Excavations in Poll Bunker, Co. Clare: a(nother) multi-period cave site in the Burren

Marion Dowd,[1] Elaine Lynch,[2] Cian Hogan,[3] Margaret McCarthy,[4] Mara Tesorieri,[5] Donal Hogan[6] and Tim O'Connell[7]

[1] Fourth Dimension Prospection Ltd and ATU Sligo (marion.dowd@atu.ie)
[2] Lynch Consultancy (elainelynch@gmail.com)
[3] CeártaCloch Lithic Analysis (ceartacloch@iarthar.eu)
[4] Rostellan, Cork (margaretmccar@gmail.com)
[5] Archaeological Management Solutions (mara.tesorieri@ams-consultancy.com)
[6] Carron, the Burren, Co. Clare
[7] Tubber, the Burren, Co. Clare

Rescue excavations in a newly discovered cave in the Burren uplands have further highlighted the multi-period nature of caves. The site supports wider evidence for the increased use of caves during the later part of the Bronze Age and again during the early medieval period. Unusual for Burren caves, however, was the recovery of human remains of Late Neolithic/Chalcolithic date. The site continued to be utilised into the high medieval period, resulting in stratigraphic disturbance and emphasising the importance of radiocarbon dating for disentangling discrete periods of activity within cave environments. The site is discussed within the wider context of prehistoric and medieval activities in the Burren.

INTRODUCTION

In December 2020 one of the authors, caver Donal Hogan, discovered a previously unknown natural limestone cave in Poulbaun townland in the Burren uplands, Co. Clare (Fig. 1). This small, inconspicuous site was not previously known to the landowner or the caving community; it was not marked on any maps and was not a recorded archaeological site. Donal named it 'Poll Bunker' and, together with his caving colleague Tim O'Connell, investigated the site in April 2021 (Fig. 2). They removed large stones from the cave and began to dig out deposits from the cave floor to determine whether a larger system could be reached. They soon recognised Bronze Age pottery sherds and bones in the sediment, whereupon they immediately ceased digging and contacted the relevant authorities. Following a site inspection by Marion Dowd on behalf of the National Monuments Service (NMS), the cave was added to the Sites and Monuments Record (CL005-275----).

A rescue excavation was subsequently carried out in August 2022 by Fourth Dimension Prospection Ltd on behalf of the NMS, directed by Marion Dowd (under licence no. 21E297) and with the permission of the landowner, Donat O'Brien. A partial human skull was recovered from the deepest deposit. The overlying and principal stratum in the cave produced an assemblage of Middle–Late Bronze Age pottery, worked chert and flint, mussel shells, charcoal and over 500 mammal, amphibian and bird bones. Radiocarbon dates revealed sporadic activities in this small upland cave spanning at least 4,000 years, from the Late Neolithic/Chalcolithic (*c.* 2500 BC) through to the fifteenth century AD (Table 1).

SITE DESCRIPTION

Poll Bunker is located in the eastern part of the Burren uplands. At 225m OD, the cave penetrates the north-eastern flanks of a hill that Tim Robinson (1999) recorded as *Cnocán na Spáinneach* ('Little Hill of the Spanish'), though when and from whom he recorded that name is not known. At present this is a relatively remote area of expansive karst, but the concentration of monuments in the wider hinterland testifies to vibrant settlement here in prehistoric and early historic times.

A distinctive triangular piece of limestone, which seems to have been deliberately positioned to mark the cave's location, stands upright on the knoll directly above the entrance to Poll Bunker. The entrance measures 0.5m in height by 0.45m in width and opens to the east-south-east, commanding panoramic views towards Deelin and Gortaclare Mountain (Fig. 3). Almost certainly the entrance opening would originally have been larger, but both it and the short entrance passage have silted up over time. Beyond the entrance opening there is a sharp drop of 1.2m. From there the narrow passage (1.06–1.55m high; max. width 0.8m) descends into a small oval chamber that measures 1.3m

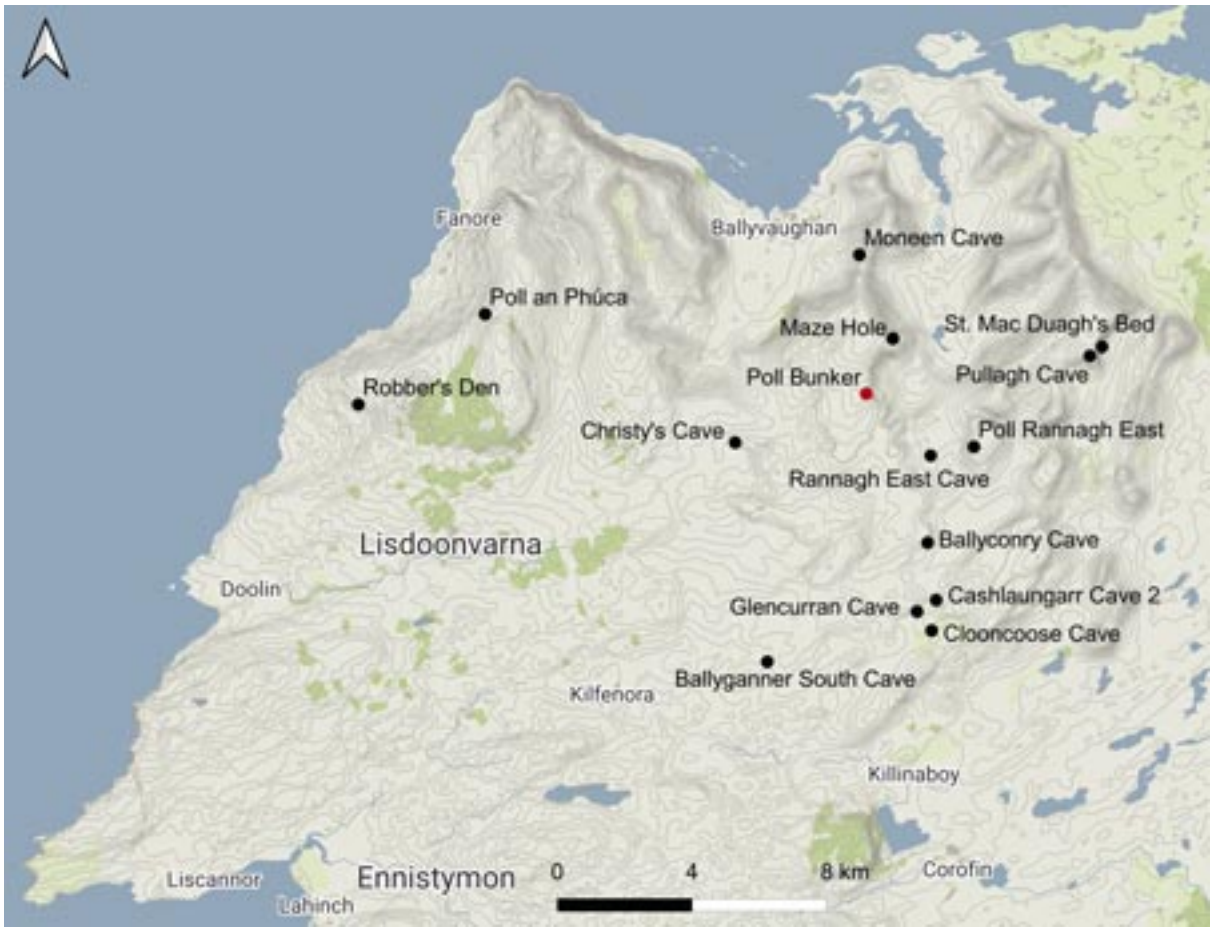

Fig. 1—Poll Bunker and other caves of archaeological significance in the Burren (James Bonsall; base map: MapTilerPlanet ©MapTiler; topographical data ©EU-DEM).

Fig. 2—Donal Hogan and Tim O'Connell flanking the entrance to Poll Bunker (Marion Dowd).

Fig. 3—View from the entrance of Poll Bunker towards Deelin and Gortaclare Mountain (Marion Dowd).

in length (SE/NW) by 1.2m in width (NE/SW) and reaches a maximum height of 2.08m. Overall, the cave is just 2.7m in total length (Fig. 4), and the chamber is the only part where it is possible to stand upright. During daylight hours, Poll Bunker is dimly lit but never shrouded in complete darkness. The interior is damp, and water pools on the chamber floor after wet weather.

ARCHAEOLOGICAL DEPOSITS

The purpose of the 2022 excavation was to recover archaeological material disturbed during the initial exploration by the cavers in 2021 and to investigate the nature of activities at the site.

The deepest stratum encountered comprised a firm, tenacious yellow clay (C.3) that was exposed across the entire chamber (1.3m N/S x 1.18m E/W). In 2021 it had been partially dug out and human cranial fragments were exposed. This area of disturbance was cleaned in 2022 and additional cranial fragments were recovered, but much of the layer remains *in situ*. A total of 39 human cranial fragments were recovered. These comprise a left parietal and occipital bone representing a minimum of one individual: a juvenile aged between two and seventeen years at the time of death (Appendix 1). This partial human cranium was radiocarbon-dated to the Late Neolithic/Chalcolithic: 4020±32 BP, 2585–2467 cal. BC (UBA-51167; see Table 1).

Overlying the stratum containing the human cranial fragments was a relatively loose, mid-brown clayey silt (C.4) with moderate small angular stones and occasional large stones. It extended across the entire chamber and into the passage (1.65m N/S x 1.18m E/W) and varied from 0.1m to 0.18m in thickness. This stratum produced 43 sherds and 72 small fragments of Middle–Late Bronze Age pottery derived from three distinct vessels (Appendix 2). Fourteen lithics were recovered: a chert core, a flint core fragment, a chert convex scraper, two broken chert convex scrapers, a broken flint convex scraper, three retouched chert flakes, a retouched flint fragment, two chert flakes, a flint flake and an indeterminate piece of chert debitage (Appendix 3). Further material of anthropogenic origin included three mussel (*Mytilus edulis*) shells, 3.35g of charcoal fragments (see below), a worked piece of sandstone and eight pieces of quartz.

C.4 also produced 469 mammal, amphibian and bird bones (Fig. 5). Of these, 163 (35%) could be determined to species and included 70 sheep/goat bones representing at least two individuals, 37 hare bones from at least two adult individuals, nineteen cattle bones representing one individual, ten pig bones from an adult sow, seven dog bones, two mouse bones, two frog bones and sixteen bird bones from a robin and a

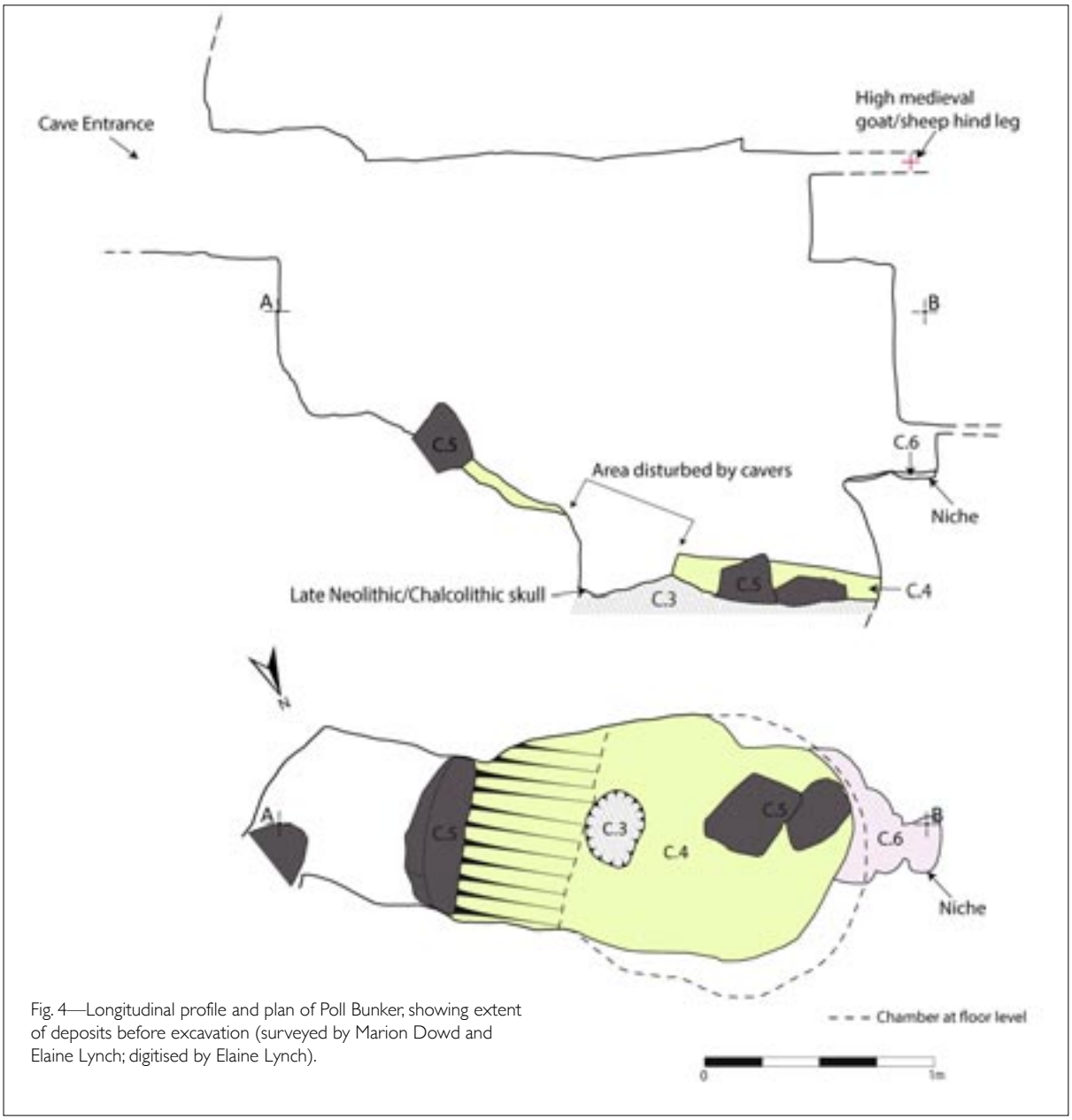

Fig. 4—Longitudinal profile and plan of Poll Bunker, showing extent of deposits before excavation (surveyed by Marion Dowd and Elaine Lynch; digitised by Elaine Lynch).

goldcrest (Appendix 4). The small size of the entrance and of the cave itself means that the larger mammals could not have entered the cave whole or alive. Five of the bones were radiocarbon-dated (Table 1). A hare bone returned an Early Bronze Age date of 3847±34 BP, 2456–2203 cal. BC (UBA-51173). A butchered cattle bone was dated to the Middle Bronze Age at 3098±35 BP, 1438–1266 cal. BC (UBA-51172), broadly contemporaneous with the Middle–Late Bronze Age pottery. A dog bone was dated to the transition between the Late Bronze Age and Early Iron Age at 2498±26 BP, 773–537 cal. BC (UBA-51171). Surprisingly, two dates from C.4 also revealed an early medieval presence. A pig tooth was dated to 1196±24 BP, cal. AD 773–892 (UBA-51170), and a butchered sheep/goat bone was dated to 1070±23 BP, cal. AD 896–1023 (UBA-51168), revealing activities in the late eighth or early ninth century AD and in the tenth or early eleventh century AD respectively.

An even later phase of activity was also identified. Wedged deep into a narrow fissure near the cave roof (Fig. 4) were twelve bones from the lower region of the hind limb of a sheep/goat, together with a sheep/goat rib, a cattle tooth and seven pieces of quartz. The sheep/goat lower hind leg bones comprised a metatarsal, a calcaneus with an unfused epiphysis, a navicular/cuboid (ankle bone) and nine phalanges. The sheep/goat hind leg was radiocarbon-dated to the high medieval period at 425±23 BP, cal. AD 1432–1491 (UBA-51169; Table 1).

A small natural niche occurs in the back wall of the chamber (Fig. 4). A thin layer of soft, light yellowish-brown clayey silt (C.6) with moderate pebbles covered its base. A shale percussor and seventeen bones (includ-

Table 1—Radiocarbon dates from Poll Bunker.

Species	Lab code	$\delta^{13}C$	$\delta^{15}C$	C:N ratio	Collagen yield %	Radiocarbon age (BP)	Calibrated radiocarbon date (2δ) cal. BC/AD
Human Juvenile, occipital	UBA-51167	–21.2	10.00	3.14	0.95	4020±32	2623–2467 cal. BC
Hare Adult, tibia	UBA-51173	–20.8	1.40	3.12	1.3	3847±34	2456–2203 cal. BC
Cattle Adult, metatarsal	UBA-51172	–21.6	3.90	3.13	2.4	3098±35	1438–1266 cal. BC
Dog Adult, right radius	UBA-51171	–20.2	7.10	3.10	10.1	2489±26	773–537 cal. BC
Pig (Female), pre-molar	UBA-51170	–21.7	6.30	3.12	1.8	1196±24	cal. AD 773–892
Sheep/goat Adult, vertebra	UBA-51168	–22.6	5.90	3.11	1.9	1070±23	cal. AD 896–1023
Sheep/goat Adult, phalange 1	UBA-51169	–22.0	5.40	3.11	5.7	425±23	cal. AD 1432–1491

Fig. 5—The assemblage of 469 mammal, amphibian and bird bones from C.4 spans at least 3,500 years, from the Early Bronze Age to the early medieval period; butchered mammal bones to right (Ken Williams).

ing eight of sheep/goat and seven of bird, probably robin) that were obscured by moss and vegetation growth were recovered from within this layer.

Three large limestone stones (C.5), with weathering indicating that they had originated from outside the cave, were deliberately brought or thrown into the cave sometime in the past. One obstructed the passage and the other two were found within C.4 in the chamber (Fig. 4).

The uppermost stratum (C.2) comprised a loose surface accumulation, 0.05–0.12m thick, with frequent pebbles and small stones, charcoal flecks, land snail shells, moss, decomposing vegetation and a pocket of hazelnut shells (probably a woodmouse cache). Of the

twenty animal bones (including four of sheep/goat, three of hare and one of cattle) recovered from this layer, many were black owing to having been exposed on the cave floor close to the entrance and therefore subjected to wet conditions.

A MULTI-PERIOD CAVE SITE IN THE BURREN

Prior to these investigations, there was little to suggest multi-period activities in Poll Bunker. The cave is small and in a remote upland location. It is not easy to locate, and the entrance could be concealed by vegetation growth in a matter of months. The stratigraphy was not extensive: almost all the artefacts (98.2%) and most of the animal bones (90.2%) derived from a single stratum (C.4) that was confined to a relatively small area; it was generally just 0.1m thick, though it increased to 0.18m where the cave floor dipped. It would be reasonable to assume a Bronze Age date for this stratum, considering the Middle–Late Bronze Age pottery and the butchered cattle bone that returned a mid-fifteenth- to mid-thirteenth-century BC date. There are no diagnostic elements within the lithic assemblage, but it could all be Middle Bronze Age, as its composition conforms to current understandings of Bronze Age assemblages (see Appendix 3). Radiocarbon dates, however, revealed a much more complex history of activity at Poll Bunker, spanning at least four millennia (Table 1; Fig. 6). The cave was evidently accessible to and accessed by humans and animals from at least the Late Neolithic/Chalcolithic to the fifteenth century AD, with a pronounced phase of activity in the Middle–Late Bronze Age. Other caves in the Burren have revealed similar multi-period use, namely Robber's Den, Glencurran Cave and Moneen Cave (Fig. 1; Appendix 5). What distinguishes Poll Bunker is its particularly small size, but this was clearly not a deterrent. The limited nature of the 2022 rescue excavation also needs to be emphasised. Further Bronze Age, early medieval and high medieval material may survive in the short entrance passage of the cave, which was not fully excavated, and further Late Neolithic/Chalcolithic material undoubtedly survives in the deepest stratum (C.3), which was only partially excavated.

Late Neolithic/Chalcolithic

The fragmented Late Neolithic/Chalcolithic parietal and occipital bones of a juvenile or adolescent, aged between two and seventeen years at the time of death, were stained in a manner suggesting that the cranium had been exposed in the cave relatively intact, as opposed to having been deposited after fragmentation

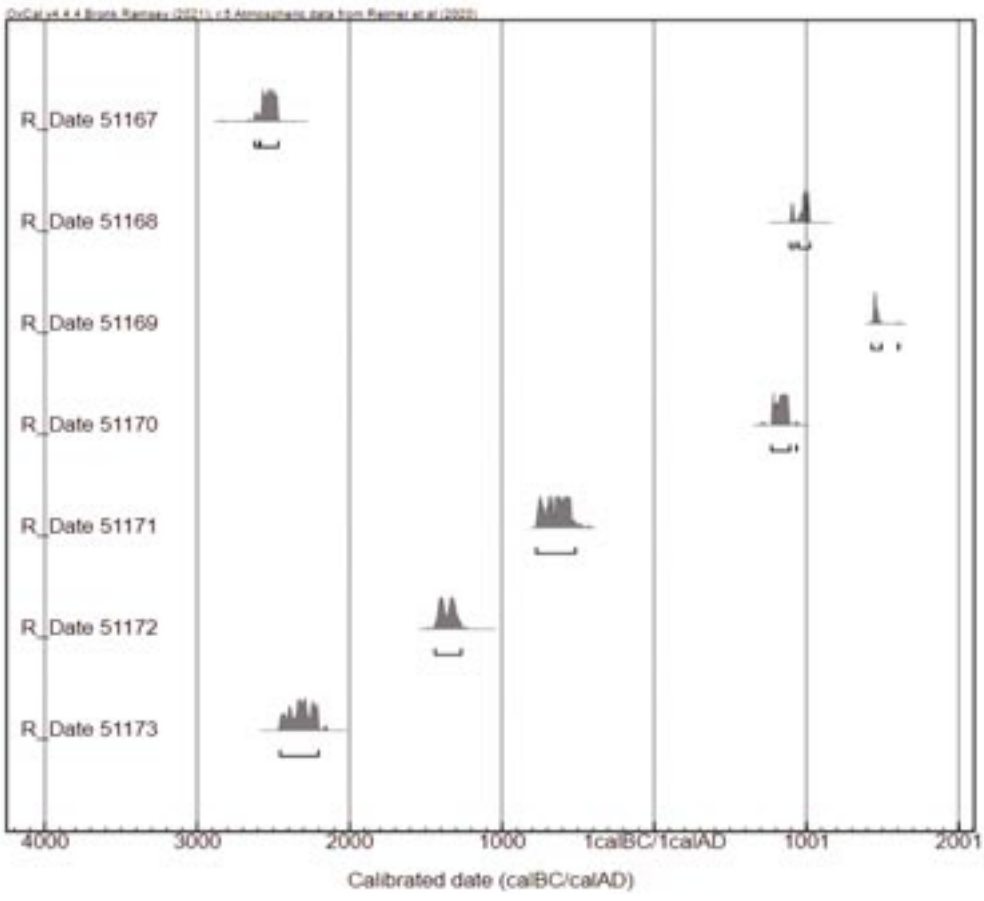

Fig. 6—Radiocarbon dates from Poll Bunker plotted in OxCal 4.4.4 (Bronk Ramsey 2021) using the IntCal20 calibration curve (Reimer *et al.* 2020).

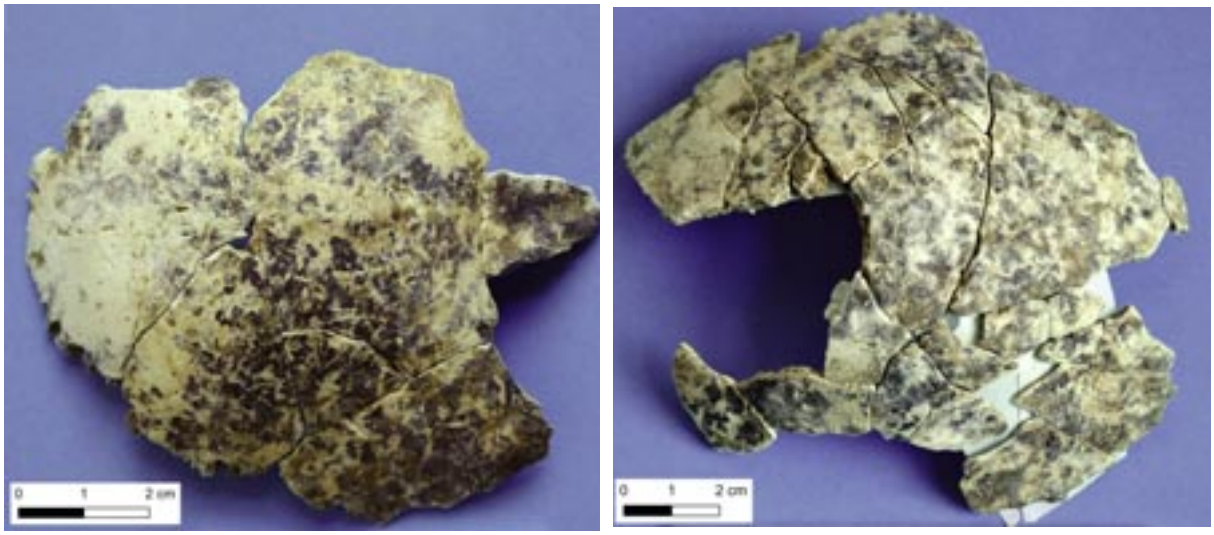

Fig. 7—(L–R) Late Neolithic/Chalcolithic occipital and left parietal, ectocranial view (Mara Tesorieri).

(Fig. 7). This is supported by the nature of the breakage, which appears to have occurred on dry bone after a long post-mortem interval and is likely a result of continued disturbance of the cave deposits over several millennia. Heat-affected changes, adhering calcite and cracking and/or flaking were not identified. This suggests that the remains were not exposed to fire or sun/wind and were likely buried or partially covered rather than left fully exposed for considerable lengths of time on the cave surface or at a different primary location prior to their final deposition (the superior angle of the occipital bone was quite light in colour, which would suggest a lack of surrounding soil staining the bone when it was fragmented).

While an accidental death in the cave cannot be ruled out, the tradition of using caves for ritual and funerary practices in Neolithic Ireland provides a more plausible explanation. Caves were appropriated for formal burial, excarnation and votive deposition of disarticulated human bones (Dowd 2008; 2015, chapter 5). Two aspects of Poll Bunker differ somewhat from general Irish Neolithic cave trends, however. First, skulls are rare outside of formal burial contexts—that is, cranial fragments of Neolithic date are uncommon in caves that were used for excarnation or token deposition (Dowd 2015, 94; Fibiger 2016). Second, human remains dating from the Late Neolithic/Chalcolithic are not usual: the majority of directly dated human bones from Irish caves date from the Early and Middle Neolithic, essentially 3800–3000 BC (Dowd 2015, 96). Some Late Neolithic/Chalcolithic cave parallels for the Poll Bunker human cranial fragments include adult remains from Elderbush Cave, Co. Clare; adult remains from Ballynamintra Cave, Co. Waterford; and the remains of two children from Glennamong boulder chamber, Co. Mayo. At all three sites the material comprised small quantities of unburnt disarticulated human bones, which have been interpreted as evidence of excarnation (Dowd 2008; 2015, 96–7; Dowd *et al.* 2020).

To date, there is little evidence to indicate that Neolithic or Chalcolithic communities in the Burren used caves to any great extent. At Moneen Cave the Neolithic is represented by a flint flake and a bear cub femur (Dowd 2016, 61–2). A Late Neolithic bear tibia with a chop-mark was recovered from Aillwee Cave (Dowd *et al.* 2019, 13–14). Radiocarbon dating has also identified a Neolithic wildcat, hare and mussel shell from Glencurran Cave (Dowd, in prep.).

More broadly, Poll Bunker adds to the corpus of Neolithic funerary sites from the Burren, including Poulnabrone portal tomb (3.5km to the south-west), the Linkardstown-type burial at Poulawack (5km to the south-west), and the court tombs at Parknabinnia, Ballyganner North, Leamaneh North and Ballycasheen. The similarity in morphology between Poll Bunker and the aforementioned megalithic tombs is worth noting: all comprise small, dark, enclosed subterranean or semi-subterranean rock chambers. While the construction and primary use of these monuments date from the Early and Middle Neolithic, sites such as Parknabinnia, Poulnabrone and Poulawack became renewed places of ritual and/or funerary activity in the Chalcolithic, involving burial or the deposition of unburnt disarticulated human bones. New funerary monuments also emerged at this time, including wedge tombs and cairns (Eogan 2002; Jones *et al.* 2015; Cleary 2016). Notably, Poll Bunker is located in what was clearly a ritual landscape: a wedge tomb (CL005-160027-) is situated 170m north-west of the cave, while a cairn and two cists (CL005-160048-, 160047-,

160028-) are located 220m directly to the south. It is possible that the Poll Bunker cranial fragments relate to funerary or ritual activities in one or more of these monuments, potentially with the movement of human bones or body parts between sites. In the absence of excavation, however, the nature and date of activities at these monuments remain unknown.

Early Bronze Age

The Early Bronze Age hare tibia may be a natural occurrence in the cave, but human activities cannot be entirely discounted, given the significance of hares in ritual practices at Parknabinnia court tomb and Poulnabrone portal tomb. At Parknabinnia the bones of at least 38 hares—whole individuals as well as disarticulated body parts—were found scattered throughout the tomb; two hare bones were radiocarbon-dated to the Middle Neolithic (Beglane and Jones 2021, 4). Over 400 hare bones were recovered from Poulnabrone; one returned a Middle Neolithic date while two others were dated to the Early Bronze Age (Schulting 2014, 98).

Middle–Late Bronze Age

Poll Bunker witnessed significant activity during the Middle to Late Bronze Age transition, though it is not clear whether the material represents multiple usages of the cave or a single event in time. The pottery assemblage consists of 43 sherds and 72 crumbs, derived from at least three different vessels (Fig. 8; Appendix 2). The rim forms and fabric are characteristic of the plain bucket- and barrel-shaped flat-bottomed domestic vessels that emerged during the Middle Bronze Age (*c.* 1600–1100 BC) and continued to dominate in the Late Bronze Age (*c.* 1100–700 BC). The fabric is, however, much finer than the thicker and coarser wares usually associated with the Late Bronze Age; accordingly, the Poll Bunker assemblage probably dates from the transitional period between the Middle and Late Bronze Age. These vessels are generally associated with settlement activity throughout Ireland, but examples have also been found with cremated bones in funerary contexts (Roche 2008, 139; Grogan and Roche 2009, 299). Although the sherds from the three Poll Bunker vessels do not have any visible carbonised residues, they were most likely originally used for domestic purposes. Many of the sherds have a worn or weathered appearance, including along the breaks, indicating that they were exposed to weathering and wet conditions after the vessels had broken, which may have happened inside the cave. Despite the full excavation of the stratum (C.4) that contained the pottery, none of the

Fig. 8—Middle–Late Bronze Age pottery from Poll Bunker. Vessel 1, top left; Vessel 2, top right; possibly Vessel 1 or Vessel 2, centre; Vessel 3, bottom (Ken Williams).

sherds refitted. This suggests that sherds rather than complete vessels were originally deposited in the cave, which is a pattern recognised from other cave sites throughout Ireland (Dowd 2015, 135–7).

Poll Bunker is one of three caves in the Burren that have produced Middle–Late Bronze Age pottery. Glencurran Cave, 6.5km south-east of Poll Bunker (Fig. 1), was a major focus of votive deposition during the Middle and Late Bronze Age. Deposits included sherds from five different Middle–Late Bronze Age vessels, whole newborn piglets, lambs and calves, joints of meat, lithics and strings of amber beads (Dowd, in prep.). At Moneen Cave, a small mountain cave 4km north of Poll Bunker (Fig. 1), sherds from at least six different Middle–Late Bronze Age pottery vessels were deposited in the cave, together with oyster shells and joints of meat (Dowd 2016, 68–70; Lynch and Roche 2016).

The pottery assemblages from the three caves are comparable in terms of fabric and temper. Like Poll Bunker, Glencurran and Moneen had vessels that were moderately and richly tempered with crushed angular pieces of quartzite. Vessels 1 and 2 from Poll Bunker are comparable to Vessel 4 from Moneen (Lynch and Roche 2016, 35–6). The shape of the out-turned rim shared by these vessels was possibly functional and may have been used for securing a hide or cloth lid to the pot. It is also possible that the internal bevelled rim may have supported a lid. There are Middle and Late Bronze Age pottery assemblages from other caves, including Killuragh Cave, Co. Limerick, Oweyberne Cave 3, Co. Antrim, and four caves from Co. Waterford: Ballynamintra Cave, Brothers' Cave, Carrigmurrish Cave and Kilgreany Cave (Roche 2016). The rim forms from Poll Bunker can be closely paralleled with Vessel 7 from Carrigmurrish Cave (*ibid*., fig. 4.9).

There were no diagnostic elements in the lithic assemblage from Poll Bunker (Fig. 9), but the assemblage is likely contemporaneous with the pottery. The absence of knapping debris, despite sieving of all excavated deposits, indicates that lithics were not manufactured within the cave—an unlikely scenario in any case, considering that the space is dimly lit. Chert scrapers from Middle and Late Bronze Age sites can be as small as *c.* 13mm in length and *c.* 17mm in width (Hogan 2021a, 124). The three convex scrapers (21E297:42, 43, 44) from Poll Bunker are diminutive, which could lead to an association with the 'micro-scraper' classification, though this is only a potential subtype (Woodman *et al*. 2006, 159). Their small size suggests a deliberate choice, supported in this instance by the availability of chert within the vicinity of Poll Bunker. Most 'micro-scrapers' are unprovenanced or have poor associations. Woodman *et al*. (2006) suggest that they were used for a specific purpose in coastal areas, and that they were made and used for a limited period. Diminutive scrapers have also been identified on Middle Bronze Age inland sites, however, such as at Grange 3, Co. Meath, and Camlin 3, Co. Tipperary (Hogan 2021a, 123–4; 2021b, lxi, xlviii).

Freehand technology is not popularly associated with lithic assemblages from the very late sub-periods of prehistory, although some sources posit the continuation of a 'simple platform technology' (Woodman 2016, 75). Freehand-reduced material has been identified on Middle and Late Bronze Age sites as well as on Iron Age sites, but in small numbers, accounting for approximately 17% of analysed assemblages in a recent study (Hogan 2021a, 118, 119). The Poll Bunker freehand pieces can therefore be seen as part of the Middle or Late Bronze Age artefactual assemblage. The identification of a possible bipolar notch on flake 21E297:50 is noteworthy, but cautiously so. This form of modification was not noted during recent research on Chalcolithic and Bronze Age assemblages (Hogan 2021a), and so represents a potential addition to the lithoculture of the period.

In Ireland, use-wear analysis has demonstrated that scrapers have been used in hide-working and woodworking, with the suggestion of a shift from hide-working to woodworking as the tools decreased in size (Bamforth and Woodman 2004, 29, 30, 35). This could intimate a woodworking function for the 'micro-scrapers' from Poll Bunker. A Polish study of Mesolithic micro-scrapers offers support for this. Osipowicz (2010, 4) suggested that these tools were likely used in the processing of soft plants with non-lignified stem tissue, i.e. herbaceous plants, although they could occasionally be used on other organic and non-organic materials. The breaks on two scrapers (21E297:42, 43) from Poll Bunker may have been intentional. This practice has been noted in Neolithic (Mallía-Guest 2011, 83), Chalcolithic (McDevitt 2010) and Bronze Age (Hogan 2021a, 124) assemblages and may reflect deliberate decommissioning of tools as part of ritual activity. Though difficult to establish conclusively, this has been suggested for altered lithic material elsewhere (Ballin 2014; Little *et al*. 2016).

A cattle metatarsal from C.4 was directly dated to the Middle Bronze Age. The nineteen cattle bones from this stratum (C.4) represent an adult individual between two and three years of age at death. Primary meat bones as well as peripheral elements were present, indicating that the animal was slaughtered and butchered near the cave (an animal of this size would have been too large to enter the cave live). The butchery marks were associated with carcass division and possible marrow extraction (Appendix 4).

The Bronze Age material identified in Poll Bunker may reflect the use of this cave for occupation, storage or the disposal of debris from a nearby open-air site.

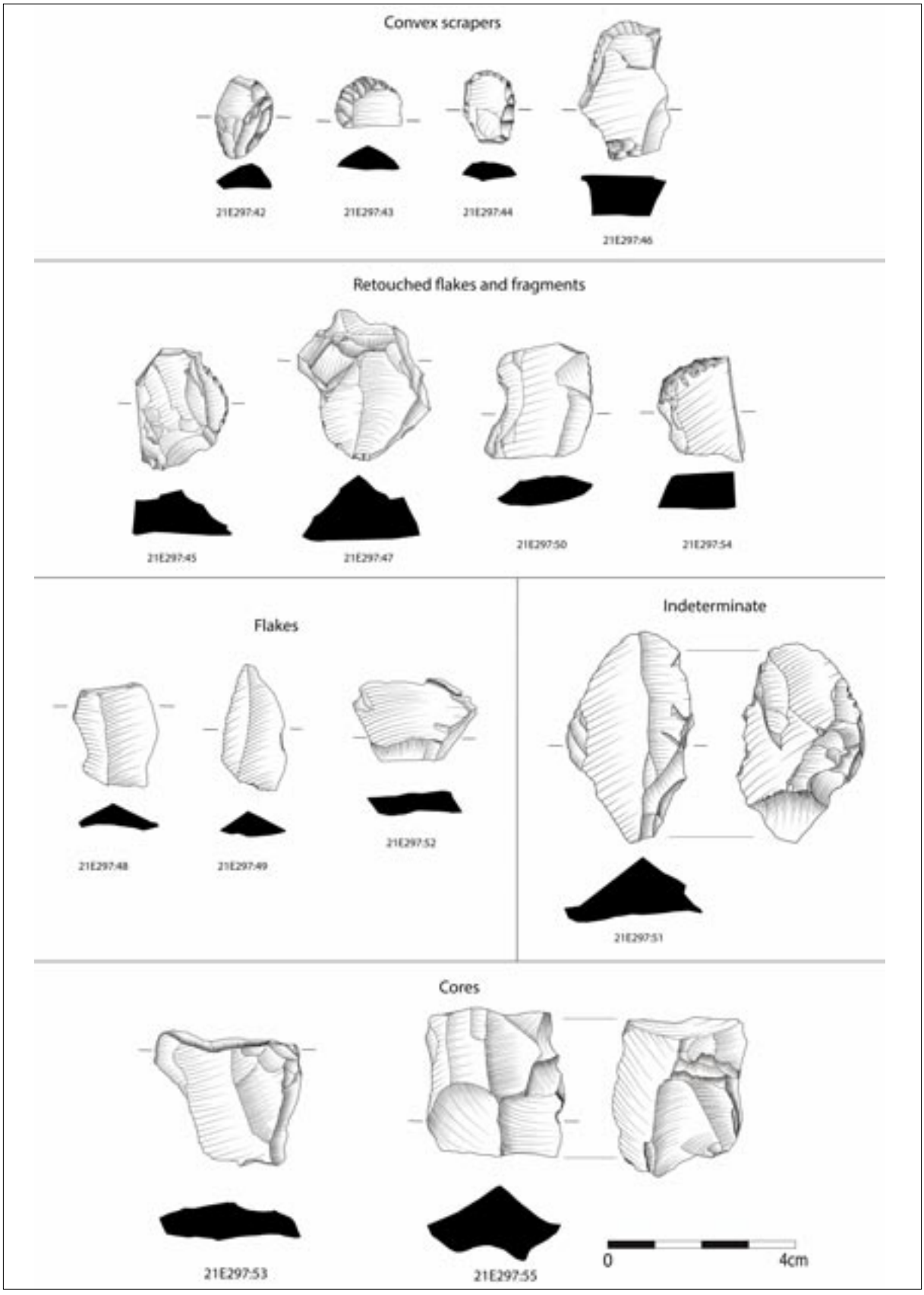

Fig. 9—Lithic assemblage (Elaine Lynch).

The range of material—pottery vessels, convex scrapers and flakes, butchered animal bones—are typical domestic finds from contemporary settlements. A ritual interpretation must also be considered, however, based on the fragmented nature of the artefacts when they first entered the cave, combined with multiple instances across Ireland of caves becoming foci of votive deposition during the Middle and/or Late Bronze Age. Middle–Late Bronze Age pottery is the most common type of prehistoric pottery from Irish caves, typically associated with votive deposition (Dowd 2015, chapter 6; Roche 2016). The Late Neolithic/Chalcolithic human skull from Poll Bunker tentatively hints at the possibility that, as at Poulnabrone and Poulawack, Bronze Age communities were aware of the earlier funerary use of this cave and continued to consider it a special place in the landscape.

Late Bronze Age–Early Iron Age

The Late Bronze Age–Early Iron Age dog was of advanced age, suggesting that it may have sought shelter in the cave to die, or that its carcass may have been dumped in the cave. Given the earlier apparent ritual significance of the cave, it is also possible that the dog remains represent some form of deliberate deposition, not least considering the symbolic significance of dogs across Iron Age Europe (e.g. Wait 1985; Bhreathnach 2002).

Early medieval

Radiocarbon dating indicates two phases of early medieval activity. The tooth of a sow, one of ten pig bones from the cave, was dated to the late eighth or early ninth century AD. It may be a natural occurrence within the sediments or may relate to farming practices. The butchered sheep/goat vertebra certainly reflects human activities near or in the cave during the tenth or early eleventh century AD. The other undated sheep/goat bones (from C.4) may be contemporaneous. These two sheep/goats were slaughtered at 13–16 months (Appendix 4). The butchery marks are consistent with dismemberment of the carcass prior to cooking. This may reveal short-term occupation of the cave during the early medieval period, possibly related to transhumance or an itinerant labourer. Alternatively, butchery waste from an open-air site may have been disposed of in the cave. Of note are a cashel (CL005-160031-) located 165m south of the cave, a second cashel (CL005-160026-) 190m west of the cave and a third cashel (CL005-160033-) 230m to the south-east. None of these three cashels have been excavated, but there can be little doubt that the occupants were aware of the existence of the cave and appropriated it as a convenient protected space that could be utilised for a variety of purposes. Though unlikely, use of the cave as a hermitage cannot be entirely ruled out, considering the evidence for cave hermitages in other parts of Ireland (Dowd 2018).

Early medieval communities across Ireland utilised natural limestone caves for a variety of purposes. A relatively common phenomenon was to construct a souterrain against the mouth of a small cave passage, thereby taking advantage of a pre-existing underground space. Five examples of cave-souterrains are known in the Burren, occurring in the townlands of Ballyganner South, Castletown, Pullagh, Rannagh East and Termon (Fig. 1; Appendix 5). Considering the similarity in morphology, it is possible that Poll Bunker was used as a ready-made souterrain. Other caves were appropriated at this time for occupation, including Glencurran Cave, which served as a dwelling-place on an intermittent basis over several centuries (Dowd 2015, chapter 8). The hermitage cave known as St Mac Duagh's Bed in Keelhilla was traditionally believed to be where the early medieval St Colmán retired to pray and contemplate. Some caves in the Burren have produced evidence of occupation in the form of drystone walling, paving, seashells and butchered animal bones, but in the absence of excavation and/or radiocarbon dating the period or periods in question remain unknown (Fig. 1; Appendix 5). Debris such as butchered animal bones and a bone comb fragment from Robber's Den is also suggestive of early medieval occupation, though the recovery of the mandible of an adult female, dated to 1210±40 BP (Beta-277382; AD 690–935), complicates this interpretation (Dowd 2015, 184, 200).

High medieval

During the fifteenth century, the lower hind leg of a sheep/goat (under 2.5 years of age) was wedged into a narrow fissure near the roof of the cave (Fig. 10). There are no natural processes through which the leg could have found its way into this location. What it represents is difficult to ascertain. It may relate to butchery activities, food-processing or meat storage in or near the cave (though no butchery marks were present on the leg bones). Alternatively, the cave may have been used by a shepherd or farmer as a sheep or goat shelter. It is also worth considering the possibility that the treatment of the sheep/goat leg may reflect folk traditions about the supernatural potency of animal legs to bring good luck and protection to the homestead and farm if hung in the dwelling-house or byre (Ó Súilleabháin 1963, 15, 401). The leg of an animal that had died of blackleg (black quarter), for instance, was commonly cut off and hung in the byre to safeguard other livestock from the disease (McGowan 2009, 248). This may be relevant if Poll Bunker was used in association with sheep- or goat-herding.

Fig. 10—The lower hind leg of a sheep/goat of fifteenth-century AD date, found together with a cattle tooth and a sheep/goat rib fragment, wedged into a fissure near the cave roof (Ken Williams).

Signs of human activity in other Burren caves are less common during the high medieval period than in earlier times. The remains of an adolescent from Moneen Cave, which appear to represent a boy who died while seeking shelter during the period AD 1520–1670 (UBA-19933, 265±24 BP), may be related to booleying on Moneen Mountain (Dowd 2016, 18). An adult human tibia from Robber's Den, dated to AD 1470–1650 (Beta-277383, 320±40 BP), is more enigmatic owing to the absence of associated skeletal remains (Dowd 2015, 213–14). Glencurran Cave has produced butchered animal bones of high medieval date that again probably reflect short-term occupation (Dowd, in prep.).

High medieval/post-medieval wall

When first discovered, the floor of the cave chamber was strewn with 10–15 large stones (C.1), primarily limestone but with at least one of sandstone. These were removed from Poll Bunker by the cavers prior to the realisation of the archaeological significance of the site. They likely represent the remnants of a drystone wall that once blocked the entrance but subsequently collapsed and fell inwards. The fifteenth-century sheep/goat hind leg provides a *terminus post quem* for the wall, which likely functioned to keep animals in or out of the cave. It may have been blocked to prevent livestock—sheep, lambs, goats or goat kids—from wandering in and injuring themselves. A more likely scenario, however, is that the cave functioned as a *cró*, a traditional feature of goat husbandry found on upland grasslands in the Burren. The *cró* was used to house goat kids by day while the mother foraged. At night the kids were released to suckle their mothers, before being returned to the *cró* the following morning. The kids were thus reared on a diet exclusively of milk, making the meat sweeter and more tender (Dunford 2001, 237).

Undated material

Archaeological material of unknown date includes animal bone, a shale percussor, a worked piece of sandstone, charcoal fragments, three mussel shells and eighteen quartz fragments (Fig. 11). The percussor, found in the niche in the back wall of the cave, displays an area of intensive damage that appears to reflect grinding, and opposing scars that likely represent opposed striking points in bipolar reduction, i.e. a hammer and anvil (Appendix 3). This implement was likely used in knapping and may be associated with the lithic assemblage. The sandstone piece from C.4 displays extensive pitting and staining, possibly resulting from use, and gloss that may be a consequence of exposure to heat.

An anthropogenic origin can be assumed for the burnt animal bones, probably reflecting meals prepared or consumed in or near the cave. Two bone fragments from C.4 are fully calcined, indicative of full oxidation

Fig. 11—Top (L–R): quartz from C.2, C.4 and C.7. Bottom (L–R): mussel shells, charcoal and worked sandstone pebble from C.4 (Ken Williams).

at a high temperature for several hours. Charring associated with roasting joints of meat was noted on a few cattle and pig bones from C.4 and on a single fragment from C.2. The paucity of charcoal indicates that fires were never lit within the cave; the calcined and charred bones therefore likely represent meat cooked outside the cave, with joints brought into the cave or deliberately discarded there. Despite the small quantity of charcoal recovered, a wide variety of taxa were identified: in order of representation these were Pomoideae (hawthorn, mountain ash, apple, pear), ash (*Fraxinus*), blackthorn (*Prunus spinosa*), hazel (*Corylus avellana*) and young oak twigs (*Quercus* spp). Most of the taxa identified are small, light-dependent and coloniser trees, which most likely grew in areas of relatively clear and open land (charcoal identification by Dr Ellen OCarroll).

The mussel shells could reflect Bronze Age activities (mirroring the oyster shells from Moneen Cave) or may be early medieval in date (as are scallop shells from Glencurran Cave; Dowd 2015, 184). Quartz occurs naturally in the environs of Poll Bunker and, while some pieces may be natural occurrences, the preponderance of fragments suggests deliberate collection, curation and/or deposition. Quartz found in the same fissure as the high medieval sheep/goat leg may be contemporary with it. In recent centuries quartz was perceived to have supernatural properties and was often associated with the *sí* (fairies) (Thompson 2005). Quartz also frequently features in Neolithic and Bronze Age ritual and mortuary contexts and is a feature of some early medieval Christian burials (Koeberl 1997; O'Brien 2020, 119–22).

CAVES AS DYNAMIC ENVIRONMENTS

Caves are dynamic environments, subject to a greater number of natural and cultural formation processes than typically affect open-air sites. Unless access is blocked, these enclosed and protected subterranean spaces tend to be repeatedly visited over centuries and millennia, all contributing to the reworking of stratigraphy. The confined nature of Poll Bunker means that each human and animal visitor over at least four millennia had limited space in which to move and carry out activities, which would have caused great disturbance to the cave stratification, including incorporation of later material into earlier levels. The degree of fragmentation evident in the Late Neolithic/Chalcolithic human cranium, some of the lithics and most of the faunal assemblage is partially a consequence of trampling. The Middle–Late Bronze Age pottery seems to have been deposited in the cave as sherds rather than intact vessels, and these were likely further fragmented by subsequent trampling.

Bioturbation and water activity have also contributed to stratigraphic disturbance. Substantial roots from

vegetation growing outside the cave were encountered growing through the principal archaeological stratum (C.4) in the chamber. The Late Neolithic/Chalcolithic cranial fragments also bore striations caused by root activity (Appendix 1). Deposits in the cave were noted to be saturated during excavation, with water pooling on the cave floor. Saturation of strata, even if infrequent, will cause mixing of deposits and degradation of bones and artefacts. Many of the pottery sherds, for instance, were wet and crumbling when initially discovered. The blackened nature of some of the animal bones also reflects water action and exposure.

Poll Bunker embodies many of the recurring features of cave archaeology in Ireland and more broadly. Caves are typically multi-period sites. The way a particular cave is used varies enormously, depending on the political, religious and cultural context of the time. Caves act as traps for material generated by cultural and natural processes, processes that are frequently difficult to differentiate during excavation. Radiocarbon dating remains the most powerful tool for identifying different phases of activity. Multiple radiocarbon dates are recommended even for an individual archaeological context or stratum, since, as has been demonstrated here, dating by association is extremely unreliable in cave contexts.

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Appendices 1–4 are summaries of more comprehensive specialist reports that have been submitted with the final excavation report to the National Monuments Service and the National Museum of Ireland.

APPENDIX 1: LATE NEOLITHIC/CHALCOLITHIC HUMAN SKELETAL REMAINS FROM POLL BUNKER

MARA TESORIERI

The 39 human cranial fragments recovered from C.3 represent a left parietal and occipital bone, radiocarbon-dated to the Late Neolithic/Chalcolithic. The remains were highly fragmented, light to dark yellow in colour, with dark staining on both the endocranial and ectocranial surfaces. It was possible to refit the majority of the fragments. Based on the size of the bone, they likely belonged to a juvenile or young adolescent (i.e. between two and seventeen years of age).

Taphonomy

The fragments were moderately to well preserved (preservation score 1–2) (Powers 2007) and ranged in colour from cream to white, with spots of dark staining resulting in a 'mottled' appearance to the bone surface. The staining was located primarily along the ectocranial surface, with only around 50% or less of the endocranial surface affected. There was no evidence of taphonomic damage caused by animal scavenging, such as claw or teeth marks, although there were a small number of striations along the surface indicative of root action.

Pathology

Endocranial lesions in the form of small plaques layered on top of the periosteum (the diploë was not involved) were identified along the cruciate eminence, specifically along the transverse sinus groove on the right side of the occipital bone. Most of the lesions, however, were concentrated within the parietal eminence on the endocranial surface of the left parietal. Endocranial lesions in both adults and non-adults are commonly recorded in human skeletal remains dating from all periods. Despite their high occurrence within the archaeological record, their aetiology is still debated. They are likely a result of a number of different pathologies and trauma rather than one single factor. The plaques of new bone formation identified in the Poll Bunker assemblage were identified as grey fibre bone deposits, one of the four category types of endocranial lesions (Lewis 2017, 142). These lesions have been attributed to active bleeding of the meninges as a result of trauma, anaemia, chronic meningitis (resulting from bacterial infection), rickets, scurvy etc. (Lewis 2017). While an aetiology for endocranial lesions can occasionally be attributed to a specific disease, this requires the presence of an intact or nearly intact skeleton in order to observe lesion distribution and is therefore not possible for the Poll Bunker assemblage.

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APPENDIX 2: MIDDLE–LATE BRONZE AGE POTTERY ASSEMBLAGE FROM POLL BUNKER

Elaine Lynch

The Poll Bunker pottery assemblage (all from C.4) consists of three rim sherds, seven base sherds, two base fragments, one base angle fragment, 30 body sherds and 72 fragments/crumbs (Table 2). Most of the sherds are small and fragmented but generally in good condition. No decoration was noted. A minimum of three vessels are represented, based on the varied types of rim forms and fabrics. None of the sherds re-joined.

Description

The sherds are associated with domestic Middle to Late Bronze Age pots. Vessels 1 and 2 were identified by two different rim sherds. Both have out-turned rims forming a slight external neck with an internal bevel, from moderately thick-walled, possibly barrel- or bucket-shaped flat-bottomed vessels (Fig. 12). Vessels 1 and 2 are similar in fabric, which was moderately tempered with crushed pieces of white quartzite (<0.2cm). It is possible that these two vessels were constructed from the same clay mixture. Vessel 3 was richly tempered with crushed pieces of white quartzite, the majority of which were small (<0.2cm), with some larger pieces (<1cm). The white quartzite gives the three vessels a distinct speckled appearance. Tiny flecks of mica are visible on the surfaces of all three vessels, giving them a glittery effect. The colour of prehistoric vessels is the result of clay composition combined with the duration

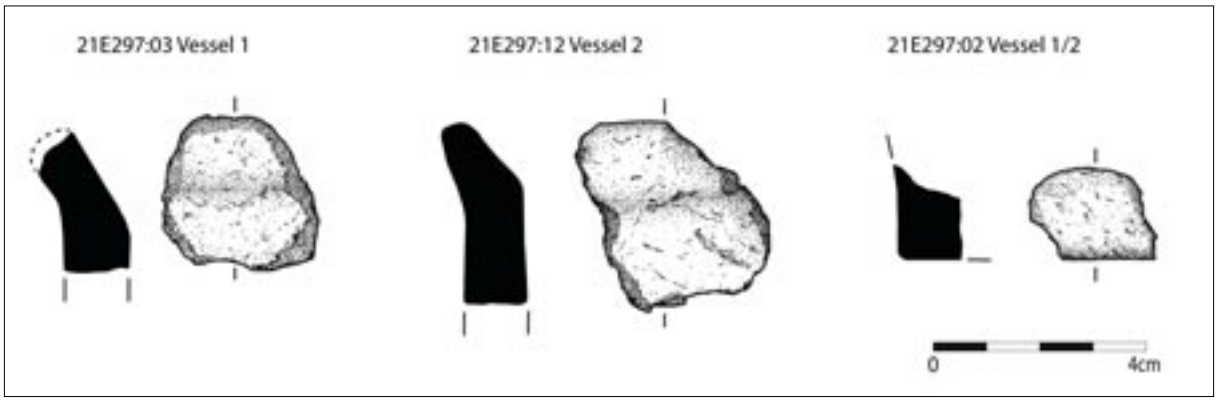

Fig. 12—Rim sherds from Vessel 1 and Vessel 2, and a base sherd, probably from one of these vessels (Elaine Lynch).

Table 2—Details of vessels.

Vessel no.	Rim	Body	Base	Fragment or crumb	Temper size (cm)	Temper quantity	Temper type	Thickness (body) (cm)	Weight (g)
1	1	19	–	–	<0.2	Moderate	Quartzite	0.95–1.25	138.9
2	2	8	–	–	<0.2	Moderate	Quartzite	1.05–1.20	74.6
3	–	3	–	6	<1–0.5	Rich	Quartzite	1.10–1.35	82.2
1 or 2	–	–	7	3 base	<0.2	Moderate	Quartzite	1.40–1.50	69.6
1?	–	–	–	66	<0.2	Moderate	Quartzite	0.95–1.25	66.8
Total	**3**	**30**	**7**	**75**					**432.1**

and atmospheric temperature of the firing process (Shepard 1956, 103). The three Poll Bunker vessels were fired to an orange/reddish-brown with dark grey cores, suggesting that the vessels were rapidly fired in low-temperature conditions (*ibid.*, 104) and the oxidisation of the sherd cores was incomplete. The three vessels were constructed using coils that were pinched into shape. All the vessels appear to have been smoothed during the construction phase but not to a high finish. Some Vessel 1 and Vessel 2 sherds have striation marks on the surface, which are possibly from the potter's fingers or a tool. Vessel 2 has obvious striation marks on the internal surface of the two rim sherds.

Reference

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Catalogue

VESSEL 1: One rim sherd (21E297:3) and nineteen body sherds (21E297:4, 8, 11, 13, 14, 17, 19, 20, 21, 23, 27, 30, 33–38, 40).
Total weight: 138.9g.
Vessel shape: Rounded, out-turned rim forming a slight external neck with an internal bevel (over 2.2cm wide). Top of rim is broken.
Estimated internal rim diameter: Sherd too small to determine accurately.
Body thickness: 0.95–1.25cm.
Fabric: Coarse and firm.
Temper: Moderately tempered with fine (<0.2cm) angular pieces of crushed quartzite and mica.
Surface: The exterior surface is flat, even and well-smoothed; striation marks are visible on the surfaces of several sherds (21E297:3, 4, 8, 11, 17, 19, 20) from smoothing of the surfaces during construction.
Sherd colour: Orange exterior; dark grey core; orange internal surface.

VESSEL 2: Two rim sherds (21E297:6, 12), one sherd from below the rim (21E297:24) and seven body sherds (21E297:5, 10, 15, 26, 29, 31, 39).
Total weight: 74.6g.
Vessel shape: Rounded, out-turned rim forming a slight external neck with an internal bevel (1.85cm wide).
Estimated internal rim diameter: Sherd too small to determine accurately.
Body thickness: 1.05–1.15cm.
Fabric: Coarse and firm.
Temper: Moderately tempered with fine (<0.2cm) angular pieces of crushed quartzite and mica.
Surface: The exterior surface is flat, even and well-smoothed; horizontal striation marks are visible on the internal surfaces of the rim sherds from smoothing of the surfaces during construction.
Sherd colour: Reddish-brown exterior; dark grey core; dark brown internal surface.

VESSEL 3: Three body sherds (21E297:7, 22, 25) and six fragments/crumbs (21E297:40).
Total weight: 82.8g.
Body thickness: 1.1–1.35cm.
Fabric: Coarse and firm.
Temper: Richly tempered with small (<0.5cm) and occasionally large (<1cm) angular pieces of crushed quartzite and mica.
Surface: Interior surface is flat, even and smooth, with temper visible on the surface; the exterior surface is rough and gritty, with temper protruding through the surface.
Sherd colour: Orange exterior; dark grey core; dark grey/black internal surface.

Possibly VESSEL 1 or VESSEL 2: One base angle sherd (21E297:2), six base sherds (21E297:1, 9, 16, 18, 28, 32), two base fragments (21E297:40) and one base angle fragment (21E297:40).
Total weight: 69.6g.
Base thickness: 1.4–1.5cm.
Fabric, temper and sherd colour: Same as Vessels 1 and 2.

Possibly VESSEL 1: 66 body fragments/crumbs (21E297:40).
Total weight: 66.8g.
Base thickness: 0.95–1.25cm.
Fabric, temper and sherd colour: Same as Vessel 1.

APPENDIX 3: LITHIC ASSEMBLAGE FROM POLL BUNKER

Cian Hogan

Fourteen chert and flint lithics were recovered from C.4, including both core and product debitage. Chert and flint were the raw materials exploited.

The assemblage

Chert combination core (21E297:55): displays markers of freehand and bipolar reduction. Some exterior surface is present. There is abrasion on arrises. Three parallel removals are attributed to freehand reduction, with two parallel removals attributed to bipolar reduction. These two sets of removals occur on two faces at right angles to each other, showing rotation of the core. The freehand removals interrupt a possible bipolar scar. This signifies that they occurred later in the working sequence, using the edge as a platform. It is possible that the bipolar removal was struck specifically to create the platform. Typically, it is posited that bipolar reduction follows platform reduction, instigated when the platform core has reached an unworkable stage (Barham 1987, 49; Hiscock 2015; Ballin 2017, 34). This core appears to be an example of bipolar reduction being used as a precursor to freehand reduction as a way to produce a platform. L 30mm, W 29mm, T 19mm, Wgt 17.8g.

Regular chert flake (21E297:49): a freehand product. There is edge damage and calcite accretion present. It has a small platform, a feathered termination and a diffuse bulb of percussion. It was reduced using direct percussion. L 21mm, W 15mm, T 5mm, Wgt 1.6g.

Irregular flint flake (21E297:52): reduced using direct percussion, possibly with a soft hammer. Edge damage and calcite accretion are visible. There is cortex on the distal end, though not enough to discern its source. The quality of the flint is poor, with pitting across both faces. L 21mm, W 21mm, T 5mm, Wgt 2.56g.

Chert convex scraper (21E297:44): produced on a small flake of indeterminate reduction. It shows edge damage. Retouch has been applied in an inverse, scalar fashion. It is abrupt and short. A defect on the right lateral proximal zone interrupts the retouch, indicating a later occurrence. This appears to have had a hinged termination, indicated by a section of the distal edge to the right of the arris. L 15mm, W 11mm, T 4mm, Wgt 0.85g.

Chert convex scraper fragment (21E297:42): a distal fragment, missing a section of its left lateral. It displays edge damage. Retouch has been applied in a direct, scalar fashion. It is abrupt and semi-invasive. The edge between the retouch and the ventral surface shows greater crushing than on other pieces. This could indicate a difference in use or manufacture. L 17mm, W 11mm, T 4mm, Wgt 1.11g.

Chert convex scraper, medial fragment (21E297:43): proximal end has been broken off. Owing to the retouch, it is unclear how much of the distal end is missing. Exterior surface is present. Retouch has been applied in a direct, sub-parallel fashion. It is semi-abrupt and semi-invasive. This was possibly created using pressure flaking. The angle of retouch is lower than in other pieces, so may possibly be a fragment of a subcircular disc scraper. The retouch is interrupted by the medial break present. There is an abraded feel to the retouch arrises, possibly from use. L 9mm, W 13mm, T 4mm, Wgt 0.86g.

Convex scraper fragment (21E297:46): a piece of indeterminate product debitage. The material is recorded as chert, though it could be poor-quality flint. Parts of the piece feel abraded. It is unusual in its overall form. It is unclear whether the missing laterals occurred during reduction or later. The presence of faults, very similar to bedding planes, likely contributed to breakage. The straightness of the ventral surface is reminiscent of a split pebble. It is missing its right lateral, and probably the proximal section of the left lateral. Retouch has been applied in a direct, sub-parallel fashion. It is abrupt and semi-invasive. It was likely applied using pressure flaking. L 30mm, W 15mm, T 8mm, Wgt 6.43g.

Retouched flint flake (21E297:45): an axial bipolar product. The ventral surface shows a substantial removal scar. This could be from a large, hinged bulb or a parasitic removal. Retouch on the right lateral has been applied in a direct, scalar fashion. It is abrupt and short. The retouch was likely created using direct percussion. This has an abraded feel. There are calcite accretions present. L 24mm, W 19mm, T 8mm, Wgt 5.22g.

Retouched chert flake (21E297:47): a secondary flake, produced using direct percussion. It has a plain platform, with two parallel removals. There are no clear waves or bulb of percussion. There is a section of *écaillé* retouch on one corner. A dorsal scar runs perpendicular to the flake. This may have been struck to remove the ridge seen on the dorsal surface. A series of removals along its distal half, with crushing or edge damage along the associated edge, are interpreted as crude but deliberate retouch applied in a direct, scalar fashion. It is abrupt and semi-invasive. This was possibly applied using direct percussion. L 26mm, W 30mm, T 14mm, Wgt 10.75g.

?Retouched chert flake (21E297:50): a possible bipolar product. It has a defect on its distal end. This is possibly the result of the bipolar blow, as the edges feel abraded. The concavity on its left lateral may have been deliberately produced and is similar to concavities on Clactonian notches (Ohel 1979; McNabb 1992, 688, 689; White 2000; van der Drift 2009, 9; 2012, 22). This would be produced using bipolar reduction, which introduces some doubt as to its authenticity, as this can occur naturally. If accepted as such, this type of modification is achieved through bipolar working (van der Drift 2009). There are two small indentations on the dorsal surface, located approximately in the centre of the piece. This would be the expected location of impact damage from a hammerstone, thus supporting the interpretation. The presence of a flaw in the chert adjacent to the concavity introduces some doubt, as this raises the likelihood of a natural or unintended fracture, which is a long-held criticism of the identification of such pieces (Ohel 1979). L 24mm, W 23mm, T 7mm, Wgt 5.04g.

Retouched fragment (21E297:54): of indeterminate reduction and produced on poor-quality flint or high-quality chert. It is broken on two axes, with no clear waves of percussion to indicate its original form. There are two scars, one interrupted by a later break, on the curving side, adjacent to the rough surface. These are likely to be retouch and are applied in a direct fashion. It is abrupt and semi-invasive. The retouch is abraded, likely owing to use. L 20mm, W 17mm, T 9mm, Wgt 5.56g.

Chert debitage (21E297:51): possibly reduced using bipolar percussion. It is irregular in form. There appear to be dorsal and ventral surfaces. The apparent ventral surface shows several possible removals. These could be parasitic removals or partial collapsing owing to the nature of chert. Edge damage occurs on the piece. L 41mm, W 28mm, T 12mm, Wgt 11.71g.

Irregular chert flake (21E297:48): a non-axial bipolar removal. It displays edge damage and abrasion. There is one dorsal scar present, running perpendicular to the orientation of the flake. This may be a freehand removal. L 17mm, W 22mm, T 5mm, Wgt 2.29g.

Flint core fragment (21E297:53): a piece of debitage. There is edge damage present, and iron staining can be seen. The reduction technology is unclear. L 31mm, W 27mm, T 10mm, Wgt 9.46g.

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APPENDIX 4: MAMMAL, AMPHIBIAN AND BIRD BONE ASSEMBLAGE FROM POLL BUNKER

Margaret McCarthy

A total of 520 bones were recovered from Poll Bunker (Table 3). The assemblage demonstrates an extremely high level of fragmentation, some of which may be associated with butchery and food preparation. Over 46% of the remains could only be placed into a size category, and a further 12% represent minute indeterminate fragments of bone.

Methods

All the bones were identified using the writer's reference collections and avian collections in the Natural History Museum, Dublin. Data were recorded onto an Excel database, with categories for butchery, ageing, sexing, species and element. Bones not identified to species were categorised according to the relative size of the animal: large mammal (assumed to be cattle, horse or deer), medium mammal (assumed to be sheep, goat, pig or large dog) and indeterminate. Material described as 'large mammal', for instance, is likely to belong to cattle but was too small to eliminate the possibility of horse and red deer, though neither of these species is present in the identified samples. Similarly, specimens that in all probability were sheep but which may have also originated from goat, pig or large dog were recorded as 'medium mammal'. Owing to the

Table 3—Faunal remains from Poll Bunker by context.

	Cow (*Bos taurus*)	**Sheep/goat** (*Ovis aries/ Capra hircus*)	**Pig** (*Sus scrofa*)	**Dog** (*Canis lupus familiaris*)	**Hare** (*Lepus timidus*)	**Mouse** (*Mus* sp.)	**Frog** (*Rana temporaria*)	**Bird** (*Aves*)	**Indeterminate bird**	**Large mammal**	**Medium mammal**	**Indeterminate**	**Total**
C.2	1	4	–	–	3	–	–	–	–	1	4	7	20
C.4	19	70	10	7	37	2	2	16	6	84	154	62	469
C.6	–	8	–	–	–	–	–	7	–	–	–	2	17
C.7	1	13	–	–	–	–	–	–	–	–	–	–	14
Total	21	95	10	7	40	2	2	23	6	85	158	71	520

anatomical similarities between sheep and goat, bones were assigned to the category 'sheep/goat' unless a definite identification was made using guidelines established by Boessneck (1969) and Prummel and Frisch (1986). Notably, there was no definite identification of goat and the remainder of the elements allowing for discrimination between the two species were all identified to sheep. Ageing data were determined using procedures outlined by Silver (1969) for long bones and by Grant (1975a; 1975b) for mandibles. The relative proportions of the different species were assessed using the fragments total and the minimum number of individuals represented. Taphonomic criteria, including butchery, pathology, gnawing and surface modifications as a result of weathering, were also recorded.

Condition

The assemblage demonstrates a moderate level of preservation, with just 54 fragments showing signs of severe surface exfoliation and weathering, indicating that these bones had lain exposed on the surface for some time before becoming incorporated into deposits. In view of the relatively good state of preservation, the very high degree of fragmentation is of note, with few complete long bones and skulls recovered. A significant portion of the material could only be assigned to a size category or was indeterminate, leaving 199 specimens to be assigned to species. Despite the presence of some dog bones, none of the fragments exhibit gnawing, which implies rapid deposition and subsequent sealing of material. Burning was observed on a few specimens, recorded as charred and calcined, and presumably relates to meal preparation.

Analysis

C.4 yielded 469 bones, of which 163 could be identified. The condition varied. Some were weathered from subaerial exposure, others were discoloured from prolonged periods in the damp, wet conditions of the cave, while many fragments were in such good condition as to indicate rapid deposition and incorporation into cave sediments.

Sheep/goat are the dominant species, accounting for 43% of the identified sample from C.4 and representing at least two individuals, at least one of which was deposited during the early medieval period. Elements from the peripheral region of the skeleton as well as meat-bearing limb bones are present, indicating that live sheep were slaughtered and butchered in the vicinity of the cave. Phalanges are the most common elements (22 out of an identified sample of 70), followed by carpal/tarsal bones, loose teeth and mandible fragments. The foot bones are unfused, and a femur fragment is also unfused distally. In general, epiphyseal fusion data combined with limited dental ageing evidence indicate that the two sheep/goats from this stratum were slaughtered at around 13–16 months of age. Three vertebrae exhibit traces of axial and lateral butchery associated with the dismemberment of the carcass prior to cooking.

Cattle are the second most common livestock species and the nineteen fragments from C.4 represent a single adult individual, between two and three years of age at death. Identified elements include humerus, metatarsal, carpal/tarsal, vertebrae, mandible and loose teeth. The remains include primary meat bones as well as peripheral elements, indicating that the animal was slaughtered and butchered in the vicinity of the cave. Axial chop-marks associated with carcass division and possible marrow extraction were observed on two vertebrae and on a proximal fragment of a metatarsal. A radiocarbon date from a butchered metatarsal indicated Middle Bronze Age activity.

Ten pig bones were identified, representing a single female individual a little under a year old at death. Identified fragments comprise humerus, maxilla, mandible and loose teeth, though there is an insufficient range of skeletal elements to suggest that the whole carcass was processed in the vicinity of the cave. An early medieval date was returned from a pig tooth.

A dog was represented by seven bones, comprising fragments of radius, ulna, tibia, femur and mandible. A Late Bronze Age/Early Iron Age date was obtained from the radius. The mandibular teeth exhibit some degree of wear, indicating that the dog may have been quite advanced in age. An estimation of shoulder height from

measurements of two long bones indicated a relatively small dog, similar to a modern cocker spaniel in stature.

Wild fauna are well represented and include hare, mouse and frog. In terms of numbers of identified specimens (NISP), hare is the second most common species from C.4; the 37 bones represent at least two adult individuals. Ribs and vertebral fragments are the most frequent elements present; the remaining bones comprise fragments of humerus, tibia, metapodia, sacrum, scapula, pelvis and mandible. An Early Bronze Age date was obtained from the tibia. Other identified mammalian and amphibian bones include mouse and frog. Two mouse—possibly woodmouse (*Apodemus sylvaticus*)—leg bones were extracted from a sieved soil sample, and two leg bone fragments were identified as frog.

Twenty-two bird bones were recovered, sixteen of which could be identified to species. These represent two small species of passerine, likely robin (*Erithacus rubecula*) and goldcrest (*Regulus regulus*), the latter being Ireland's smallest bird species. These remains are fresh and modern in appearance and are interpreted as natural occurrences.

C.2 produced twenty animal bones. Several fragments have a distinctive blackened (though not charred) appearance, as they had been exposed to damp, wet conditions on the surface of the cave close to the entrance. The identified sample comprised eight fragments representing cattle, sheep/goat and hare. Cattle is identified from a fragment of a mandibular molar, and the four ovicaprid bones include a fragment of an unfused distal metatarsal, a piece of vertebra and two incisors. The sheep/goat bones are from a single individual less than 2.5 years of age at death. There are no marks on any of the fragments to provide definite evidence that they were food remains, but the fragmented vertebra suggests dismemberment. An adult hare is represented by the proximal end of a metacarpal, the acetabular region of a pelvis and a complete vertebra. Four fragments of long bone from a medium-sized animal and seven minute fragments of bone indeterminate to species or size grouping were also present.

Fourteen animal bones were discovered wedged deep into a narrow fissure near the cave roof. All are diagnostic to species and, with the exception of a mandibular molar from an adult cow, are from a sheep/goat. Identified sheep/goat bones include a complete right distally unfused metatarsal, a complete calcaneus with an unfused epiphysis, a navicular/cuboid (ankle bone), nine phalanges and an almost complete rib. These represent a single individual that was under 2.5 years of age at death and, with the exception of the rib, are all from the lower hind leg of the animal, which has been radiocarbon-dated to the fifteenth century AD. The bones display no evidence of cultural modification relating to meal preparation (butchery and cooking) or alterations caused by wild carnivores.

C.6 produced seventeen bones representing an adult sheep/goat and a small species of perching bird that best matches robin. The bird bones are fresh-looking and modern in appearance and probably represent a natural fatality.

Discussion

The dating programme indicates that the faunal assemblage resulted from many phases of human activity in Poll Bunker. The interpretation of chronologically diverse remains from a single stratum (C.4) is complicated by specific taphonomic issues associated with the dispersal of finds and bones in cave environments. The clear variation in preservation of the faunal remains suggests that different taphonomic processes operated before the bones were incorporated into the cave deposit, supporting the clear chronological heterogeneity shown by the radiocarbon dates. While a mundane explanation could be sought for the presence of hares, birds, mice and frogs, the recovery of butchered livestock raises questions regarding the nature of activities in the cave. There is a possibility that some of the faunal remains are the result of domestic activities of Bronze Age and/or more recent historic date. The general composition of the assemblage illustrates a reliance on domestic sheep/goat, which account for half the total number of identified specimens. The degree of disarticulation and fragmentation of the cattle and pig remains indicates some form of carcass utilisation. The range of skeletal elements indicates waste from different stages in the carcass-reduction sequence, although those parts that are discarded at the primary butchery stage, for example mandibles and feet, are more numerous than other elements. The presence of sub-adult individuals suggests deliberate selection. There may be a ritual aspect to the deposition of some of the faunal material, similar to the evidence from Glencurran Cave and Moneen Cave.

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APPENDIX 5: CAVES OF ARCHAEOLOGICAL SIGNIFICANCE IN THE BURREN

Marion Dowd

Fifteen caves of archaeological significance have been identified in the Burren to date (see Fig. 1; Table 4). The following five caves have been excluded. Drystone walls at Clooncoose Cave 2 (Clooncoose td) and Poll Bru (Rannagh East td) are of unknown antiquity. Carran Mine Cave (Castletown td) is a mid-nineteenth-century lead mine that intersected a natural cave. Mullan (2019, 203) records Poulawillin Cave (Eantybeg North/Eanty More td) as being 'of significant archaeological interest' related to the mining of chert deposits but, although *in situ* chert seams were observed in the cave wall during an inspection of the site by archaeologist Michelle Comber, nothing of an archaeological nature was noted (M. Comber, pers. comm., 22 September 2023). Drew (2004) lists Skeleton Cave (Knocknagroagh td) as containing 'human skeletal remains', possibly based on local information, but there are no supporting data and nothing in the published literature.

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Table 4—Caves of archaeological significance in the Burren.

Name	Townland	SMR	Type of archaeology (*see Dowd 2015 for further detail*)
Moneen Cave	Acres (Burren By)	CL002-080----	Bronze Age and high medieval deposits
Maze Hole /Aillwee Upper Cave	Aillwee	CL006-147----	Seashells, date unknown
Poll an Phúca / Pollballyelly	Ballyelly	CL004-096----	Seashells, date unknown
Ballyganner South Cave	Ballyganner South	CL009-059122-	Early medieval souterrain built against cave
Robber's Den	Ballynahown	CL004-069----	Bronze Age, early medieval and high medieval deposits
Ballyconry Cave	Castletown (Burren By)	CL010-015004-	Early medieval souterrain built against cave
Clooncoose Cave	Clooncoose	CL010-100004-	Walling and paving, date unknown
St Mac Duagh's Bed	Keelhilla	CL006-023004-	Hermitage associated with early medieval saint
Poll Bunker	Poulbaun (Burren By)	CL005-275----	Neolithic, Bronze Age, early medieval and high medieval deposits
Christy's Cave	Poulnabrucky	CL005-229----	Limpet shells, animal bones and walling, date unknown
Pullagh Cave	Pullagh	CL006-048----	Early medieval souterrain built against cave
Rannagh East Cave	Rannagh East	CL006-053002-	Early medieval souterrain built against cave
Poll Rannagh East Cave*	Termon	CL006-142----	Early medieval souterrain built against cave
Cashlaungarr Cave 2	Tullycommon	CL010-229----	Walling, animal bone and worked bone, date unknown
Glencurran Cave	Tullycommon	CL010-054----	Bronze Age, early medieval and high medieval deposits

*This cave is located in Termon townland, not Rannagh East townland as per multiple caving publications.