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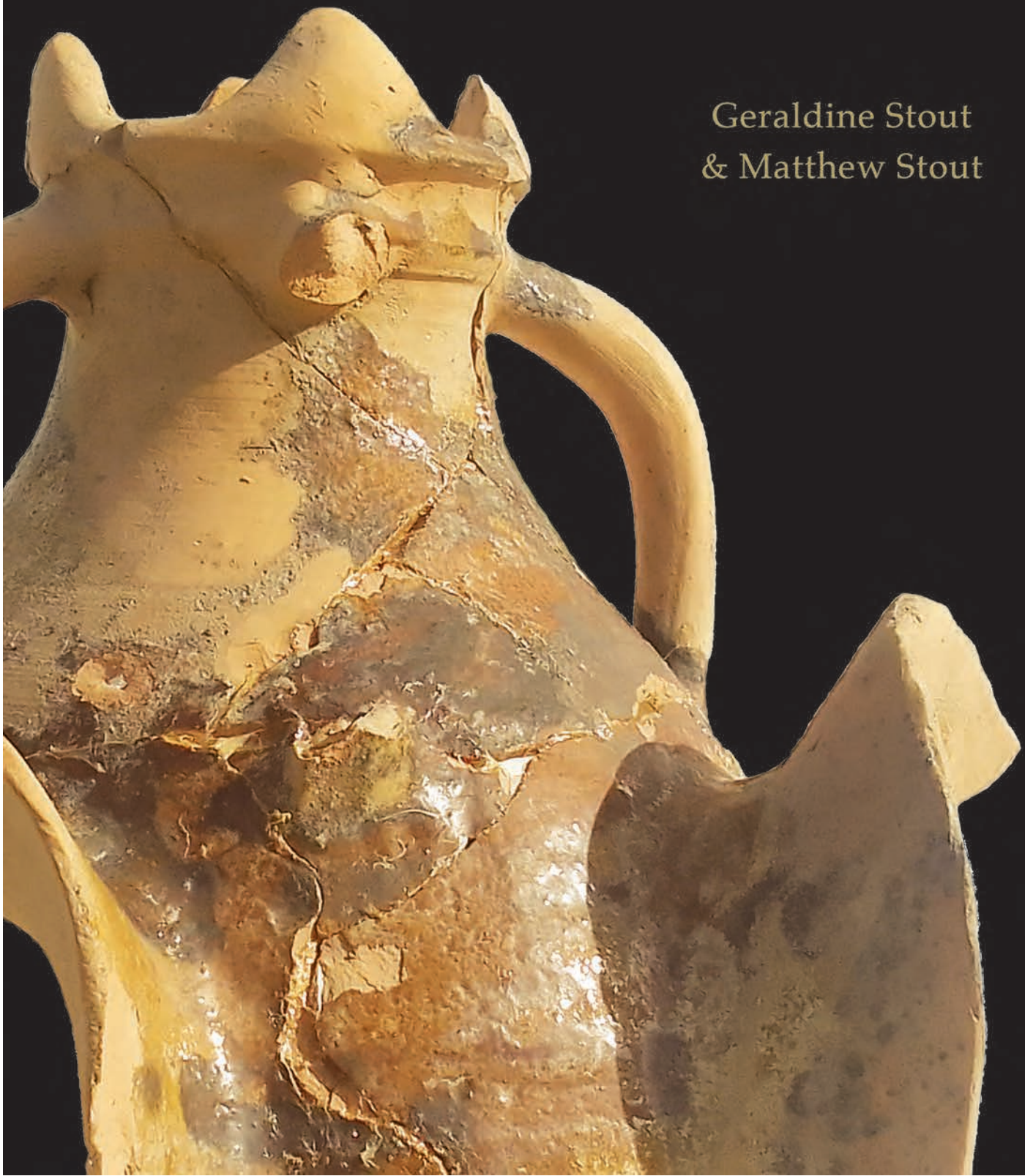
BEAUBEC, Co. Meath

Excavation of a French Cistercian Grange in the Boyne Valley

Geraldine Stout
& Matthew Stout



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This book is dedicated to John McCullen,
farmer, historian, caretaker of Beaubec

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Grace McCullen grew up in Beamore and is an enthusiastic advocate for Beaubec, local heritage in the Boyne Valley, the countryside and sustainable enterprise. Grace is a strategic marketer by profession and contributed to the communication and story-telling of 'The Dig at Beaubec'. As a former guide at Newgrange and Knowth, Grace happily welcomes visiting groups to the site, and looks forward to preserving the long-term future of the grange and grounds at Beaubec.

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Michala Nagyova is a graduate in archaeology from UCD. She has worked on numerous archaeological excavations, including Beaubec. Her research interests include the analysis of insects.

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Chris Southgate established Southgate Associates in 1990 as conservation engineering specialists. Southgate Associates expanded shortly afterwards to include architectural conservation, building, archaeology and heritage consultancy. This company provides services over a vast range of historic structures, ranging from dangerous medieval buildings to internationally significant cathedrals. Southgate Associates is experienced in practical building conservation, conservation management plans, and environmental impact assessment reports. The team is now writing the heritage strategy for the 'Cork Docklands Masterplan'.

Dr Geraldine Stout is the leading authority on the archaeology of the Brú na Bóinne World Heritage Site. Her publications include *Newgrange and the bend of the Boyne* (Cork University Press, Cork, 2002), 'The Cistercian grange: a medieval farming system' in M. Murphy and M. Stout (eds), *Agriculture and settlement in Ireland* (Four Courts Press, Dublin, 2015) and *The Bective Abbey project, Co. Meath: excavations 2009–12* (with Matthew Stout, Wordwell, Dublin, 2016). She is a patron of the Meath Archaeological and Historical Society and a Fellow of the Society of Antiquaries of London.

Dr Matthew Stout lectured in the School of History and Geography, Dublin City University. His books include *The Irish ringfort* (Four Courts Press, Dublin, reprinted 2023), *Early medieval Ireland 431–1169* (Wordwell, Dublin, revised edition 2023) and *Excavation of a multi-period site at Stalleen, Co. Meath, by Mandy Stephens: research in the Brú na Bóinne World Heritage Site* (edited with Geraldine Stout, Chapel Press, Julianstown, 2022).

Dr John Sunderland is an artist and archaeologist based in Cork, Ireland. His practice-based PhD in fine art examined the visual interpretation of landscape change and he continues to investigate our temporal experiences of landscapes and of materiality through a hybridized art and archaeology practice. He has undertaken residencies in Sweden, the UK and Ireland and exhibited nationally and internationally. His work can be found at www.johnsunderland.com.

Dr David E. Thornton is assistant professor of medieval European history at Bilkent University, Turkey. His research interests have ranged from medieval Irish and Welsh genealogy, Domesday Book and, most recently, the prosopography of the monstic orders in late medieval and early Tudor Britain and Ireland. He has published articles on the Cistercians in medieval England and Wales, and has a number of forthcoming papers on the monastic orders in Ireland before the Dissolution.

Chapter 15

Plant macrofossils from Beaubec, Co. Meath

Penny Johnston

Introduction:

The monks of the Cistercian grange of Beaubec in Bey More townland, Co. Meath, kept a range of livestock and cultivated various crops in the fields around the settlement. This chapter focuses on the archaeobotanical remains retrieved as a result of archaeological excavations, including the surviving remains of plants that were grown as crops, consumed as food, and the wild plants that grew in the areas around the settlement.

Unbeknownst to the medieval monks, they established their settlement in the same place as a small group of much earlier (Late Neolithic) pits. One of the pits contained large amounts of charcoal, but no non-charcoal plant remains were found and therefore this phase of activity plays only a minor role in the discussion below. Plant remains were present but sparse in deposits associated with Medieval Phase 1 (i.e. around the thirteenth century AD) and it likewise is mentioned only briefly in this chapter. The bulk of the discussion below focuses on the period after the beginning of the thirteenth century, when the grange was fully established and when the farm was producing surplus for the local and the export markets. The archaeobotanical samples from this period were taken from deposits associated with an upstanding stone service tower, subsurface remains of a deep moat and deposits that accumulated within the stone foundations of a barn, including a corn-drying kiln oven.

Methodology

Archaeobotany is the study of macroscopic plant remains that are recovered from archaeological deposits. This can give us a range of different types of information:

- Charred crop remains can tell us about what cereals were grown on or near the site, how they were processed and prepared for storage or consumption and about what types of weeds grew in the fields alongside the crops.
- Waterlogged plant remains from moats, ditches and deep features that cut the water table can tell us about the types of plants that grew in the vicinity of the site.
- Where the waterlogged remains are from cess pits or latrine deposits, they can give us direct evidence about the plants that were consumed by the occupants of the site.

The results from Beaubec are a relatively unusual example of a rural site where all three strands of evidence were found. Charred crop remains were recovered from a kiln, deposits within the barn and a destruction layer within the service tower. Waterlogged remains of plants from the surrounding environment were found in the fills that accumulated in the moat, outside the buildings. Waterlogged food remains were found in the service tower within the monks' residence. These results can be woven together to form a rich picture that gives us insight into local environment, consumption and arable husbandry practices in the medieval period.

Macroscopic plant remains are usually visible to the naked eye but are often very small (some are less than 1mm in width) and can be difficult to see in the archaeological deposits. Because of this the sediment needs to be washed away from the plant remains. The method used to clean the remains depends on the nature of the archaeological deposits and the reasons why the plant material has been preserved on the site. In Ireland, plants are usually preserved in archaeological deposits because they are either carbonised (that is, converted to inert carbon as a result of burning) or because they have been waterlogged (persistent damp, waterlogged conditions means that oxygen is not present, and the microorganisms that normally cause decay cannot do their usual damage). Decisions about how to sample and process samples usually depend on the type of preservation present on any given archaeological site.

At rural sites, where the archaeological features do not cut the water table and where

Pl. 15.1 The Discovery Programme flotation machine in use on site at Beaubec.

Pl. 15.2 Waterlogged deposit at the base of the moat, Cutting B, facing the eastern section of the cutting.

organic deposits did not accumulate quickly, plant remains are usually preserved by carbonisation. This is when exposure to fire has been sufficient to convert plant material into carbon (which is inert and therefore does not decay in the soil), but has also been insufficient to burn the plant material away to ash. The ideal preservation conditions for charred plant remains tend to be in low oxygen scenarios, for example at the base of a hearth, or where a roof or some similar superstructure has collapsed over the fire, leaving the plant material to smoulder and covert to carbon slowly (see Boardman and Jones 1990, 1–11 for a discussion of the optimum preservation conditions for charred archaeobotanical remains). Because carbonised plant material is less dense than water it floats, and soil samples from sites where this type of preservation is expected are usually processed by flotation. This is an efficient method used to extract the charred plant remains from archaeological sediments.

The dry samples from Beaubec were processed on site using a flotation machine, kindly lent for the duration of the excavation by The Discovery Programme (Pl. 15.1). A minimum of ten litres of bulk soil was usually taken for these samples, unless the deposit was not large enough to accommodate this. The exception to this was in some of the samples that contained large quantities of charred grains (for example, from the kiln); in these cases smaller volumes of soil were taken there because these were almost pure plant material, with very little sediment present. The areas with the richest results were sampled several times to maximise retrieval and to demonstrate the process of flotation to visitors and volunteers on the site.

Carbonisation is the most common and expected method of preservation at rural sites like Beaubec. However, this site was relatively unusual because several deposits were also waterlogged. These came from the lower layers of the deep moat, where the organic material was preserved because it was below the watertable (Pl. 15.2). Waterlogged remains were also found in deposits within the service tower, part of which appears to have been used as a latrine (Pl. 15.3). All the waterlogged samples were processed by washing the entire sample through a series of stacked geological sieves (smallest mesh size 250 microns). Similar to the approach to the dry deposits, contexts with waterlogged preservation were sampled multiple times. However, in these cases the sample size was much smaller, usually no greater than two litres (details of individual sample volume are provided in Table 15.1). Where appropriate, the

Pl. 15.3 The latrine during excavation, from the service tower and facing west, towards the underground culvert (Photo: John Sunderland).

Table 15.1: Samples from Beaubec

Italics = Wet sieved Blue = did not produce seeds

Sample Number	Phase	Area	Context	Volume (litres)	Sample Number	Phase	Area	Context	Volume (litres)
1	Medieval Phase 2	Barn	AF6	2	55	Medieval Phase 2	Barn	GF3	20
2	Medieval Phase 2	Barn	AF13	10	56	Medieval Phase 2	Barn	GF2	12
3	Medieval Phase 2	Barn	AF15	20	57	Medieval Phase 2	Barn	FF13	10
4	Medieval Phase 2	Barn	AF14	2	*58*	*Medieval Phase 2*	*Service tower*	*HF5*	*4*
5	Medieval Phase 2	Barn	AF15	10	59	Medieval Phase 2	Residence	JF20	8
6	Medieval Phase 2	Barn	AF14	5	60	Medieval Phase 1	Pre-barn	GF7	10
7	Medieval Phase 1	Pre-residence	BF5	5	61	Post-medieval		GF7	6
8	Medieval Phase 1	Pre-residence	BF4	8	63	Medieval Phase 2	Service tower	HF6	10
10	Medieval Phase 2	Barn	AF14	24	64	Medieval Phase 2	Barn	QF15	10
11A	Medieval Phase 1	Pre-residence	BF7	10	*65*	*Medieval Phase 2*	*Residence*	*JF26*	*2*
11B	*Medieval Phase 2*	*Residence*	*BF7*	*2*	66	Medieval Phase 1	Pre-barn	V(4)F13	5
12	Medieval Phase 2	Barn	AF5	10	67	Eighteenth century		V(7)F3	5
13	Medieval Phase 2	Barn	AF16	10	68	Medieval Phase 2	Barn	V(10)F4	4
14	Medieval Phase 2	Residence	BF7	10	69	Medieval Phase 2	Barn	V(7)F5	8
15	Medieval Phase 2	Barn	AF14	10	73	Medieval Phase 2	Barn	V(5)F6	8
16	Medieval Phase 2	Barn	AF17	10	74	Medieval Phase 2	Barn	V(7)F5	5
17	Medieval Phase 2	Barn	AF17	10	75	Eighteenth century		V(6)F3	1
18	Medieval Phase 2	Barn	AF15	10	76	Medieval Phase 2	Barn	V(5)F6	3
19	Medieval Phase 2	Barn	AF15	5	77	Medieval Phase 2	Barn	V(11)F2	10
20B	*Medieval Phase 2*	*Residence*	*BF8*	*2*	78	Eighteenth century		V(6)F3	2
21B	*Medieval Phase 2*	*Residence*	*BF8*	*2*	79	Eighteenth century		V(6)F3	2
22	Eighteenth century		CF4	2	80	Medieval Phase 2	Barn	V(5)F5	2
24	Medieval Phase 2	Barn	AF16	10	81	Medieval Phase 2	Barn	V(11)F12	8
25	Medieval Phase 1	Pre-barn	AF16	10	82	Medieval Phase 2	Barn	V(6)F10	4
26	*Medieval Phase 2*	*Residence*	*BF8*	*2*	83	Medieval Phase 2	Barn	V(10)F18	10
27	Late Neolithic	Pit circle	CF6	2	84	Medieval Phase 2	Barn	V(6)F8	5
28	Medieval Phase 2	Barn	DF3	10	85	Medieval Phase 2	Barn	FF12	5
29	Medieval Phase 2	Barn	DF17	10	87	Medieval Phase 2	Barn	V(11)F2	10
30	Medieval Phase 2	Barn	DF4	10	88	Medieval Phase 2	Barn	V(6)F7	3
31	Medieval Phase 2	Barn	DF4	10	89	Medieval Phase 2	Barn	V(12)F6	6
32	Eighteenth century		CF4	5	90	Medieval Phase 2	Barn	V(8)F2	3
33	Medieval Phase 2	Barn	DF17	10	91	Medieval Phase 2	Barn	V(7)F11	8
34	Modern		HF1	2	92	Medieval Phase 2	Barn	V(10)F15	10
35	Modern		LF3	5	93	Medieval Phase 2	Barn	V(6)F7	5
36	Late Neolithic	Pit circle	KF3	5	94	Medieval Phase 2	Barn	V(6)F7	8
37	Medieval Phase 2	Barn	FF6	10	95	Medieval Phase 2	Barn	DF17	10
38	Late Neolithic	Pit circle	KF3	10	96	Medieval Phase 2	Barn	V(10)F5	8
39	Modern		LF4	5	97	Medieval Phase 2	Barn	V(7)F19	10
40	Medieval Phase 2	Barn	FF8	10	98	Medieval Phase 2	Barn	V(7)F17	20
41	Medieval Phase 2	Service tower	HF2	10	99	Medieval Phase 2	Barn	V(5)F7	10
43	Medieval Phase 1	Pre-barn	EF10	10	100	Medieval Phase 2	Barn	V(5)F7	10
44	Late Neolithic	Pit circle	KF3	5	101	Medieval Phase 2	Barn	V(11)F7	7
45	Medieval Phase 2	Service tower	HF2	10	102	Medieval Phase 2	Barn	AF17	8
46	Medieval Phase 2	Service tower	HF3	10	103	Medieval Phase 2	Barn	DF17	1
47	Medieval Phase 2	Barn	FF11	5	104	Medieval Phase 2	Barn	DF17	3
48a	Medieval Phase 2	Barn	FF11	3	105	Medieval Phase 2	Barn	DF17	2
48b	Medieval Phase 2	Barn	FF11	3	106	Post-medieval		V(10)F4	10
50	*Medieval Phase 2*	*Service tower*	*HF8*	*1*	107	Medieval Phase 1	Pre-barn	V(11)F21	5
51	Medieval Phase 2	Barn	GF2	10	108	Medieval Phase 2	Barn	V(8)F22	6
52	Medieval Phase 2	Barn	GF3	10	109	Medieval Phase 2	Barn	V(5)F5	6
53	*Medieval Phase 2*	*Service tower*	*HF5*	*1*	110	Medieval Phase 2	Barn	DF17	1
54	*Medieval Phase 2*	*Service tower*	*HF5*	*1*	111	Medieval Phase 1	Pre-barn	V(4)F23	4

waterlogged deposits were also sampled for insect remains (Chapter 16).

Once processed, the samples were examined by stereoscopic microscope; they were first sorted to extract identifiable plant remains. Most samples were at least partially sorted during the excavation. This meant that it was possible to identify significant samples as they were being excavated; additional samples were then taken where necessary or appropriate. The

extracted plant material was then identified under magnification (x10–x50). The results of identification are presented in Table 15.2 (Medieval Phase 1 charred remains), Table 15.3 (Medieval Phase 2 charred remains), Table 15.4 (Medieval Phase 2 waterlogged remains from the moat and the latrine) and Table 15.4 (Medieval Phase 2 waterlogged remains from the latrine). The completed datasets are available on open access (Johnston 2023a–e). Nomenclature and taxonomic order broadly follow Stace (1997).

Phases

The main phases of activity at the site included activity in the Late Neolithic (3000–2500BC), Medieval Phase 1 (before *c*.AD1300) and Medieval Phase 2 (*c*.1300–1400).

Late Neolithic

A total of four samples was taken from possible Late Neolithic pits excavated at Beaubec. These came from the deposits **K**F3 (S36, S38 and S44) and **C**F6 (S27). Charcoal was present and was particularly abundant in **K**F3. However, there were no identifiable seeds in either of these samples. A possible grain of cereal was recovered from **K**F3 but this was badly degraded and it was not possible to say for definite that it was a grain. Archaeobotanical remains, specifically cereals, are not common in deposits associated with Late Neolithic activity, to the extent that some have suggested that arable agriculture died out entirely in this period in Ireland and in Britain (Stevens and Fuller 2012, 707–72), although this is disputed (Bishop 2015, 834–55). Others argue that additional factors may cause this pattern (McClatchie *et al.* 2022). As settlement evidence from the Late Neolithic is less archaeologically visible than in the Early Neolithic the pattern may also be underpinned by methodological flaws as it seems likely that the less visible deposits from the Late Neolithic are under-sampled.

Medieval Phase 1

Medieval Phase 1 comprised activity that pre-dated the main phase of stone building at the site. The majority of this evidence is in the form of agricultural furrows that were cut into the natural yellow boulder clay. There were five samples with macroplant remains from this activity, taken from various areas across the site: **A**F16 (S25), **E**F10 (S43), **G**F7 (S60), **V**F4 (S66) and **V**(4)F23 (S111) (Table 15.2).

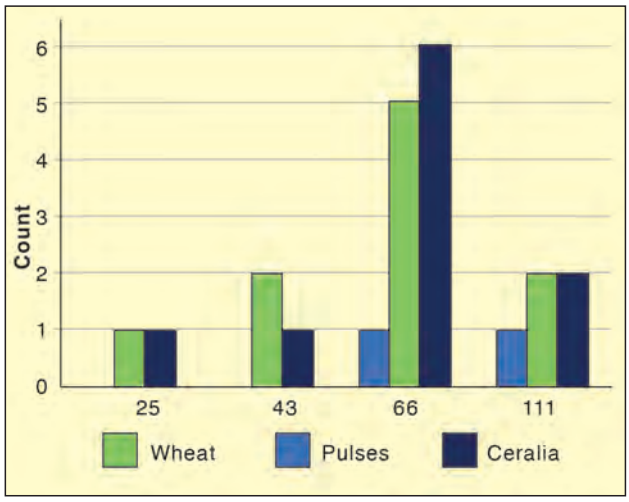


Fig. 15.1 Plant remains from Medieval Phase 1 (n=22).

Radiocarbon measurements were obtained from two samples. The charcoal-rich fill of an early pit **V**(4)F23 (S111) returned a measurement with a calibrated range from the eleventh to the twelfth centuries (AD1023–1157, UBA-48062, see Appendix 2). A radiocarbon sample from another feature, the fill of a furrow **G**F7 (S60), returned a much later measurement with a calibrated range from the fifteenth to the early seventeenth centuries (AD1436–1608; UBA-48058, see Appendix 2). This latter measurement is anomalously late and it appears to be based on intrusive carbon.

The plant remains from all of these deposits were very sparse. They included small

Table 15.2: Charred plant remains from Medieval Phase 1 deposits

Sample	**25**	**43**	**60**	**66**	**111**
Cutting	**A**	**F**	**G**	**V4**	**V4**
Context	**16**	**10**	**7**		**23**
Garden peas (*Pisum* species)					1
Medium indeterminate legumes (*Fabaceae*)				1	
Naked wheat (*Triticum aestivum L./turgidum* Desf./*durum L.*) grains, probable				2	
Wheat (*Triticum L.* species) grains	1	2	4	3	2
Indeterminate cereal (*Ceralia*) grains	1	1	1	6	2
Indeterminate cereal (*Ceralia*) apical ends of grains			1		
Grass family (*Poaceae*), indeterminate			2		
Total number of items	**2**	**3**	**8**	**12**	**5**

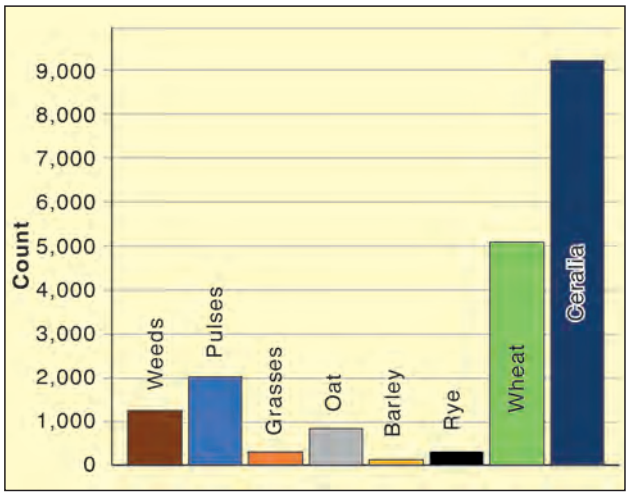


Fig. 15.2 Plant remains from Medieval Phase 2 (n=19,077).

quantities of wheat, indeterminate cereal grains (*Ceralia*) and pulses (Fig. 15.1: results from S60 have been excluded as they are potentially intrusive because they are associated with the anomalous radiocarbon measurement from this sample).

Medieval Phase 2

The bulk of the archaeobotanical evidence comes from the second phase of activity at the site, associated with the building and the use of the corn-drying kiln. A total of seventy-three samples with macroplant remains were analysed from this phase of activity; of these, sixty-four contained charred macroplant remains (the results from the richest of these are presented in Table 15.3; full details of all the samples from this phase of activity can be found in Johnston 2023c). A further nine samples contained waterlogged remains (Table 15.4). The waterlogged material is discussed separately below, but the discussion of plant remains from this phase begins with the charred remains. These samples were significantly richer than those from Medieval Phase 1. A combined graph of the results from samples of Medieval Phase 2 activity (Fig. 15.2) demonstrates that the range and volume of plant items is much greater in this phase when compared to Phase 1 (comparing Figs 15.1 and 15.2). Despite the differences in terms of numbers of items counted (twenty-two identified seeds from Phase 1, in contrast to 19,077 from Phase 2), wheat and pulses were recovered from both phases. The results from Medieval Phase 2 are discussed in greater detail below, as the vast majority of the seed assemblage from Beaubec comes from this phase.

Analysis of the charred plant remains

All of the rich assemblages of charred grain contained large amounts of cereal grains that were unidentifiable. In general, these grains were clinkered and vesicular, the heat of the fire that carbonised the grain also distorted the grain morphology and made it difficult to distinguish their characteristic features. This means that the quantities of grain originally present at the site were far greater than the quantities described in Table 15.3. There were four main areas where charred plant remains were found in abundance; two separate areas of burning within the barn, a burnt deposit within the service tower (possibly a destruction layer) and from the kiln. All of these are from activity associated with Medieval Phase 2 and they are described according to location below.

Burnt/hearth deposits within the barn

There were at least two discrete areas of burning, rich in charred plant remains, located within the barn. The first of these extended from Area **V**(7) to **V**(10) and comprised a deposit of burnt grain and pulses immediately over a flagged stone floor (Samples S69, S83 and S97). This deposit appears to represent the remains of stored food that was burnt, possibly as part of the processing that was carried out in this part of the barn, by the flagged area. The stored foods included pulses (these were mostly peas, although a few beans were also found), comprising 28% of the assemblage. However, this percentage is based on item counts, which underrepresents the pulses since peas and beans are much larger than cereal grains and, for example, 100 peas would take up a much larger volume/storage space than 100 cereal grains. Wheat was the most common cereal type (19%). Small quantities of oat and rye (2% each) and barley (1%) were also identified. In addition, weed seeds (4%) and grasses (1%) were found; these were all plants that are typical of arable fields and it is likely that they were accidentally harvested and stored, along with the crop, before they were burnt. A large percentage of the cereal grains (43%) were not identifiable to type.

Another seed-rich deposit was found in Area **V**(5). There were three samples from this area that were very rich (Samples S73, S76 and S100), with >1,000 items identified from Sample S76, and more than 400 items counted per litre. Pulses were much less frequent here in comparison to the deposits in Area **V**(7)/**V**(10).

Table 15.3: Charred plant remains from Medieval Phase 2 deposits (samples with >100 items)

Sample	1	3	5	10	12	13	16	19	28	29	31	33	37	40	47	48A	48B
Cutting	A	A	A	A	A	A	A	A	D	D	D	D	F	F	F	F	F
Feature	6	15	15	14	5	16	17	15	3	17	4	17	6	8	11	11	11
Hazelnut shell fragments		1															
Weed seeds	1	31	17	1	7	1	11	9	11	4	12	12	26	235	85	11	17
Grasses	1	2			9	1	9	4	6		3	3	42	22	6	2	19
Beans													1				
Garden peas	4	3	2		1				6	1	3		21	56	51		2
Small peas and vetchlings			29				2	6									
Indeterminate legumes	3	44		6	26	61	7			4	26	3	95	296	33	2	7
Oat	16	51	34	4	9	11	3	6	24		99		21	3	16	24	68
Barley		7											1	2	4		2
Rye		2		6	2	5	39	27		1		1	7	6	33	1	2
Wheat	53	101	56	29	17	33	360	110	41	396	87	72	582	1002	108	21	48
Ceralia	38	244	93	89	134	187	236	247	110	210	154	28	1085	1567	569	61	70
Indeterminate seeds	1	4	3		37			4	4	3	2	7	63	13	17	7	7
Total item counts	**120**	**492**	**242**	**135**	**243**	**357**	**684**	**430**	**202**	**619**	**399**	**126**	**2040**	**3437**	**1095**	**144**	**268**

Sample	63	64	69	73	76	77	78	81	83	85	87	95	96	100	104
Cutting	H	Q	V(7)	V(5)	V(5)	V(6)	V(4)	V(11)	V(10)	F	V(11)	F	V(7)	V(5)	F
Feature	6	15	5	6	6	3	3	12	5	27	2	24	57	7	26
Hazelnut shell fragments															
Weed seeds	154	3	37	6	59	1	2	18	28	2	12	45	52	4	3
Grasses	31		12	5	17	4	4	8	7	3	11	15	7		8
Beans			5			1			1	1					
Garden peas	8		99		16		3	11	1	3	8	10	60	2	1
Small peas and vetchlings				2						2					
Indeterminate legumes	62	5	239	3	88	2	8	25	289		4	44	174	6	2
Oat	111	7	13	6	30	23	6	19	18	2	10	96	30	12	28
Barley	24		2			6	6	5	4		11	19	9	3	
Rye	22		35					3	18			41	17		
Wheat	181	72	166	147	378	3	3	6	169	36	11	184	258	118	23
Ceralia	497	74	319	287	610	19	22	45	418	50	31	626	600	86	41
Indeterminate seeds			7	3	3		2	5	8	3	25	22	5	2	2
Total item counts	**1099**	**162**	**951**	**462**	**1275**	**60**	**60**	**145**	**970**	**115**	**123**	**1175**	**1218**	**235**	**115**

The identifiable remains from this sample were mostly grains of wheat (most of these were a naked wheat type).

Kiln samples

This was the most intensively analysed part of the site as it was excavated over three seasons of excavation (2019–2021). A total of fourteen samples were analysed from the kiln, split into two phases of use (Kiln Phase 1 and Kiln Phase 2). There were three samples from Kiln Phase 1 (Samples S16, S28 and S102) and there were eleven samples from Kiln Phase 2 (Samples S17, S29, S33, S37, S48, S85, S95, S103, S104, S105). There was another sample of kiln fuel (Sample S110) and a further three (Samples S13, S28 and S31) from cereal-rich deposits outside the kiln that appear to represent rake-out from the kiln (i.e. when burnt waste within the kiln was cleared out to prepare for another episode of use). Seeds and grain were quite common in almost all of the samples from the kiln apart from a sample of kiln fuel (Sample S110) where grain was rare and large chunks of charcoal were common.

The kiln samples were among the richest from the site and an examination of seed density shows that one sample (Sample S37,

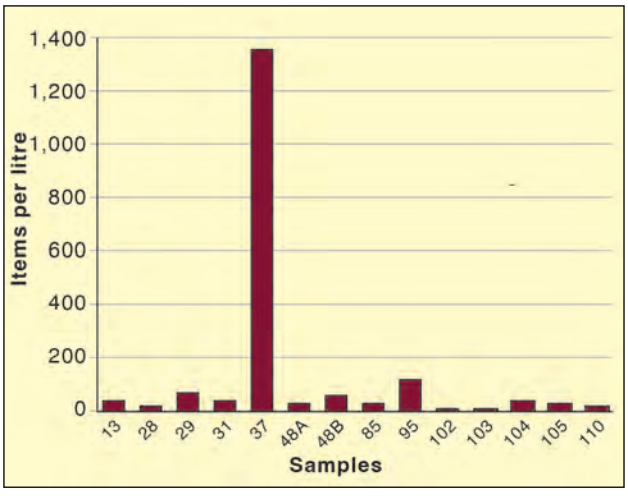


Fig. 15.3 Seed density in samples from the kiln.

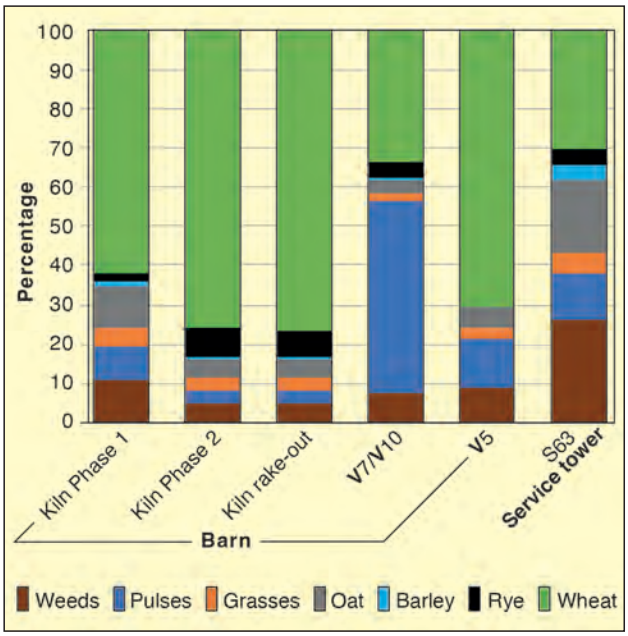


Fig. 15.4 Percentage composition of samples from different areas of the site (n=6,690).

from a deposit in the kiln flue, where 1,360 items were counted per litre of soil processed) was almost entirely made up of burnt macrofossils. This concentration of pure grain must represent a deposit that is not mixed with fuel. The density of other samples was more variable (Fig. 15.3) and these may be from deposits where the crop was mixed with fuel or with structural elements of the kiln when an accidental fire might have occurred.

Burnt deposits within the service tower

There were three samples of carbonised plant remains from within the service tower (Samples S41, S45 and S63). Plant remains were only abundant in one of these (Sample S63), taken from a layer of intense burning that included large chunks of charcoal from burnt timbers. The plant remains were friable and delicate, probably because they were charred at quite high temperatures. As a result, many of the cereal grains from this sample (46% of the plant items) could not be identified to genus. Where the grains were identifiable, they included wheat (17%), oat (10%), barley (2%) and rye (2%). A notable quantity of pulses (6%) was also recovered in this deposit, along with seeds from weeds and wild grasses (17%).

Comparisons between charred assemblages from different areas of the site

Samples from both phases of kiln use and from the rake-out were predominantly (at least 60% of identifiable remains) wheat. Where identifiable this was bread wheat. Weeds, pulses and oats were more prevalent during the first phase of kiln use, whereas rye was more common in the second phase (Fig. 15.4). The rake-out samples are almost identical to the samples from Kiln Phase 2, perhaps suggesting that they are related to this phase of use of the kiln, rather than from Kiln Phase 1.

There are some subtle differences in the charred assemblages from elsewhere at the site (Fig. 15.4). Wheat is noticeably less common in samples that are not associated with the kiln, apart from the sample from **V**(5). However, **V**(5) differs from the kiln samples in that it does not contain any rye, and barley was present only in very small amounts. Other noticeable differences include the distribution of pulses; these make up a greater portion of the identifiable remains from the non-kiln samples (particularly for samples from **V**(7)/**V**(10). The sample from the service tower differs from other areas of the site in that it includes a much greater percentage of oat grains and weed seeds than elsewhere.

Analysis of the waterlogged plant remains

Waterlogged plant remains were recovered from the fills of the moat, particularly the basal fills, and from the latrine within the service tower.

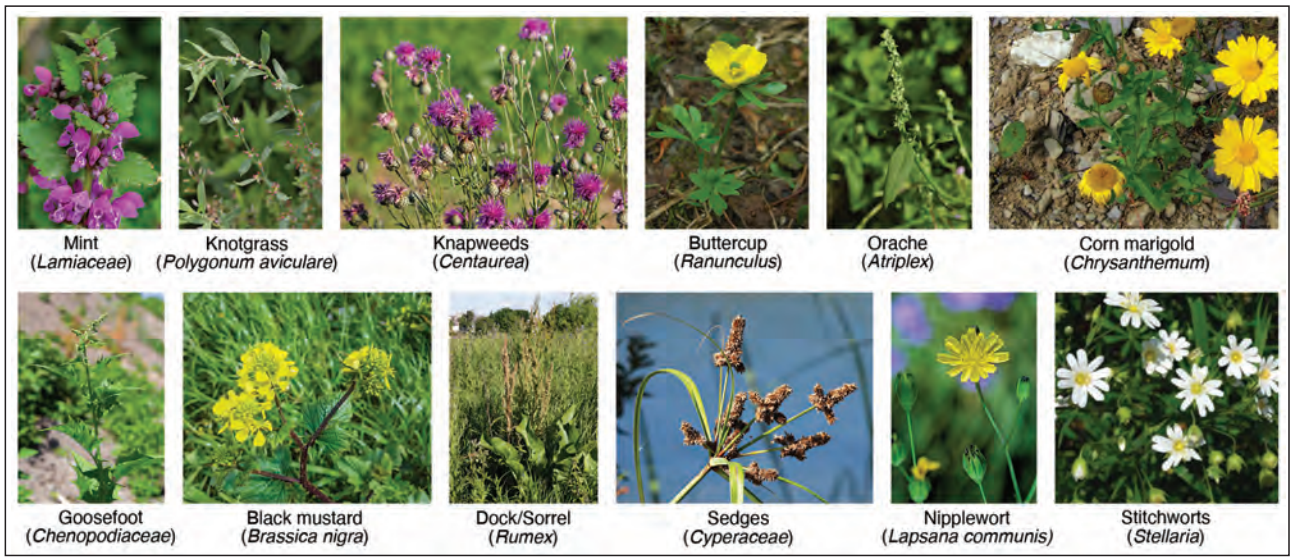
Moat samples

There were four waterlogged samples (Samples S20, S21, S26 and S65) from the basal fills of the moat (Table 15.4). The seeds included plants such as buttercups, knotgrasses and knapweeds, all common weeds of grassland and open ground. Plants such as common nettle and oraches/goosefoots also suggest some disturbance and nutrient enrichment of the soils. These would have colonised middens associated with the settlement at Beaubec and would have grown in areas where animals had defecated. In fact, the insect remains from some of the moat deposits suggest that animal dung was also present within the moat (Chapter 16). While the moat was open and would have acted as a trap for plant material from the surrounding area it is also possible that some of the seeds present in the moat were incorporated into the deposits because they were eaten by livestock and were present in their dung.

In other cases it is more certain that the seeds came from plants that grew in the immediate vicinity of the moat, if not within it.

Table 15.4: Identified waterlogged plant remains from moat and latrine samples

	Moat				Latrine				
Sample	**20B**	**21B**	**26**	**65**	**45**	**46**	**53**	**54**	**58**
Cutting/Context	**B**F8	**B**F8	**B**F8	**JF**26	**H**F2	**H**F3	**H**F5	**H**F5	**H**F5
Buttercup type (*Ranunculus* spp. L.)		1	3	4			7	1	2
Fig (*Ficus* species L.)				3			25	7	38
Common Nettle (*Urtica dioica* L.)		4	1	72				2	
Hazelnut shell fragments (*Corylus avellana* L.)								1	
Fat-hen (*Chenopodium album* L.)									1
Orache (*Atriplex* species L. (Halimione Aellen))		4	8	1					1
Indeterminate seeds from the goosefoot family (Chenopodiaceae)	1	4					1		
Stitchworts (*Stellaria* L. species)		4							
Mouse-ears (*Cerastium* L. species)			3						
Corncockle (*Agrostemma githago* L.) – fragments							+		+
Water-pepper (*Persicaria hydropiper* L.)			1						
Knotgrass (*Polygonum aviculare* L.)		4	8						1
Broad-leaved dock (*Rumex* cf *obtusifolius* L.) – fruiting tepal									1
Dock/Sorrel type (Rumex spp.) - type									5
Indeterminate seeds from the Knotgrass family (Polygonaceae)	1	12	10			4			
Black mustard (*Brassica nigra* (L.) W.D.J. Koch) – type			1				1	2	1
Mustards (*Sinapis* spp. L.)									1
Wild radish (*Raphanus raphanistrum* L.) – seed capsule							1		
Bramble: blackberry (*Rubus fructicosus* L. agg.)			78						1
Raspberry/blackberry (*Rubus idaeus/fructicosus* L.)	15	24				17			1
Raspberry/blackberry/dewberry (*Rubus* spp.)				7			14	5	6
Blackthorn/Sloe (*Prunus spinosa* L.)							5		
European plum (*Prunus domestica* L.) type						1	1		
Wild/dwarf cherry (*Prunus avium/cerasus* L.) type							2		3
Sloe/cherry/plum stone fragments (*Prunus* spp.)							+		
Grape (*Vitis* L. species)							3		3
Indeterminate Apiaceae	1		2						
Hemp-nettle (*Galeopsis* L. species)	1								
Selfheal (*Prunella vulgaris* L.)							1		
Indeterminate Lamiaceae	10	36	9				1		
Elder (*Sambucus nigra* L.)	20	7	9	42	1	4	3	5	4
Knapweeds (*Centaurea* spp. L.) – type		8	5	2			1	1	2
Nipplewort (*Lapsana communis* L.)							4		
Corn Marigold (*Chrysanthemum* cf *segetum* L.)		1					7		0.5
Trifid Bur-marigold (*Bidens tripartita* L.)								1	
Indeterminate daisy (Asteraceae)								1	
Common Spike-rushes (*Eleocharis palustris* (L) Roem. & Schult.)		2	1						
Indeterminate sedges (*Cyperaceae*)		2	1				1		
Oat (*Avena* L. species) – charred grains						1			
Hulled barley grains (*Hordeum vulgare* L.) – charred grains			1						
Naked wheat (*Triticum* cf *aestivum* L./ *turgidum* Desf./*durum* L.) – charred grains						1			
Naked wheat (*T. aestivum/compactum* type) – charred rachis internode		1							1
Wheat (*Triticum* L. species) – charred grains			1						
Indeterminate cereal (*Ceralia*) – charred grains					4	2			
Indeterminate cereal (*Ceralia*) – charred rachis internode			1						
Indeterminate grasses (*Poaceae*)							1		
Indeterminate seeds	2		3			3		1	
Straw fragments									++
Moss fragments									+++



Pl. 15.4 Common weeds from waterlogged contexts at Beaubec.

These included plants of damp environments, such as water-peppers, spike-rushes and sedges. The insect remains suggest that the moat water was quite stagnant (Chapter 16) and these plants probably grew at its edges, on the banks of the moat.

Wasteland plants appear to have been growing higher up along the verges of the moat. These included briars and elder; seeds from the fruits from these plants were the most numerous seeds in the moat deposits. These are seeds that have hard outer shells which means that they can survive in environments where softer plant tissues decays. They frequently survive in ditch deposits that went through cycles of being waterlogged and then drying out for short periods of time, before becoming waterlogged again. Blackberry and elderberry seeds sometimes accumulate in archaeological deposits because berries were collected by people, however in the moat samples it appears that they accumulated naturally; the skins of the berries were sometimes still intact around the seeds, meaning that it is unlikely that they have passed through a gut, and suggesting that these berries rotted on their plants and fell into the moat.

Some of the moat samples also contained the remains of cereals, including charred grains of hulled barley and naked wheat. As charred cereals were common in other areas of the site it appears that these small quantities of grain were waste from accidental fires that occurred during crop processing, e.g. in the kiln, that were subsequently disturbed and distributed across the site and then washed into the moat. A single uncharred rachis internode from bread wheat was also found in Sample S20. This is a relatively unusual find as cereal remains do not survive well in waterlogged conditions; the grains tend to decompose quickly, generally leaving only fragments of the testa which are not usually selected during archaeobotanical analysis (see Badura *et al.* 2015, 447). This uncharred rachis internode from Beaubec helps to corroborate the suggestion that most of the wheat grains from the site may be bread wheat; such identification is impossible based on grain morphology alone.

Latrine deposits

Waterlogged samples from within the service tower contained significant quantities of fruit seeds and these are usually considered an archaeobotanical signature for human excrement; they appear to be from the latrine for the grange (although, in contrast, no beetles specifically associated with human excrement were found in the samples, Chapter 16). There were five samples from this area (Samples S45, S46, S53, S54 and S58; see Table 15.4). The fruits consumed at the site included native fruits such as raspberry/blackberry and sloe; these are commonly found in waterlogged deposits from Irish urban sites and were evidently commonly exploited as food throughout the medieval period. The evidence from the moat suggests that blackberry was readily available in the immediate vicinity of the settlement and it seems unlikely that they had to travel to collect this. Similarly, while no sloe stones were found in the moat deposits, blackthorn trees are abundant in the surrounding area today and this may also have been the case in the past.

Small quantities of cherry stones (Bird cherry type) were found in the latrine deposits from Beaubec. It is likely that bird cherry was also collected locally, growing in amongst the blackthorn. Elsewhere they have been found in large quantities in very specific deposits, such as a thirteenth-century collapsed wooden chute that was full of fruit remains, found in High Street in Dublin. This was interpreted as the remains of fruit processing, perhaps even fruit fermentation (Mitchell 1987, 27).

Stones from non-native plants included fruit trees such as a wild plum (*Prunus domestica* ssp. *insititia*). These may include damson-type fruits and bullace. It is notoriously difficult to distinguish different plum types (see van Zeist and Woldring 2000, 563–4) and it was not possible to determine between damson or bullace based on the plum stones that we have from Beaubec. While these are not native to Ireland they appear to have been introduced and were growing in Ireland by the medieval period. It seems likely that they were grown in orchards associated with the grange, as has been suggested for other monastic settlements in Britain (see Dickson 1996, 29). No examples of the larger cultivated plums were found, and these were probably a later introduction; they are usually only found in post-medieval deposits in Britain (Greig 1996, 215–16) and the same appears to be the case in Ireland.

More exotic fruits such as figs and grapes were also found at Beaubec. These are not native fruits and their waterlogged remains are a clear indication that some food stuffs were imported to the site (this is dealt with in more detail in the Discussion section below).

Given the evidence for extensive cereal processing on the site it is likely that cereals were part of the diet. Although no uncharred cereal grains were recovered from the latrine deposits this is not unusual as the grain would generally have been ground before consumption, making it difficult to distinguish in a macro-analysis. Nevertheless, there is some tangential evidence for cereal consumption; these come in the form of fragments of crop weed seeds that would have been ground up and consumed with cereal flour, particularly fragments of the corncockle (*Agrostemma githago*). Corncockle is a weed with large seeds that mimic cereal grains during crop processing; this means that the intrusive seeds can only be removed from the crop by picking them out by hand, making it almost impossible to remove all traces of the weed from the grain harvest. They were frequently ground with flour in the past. Finely ground fragments were present in deposits from Fishamble Street, probably as a result of having been milled, consumed with cereal food, and passed through the digestive system (Geraghty 1996, 37; Collins 1997, 229). Similar results have been noted in other urban deposits (e.g. Tierney and Hannon 1997, 882; Johnston 1998). It is likely that this is also the origin of the corncockle fragments in the Beaubec latrine samples.

Discussion

Cereals

Wheat was the predominant cereal type in almost all of the samples from Beaubec. However, more detailed identification of the different species of wheat present in archaeological samples can be difficult if only the grains are present. This is the result of a combination of factors, including the complex evolution of wheat in general, as well as the fact that the charring of archaeological grains can sometimes distort their morphology (Hillman *et al.* 1996, 195; Jones 1998, 29). At Beaubec it was possible to say that, where identifiable, all of the wheat grains were from a variety of naked wheat. These wheats are easy to process after the harvest as the grains are not surrounded by protective layers (glumes) as they grow. In addition, small quantities of bread wheat-type rachis internodes were found in some of the samples. These are parts of the wheat plant where the grain breaks away from the stalk when the cereals are harvested and threshed. They are significant because, unlike the grains, rachis internodes can be separated out by species. At Beaubec their presence means that we can suggest that most (or perhaps even all) of the wheat grains were from bread wheat. By the medieval period this had become the standard grain crop in eastern Ireland and it fetched the highest price when sold (Murphy and Potterton 2010, 306). This may have been a consideration when deciding what crops to plant at Beaubec; a 1235 confirmation grant gave the monks at the settlement the right to buy and sell merchandise and they had a commercial interest in Drogheda by the early fourteenth century (Chapter 2).

Wheat was present in most of the samples and it was dominant in many, particularly the samples from the kiln. Kilns were used to dry grain after harvest, in preparation for milling

and for storage. They were also used for preparing malt for brewing. Malt is sprouted grain, a state usually initiated during the brewing process by steeping grains in water so that enzymes begin to convert the starch in the grain into more digestible sugars (Bouby *et al.* 2011, 356). The germination process is then halted by heating the sprouted grains in drying kilns (van der Veen 1989, 304). The resultant archaeobotanical samples would be of mature, well-developed grains with a wasted base, although charring experiments suggest that germination has a minimal impact upon grain morphology (Stika 1996, 86). Van der Veen (1989, 305) suggests that the archaeobotanical signature for the presence of malt should be 75% sprouted grain. There is no archaeobotanical evidence to suggest that malt was being prepared in the kiln at Beaubec; no evidence for sprouted grain was noted. However, the grain sprouts are very fragile and carbonise quickly, and it may be that some malt was present but the remains burnt away to chaff. If beer was ever brewed at the site, it seems likely that wheat was used, as this was the main grain found. There is some documentary evidence suggesting that wheat was used for malt in the Dublin region in the period when the Beaubec grange was occupied; for example, 6% of the wheat received at the Holy Trinity manor at Clonkeen was malted according to the accounts for 1344–5 (Murphy and Potterton 2010, 308).

It seems likely, however, that the bulk of the bread wheat from Beaubec was ground into flour and used to make bread or exported. Before the Anglo-Norman invasion most Irish bread was flat and unleavened, but after the colony was established oven-fired wheaten loaves became more common (Sexton 1998, 84–5). Flour from bread wheat, with its high gluten content, was a suitable raw material for these leavened loaves and much of the bread wheat grain accidentally burnt at Beaubec was probably grown to be ground as flour.

There were no obvious remains of actual bread in the samples from Beaubec, although this is not unusual as they can survive as amorphous charred masses and further classification is difficult at a macro level. Scanning electron microscopy (SEM) is usually required to distinguish items such as breads and porridges but methodological approaches to classifying these are still in development (see González Carretero *et al*. 2017, 415–32; Valamoti *et al.* 2019, 97–113).

Bread wheat was also the main cereal type found in contemporary deposits from Swords Castle in Co. Dublin and from Killeen Castle and Bective Abbey in Co. Meath (McClatchie 2022, 282; Dillon and Johnston 2009, 101; Lyons 2016, 186–8). However, it was not the case in the archaeobotanical remains from deposits associated with the grange at Stalleen, Co. Meath, where oat was the dominant cereal type, comprising 74% of the identified cereals in the deposits associated with the Grange, followed by equal proportions of barley and wheat at 13% each (Cobain 2022, 114). The only comparable area at Beaubec where oat was found in significant amounts was from the burnt layer in the service tower. However, it was in no way as frequent as it was in Stalleen, since wheat made up 54% of the identifiable cereal assemblage and oat comprised just 33% followed by barley 7% and wheat 6%. In fact, apart from wheat, cereals such as rye, oat and barley were present in such small quantities in Beaubec deposits that in some cases it is possible that they were not deliberately stored crops, but were present because they were weeds of the corn field that grew in amongst the wheat crop (for example, when grain from an earlier crop is left in the field and self-sows amongst the succeeding crop).

Pulses were found in forty-eight of the Beaubec samples, almost 50% of the samples examined. They were particularly abundant (>30 items) in twelve samples from the kiln and the surrounding area (S3, S5, S13, S37, S40, S47 and S95), from the deposit of *in situ* burning in the service tower (S63), from a deposit of intense burning overlying a flagged surface within the barn (S69 and S96), from burnt deposits in Area **V**(5) (S76) and from a charcoal-rich area near a collapsed wall in Area **V**(11) (S81). Two types of cultivated legumes were identified, garden pea and broad bean. These have also been identified from broadly contemporary sites in the general area, such as Swords Castle (McClatchie 2022, 283) and Bective Abbey (Lyons 2016, 197–8). Although there are early written records to suggest that some pulses (peas and beans) were in cultivation in Ireland in the early medieval period (Kelly 1998, 248–50), they usually do not appear in the archaeobotanical record until later, after the Anglo-Norman conquest; at Swords Castle, for example, it is only found in deposits dating from the eleventh/twelfth centuries and later (McClatchie 2022, 283). Pulses played an important role in crop

rotation as they are nitrogen-fixing and help to re-establish soil fertility after cereal cultivation. Including pulses in a crop rotation system boosted yields and productivity as it meant that it was not necessary to leave plots fallow and uncultivated when soils were depleted due to over-cultivation. There is documentary evidence to suggest that peas and beans were grown quite widely in the area around Dublin from at least the thirteenth century, although they were not grown in all the demesnes where there is surviving evidence, suggesting the intensive crop rotation was not necessarily widespread or universal in Ireland in this period (Murphy and Potterton 2010, 314–15). Nevertheless, McClatchie (2022, 283) suggests that the recovery of pulses along with large quantities of bread wheat at Swords Castle could indicate that crop rotation was in place in some areas, particularly since bread wheat requires better soil quality than other cereal types. The same is true for Beaubec and it seems very likely that crop rotation was in place here.

Imported foods

Finds of exotic fruits such as grape and fig in the Irish medieval archaeobotanical record are usually associated with a general increase in prosperity as well as an increasing influence from mainland Europe, including the arrival of new monastic orders such as the Cistercians (Lyons 2015, 161). Both fig and grape were recovered from the latrine deposits at Beaubec. These are unusual finds from rural Irish sites, although they are sometimes recovered from urban deposits. Grape pips become increasingly common in Irish archaeological deposits from the twelfth century onwards (McClatchie 2014, 437; Lyons 2014, 162). By the thirteenth century they are found quite widely, particularly in urban settlements; they have been found in thirteenth- and fourteenth-century deposits from Drogheda, Cork, Waterford, Dublin, Kilkenny and Cashel (Mitchell and Dickson 1985, 34; Collins 1997, 231, 233; Tierney and Hannon 1997, 889; McClatchie 2003, 396; Lyons 2015, 123, 127). It is generally assumed that these were imported fruits and that, since it would have been difficult to keep fresh fruit during a sea journey, they were imported as dried fruit. It is likely that the increased evidence for raisins is linked to evidence for a growing trade associated with other grape products, especially wine, which in turn is often linked to the influence of European monastic orders in the medieval period (Lyons 2015, 161). Fragments of Saintonge pottery were also recovered from Beaubec (Chapter 7) and this is also an indicator of the existence of a wine trade network that connected Beaubec to France, where its motherhouse was located.

Similar to grapes, there is evidence for figs in Ireland from around the twelfth century onwards (McClatchie 2014, 437; Lyons 2014, 251, table 6.2.2; McClatchie 2003, 394; Mitchell 1987, 25; Collins 1997, 229–30; Johnston 2020; Tierney and Hannon 1997, 889; Lyons 2015, 162). All of the fig seeds from Irish deposits were probably from imported fruit. Fig fertilisation is a complex process and relies on the presence of the female fig wasp (Machado *et al.* 2005, 6558), a species not found in Ireland. This means that although fig fruits can be grown in certain favourable conditions in Ireland, these fruits will not produce seeds. Fig seeds on Irish sites must have been from imported fruits (Dickson and Dickson 1996, 628–30). Because of this, it is likely that figs were quite expensive. Documentary evidence from England suggests that they cost the equivalent of a day's labour *c*.1300 (Greig 1982, 50), making fig seeds an indicator of affluence, their occurrence coinciding with periods of economic prosperity (McClatchie 2003, 401).

Other *potential* evidence for imported foods comes from the assemblage of charred pulses. Many of the peas found in the deposit from **V**(7)/**V**(10) were unusually large, bigger than the normal expected size for peas from Irish fields in this period. This suggests the possibility that these items were imported. We know from the waterlogged remains that imported fruits such as grape and fig were consumed at the site; it is possible that peas and beans, which are easily dried and transported, may also have been imported). Historical records indicate that the Beaubec grange exported items to related monastic foundations, including wool and sheep skins taken to the motherhouse in Normandy in 1271 (Chapter 2). In the early fourteenth century the grange was assigned to the abbey of Furness in Lancashire and from that period until the early fifteenth century it seems that crops (particularly grain) were often taken from Irish granges to feed Furness (Chapter 2). The trade routes that carried exported goods away from Beaubec certainly existed and it follows that some goods may have travelled in the opposite direction. Whether these items included peas remains a point of conjecture,

but analysis of stable isotopes from the Beaubec peas may clarify this in the future.

Environment and ecology

Limited evidence for the local environment is hinted at by the waterlogged seeds from the deposits within the moat (see above). Weed seeds were also found amongst the charred grains and were particularly prevalent (>50 weed seeds counted) in twelve samples, including dispersed deposits of charred material (Sample S12), from the kiln and the surrounding area (Samples S37, S40, S47 and S95), within the service tower (Sample S63), the layer of burning over the flagged floor (Samples S69 and S96), an area of burning in **V**(5) (Sample S76), and a charcoal-rich area near the collapsed wall near the service tower (Sample S81). The most common type of weed seed was sheeps' sorrel, found in all of the rich weed assemblages. This is a very common plant that grows in grassland and cultivated soil (with a preference for acidic sandy soils). Sedges were also found in six of the richest weed seed assemblages (from Samples S12, S37, S40, S95, S63, S81), suggesting that some of the ground that was cultivated may have been damp, or that it was near to damp habitats like the moat. Other weeds, such as buttercups and knapweeds, were preserved in the waterlogged conditions of the moat and in the charred seed assemblages. It seems likely that many of the crops processed in the kiln and stored in the barn at Beaubec did not travel far but were cultivated in the fields in the immediate area around the grange. Other common seeds included plants that are commonly interpreted as crop weeds, such as wild radish and corn marigold. It is likely that these plants were harvested accidentally and brought to site along with the grain. Their presence indicates that the cultivated fields around the grange would have looked quite different from the fields of today, more colourful and varied, in the absence of modern weed control methods (Pl. 15.4).

Conclusion

Situated near the mouth of the Boyne, Beaubec grange could take advantage of trade routes out of Ireland by sea. We know from historical accounts that surplus from the grange was likely sold in markets nearby as well as being exported, initially to De Bello Becco in Normandy, and subsequently to Furness in England. The archaeobotanical record indicates that wheat (most likely bread wheat) was the main crop cultivated on the farm and at least some of this was grown for market and for export. The archaeobotanical record also provides evidence that trade operated in both directions since luxury imported food stuffs such as fig and grape were found at the site. This augments the evidence from ceramic wares and artefacts, which are the traditional archaeological indicators of long-distance trade. The suggestion that peas may also have been imported is a more tentative argument, one that may be clarified by scientific investigations, such as the analysis of stable isotopes, in the future.

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Over eight hundred years ago a small community of French Cistercian monks left De Bello Becco Abbey in Normandy to establish a farm in the Boyne Valley, on lands granted to them by the Anglo-Norman Lord, Hugh de Lacy. This book discusses the results of three seasons of a research excavation on the site of this monastic farm in Bey More in Co. Meath. It traces the history of the grange and its French monastic community. The uncovered remains of their monastic residence and farm buildings are described and the architectural influences from both home and abroad are examined.

Reports from eleven specialists examine in detail the finds from the excavation, including the large environmental and faunal samples. This analysis provides an insight into Cistercian farming practices and daily life. The location of the farm near the market town and international port of Drogheda was key to its prosperity. This book is essential reading for those interested in monastic landscapes and medieval farming in the Boyne Valley. It is a further contribution to the growing body of evidence on the Cistercian estates of medieval Ireland.

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