbon age BP</i>	<i>2σ calibrated age ranges – 95.4%</i>
Adult occipital Bone	Cairn G, Carrowkeel td	UBA-15656	4494 ± 29	3346–3094 cal. BC
Parietal bone, child <i>c.</i> 6–12 years	Cairn G, Carrowkeel td	UBA-15657	4342 ± 28	3023–2899 cal. BC
Charcoal ( <i>pomoidae?</i> )	Cairn M, Carricknahorna East td	Ua-511	4530 ± 100	3517–2924 cal. BC
<i>Corulus</i>	Site 1, Mullaghfarna td	GrA-29173	4500 ± 45	3358–3030 cal. BC
<i>Bos taurus</i> (tooth)	Site 1, Mullaghfarna td	GrA-29184	4280 ± 40	3018–2762 cal. BC

The Neolithic date from cairn M ( $4530 \pm 100$  BP) was returned from charcoal recovered in the course of a trial excavation (Bergh 1995, Table 10, 103–5). Notwithstanding the overly large standard deviation, when calibrated it gives a range of 3517–2924 cal. BC (Table 1). The other two previously unpublished Neolithic dates are from the Mullaghfarna hutsites (Table 1; Stefan Bergh, pers. comm.). Significantly, all five dates fall within a similar time span, from approximately 3200–2900 cal. BC, raising the possibility of a spike in activity at Carrowkeel at that time. Moreover, the new dates compare well with the Neolithic dates from the Mullaghfarna enclosures, thus strengthening the argument for a direct association between the hutsites and the passage tombs. Except for some of the chambered cairns of the Orkney Islands (see Richards 2005), a locational and chronological association of this type is relatively rare in a European context.

## The dates in context

Since Sheridan's (1985/6) analysis, passage tombs have typically been viewed as a phenomenon that developed from small simple sites to larger more complex ones, and generally from the west to the east of Ireland. The dating evidence from the Carrowkeel passage tombs and Mullaghfarna hutsites raises the question as to what extent these centres were in use contemporaneously rather than succeeding each other progressively. Apparently, there was a period of activity at Carrowkeel and the Mullaghfarna hutsites which occurred at the same time that immense energies were being expended in the construction of the main sites at Newgrange and Knowth in the east of the country. It is probable that all four main complexes were simultaneously in use in certain periods.

The Carrowkeel dates are of additional interest in the context of 25 dates on bone/antler pin fragments from two passage tombs in the Carrowmore complex located just 22km north of Lough Arrow (Bergh and Hensey 2013). Bayesian modelling of the dates indicates that the most probable primary age of the pins—and assumed deposition—was *c.* 3650–3100 cal. BC. The new dates suggest that the Carrowmore passage tombs saw continual deposition over approximately half a millennium. It would appear that the rituals associated with passage tombs, in particular the tradition of depositing cremated bones with antler/bone pins, were already well established when the dated human bones from cairn G were deposited. For instance, the child's bone may have been deposited some 650 years after the earliest known dated pin fragment from Carrowmore.

The long term use of passage tomb complexes for rituals involving the deposition of human bone and pins, such as exhibited in the north-west of Ireland, could suggest a surprising conservatism in ritual practice. This apparent conservatism stands in dramatic contrast to the evolution of passage tomb design that was taking place towards the end of the fourth millennium BC, especially in the Boyne Valley (Stout 2010; Bayliss and O'Sullivan forthcoming; Schulting *et al.* forthcoming). There appears to be a tension between the dynamism of monument design and embellishment and the conservatism or standardisation of rituals around human bone and its placement in the monuments. The evidence may point to a certain independence of the

passage tomb complexes. It might also reflect divisions within passage tomb society, for instance changes amongst the upper tiers of Neolithic society taking place against the backdrop of a continuance of traditional practices by the wider population.

### Late Neolithic and Bronze Age use of the passage tombs

It is clear from both radiocarbon and typological evidence that there was significant activity in the complex throughout the Late Neolithic and Bronze Age, subsequent to the monuments' primary use-period. The younger date from cairn G (Table 1) hints at Late Neolithic deposition. Activity at this time at Carrowkeel can also be inferred from the new Carrowmore pin dates, and from the copious evidence of re-use of passage tombs in Co. Meath (e.g., O'Sullivan 2006). The cist-like structure found in the chamber of cairn B at Carrowkeel is also of interest as sub-megalithic cists tend to be Early Bronze Age in date (Neil Carlin, pers. comm.; Cooney and Grogan 1994, 84–7; Hensey and Robin 2012). Additionally, two smaller cists were found by Macalister in the body of cairn B on its southern side (Macalister *et al.* 1912, 322).

Treanmacmurtagh cairn (cairn V) contained a probable secondary burial in the form of a cist located inside the western edge of the kerb with a couched inhumation of a 10–12-year old boy along with a small bowl beside the skull. Beneath this were the cremated remains of an adult and two sherds of a possible bowl vessel (Rynne 1969, 145–50). The crouched burial was dated to  $3665 \pm 35$  BP, 2187–1941 cal. BC (Brindley 2007, 65). Notably, the second date from the trial excavation of cairn M (from a human tooth), though again of wide standard deviation, was also of Early Bronze Age date:  $3770 \pm 100$  BP/2473–1935 cal. BC (Bergh 1995, Table 10).

Based on Brindley's analysis of the bowl tradition, the tripartite bowl from cairn O is from stage 2 in her sequence, suggesting it was made within a 100-year period centred on a median date of 2030 BC (Brindley 2007, 247). The ribbed bowl from cairn K could be from stages 1 or 2. Further possible Bronze Age evidence includes the secondary deposit of cremated remains of one adult at the south edge of the kerb of cairn R at Carnaweelan (Buckley and Mount 1994, 71). Notably, the majority of dates from the Mullaghfarna hutsites are also Bronze Age (Stefan Bergh, pers. comm.). From this brief review, it is apparent there has been substantial and continued activity at Carrowkeel from the Middle Neolithic through to the Middle Bronze Age.

### First discoveries of passage tomb art

Though Macalister and his team made a point of looking for megalithic carvings at Carrowkeel prompted by the discoveries of art on passage tombs in the east of the island, their searches did not prove fruitful: 'Once and for all we may here state that although we searched for sculptured ornament, such as is to be seen at Brugh na Bóinne, with the most scrupulous care, not a single decorated stone came to light anywhere, either outside or inside the cairns [sic]' (1912, 321). The search for art entered a new phase in 2009 when one of the authors (Hensey) discovered carvings in cairn B on an orthostat at the end of the undifferentiated chamber (Hensey and Robin 2011) (Fig. 5). A second piece



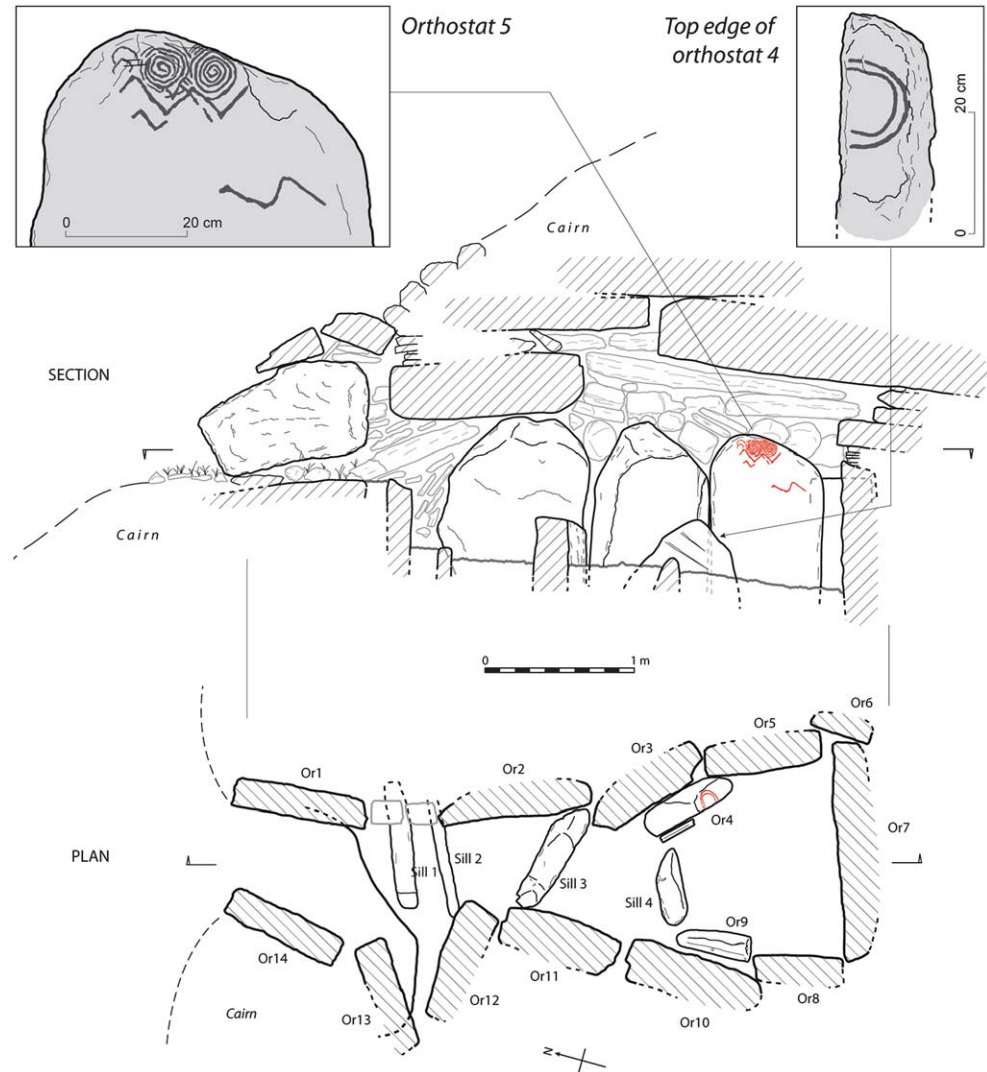


FIG. 5—Plan of cairn B with location of recently discovered art highlighted (Hensey and Robin 2012).

of art was subsequently found within the same monument on orthostat 4 (Hensey and Robin 2012).

A novel recording technique was used to record the carvings (Cassen and Vaquero Lastres 2003). The motifs on orthostat 5—two spirals over a chevron—are grouped at the top of the stone, between its left edge and a diagonal ridge on its upper right corner (see Fig. 5). The form and location of the motifs make them highly typical examples of passage tomb art. They belong to an older style of megalithic carving comparable with the earliest phase of passage tomb art in the Boyne Valley (Hensey and Robin 2011).

The same recording technique was used to identify a piece of art on the southern kerb of Heapstown cairn (Plate V), revealing it to be a core passage

tomb motif (known as an ‘offset’ or ‘scalariform’ design) found on approximately eight per cent of decorated passage tomb stones (Robin 2009; Hensey and Robin 2011). The form of the motif and the use of typical passage tomb art picking technique demonstrate it to be Neolithic (rather than made in a subsequent prehistoric period or in modern times). As noted earlier, the identification of this art goes some way to confirming the pedigree of Heapstown, affirming its ties with the passage tomb tradition and with cairn B and the other passage tombs in the complex.

On a wider scale, the motifs found at Carrowkeel cairn B and at Heapstown, taken together with those from Listoghil in Carrowmore (Hensey and Robin 2011), suggest that megalithic art can no longer be seen as an exclusively Irish Sea phenomenon. Whether we can say that the earliest Irish passage tomb art is found in the north-west is a moot point, although the earliest recorded passage tomb use in Ireland is at Carrowmore (Bergh and Hensey 2013). It should be noted that targeted searches for art in the rest of the complex have thus far proved unfruitful.

#### Future research possibilities

The research that has been carried out over the past century at Carrowkeel and in the wider complex around Lough Arrow has expanded and enriched the discoveries made in 1911, particularly in terms of understanding the wider landscape and archaeological context. What has become increasingly apparent is the need to return to the assemblages recovered from the tombs 100 years ago.

Because of shortcomings in the 1911 recording strategy and in the subsequent report of the excavation, there is at present no clear documentation of the quantity and nature of human bones that were recovered from the tombs. The surviving remains are divided between the Duckworth Laboratory at Cambridge and the National Museum. Eighteen boxes of bone are extant in the



Pl. IV—Cairn G on the summer solstice 2010. Photo by S. Moore.



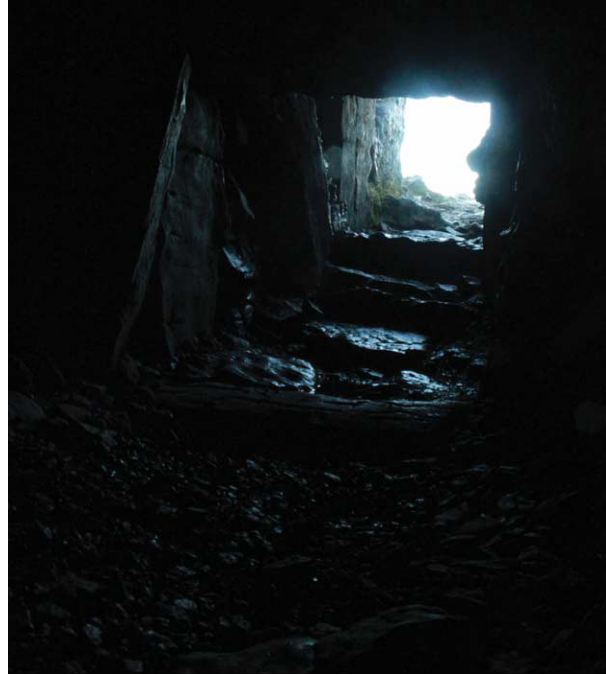


Pl. V—Passage tomb art at Heapstown cairn. Photo by R. Hensey.

Duckworth Laboratory and many of these contain handwritten notes by A. Macalister. The notes are invaluable as in a number of instances the bone is tied not only to a specific cairn within the complex, but also to a particular recess within that cairn (Plate VI). Of the eighteen boxes in Duckworth, two contain reconstructed skulls; four have cremated bone (comprising 25 wrapped bundles); five have unburnt remains; six contain mixed cremated and unburnt bone and one box of cremated and unburnt animal bone. Much of the material is unburnt bone. It is likely that A. Macalister and/or the excavation team placed greater emphasis on the recovery of larger fragments of bone from the chambers, believing there would be a greater retrieval of information. The material is very well preserved, contains a considerable amount of cremated and unburnt human bone, and is eminently suitable for further research (in comparison, the Carrowmore and the Boyne Valley tombs have inferior quality assemblages of human bone from much more disturbed contexts).



Pl. VI—A portion of the Duckworth/Carrowkeel bone assemblage. Photo by R. Hensey.



Pl. VII—Interior of cairn K. Photo by P. Meehan.

Ideally the material in Cambridge should be returned to the National Museum of Ireland and the complete human bone assemblage should receive osteological analysis to modern standards. Notwithstanding A. Macalister's considerable reputation, it is important to bear in mind that his analysis is of its time and re-analysis to modern scientific standards would result in more accurate and informative results. For example, more detailed information on the age, sex, pathologies and diet of the deceased may be established, as well as insights into the nature of funerary rituals. Not only is a catalogue of surviving human remains essential, a thorough documentation is also likely to reveal new information, for instance the presence of animal bones. Preliminary analysis has already revealed hitherto unrecorded lithics and soil samples. Notably, cutmarks were present on some of the bones, indicating the possibility of defleshing and/or disarticulation of bodies as part of the funerary rite.

Future analysis would also facilitate further radiocarbon dating projects, expanding on the pilot dating project presented here. New dates on material from Carrowkeel would help clarify its relationship with the Carrowmore passage tomb complex and fill gaps in our knowledge of Irish passage tomb chronology. This chronological revaluation might include a detailed analysis of the Late Neolithic and Bronze Age re-use of the complex and what the Mullaghfarna hutsites mean in that context. A limited excavation of one of the passage tomb chamber floors would be immensely valuable and would facilitate the retrieval of material for dating from more reliable contexts. A number of small-scale excavations at other monuments in the complex would also resolve chronological questions concerning the evolution of the monuments.

None of the cairns on the Kesh Corran side of the complex have been excavated or dated. The 170m enclosure on the summit of Kesh Corran Mountain (Kytmanow 2005), surrounding the probable passage tomb (cairn Q) in its northern end, is also worthy of investigation. A more detailed survey of the monuments, for example using the latest LiDAR capabilities, would be particularly helpful in light of conservation issues. This could be combined with GIS modelling of the internal spatial configuration of the open chambers. A geological analysis of visible cairn make-up, such as was carried out in the Boyne Valley (Meighan *et al.* 2002; Meighan *et al.* 2003), might also be valuable.

Necessary too are comprehensive recordings of the artefacts recovered in the 1911 excavation. Archaeological assemblages recovered during antiquarian investigations have much to reveal, and can provide fresh information if new questions are asked and modern techniques applied. Some of the artefacts also deserve specialist analysis, in particular the bone and stone objects; for example there has been no geological identification of the beads and pendants from Carrowkeel. Additionally, a dedicated reanalysis of the pottery would be useful and perhaps add to the information gleaned in previous studies (e.g. Herity 1982). It is hoped this paper will encourage a greater appreciation of the extent and importance of this complex and serve as a stepping stone to future work there.

## Discussion

The passage tombs and related megalithic monuments of Lough Arrow, taken together, represent one of the most spectacular, best preserved and yet most under-researched megalithic complexes in north-west Europe. Our investigations reinforce the position of Carrowkeel as one of the four great passage tomb complexes of Ireland; the potential for internationally important discoveries is manifest. In attempting to gain a better understanding of the Irish passage tomb clusters, the metaphor of a central node acting as a nucleus surrounded by more distant passage tombs (and ‘holding’ later monumental construction) may provide some fresh insight into the ordering of these complexes. That the bone assemblage has recently been discovered, in storage in Cambridge, opens up new challenges and opportunities in the recovery, analysis and interpretation of primary data. Our pilot dating project—combined with the work of others—begins the process of clarifying the chronology of Carrowkeel. In a wider sense, the realisation that all the principal Irish passage tomb centres may be in use simultaneously, and the discovery that (some amount of) art is found at all four principal centres, provides new perspectives on the interpretation of the Irish passage tomb tradition. The great number of prehistoric enclosures at Mullaghfarna, where all are spatially associated with a passage tomb cluster and some are now shown to have been in use contemporaneously, is uncommon in Europe.

Our research, involving regular visits to Carrowkeel over the last decade, has brought into sharp focus the many pressing problems and threats to the site. Currently, access to the monuments is not controlled and the passage tombs are visited on an ad hoc basis. The putative summer solstice sunset orientation at cairn G (Plate IV) draws many visitors every year—even though the orientation is technically imperfect (Hensey 2008). Visitor generated stress

and the absence of any formal visitor management strategy are major issues facing the complex. No work has been done to date to quantify visitor numbers and no report has been published on the health and governance of the complex. No signage, interpretative or educational material, or efforts to control the flow of visitor traffic is in place. We have noted increased levels of graffiti and litter, and the evidence of regular walking on the cairns (throughout the year, but especially at the peak of the tourist season) presents an immediate danger to the structural integrity of monuments (especially at cairns K, H, G, E and F).

One hundred years on from the 1911 excavations this landscape and its monuments still have much to tell us. In many senses, the most critical phase of research (and management and conservation) at Carrowkeel still lies in the future.

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It should be noted that the RIA has been a friend of research in the complex for many years. Not only did it finance the 1911 excavations and subsequently publish the report of the work in its *Proceedings*, latterly it provided funds to Bergh for dating material from site M (1995), and sponsored Hensey and Robin's (2012) search for further passage tomb art in the complex. Finally, thanks are due to Stefan Bergh, Mary Cahill, Guillaume Robin and Elizabeth Shee Twohig for comments on an earlier version of this paper, and to Susann Stolze and Jonny Geber for comments and corrections prior to submission.

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## Appendix

TABLE A.1—Passage tombs and probable passage tomb tradition sites within the Carrowkeel complex.

<i>Name</i>	<i>Our classification</i>	<i>Townland</i>	<i>ITM Ref (E/N)</i>	<i>RMP</i>	<i>Diameter (m)</i>	<i>Height (m)</i>
Cairn A	Cairn	Tully	574213/810667	SL040-103	12	2.5
Cairn B	Passage tomb	Treansrabbagh	574437/811610	SL040-097001	27	5
Cairn C	Passage tomb	Carrowkeel	574787/812108	SL040-086	18	1.5
Cairn D	Probable passage tomb	Carrowkeel	574794/812082	SL040-087	18	1
Cairn E	Passage tomb	Carrowkeel	574897/811610	SL040-095	37 × 11*	2
Cairn F	Passage tomb	Carrowkeel	574897/811402	SL040-096	29	5.5
Cairn G	Passage tomb	Carrowkeel	575276/811950	SL040-089	20	3
Cairn H	Passage tomb	Carrowkeel	575276/811880	SL040-090001	20	2.5
Cairn K	Passage tomb	Carrowkeel	575295/811745	SL040-093	22	3.5
Cairn L	Cairn	Carrowkeel	575267/811726	SL040-094	18	1.5
Cairn M	Passage tomb	Carricknahorna East	575514/811378	SL040-101	10	1
Cairn N	Passage tomb	Carricknahorna East	575545/811294	SL040-102	7	0.5
Cairn O	Passage tomb	Doonaveragh	575899/811775	SL040-099	20	2.5
Cairn P	Cairn	Doonaveragh	576011/811603	SL040-100	11.5	2
Cairn Q	Probable passage tomb	Drumnagranshy/ Murhy	571243/512636	SL040-008	26	5
Cairn R	Passage tomb	Carnaweelan	571656/813239	SL040-006001	19	0.5
Cairn S	Cairn	Treanmore	572083/812413	SL040-010	14	1.5
Cairn T	Cairn	Treanmore	572468/812141	SL040-013	13	1
Cairn U	Cairn	Treanmacmurtagh	572810/812190	SL040-015	9	1
Cairn V	Probable passage tomb	Treanmacmurtagh	573051/812195	SL040-016001	23	2.5
Cairn W	Cairn	Treanmore	572290/811723	SL040-066	10	1
Cairn X	Cairn	Carrowkeel	575202/811976	SL040-088	11.5	1.5
Cairn Y	Cairn	Carricknahorna West	575506/809181	SL040-105	9.5	1
Ardloy	Passage tomb	Ardloy	573700/816614	SL034-109	13	1
Heapstown cairn	Probable passage tomb	Heapstown	577216/816278	SL034-128	62	6
Suigh	Probable	Barroe	580262/815515	SL034-155	25	3
Lughaidh	passage tomb	North				

\* E is c. 37m long (32.5m long without court area) and 11m maximum width.

TABLE A.2—Other megalithic structures within the wider Carrowkeel/Lough Arrow complex.

<i>RMP no.</i>	<i>ITM Ref (E/N)</i>	<i>Townland</i>	<i>Classification</i>	<i>L (m)*</i>	<i>W (m)*</i>
SL040-127	578426/810291	Aghanagh	Court tomb	25.2	9
SL034-206	579033/815194	Ballindoon	Unclassified	13	10
SL041-004	581311/313331	Ballinlig	Court tomb	14	9
SL034-224	579875/814423	Barroe Upper	Wedge tomb	6	1.9
SL034-099	572307/816259	Cams	Court tomb	19	12
SL034-152	579550/815763	Carrickglass	Portal tomb	2.1	1.5
SL035-106	583791/813638	Carricknagrip	Unclassified		
SL040-106	576334/810249	Carricknahorna East	Court tomb	23.5	17.5
SL040184	576776/808811	Carricknahorna East	Unclassified	22.5	16
SL040-229	575676/813050	Carrowkeel	Unclassified	8.5	8
SL041-034001	582851/812939	Cloghmine	Unclassified	4.5	2.2
SL035-061	583378/815553	Coolmurly	Unclassified		
SL035-062	583386/815525	Coolmurly	Court tomb	33	10
SL035-063	583313/815427	Coolmurly	Wedge tomb	3	1.2
SL035-078	581441/814130	Moytirra East	Unclassified		
SL035-079	581441/814130	Moytirra East	Court tomb	13	2.9
SL034-208001	580611/815192	Moytirra West	Wedge tomb	20	17
SL035-075	581233/814526	Moytirra West	Portal tomb		
SL040-098	576110/812176	Mullaghfarna/ Carrowkeel	Court tomb	6.3	2
SL040-234	571489/811846	Murhy	Wedge tomb	6	1.5
SL034-088	573909/817190	Springfield	Portal tomb	9	7
SL035-097001	583210/813614	Treanmore	Court tomb	19.5	12.5
SL040-091	575300/811849	Carrowkeel	Megalithic structure	1.7	1.2
SL034-254	577299/816197	Heapstown	Megalithic structure	2.7	2.7